FOURTH CONFERENCE

of

The North Eastern Economic Association

on

"AGRICULTURAL TRANSITION IN THE HILL AREAS OF THE NORTH EASTERN REGION"

September 7-8, 2001

PROCEEDINGS VOLUME

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THE NORTH EASTERN ECONOMIC ASSOCIATION

SEPTEMBER 7 – 8, 2001

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Agricultural Transition in the Hill Areas of the North Eastern Region

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Agricultural Transition in the Hill Areas of the North Eastern Region

SEPTEMBER 7 – 8, 2001

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Agricultural Transition in the Hill Areas of the North Eastern Region

SEPTEMBER 7 – 8, 2001

PROGRAMME

INAUGURAL FUNCTION

September 7, 2001 (Friday)	**9:30 a.m.**
Chairperson :	Dr. (Mrs.) M. P. Rina Lyngdoh Principal, Shillong College
Welcome Song	Students of Shillong College
Welcome Address	Chairperson
Address	Shri R. Kharpor President, Governing Body Shillong College
Key Note Address	Dr. P. M. Passah Vice-President, N.E.E.A
Inaugural Address	Chief Guest, Shri E. K. Mawlong Hon'ble Chief Minister of Meghalaya
Release of the Souvenir	Hon'ble Chief Guest
Vote of Thanks	Shri B. Syiem Secretary, Organising Committee

7th SEPTEMBER 2001 (Friday) : SHILLONG COLLEGE, SHILLONG- 793 003
11.00 a.m.

BUSINESS SESSION – I : **Status of Jhum Cultivation**

Chairman : Shri. K. L. Tariang
Director of Soil Conservation, Meghalaya

Dr. (Ms.) M. Dasgupta, Honorary Associate, Centre for Urban Economic Studies Department of Economics, University of Calcutta

Dr. N. M. Singh, Department of Economics, Manipur University

Shri P. K. Dhar, Department of Economics, Bongaigaon College, Assam

Dr. N. Roy, Department of Economics, Karimganj College, Assam

Dr. S. Borbora and Shri R. Mahanta, IIT, Guwahati

Shri E. Iboyaima Singh, Department of Economics, Manipur College, Manipur

Smt. P. Borthakur, Department of Economics, C.K.B Commerce College, Guwahati

2.00 p.m.

BUSINESS SESSION – II : **New Trends in Cropping Pattern**

Chairman : Dr. N. Srivastava
Professor of Economics
N.E.H.U. Shillong

Smt. T. B. M. Lynser, Department of Agriculture, Shillong.

Dr. Jagadish Kalita, Department of Economics, Barama College, Nalbari, Assam.

Dr. S. Islam, Department of Economics, K. C. Das Commerce College, Guwahati

Shri S. B. Singh, Indian Council of Agricultural Research. Meghalaya.

Smt. P. Priyadarshini, Arunachal University, Arunachal Pradesh.

8th SEPTEMBER 2001 (Saturday) : **SHILLONG COLLEGE, SHILLONG – 793003**
10. 00 a.m.

BUSINESS SESSION – III	:	**Dairy and Animal Husbandry**

Chairman : **Shri B. Singh, IFS**
Principal Chief Conservator of Forests,
Govt. of Meghalaya

Dr. J. S. Jyrwa, Department of Veterinary, Meghalaya

Dr. B. Plain, Department of Veterinary, Meghalaya

Dr. W. Lato, Regional Cross Breed and Cattle Breeding Project,
Kyrdemkulai, Meghalaya

1.00 p.m.

BUSINESS SESSION – IV	:	**Horticulture and Plantation Crops**

Chairman : **Dr. N. Mohendro Singh**
Professor of Economics
Manipur University, Imphal, Manipur

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Shillong College, Shillong

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Assam, Guwahati

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Shri D. Nath, Goalpara College, Goalpara, Assam

Dr. H. Bareh Ngapkynta, Ex – Professor, NEHU

Smt. A. Mahanta, Darrang College, Tezpur, Assam

VALEDICTORY FUNCTION

Chairperson:	Dr. (Mrs.) M. P. Rina Lyngdoh Principal, Shillong College & President, Organising Committee
Valedictory Address	Shri P. J. Bazeley, I.A.S Principal Secretary Government of Meghalaya.
Chief Guest's Address	Shri A. H. Scott Lyngdoh Hon'ble Minister of Finance Etc., Government of Meghalaya.
NEEA Vice President's Remarks	Dr. N. Mohendro Singh

Observations by Participants

Convener's Remarks

VOTE OF THANKS

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Vice - Chancellor

22nd January, 2002

FOREWORD

The Fourth Conference of North Eastern Economic Association debated issues which are of vital importance to the economic and social life of the people of North East India. The focus of the Conference was on issues relating to agriculture, which is the basic economic activity of our people. This, obviously, is also a primary determinant of their social and cultural life. The juxtaposition of traditional agricultural practises and the introduction of modern methods and technical knowledge as well as radical changes brought about by larger economic dynamics of the country and indeed of the world generates problems that must be addressed with utmost seriousness.

The papers brought together in this volume were originally presented in the Conference and they draw our attention sharply to these problems. I have no doubt that the volume will be an important contribution to the understanding of the human predicament of the North East today.

Mrinal Miri

(Mrinal Miri)

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ABOUT THE ASSOCIATION

The North Eastern Economics Association (NEEA), a non-political, non-partisan, voluntary regional economic association with a national perspective, was formed on 19th February, 1997 with headquarters at Guwahati. The Association has been registered under Societies Registration Act XII of 1860.

The main objective of the Association includes :

a. Undertaking, coordinating, promoting and collaborating in the study of socio-economic problems and issues with emphasis on the North Eastern Region of the country.
b. Providing a common platform for interaction of ideas and exchange of experiences, and
c. Contributing towards promoting of an atmosphere conducive to research.

These objects are sought to be achieved by :

a. Undertaking, organizing, collaborating and coordinating studies/researches in socio-economic problems and issues.
b. Holding periodic conferences, seminars, symposia, discussions etc. in different parts of the Region.
c. Publishing books, reports, booklets, monographs, papers or summaries of papers, either separately or collectively, in a periodical which may be issued under the auspices of the Association.
d. Cooperating and collaborating with other institutions/bodies having similar objects.
e. Taking all such lawful steps as are incidental, necessary and conducive for the attainment of the aforesaid objects.

Persons/Institutions interested in the study of socio-economic problems and issues subscribing to the objectives of the Association are eligible to apply for membership. At present there are 200 members of the Association of which 160 are life (including founder) members. Two of our life members, Dr. Nanda Kumar Dey of Dibrugarh University and Mrs. Renu Saikia of Guwahati Commerce College are no more amidst us. There are members from each of the seven States of North East and also from other States of the Country like West Bengal, New Delhi and Andhra Pradesh belonging to various disciplines over and above Economics such as Statistics, Political Science, Commerce, Education, Education, History, Geography, Home Science and even Medicine.

The activities of the Association is managed by an Executive Committee of 7 office members and 16 members. The Association has so far organized three Conferences. The First Conference was held during April 8-9, 1998 at Guwahati on the theme "Development policies and Development Experience in the North East". The Second Conference on the theme "Economy of the North East beyond 2000" held during February 10-12, 1999 was hosted by Margherita College, Margherita. The Third Conference hosted by Manipur College, Imphal was held during December 18-19, 1999. The theme of the Conference was "Resource Mobilisation in the North East. The Fourth Conference held during September 7-8, 2001 was organized by Shillong College, Shillong and the theme chosen for the Conference was *Agricultural Transition in the Hill Areas of North East India.*

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CHAIRPERSON'S ADDRESS

Dr. (Mrs.) M. P. R. Lyngdoh
Principal, Shillong College
President, Organising Committee

On behalf of the Shillong College fraternity and the North Eastern Economic Association, we would like to extend our warm welcome to the Honourable Chief Guest, Shri E. K. Mawlong, Chief Minister of Meghalaya, who has kindly consented to be with us today to grace the inaugural session of the Conference on "Agricultural Transition in the Hill Areas of the North Eastern Region", in spite of the stress and strain arising out of the situation in the state. We also welcome Shri K. L Tariang, Director, Soil and Water Conservation, and other members of the Governing Body. Our heartiest welcome to all our resource persons, delegates, participants, representatives from the various departments and organizations, and all our distinguished guests, friends, ladies and gentlemen.

The two day Conference is being attended by delegates from the North Eastern Economic Association, scholars and experts from different departments. Their presence will enable us to identify problems related to agriculture in the region and give solution for the progress and development of agriculture which is the mainstay of the country's economy in general and the North Eastern Region in particular. As we are aware, agriculture is the most important sector of the national economy, about 70% of the total population of the country lives in rural areas and depends on agriculture alone. When we talk of rural development , it is linked with agriculture development. Therefore, there is a need to improve the socio-economic life of rural people through modernization of agriculture and allied activities and proper marketing facilities so that the real benefit goes directly to them. The Integrated Rural Development Programme introduced by the Government is one step to help the rural poor and is linked with agriculture and other activities. There must be a uniform development in the rural sector. In the North Eastern Region, 75 to 80% of the people depend on agriculture and reside in rural areas still practicing primitive methods of agriculture. In this Conference, some sub-themes have been identified to be discussed during the different sessions. There are (1) Status of jhum cultivation (2) New trends in cropping patterns (3) Prospects and problems of plantation and Horticulture (4) Land-tenure system and land relations (5) Dairy farming and animal rearing (6) Geographical specific farming in the hill. These sub-themes will be able to cover the different aspects of agriculture, their problems and remedies.

The usual complaints that we hear from the farmers are the non-availability of seeds and fertilizer, lack of proper marketing facilities and the unorganised small farmers are being exploited by middlemen and traders. Majority of the people in the North Eastern Region live in the rural areas in villages and scattered homesteads. The geographical condition of the region is hilly and sloppy and most of the villages are difficult to access and there are problems of transport and communications and marketing of their products except through local village market. To improve their lot, strategies have to be evolved. Scientists and experts are to involve in rural development through different training programmes and village adoption schemes. The most prevalent form of agriculture in the region is the old method of cultivation or jhumming. Therefore, there is a need for application of suitable scientific Technology under the existing jhumming system of agriculture.

The country as a whole has to tackle the problems of poverty, illiteracy, unemployment, regional imbalances and other social and economic problems to usher in an era of progress and prosperity of the nation in the 21st century.

I am confident that the deliberations during the different sessions will focus on the various problems pertaining to agriculture and offer specific suggestions for improvement of the agrarian sector in the region. I wish the delegates coming from outside the state a pleasant stay in Shillong and I am hopeful that you will have a very fruitful deliberation.

Thank you
Khublei, Jaihind

KEY – NOTE ADDRESS

AGRICULTURAL SECTOR : GROWTH AND DIVERSIFICATION

Dr. P. M. Passah
Vice-President, NEEA

The Agriculture Sector is generally the largest and the most important sector of most underdeveloped and developing economies like India. Not less than 70 percent of the population in each of these countries depends upon agriculture and even those who are not wholly dependent upon agriculture are associated to it in more than one way through trade in agricultural products, through work in agro-based industries, etc. But this sector is also the most backward. Collin Clack attributes the cause of this backwardness and underdevelopment to the high density of agricultural population with low agricultural productivity. But it must be realised that immense improvements are possible in agricultural productivity in most parts of the world. What is needed is education and technological knowledge and of course, capital. But this address would not be confined directly to these requirements. It will only give a quick bird's eye view of the growth and diversification of the agrarian economy.

AGRICULTURAL GROWTH

With regard to agricultural growth, we will only look at the output of foodgrains vis-à-vis food security. Despite the fact that there is enough cultivable land in the world to feed the existing population based on Collin Clark's analysis[1] and despite substantial increase in food production in the last two decades, there are over 800 million people in poor countries who go to bed hungry everyday. We heard of starvation deaths even today in North Korea, Indonesia, Bangladesh and even India. The prediction of the International Food Policy that the developing countries may face a crisis in the near future because of declining trend in agriculture, may come true. In fact, the situation has been quite grim in Africa and South America which have been facing acute food crisis due to high population growth. According to the Food and Agricultural Organisation(FAO) projections, the number of undernourished may decline to 575 million in 2015 and 400 million in 2030. One is, however, reminded of the Rome Declaration of the World Food Summit which called for reducing the number of the undernourished to half by the year 2015.

The Indian Scene

Based on established nutrition norms, India needs around 260 million tonnes of foodgrains to feed its present population of more than one billion. Thus the present food output of around 210 million tonnes is not enough to feed an ever-increasing population if the entire half-fed population is fully provided. The population rise has, in fact, nullified the benefits of higher production and has been posing a threat to food security. According to statistics, there are more than 250 million people in India considered to be food-insecure and almost half of the women in the 15-49 age group and three-fourths of the children are anaemic.

It is indeed anomalous to speak of food insecurity and the need to increase food production at a time when there is surplus foodstock in the country's godowns whose value is estimated at Rs.50,000 crore[2]. It is a great paradox of surplus foodgrains and hungry stomachs. The United Nations Fund for Population Activities (UNFPA) in its recent report has confirmed that millions of the rural poor in India are not adequately fed despite the sizeable gains achieved in agricultural productivity after the Green Revolution. The rural poor are being denied their daily full quantum of energy requirement in contrast to the rapid rise in urban prosperity. Thus, adequate steps have to be taken on the agricultural sector along with properly designed poverty alleviation programmes so as to guarantee food security to the rural poor. It has been admitted at the highest level, that there is a system failure on the food front for the poor notwithstanding the strong and well-manned Public Distribution system (PDS) in place. This has to happen because

not enough attention has been paid to storage, preservation, processing, and proper distribution of food in the country leading to enormous quantities of foodgrains lying waste in various godowns throughout the country

Procurement, Storage and Distribution

The main reason responsible for the wastage of foodgrains and other food items is the absence of adequate storage, post-harvest and processing facilities. Added to this is the failure to replace the old and outdated policies adopted earlier for the procurement, movement and stocking of farm produce when India was still suffering from scarcities of food supply. This failure has resulted into serious administrative and fiscal lapses both for the Union Government and the States. It is high time that new policies should be evolved and adopted for the interest of the farmer, the consumer and the Government. The first and foremost step should be, to have a fresh look at the Essential Commodities Act 1995 and to restructure the Food Corporation of India with a view to decentralize the system of procurement and distribution of foodgrains and ensure the availability of food to all the genuine poor beneficiaries who are Below Poverty Line (BPL).

Productivity Improvement

There are challenges facing India now with the liberalization of world trade in agriculture under the World Trade Organization (WTO) trade regime. Agriculture is one of the areas in which India has an inherent strength to dominate the global market. But the country cannot effectively address this issue without urgently removing the many bottlenecks in its own food management. A major challenge before India is to reduce costs and raise the productivity and quality of agricultural produce to global standards.

In the long run, productivity increase has to be seriously considered as the possibilities of expansion of farm area are minimal except the region stretching from Eastern Uttar Pradesh to Assam. In the rest of the country where an expansion is an impossibility, future increases in production have to come essentially through major improvements in productivity. For these improvements to take place, there is need to remove the obvious constraints comprising:

1. Scarcity of Power,
2. Inadequate Irrigation Facilities and
3. Poor Rural Infrastructure.

The removal of these constraints should be followed by:

1. A significant increase in Science and Technology Inputs,
2. Improved Extension Services and
3. Raising the Educational Levels of the farmers.

I have referred to the importance of capital formation in agricultural productivity. It is very disheartening to observe that Indian Agriculture is starved of capital and, in recent times, both public and private investments in agriculture have been going down. This calls for the need on the part of the Union and State governments to prudently utilise the available limited resources more prudently and efficiently especially for capital formation. This should be invariably supplemented by the attractive Government policies to encourage private investment in agriculture especially in extension services.

AGRICULTURAL DIVERSIFICATION

It must be the aim of agricultural development to diversify the rural economy. The development of activities allied to agriculture would tremendously contribute to the diversification of agriculture. There is also the need to develop rural industries based on agricultural outputs. The diversification would not only lead to higher incomes and employment of the rural population but would also result into even self-sufficiency and exportable surplus of agricultural

produce. I would only like to talk briefly on Crop Diversification and Rural Infrastructure.

Crop diversification

The strategy in India has been to raise foodgrains confining to two crops only, namely, wheat and rice, leaving aside other cereals and crops, the production of which remains stagnant for the last many years. India would do well to change its strategy in crop diversification to attain self-sufficiency in many items of agriculture produce.

But I would like to refer straightaway to one attractive area of diversification i.e., Horticulture. The Union Government has recently mooted a Technology Mission for Integrated Development of Horticulture in North Eastern Region. The Region is very fortunate and its people are expected to take full advantage of the Mission's Programmes right from the start. If the goals of the Mission are achieved at every stage, there is no doubt that the North Eastern Region would convert itself into a National granary of horticulture produce with the potential to export these produce to other states in the country and abroad.

I have referred to the region stretching from Eastern Uttar Pradesh to Assam which has the potential of productivity increase if some more effort and use of nutrients are adopted. Assam is already poised with the possibility to generate surplus foodgrains. The one lakh shallow tube wells scheme under the Samariddha Kishak Yojana (SKY) implemented by the state, has almost revolutionised the production of rice expected to break all past records with the farmers facing the problem of lack of space for storage. With the brightening scenario of Assam in foodcrop production, the Hills States surrounding it can go all out for horticultural development.

Rural Infrastructure

The entire rural infrastructure has to be refurbished to make rural activities viable. The Union Government has an ambitious plan to achieve Universal Rural Connectivity before 2007 through the National Rural Road Project. Besides rural transport facilities, minor irrigation works are to be built through public sector investment. Both these components of infrastructure will help the exploitation of waste and fallow lands accounting for more than 60 percent of the cultivable land in the country. The increase in productivity could be achieved even in less fertile regions through better irrigation facilities, access to farm inputs and storage facilities. The Food for Work Programmes if intensified, would not only help in better food distribution but also in creation of durable rural assets.

I am sure we are all aware that the Union Government has recently created a corpus fund known as the Rural Infrastructure Development Fund (RIDF) with an initial amount of Rs.2,000 crore. The RIDF has now grown to a massive Rs.23,000 crore. The fund is to be utilised for building of roads, bridges, communication, irrigation, drinking water supply, flood control, health, education, etc. These are the basic needs of the rural areas and the N.E. Region comprising mostly of rural areas would stand to benefit if the IRDF is fully implemented.

But there has been very poor disbursement to the N.E. states from this fund. This has happened despite the Ministry of Finance, Home and NABARD holding several meetings with State Governments of the Region to prepare necessary Project Reports for utilizing the RIDF. It is very disheartening to know that the N.E. States have failed to draw or utilise funds from RIDF.

CONCLUSION

Both agricultural diversification and building of rural infrastructure would create demands in rural areas for more specialised agro-processing, more sophisticated trading and repair services and more professional education, health and personal services. They would also mitigate the excessive rural-urban migration that has been witnessed by the slums and shanty towns in various cities. A prosperous agriculture is therefore the only determining factor for jobs

for the rural poor.

The North Eastern Economic Association has done well by selecting the most pertinent Theme for discussion in its IVth Annual Conference-cum-Seminar being held here today and tomorrow. I look forward to a very fruitful discussion of the various aspects of the Theme namely, *Agricultural Transition in the Hills Areas of North Eastern Region*. I am sure the findings and recommendations of the Seminar would attract the attention of the Governments of the North Eastern States and their planners and policy makers. The six areas which the Association has proposed to discuss are very much relevant to each state. While the Economic Reform Policy of the country has been directed toward Liberalisation, Privatisation and Globalisation, the Public Sector has still to play a leading role in accelerating the pace of development in the North Eastern Region. And, for this to happen, a responsive Government has to keep in mind the welfare of the masses.

Thank you.

References:

1. Collin Clark's Paper in A. N. Agarwal and S. P. Singh (ed.) *The Economics of Underdevelopment.*
2. Quoted from the Prime Minister's Speech at the Conference of Chief Ministers on *WTO and Agriculture and Food Management*, held in New Delhi on May 21, 2001.
3. United Nations Fund for Population Activities Report 1999.

INAUGURAL ADDRESS

SHRI E. K. MAWLONG
Chief Minister of Meghalaya

It gives me great pleasure to be present here this morning at the Inaugural Function of this two-day Conference on "Agricultural Transition in the Hill Areas of the North Eastern Region" organised by the Shillong College in collaboration with the North Eastern Economic Association, Guwahati and I heartily congratulate Shillong college for taking the initiative to hold a Conference of this magnitude and stature on an important theme that concerns both the intelligentsia and the common people. I do hope that the deliberations through the various sessions will suggest measures to bring about rapid agricultural development in the hill areas of the Region.

The North Eastern Region is renowned for its rich bio-diversity and possesses rare species of flora and fauna. This region is also home to a wide diversity of common food crops including cereals, vegetables, ground spices, cotton, jute, mandarin oranges and other citrus fruits. The genetic variability of tropical, sub-tropical, temperate fruits and of many other crops and plants including ornamental, medicinal and aromatic plants, cane and bamboo is also large in the Region. These contribute considerably to the production of improved varieties of food crops but they also represent untapped opportunities for commercial exploitation.

The Region especially in the hilly areas is dominated by tribal communities, which are small, close-knit and generally comprising several clans, with little social stratification within the community. Strong feelings of community prevail at the clan and village level and are manifested in community cooperation in social and economic pursuits. However, the tribal economy is characterised by a lack of specialisation in production as each family produces or gathers almost everything that is required for day-to-day needs. Shifting cultivation, which is commonly known as 'Jhum' remains the mainstay to their livelihood. It is a very old system of agriculture practice with the people shifting their fields in cyclic rotation after cropping for two years, after which the land is left fallow for many years. This fallow period earlier used to be 15 to 20 years, but because of pressure of land and population, the jhum cycle is now reduced to 5-6 years or even less. This system of crop cultivation has contributed to a large extent on wanton destruction and deforestation of natural forests leading to progressive degradation of land and water resources.

It is heartening to know that over these years, the government agencies in the region have made sincere efforts to combat this destructive agricultural practice of Shifting Cultivation in order to preserve and improve the ecology and the environment. A number of development schemes have also been implemented to provide an effective support base for permanent settlement of the jhum families. Though these efforts have not completely weaned away the people from jhum cultivation, it is evident that agricultural transition has taken place towards settled agriculture using the improved and modern techniques of cultivation. I trust that this Conference of eminent scholars and experts of related fields will come forward with more concrete suggestions on this vital aspect so that the government agencies and people's organizations can look forward towards their implementation.

In bringing about Agricultural Transition in the Hill Areas of the North Eastern Region, it is also important to understand the local farmer's circumstances and the local farming system. Though tribal farmers have never attended any institution or university, yet they have a vast and extraordinary sound knowledge about plant and soil qualities. They know exactly when to plant, and how to plant in the right season to reap rich harvest. We see in Jaintia Hills district of Meghalaya the "Bamboo drip irrigation" system in which betel leaf crop planted with areca nut is irrigated with water tricking down from bamboo pipes. Therefore, the agricultural farming systems suitable for the hills should be worked out through a combination of the various systems in an integrated approached. These systems strengthened with subsidiary sources of income through animal husbandry or fishery provide opportunities for optimum realization of the potential that exists in the hills areas.

I am glad that the government intends to observe the year of the farmer from September 2001 to August 2002 to prove our commitment and priority to the farming sector, and I think this Conference has come at an appropriate time. I wish this Conference a grand success and I am confident that with joint efforts, the overall productivity in the region will rise to higher levels to keep pace with that of other areas in the country.

I now declare the two day Conference on "Agricultural Transition in the Hill Areas of the North Eastern Region" open.

VOTE OF THANKS AT THE INAUGURAL FUNCTION

Shri B. Syiem
Secretary
Organising Committee

It is a great pleasure for me to stand here amidst this august gathering to offer my sincere thanks to all the members present in this Inaugural Function of the Fourth Annual Conference of the North Eastern Economic Association on " Agricultural Transition in the Hill Areas of the North Eastern Region ".

I stand here on behalf of the Organizing Committee to express my deep regards to Shri E. K. Mawlong, Hon'ble Chief Minister of Meghalaya who has kindly consented to be the Chief Guest and to inaugurate the Conference. Thank you Sir. for your kind presence. We've really feel inspired and encouraged to see you here and for the enlightening speech that you have just delivered.

We are also grateful to Dr. P. M. Passah, Vice- President of North Eastern Economic Association who has taken the trouble to prepare the Key Note Address. Dr. Passah has rightly pointed out on the need to diversify the rural economy and to build up the rural infrastructure for ensuring an enhanced job opportunities and to mitigate the rural urban migration thereby promoting the balanced development of the region.Thank you very much Sir.

I would also like to thank Dr.(Mrs) K. Lyngdoh, Pro-Vice Chancellor, North Eastern Hill University, Shri W. L. Lyngdoh, I.A.S., Director, Community and Rural Development and Shri K. L. Tariang, Director, Soil and Water Conservation who inspite of their busy schedule, could find time to be here amongst us.

We are thankful to the various departments, institutions and individuals who have sponsored this Conference and all its requirements without which this function could not have been possible.These sponsoring agencies are Planning Department, Government of Meghalaya, North Eastern Council, National Bank for Agriculture and Rural Development. Indian Overseas Bank, State Bank of India, Ka Bank Nongkyndong Ri Khasi Jaintia, Meghalaya Co-operative Apex Bank, Rapsang Group of Industries, Shri Victor Kharkongor, Community and Rural Development, Govt of Meghalaya and a few others.

My sincere thanks also goes to all the delegates, resourse persons, invitees and distinguished guests for their kind presence making this function a grand success.

Our thanks goes to the Directorate of Information and Public Relations for giving us the public address system without which it will not be possible to hold this function.

Lastly, I shall be failing in my duty if I do not mention the names of the President and members of the Governing Body of the College, the Principal, teaching and non-teaching staff and the Students' Union and all its members for offering their invaluable help and support making this Conference a success.

Once again I offer my sincere thanks to all the distinguished guests, invitees, delegates and the members present in this Inaugural Function.

Thank you.

VALEDICTORY ADDRESS

Shri P.J.Bazeley,IAS
Principal Secretary to the Government of Meghalaya,
Planning & Finance Departments

Madame Chairperson Dr.(Mrs) M.P.R.Lyngdoh, Principal, Shillong College; the Hon'ble Chief Guest Shri A.H.Scott Lyngdoh, Finance Minister, Meghalaya; Distinguished Fraternities of Shillong College and the North Eastern Economic Association; Learned Participants; Ladies and Gentlemen –

It gives me immense pleasure to associate myself with the Seminar on 'Agricultural Transition in North East India'. I am indebted, indeed, to the Distinguished Organisers for their very kind invitation and opportunity to share a few thoughts on this vital aspect of our regional economy.

Today, we stand at the dawn of a new Century of hope and promise. It is therefore appropriate for you to have spent the last two days in introspective deliberation on the extent of transition of agriculture in our region. The Twentieth Century witnessed unparalleled transition of the social, economic, political and scientific milieu of mankind. In a sense, the world emerged from a 'world of want and drudgery' to a 'world of plenty and ease'. Nevertheless, the majority of fellowmen in the developing world in general, and South East Asian Uplands including the Uplands of North East India in particular, continue to be largely dependant on primordial agriculture for their survival. May I therefore, sincerely felicitate the Shillong College and the North Eastern Economic Association for having chosen the 'Agricultural Transition of the North East' as the focus of this Seminar.

At the commencement of the twentieth century, 'Jhumming' or the 'slash-and-burn method of cultivation' characterised the bulk of agriculture in the uplands of the North Eastern Region. The dense foliage covering the uplands of the region, enabled jhumming to be carried out on the same piece of land for two to three years. Limited population enabled jhummias to move to virgin unjhummed areas, every third or fourth year. The jhum-cycle thus covered a fifteen to twenty year period, enabling once-jhummed areas to regenerate enough vegetative growth to sustain fertility for the next round of jhum cultivation. Available records reveal that jhum cultivation had, by then, degraded not more than ten per cent of the region's vegetation and landmass, and yielded a productivity of around one metric tonne of foodgrains, mainly paddy, per hectare.

Fifty years later, at the time of disintegration of the British Empire and the emergence of our country as a soverign, socialist, democratic republic, our population had multiplied, the jhum cycle had reduced to a ten to fifteen year period, the same piece of jhum land could not be cultivated for more than two years at a stretch, and jhum cultivation had by now degraded about fifteen per cent of the region's vegetation and land mass. It's yield had reduced to 0.6 to 0.7 metric tonnes, per hectare. The National and Provincial Governments, rightly accorded high priority to a new Jhum-Control Programme and a large number of Schemes were launched to wean away Jhummias to sustainable and permanent methods of cultivation.

Under National and Provincial patronage, the National, Regional and State Research Organisations and Centres including the Indian Council of Agricultural Research, more particularly its' North Eastern Regional Complex laboured extensively to discover and develop suitable technologies for improved sustainable dry-farming in upland areas. Over the last five decades, these Organisations and their research efforts registered some success, but alas, their achievements largely remain confined within their own hallowed portals, since the much required mass transference of technology is yet to take place. Development of improved local robust methods for sustainable regeneration of dry upland agriculture seems to be the only alternative. Our Institutions of Agricultural Research and Excellence and the State Organisations are yet to cut the Gordian-Knot and make sustainable upland dry-farming a reality. We can only hope and wish that the on-going efforts of the ICAR and the Regional and State Research Authorities will soon be able to accomplish this difficult task.

In the meantime, available regional records reveal that the closing years of the twentieth century witnessed a reduced jhum-cycle of six to eight years, with twenty-five to thirty per cent of its ' land mass having been degraded by jhum-cultivation. The productivity of jhum lands has also fallen to less than half a metric tonnes per hectare. Significantly, five decades of national and provincial effort have succeeded in checking further increase in the number of Jhummia-housecholds in the region, but the number has remained more or less constant. For example, in Meghalaya the number of jhummia families have remained at slightly over fifty thousand, over the last five decades, but over twenty-five per cent of our land-mass have been degraded by jhumming.

All said and done, jhumming, however unsustainable, is a way of life of our region's indigenous upland people. Unfortunately, our efforts to transform and improve jhumming have not made the required headway. It is therefore necessary to improve existing robust cultivational methodologies with improved and sustainable technologies, to transform weaknesses into strengths and challenges into opportunities. Unless this happens, agricultural transition will continue to allude the uplands of the north-eastern region.

Today, the craze, everywhere, is for 'natural or health foods', which are essentially grown organically without the use of inorganic fertilisers. For rice-eaters the world over, who can afford, scientifically packed 'ORGANIC RICE' is the craze. It is understood that the total world production of 'organic rice', mostly in neighbouring Thailand, does not exceed ten thousand metric tonnes, annually. The retail international price of organic rice – many times the price of the famed 'Basmati' rice - is around forty US Dollars per kilogram. Truly, a low productivity but high value commodity.

It is in this context, that we need to look inward into our so called agricultural 'weaknesses' or ' challenges'. Our jhum rice, *Meghalaya produces over thirty thousand metric tonnes per year, North East India cumulatively produces over a hundred thousand metric tonnes, per year,* is essentially grown on organic fertilisers obtained from the open incineration of cut and dried green foliage. Our jhum rice and other jhum produce are the products of a primitive agricultural process, free from contact with inorganic fertilisers, of any sort. *Can our Agricultural Scientists determine the organic status or otherwise of our jhum produce, particularly jhum-rice ?* If found to be organic, can we put in place a globally creditable and acceptable phyto-certification authority to authenticate the organic status of our jhum-rice and other jhum-produce? If found otherwise, can our Agricultural Scientists evolve agricultural technologies and methodologies to stabilise and sanitise dry-upland farming or jhumming, to ensure that its' produce are 'natural' or 'organic'. Once done, our primordial method of jhumming, if stabilised, will emerge as a tremendous agricultural strength and transform the agricultural economy of the uplands of our region. We would have capitalised on 'a weakness'. We would have overcome 'a challenge'. A true transition of our upland agriculture would have occurred.

At this point, it is worth to note that we have sought to bring about similar transition in other sectors of Agriculture, too. Our tea-growers have experimented with cultivation of organic tea. Their produce is being exported to Australia with good rate of returns. Similarly, our local off-season vegetables and mushrooms, mostly grown on organic fertilisers, fetch a much higher unit rate in the local markets than similar vegetables grown inorganically and brought into the State, from other places, for retail sale.

Any discussion on the transition of agriculture in the North Eastern Region will be incomplete without bringing out the significant changes that have occurred in our low or wet-land agriculture, during the last fifty years. Traditional perennial agriculture has given way to irrigated agriculture. Around one-half of the region's irrigable lands have already been irrigated. Mono-cropping has to a considerable extent been replaced with multiple cropping. The use of fertilisers and pesticides have been popularised and the region's per hectare consumption of these inputs have crossed the half-way point of the all-India average level of consumption.

In our efforts to transform Agriculture in Meghalaya, we encouraged the cultivation of off-season vegetable during the late eighties and early nineties. Today, we produce over two-and-a-half lakh tonnes of off-season vegetables, each year.

Similarly, we popularised the cultivation of maize and tomatoes, ginger and turmeric. Today, we have considerable marketable surpluses of these products, exceeding a hundred thousand metric tonnes.

The North East Uplands have tremendous horticultural potential. At our instance, the Central Government, recently, formulated and launched the 'Horticulture Technology Mission for North East India'. This Mission will, if properly implemented, considerably transform the agricultural including horticultural macro-canvas of the region and help generate economic self-sufficiency of the masses.

Traditionally, agriculture included animal husbandry, veterinary, dairy and pisciculture. Not too long ago, these activities were patronised, developed and supervised by a single department of the Central, as well as, the State Government. Likewise, most agriculturist, more particularly the upland agriculturist of the North Eastern Region continue to practice a bunch of agrarian activities which include agriculture, animal husbandry, dairy and pisciculture. However, inspite of it's rich potential for all types of agrarian activity, the region is yet to experience an agricultural transition of any sort, in so far as these activities are concerned. One can safely infer that there has been little or scarce transition in our understanding and exploitation of these time-tested and time-honoured household activities, over the last fifty years.

It is therefore, hardly surprising that much of the region's requirement of fish, eggs, poultry, dairy, pork and mutton continue to be met by imports from other regions, more particularly from Southern India. Consequently, it is necessary for Opinion leaders of our Upland Society, Research Scholars and Scientists, Policy Planners and Administrators to get together to resolve existing hurdles and problems leading to the present impasse. We need to more fully tap and exploit our agricultural potential, to generate employment and resources for the accelerated economic emancipation of our poor, more particularly, our upland poor.

Yet another grey area on the agricultural canvas of the Uplands of the North Eastern Region, relates to land holdings. In the past, much of upland agriculture was carried out on family owned or on village or community allocated lands, to which the cultivators had free and unquestioned access for such times as they chose to cultivate same. Unfortunately, the construction of an expansive road-network has opened up hitherto inaccessible rural areas, more particularly agricultural areas. This accessibility has enabled, town and city dwellers to have easy access to the rural areas with their new found town and city-based wealth. The inevitable has happened and ownership of increasingly large tracts of cultivable agricultural lands has passed, through sale and purchase of such lands, to town and city dwellers, reducing the erstwhile cultivators to the status of share-croppers. This in turn has resulted in the loss of will and capacity among the actual cultivators to invest to improve the quality, the technology and the methodology of agriculture.

Such transition in the pattern of land ownership has adversely affected the standard and sustainability of agriculture in many areas of the region. The erstwhile concept of 'zamindari' appears to have returned through the backdoor. Consequently, it is imperative for society to consider creating better awareness of the ills of this emerging trend of absentee-landlordism and to mobilise public opinion in favour of legislation to pre-empt this socio-economic malaise.

We need also to take note that wherever a Green Revolution has taken place, the intervention of informed and educated agriculturists has played a significant role. In our own country, the phenomenal achievement of Punjab in agriculture is in no small way, the result of educated and well trained agricultural graduates and engineers returning to the rural areas, for taking up modernised and scientific agriculture as their profession. These well educated young men and women, who were adequately versed in the agricultural or life-sciences, were not interested in etching out a comfortable urban living for themselves. They did not pursue employment under government or the private sector. They preferred hands-on-living in the midst of the pristine gifts of mother nature, in the midst of their rural roots. They adopted and adapted technologies and made them harmonious with robust ground realities. The result - *mother nature responded with the blessings of abundant and plentiful harvests*, and Punjab experienced unparalleled economic resurgence. A Green Revolution had occurred.

Unfortunately, this has not been true for the Uplands of the North Eastern Region. Our young men and women who have got themselves educated in the agricultural and life-sciences have not returned to their grassroot habitat. They have got themselves adjusted in organised employment. While they contribute to the implementation, supervision and management of agricultural and life-science field programmes, they do not have a direct hands-on contribution in agriculture or life-science for their livelihood. Consequently, actual cultivation, animal and crop husbandry, dairy, pisciculture, etc., are left to the uneducated and technically untrained Uplanders, who are guided and depend on their sixth sense, rather than on systematic training and technical know-how. The result, very little transition has taken place in the agriculture of the Uplands of the region, till date.

Fortunately, the organised sector in the north eastern region, including Government and PSU's are no longer capable of absorbing qualified agricultural graduates and engineers. The time has now come when our agricultural graduates and engineers will have to seek other avenues of gainful employment. One of their options will be to return to their grassroot habitats and to take up modern, scientific agriculture, dairy, animal and crop husbandry, pisciculture et all. As and when that happens, agriculture in the north eastern region will take a major leap forward. The process of agricultural transition will attain a significant milestone and the region will be on its' way to sustainable economic growth.

Half a century ago the socio-economic setting and agricultural status of Upland China was fairly similar to that of the north eastern region, today. But that is history. The agricultural and socio-economic transition of the Upland areas of the People's Republic of China is to a very large extent due to what has come to be known as the 'Bamboo Revolution'. Much, nay all wastelands, more particularly all degraded lands of their Upland Region have been brought under scientific bamboo-cultivation and management. Bamboo is their major cash crop. In a sense it is their crop of crops. The Upland Chinese relish their bamboo cultivation, as much as any other form of agriculture. And why not ? Bamboo beginning with bamboo-shoots and ending with state-of-the-art finessed bamboo laminates reach the world over, reaping endless Dollars for the Upland Chinese, enabling them to live with dignity in the midst of whistling and bounteous nature. That is truly the revolution, every agriculturist, every cultivator, every individual can yearn for.

We in the north eastern region are surrounded by endless ranges of degraded hillsides, degraded as a consequence of jhumming. Can, we too, bring them under 'Bamboo' ?. If we succeed, we would have done it for posterity. The transition - *agricultural or cultivational* - will have arrived and a comfortable, an echo-friendly and a sustainable future ensured for the region.

May, I now leave these thoughts for the continued consideration of the galaxy of distinguished scholars and economists gathered here, this evening. May it be possible for some of these thoughts to mingle with the treasure of opinion generated at this Seminar, for ushering in an agenda for change, somewhere, someday.

I thank you all for your gracious consideration and patient hearing.

I wish the process initiated by the Seminar every success.

Thank You, Jai-Hind.

CONVENER'S REMARK

Shri B. Syiem
Secretary, Organising Committee

Madame Chairperson, Dr.(Mrs.) M.P. R. Lyngdoh, Hon'ble Finance Minister Shri A.H. Scott Lyngdoh, who is the Chief Guest of the occasion, Shri P. J.Bazely, Principal Secretary, Government of Meghalaya, Prof. M.N.Singh , all the delegates, invitees, teachers, students, ladies and gentlemen. I stand here on behalf of the Organising Committee to say a few words in this concluding session of the two day Conference on "*Agricultural Transition in the Hill Areas of the North Eastern Region*". First of all, I would like to express my sincere thanks to the North Eastern Economic Association for selecting our College as the venue thus, giving us the opportunity to organise this Fourth Annual Conference of the Association which is indeed a great and wonderful experience on our part.

Friends as you all know, agriculture is the backbone of the economy of the North Eastern Region where more than seventy percent of the population depends on it for their livelihood. Despite this fact, the region is still deficit in foodgrain production and the contribution of the agricultural sector to the Region's Domestic Product is not commensurate with the number of persons employed in it. This shows that the sector is still in a state of backwardness characterised by obsolete methods of production, undeveloped means of transport and communications and other infrastructural and social bottlenecks which pose a problem to the rapid growth and development of the Region as a whole. The country has witnessed the occurrence of the 'Green Revolution' in the late sixties which led to the increase in the production of foodgrain thereby making the country almost self-sufficient. But it is disheartening to note that, even after a gap of more than three decades, the benefits of the Green Revolution is yet to make its impact felt in the Region's economy. Therefore, in the light of the prevailing economic scenario the theme of the Conference is highly relevant and most appropriate for academic discussions as well as policy implications.

We have divided the theme into six sub-themes comprising of *(i) Status of Jhum cultivation (ii) Prospects and problems of Horticulture and Plantation crops (iii) New trends in cropping pattern (iv)Animal Husbandary (v) Land tenure and land relations and (vi) Geography specific farming*, but due to some constraints, we were able to discuss only the first four sub-themes. Altogether there were seven sessions including the Inaugural Session, Annual General Body meeting of the Association and the Valedictory Function, apart from the four business sessions.

During the two day Conference, 21 papers were presented on the above mentioned sub-themes covering in fact, all the states of the North Eastern Region. I shall now give a brief summary of the dicussion taken up, during this two day Conference. Shifting cultivation which is an age-old practice and a way of life of the hill people is an issue that was thoroughly discussed and highlighted by most participants. Though this primitive form of agriculture is associated with various evils like low productivity, deforestation, soil erosion, siltation of rivers and ecological imbalances, yet it remains to be the sole occupation of the hill people. As pointed out by some authors, though the area under jhum cultivation has increased over the years, the yield has increased only marginally. This is due to the fact that, jhumming is being carried out with the help of traditional knowledge and practices thereby leaving little scope for higher agricultural production. This state of affairs also depicts the failure of government policies and programmes announced from time to time in tackling the problem of jhum cultivation. As a solution to this problem, various suggestions were made both on a short- term as well as long-term basis. In the short run, there is a need to improve jhumming for enhancing productivity through the provision of better inputs and modern technology. But in the long-run, jhumming has to be stopped since it is not viable economically as well as otherwise. Various alternatives like horticulture, animal husbandry, tea and rubber plantations etc. has to be thought of, depending on the nature of the area concerned. Programmes like education, training, awareness and motivation have also to go side by side and in this connection the role of the NGOs has to be given priority , apart from the leading part played by the government machinery.

But most important is the provision of infrastructural facilities such as good roads and communications, irrigation, power, etc., because, without providing these services, any schemes of jhum control is bound to have a limited impact and can never be really successful.

During the last decade the hill areas of the North Eastern Region has also witnessed certain changes in the cropping pattern. Though rice is the principal food crop grown in the Region, yet of late, there has been a shift to other crops such as tea, horticulture, rubber, oilseeds etc. Such shift in cropping pattern is deemed necessary taking into account the socio-economic problems of the Region such as low productivity, unemployment and poverty. In fact, these new areas of agriculture have a vast scope of development in the region due to its natural characteristics and potentialities and can also help in restoring ecological balance which has of late been threatened due to deforestation, increasing mining and developmental activities etc.

Another area that was discussed was on Dairy and Animal Husbandry. This is also an area where there is tremendous potential for development in the North Eastern Region due to its favourable climatic conditions and the food habits of the hill people. At present, the production from livestock and poultry is quite low compared to other states in India, but the demand for meat and meat products is very high that every year a good quantity of livestock is being imported from outside the Region to meet the excess demand. Moreover, the per-capita availability of meat, eggs and milk is still below the international recommended norm. For example, in Meghalaya the daily availability of milk per head is only 75 ml as compared with the recommended requirements of 350 ml per head per- day.These facts reveal that, there is a tremendous market for these products in the region, which if properly tapped through the development of this sector will surely generate employment opportunities and at the same time lessen the pressure on demand.

The North Eastern Region is considered to be one of the most backward regions of the country even after five decades of developmental planning. However, the region is not deficient in terms of resources . It is equally endowed with natural and human resources. But owing to various constraints and bottlenecks, these resources have not yet been properly tapped, thus leaving the region is under-developed. This calls for urgent policy action by the government through various programmes of public investment with major emphasis on provision of basic infrastructural facilities.

The two day Conference on *Agricultural Transition in the Hill Areas of the North Eastern Region* has been successful in the sense that it has been able to address the basic issues confronting the agricultural sector in the region and at the same time offer concrete steps for the redressal of these problems. All the four business sessions were highly interactive.The delegates participated with a high degree of zeal and enthusiasm. Most of the papers presented were very good and of high quality. We do hope that the findings and recommendations of the Conference will be quite useful for the policy makers and planners serving as a reference in their task of formulating and implementation of the various programmes and policies of the government.

We have tried our best to organise the Conference in a befitting manner. In case of any inconveniences or shortcomings, we do apologise to you all. Our efforts will prove to be successful only if these suggestions and recommendations are accepted and put into practice by the government, institutions and individuals concerned with the development of the region's economy.

Thank you.

VOTE OF THANKS AT THE VALEDICTORY FUNCTION :

Dr. S. K. Gupta
Head Deptt.of Chemistry, Shillong College

Madame Chairperson Dr.(Mrs.) M. P. R. Lyngdoh, Hon'ble Chief Guest Shri A. H. Scott Lyngdoh, Shri P. J. Bazely, Prof. N. M. Singh, Distinguished Guests, Delegates, Participants, Ladies and Gentlemen.

On behalf of the organisers of the Conference and the North Eastern Economic Association, it is my proud priviledge to sincerely thank you all for your kind presence, patronage and co-operation towards the successful completion of our Conference on " Agricultural Transition in the Hill Areas of the North Eastern Region".

We are extremely grateful to our Chief Guest this afternoon, Shri A. H. Scott Lyngdoh, who has always been very kind to us and stood by us in any meaningful endeavour we approached with him. We owe our deep gratitude to him.

We are very grateful to Shri P. J. Bazely, Principal Secretary, Goverment of Meghalaya for his most illuminating valedictory address.

Shri P. J. Bazely was also an honorary member of our Advisory Committee in the last two National Conferences on -

1. "Development of Science and Technology in the last 50 years in India with special reference to North Eastern India" held on 27-30th May 1998.

2. "Polution, Man and Environment" held on 15th and 16th june 1999.

He has always inspired us with his active presence, valuable suggestions and most helpful guidance. We are thankful to you Sir.

We sincerely thank all our distinguished guests, Chairman of different business sessions, Resource Persons, Rapportuers and Delegates present on both the days representing various organisations of different parts of North Eastern Region without whose participation and co-operation, this Conference would not have met the success it has.

We sincerely thank Prof N. M. Singh of Manipur University and Prof. P. M. Passah, Vice-Presidents, Dr. Gopal Bordoloi, Secretary, Dr. M. P. Bezbarua, Treasurer and the executive Committee Members of the North Eastern Economic Association for giving us the responsibility of organising the Conference together with their support.

It is our duty to gratfully acknowledge that this Conference was mainly possible because of the financial and material support of Planning Department, Goverment of Meghalaya, North Eastern Council, Indian Overseas Bank, State Bank of India, Department of Community and Rural Development, Goverment of Meghalaya, National Bank for Agriculture and Rural Development, Meghalaya Co-Operative Apex Bank, Ka Bank Nongkyndong Ri Khasi Jaintia, Department of Soil and Water Conservation, Goverment of Meghalaya, Rapsang Group of Industries, Mr. Victor Kharkongor and Mr. W. Lyngdoh.We appreciate their gesture with gratitude.

We are very grateful to the Media both regional and national level, A. I. R Shillong, D. D. K, Shillong, D. I. P. R. Goverment of Meghalaya, P. C. N and others for their wide coverage of our plans, programmes and various sessions.

The Teachers, Staff and Students of Shillong College feel rewarded for their hard work and dedicated service they rendered towards making the whole excerise more successful.

The Shillong College Management as well as the Principal and Chairperson of the organising committee Dr. (Mrs.) M. P. R. Lyngdoh has been a source of constant guidance and inspiration.

Members of Shillong College Academic Society worked hard for a common cause shoulder to shoulder with others.

On behalf of the organisers, I sincerely extend my hearty thanks and gratitude to each one of you present here and others whose help and co-operation made it possible to hold this conference meaningfully and successfully.

Thank you.

ROLE OF THE MEDIA AND AGRICULTURAL TRANSITION

Shri J. B. Chakraborty,
Deputy Director (Trg)
RTI (P), AIR, Shillong

People with primitive or faulty knowledge of agriculture have special needs. They have to be properly understood and convinced. Media professionals have a special role to play while focusing attention on various issues concerning the transition of agriculture in the hilly areas of the North East. In this regard it will be interesting to note that a noted agricultural scientist. Dr. William Gaud of the United States, Department of Agriculture has come to be associated not only with the higher production through enhanced productivity but also with the several negative ecological and social consequences. Thus from this, it is clearly understood that agricultural transition has not only the positive aspects to its credit but also its minus sides if the implementation is a faulty one.

Guide Lines For Media Professionals Covering Agricultural Programmes.

- Use simple words and stress clarity and active participation.
- Farmers in the hilly region of the North East should be invited and they may be utilised in the programme.
- Radio/TV programmes should be subtitled.
- Make the main message easily available and stress repetitions with jingles in an interesting format.
- Present before the farmers their skills and achievements. Selection of both male and female farmers having wide range of interest in agricultural development through transition need to be focused.
- The farmer's field needs to be photographed with the change of technology adopted e.g. Jhumming to Terrace Rice Cultivation/ Wet Rice Cultivation, etc.
- Misconception about transition with lesser yield having less production need detailed analysis through the experts & the farmers after field trials.
- The farmers unequipped with the modern gadget or inputs need not be related with the productivity.
- Farmers with inadequate use of agricultural inputs may reflect upon adaptability to various agro-climatic conditions.

Misconceptions, The Media Persons Must Avoid

- Farmers with lesser knowledge are not worthy of contributing to media programmes.
- Farmers with temporary knowledge are more in developing countries than the developed countries.
- Inadequate production committed by faults and failure is all wastage.
- Farmer's necessity cannot be compared in terms of their past living.
- Agricultural transition is not the agricultural development having several negative effects on ecological & social consequences.

AGRO- BASED INDUSTRY IN MEGHALAYA

Shri W. L. Lyngdoh, IAS
Director of Economics and Statistics
Government of Meghalaya

Meghalaya is one of the constituent units of Indian Union which came into being initially as an Autonomous State on the 1st April, 1970. After a lapse of 1 year 9 months and 21 days, the State was elevated to the full fledged status on the 22nd January, 1972. The emergence of Meghalaya 29 years ago was nostalgically an important landmark in the history of the State. That event was the result of the momentous peaceful agitation of the ethnic people of the then United Khasi and Jaintia Hills and the Garo Hills to achieve their separate identity in the political map of Indian States. These two Districts were economically backward and that had obviously made the people to aspire for better well-being and desire to determine their own socio economic fortune with their own genius by having a separate State. This new State was entirely encumbered with multifarious economic problems and was left to Government to guide the people for attaining desirable social and economic aspiration for a better standard of living .

The state of economy was comparatively backward where the rate of literacy was only 29.49% in 1971 and the per capita income was only Rs. 538 in 1970-71 while that of all India was Rs. 663 during the same period. In this context, one of the indicator of economic growth of the State is the State Domestic Product or State Income. Agriculture is considered as the main stay of the people, but it was not traditionally organised as an industry. So the activity is mainly concerned with marginal subsistence of the bulk of the population. Therefore the motivation, by and large was to produce enough in order to satisfy the minimum requirement of the family. Added to other difficulties, is the old method of shifting cultivation, which initially could create agricultural surplus but subsequently diminished in fertility and less output, and left but a barren soil or become no longer suitable for agriculture. The picture gradually changed from one period to another with the increasing population.

The primary sector which comprised agriculture, livestock, forestry and logging and fishing as the economic activities is waning from year to year in the contribution to the State Domestic Product. This is mainly due to the rise of service sector, while industry is very shy in the State. As the majority of the people are depending on agriculture, the setting up of agro-based industry in the State is the need of the hour. If agro-based industries could be set up at the block levels, the influx of rural folks to urban areas for employment could be checked. Though the State is not self sufficient in food crops and depending on the supply from outside, yet industries on agricultural and horticultural products could be started.

According to land utilization statistics for the year 1993-94, the total crop area in the State was 238488 hectares and went up to 262630 hectares in 1998-99 showing the increase by over 11%. As far as the net area sown is concerned the figures recorded 201221 hectares in 1993-94 and increased up to 244445 hectares in 1998-99. The statement below shows the area and production during 1993-94 and 1998-99 as a comparison for the period of five years.

According to the above statement, the scope of agro-aased industry in respect of food grain is very dim due to the fact that the State of Meghalaya is not self sufficient in food crops and had to depend on import from outside the State. However the scope for agro-based Industry in respect of fibres namely cotton, jute and mesta could be started in Garo Hills where such crops are being grown. As regards spices, there is enough scope to start industries at the small scale level due to the availability of crops like chillies, turmeric and ginger. These oilseeds are being imported from outside the State as finished products. Due consideration is therefore required if industries are to be set up with local raw materials. The potentiality of Agro-Based Industry shows a very healthy scope for initiating industrial set up in respect of potatoes. The production of potato increased from 119138 MT in 1993 - 94 to 201059 MT in 1998 - 99. In this regard, the whole output of potatoes with a small portion of home consumption is mainly sent to other States. The production of areca-nut in the State has increased from 9440 Mt to 11567 MT. In addition to home consumption dry areca-nut can also be produced as an industry in the State.

PRODUCTION OF IMPORTANT CROPS

		1993-94		1998-99	
	Area (Hect.)	Production MT		Area (Hect.)	Production MT
1.	Foodgrains	131867	149334	132993	186782
2.	Oilseeds	8101	4714	9219	6120
3.	Fibres	16604	60661	16471	54058
4.	Sugarcane	85	229	83	225
5.	Chilies	1739	1073	1764	1051
6.	Tobacco	760	525	742	507
7.	Turmeric	1348	1784	1375	6997
8.	Potato	17689	119138	20753	201059
9.	Areca nut	8771	9440	9585	11567
10.	Soya bean	918	876	899	812
11.	Ginger	6670	41837	7403	45590
12.	Fruits	15411	100479	32088	193773

The climatic condition of the State is very suitable for growing of fruits. As such, fruit preservation industries could be started in right earnest.

In addition to agriculture, livestock is one of the sub-sectors of the agricultural economy where industries could be started for the production of hide and skin. This is possible due to the presence of non-vegetarian population in the State. The production of hide and skin in the State holds a very optimistic scope for setting up a Tanning industry. The following statement furnished the data on production of hide and skin.

PRODUCTION OF HIDE AND SKIN

Year	Hide (in Nos.)	Skin (in Nos.)
1993-94	174720	107775
1998-99	191932	122429

In order to supplement to the consumption of meat, canning factory of livestock and poultry can also be started.

Sericulture is one of the economic activities that has been in existence even before Meghalaya came into existence but no was taken to make it as an important industry of the State. It is observed that production in respect of sericulture raw materials had increased between 1993 - 94 and 1998 - 99 as shown in the table in next page:

PRODUCTION OF SERICULTURE

	1993-94 (Kg.)	1998-99 (Kg.)
1. Mulberry		
(a) Reeling cocoons	8880	12742
(b) Raw silk	634	182
2. Eri		
(a) Cut cocoons	205054	311545
(b) Muga cocoons (in Nos)	6414000	7612000

The area under forests records 938454 hectares during 1993 - 94 and increase to 950000 hectares in 1998 - 99. Varieties of trees are available in the forests of the State and wood based industries were functioning successfully till the ban on cutting of trees is made by the Supreme Court of India. However, industries on bamboo and bamboo products still hold a good promise to the rural people in the form of cottage and small scale industries.

As stated earlier, the shyness of capital for setting up of medium and large scale industries in the State is more a reality than a dream. This is due to the fact, that absence of railway lines is a bottle neck for industrial progress. The State at present has only one medium industry, namely the Mawmluh-Cherra Cement Company. Opening up of industries with materials from agricultural sector would be a blessing to the rural people.

The number of registered manufacturing units in Meghalaya connected with agro-based industries was 6 in 1993 - 94 and such units increased to 12 during 1998 - 99. The agro-based industries under un-registered manufacturing category contributed Rs. 8154 lakh in 1993 - 94 as gross value of output to the State income and contributed Rs. 14916 lakh in 1993 - 94.

The above information are representative of the pace of development in the State. It therefore, requires a more radical transformation both quantitatively and qualitatively at the level of planning processes. The scope of employment in government services appears to have reached a saturated point. In order to cope with present un-employment crisis and to improve the economy of the State and the standard of living of the people, agro-based industrial policy would have to be thought out with sincerity.

THEME OF THE CONFERENCE

The theme of the two day Conference-Cum-Seminar held on the 7th and 8th September, 2001 in the Shillong College, Shillong in collaboration with the North- Eastern Economic Association was : *Agricultural Transition in the Hills Areas of North-Eastern Region.*

Agriculture is the mainstay of the economy of North-Eastern India. But the agrarian sector is still technologically backward especially in the Hills States. Successful structural change through the process of agrarian transition in the region would take time because of political, social-cultural and financial constraints. Since the region is a food deficit area, the theme is suitably relevant for academic discussion in the Conference-Cum-Seminar. Policy prescription has to be formulated both on short-term and long-term basis.

With the food grain production being short by 2 million tonnes of the total demand in the region and with the low poverty level, the issue calls for urgent consideration.

The following sub-themes were split up for separate discussions :

1. **Status of Jhum Cultivation :** Problems of Jhum cultivation have been discussed elaborately at various levels during the last few decades. But information about the present status of jhum cultivation is not readily available. It will be worthwhile to analyse the present status of this primitive type of cultivation in the Hill area of North-Eastern Region.

2. **New Trends in Cropping Pattern :** With improvement in communication and expansion of market economy, the hill farmers have started cultivation of commercial crops. These new trends in cropping pattern is another area worthy of detailed analysis.

3. **Prospects and Problems of Plantation and Horticulture :** Horticulture and Plantation are the two main sectors which have been encouraged in the emerging cropping patterns in the hills. Though prospects of horticulture and platation crops are well appreciated, there are several problems which need to be sorted out. These problems and prospects, therefore, need to be reviewed in the light of farm-level experience.

4. **Land Tenure System and Land Relations :** With economic development taking place along with agricultural transition, land relations and land tenure systems may require revision. The required changes in such systems and relations need to be discussed in the context of agricultural transition in particular.

5. **Dairy Farming and Animal Rearing :** These are also emerging farming activities which can greatly enhance household income and employment and need to be discussed and disseminated.

6. **Geography Specific Farming in the Hills :** In planning for agricultural development in the hills, the geography of different parts of hills, say, upper and lower slopes need to be taken into account. That is why geography specific farming is an important aspect of any discussion on transition in hill agriculture.

BUSINESS SESSION – I

STATUS OF JHUM CULTIVATION

STATUS OF JHUM CULTIVATION IN THE NORTH EAST

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ABSTRACT:

1. For the purpose of this paper, the term 'status of jhumming in the North East' will be used to denote the position of jhumming vis-à-vis the other occupations among the tribals of the region who practised jhumming by tradition.

2. Traditionally, jhumming was the only economic occupation of the shifting cultivators of the region. Today, the jhummias of the North East are not primarily dependent on shifting cultivation. They practise a number of other occupations side by side with jhumming, which has now become a subsidiary occupation for them. Unfortunately, even when they pursue a number of occupations, the jhummias of the North East today are unable to earn a decent living. They are among the poorest of the poor in the region.

3. Stylized models of jhumming in the past and at present will be constructed in the paper to examine why the status of jhumming has changed over time in the region and has degenerated from the sole occupation of the jhummias that satisfied all their needs, to a subsidiary occupation capable of meeting their requirements for only three or four months in the year.

4. Though jhumming has lost its status as the sole occupation of the jhummias of the North East today yet it is still practised by the jhummias to provide a supplementary source of food for them for at least a part of the year because their alternative sources of income do not provide them with enough income to sustain themselves. Therefore, policy measures will be suggested in the paper (a) to make the return from jhumming higher in the short run, and (b) for increasing the income of the jhummias from other sources so that in the long run, jhumming can be gradually phased out from the Region, as it is no longer sustainable either economically or ecologically.

INTRODUCTION:

For the purpose of this paper, the term, "*Status of Jhum cultivation in the North East*" will be used to denote the position of jhumming compared to that of (a) other occupations and (b) other sources of earning a living among the tribals of the region who are swiddeners.

Traditionally, jhumming was the only economic occupation of almost all the tribals of the Region and it provided them with most of their requirements. However, jhum cultivation has lost its past status (as defined above) among the jhummias of the North East. The position of jhumming vis-à-vis the other occupations and other means of making a living has changed for the shifting cultivators of the region. At present, jhumming does not satisfy their needs as it did in the past. At best, it satisfies their requirements of food for only three to four months in a year. Jhumming has also become only a minor source of meeting their requirements. Though jhumming is still carried on by most members of the jhummia tribes of the North East, it is no longer their sole economic occupation. The shifting cultivators of the North East today practised a number of occupations along with jhumming. Despite the changed status that jhumming enjoys in the north east at present when the jhummias have a number of sources of earning and a number of occupations in addition to jhumming, the swiddeners of the region are among the poorest of the poor of the region today (Bosé (ed), 1991).

OBJECTIVE AND METHODOLOGY:

The emphasis of the paper will be mainly on understanding the process leading to the changed status of jhum cultivation and not so much on describing the changed status of jhum cultivation drawing examples from the different states of the North East.

With the help of stylized models of jhumming incorporating the three features of shifting cultivation in the North East in the past and at present, the paper will examine:

(i) Why jhumming enjoyed the status of practically the sole economic occupation and the main source of supply of the requirements of the jhummias of the north east in the past.

(ii) Why the status of jhumming has changed in the north east at present and jhumming is combined with other occupation and other sources of income among the shifting cultivators of the region today

(iii) How far the poverty of the jhumias of the north east at present is due to the changed status of jhumming today.

The paper will also very briefly suggest policies measures for attacking the problem of poverty among the jhumias of the region both in the short and long run.

WHY WAS *JHUMMING* THE ONLY OCCUPATION AND THE MAIN SOURCE OF EARNING A LIVING IN THE PAST?

In order to answer this question, as the first step, a stylized model of jhumming as it was traditionally practised by a typical jhummia household in the past in the North East incorporating all the essential features of jhumming in the region will be set up.

Assume that the typical shifting cultivator household is a unit of production and consumption combined. The household has a fixed aspiration and wants to consume OC units of jhum output every year. It wants to produce only enough to satisfy its fixed consumption requirement.

Assume that OA was the total amount of land suitable for jhumming at the disposal of the typical jhumia household of the North East in the jhummia village. The typical jhummia household could also have access to an unlimited amount of land outside the village for doing jhum cultivation in the past. The jhummia household also had OL units of labour time at its disposal.

The typical jhummia household's annual output from jhum cultivation depended on the land and labour time use, given the length of the fallow period or the length of time during which the land was kept fallow in between two periods of jhumming on it. Land was cultivated only once before it was abandoned for the regeneration of its vegetative cover and the restoration of its fertility. For the sake of simplicity, it is assumed that labour time use had to be combined with land in a fixed proportion, R, to produce jhum output and there was constant returns to scale in jhumming.

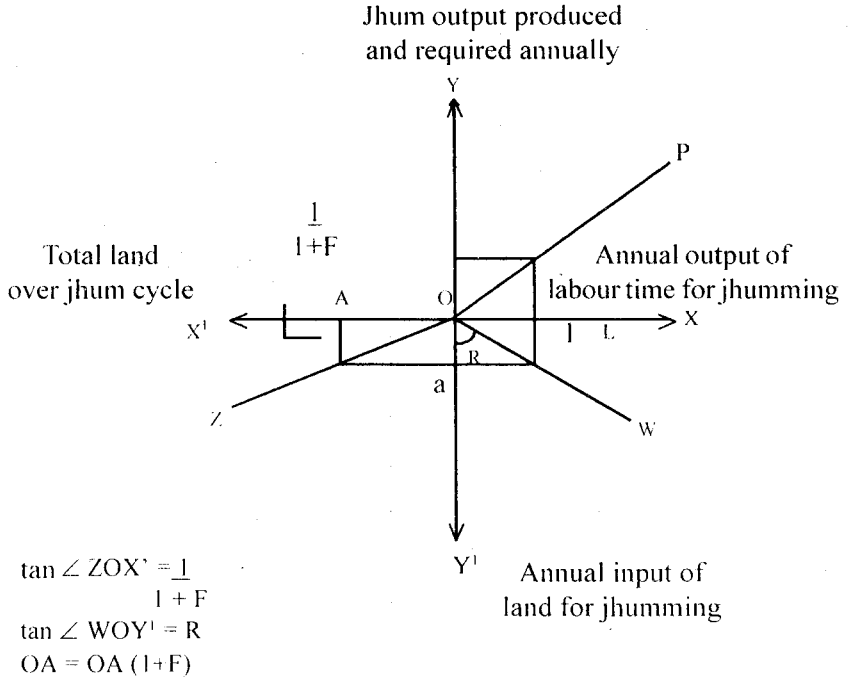
The typical jhummia household is supposed to have kept the fallow period, f, fixed at F, the length of the fallow period that ensured that the level of output produced would be sustainable over time so that if a plot of land is cultivated repeatedly after interval of F years using the same amount of labour time on it as before, the same amount of output would be obtained from it in each subsequent production period

Maintaining the fallow period at F would ensure sustainability of production over time but would not maximize output in the short run. In the short run, it would have been possible to produce the same amount of output from a given combination of land and labour -time use with a shorter fallow period than F but in the long run, if production was carried on with the lower fallow period, the output resulting from the same dose of land and labour time used

would be smaller than before. The lower fallow period, repeated over time would destroy the number of trees that would regenerate themselves, deflect the vegetation and cause a deterioration in the soil fertility condition as the fallow period would not be long enough to play its restorative role. Therefore, a shorter fallow period than F would keep the production function of the typical jhummia household unaltered in the short run but would shift it downwards in the long run.

As traditionally, a plot of land was used for one year and then kept fallow for F years, the jhum cycle consisted of (1+F) years in the past. The production decision of the typical jhummia household in the traditional set up is

Diagram 1.
The Traditional Jhum Economy



depicted in diagram 1. In this four-quadrant diagram, the output required and produced in any one year is measured along the axis OY and the labour time used in jhumming annually by the typical jhummias household is measured along the axis OX. On the vertical axis *OY* is measured the total amount of land that is used for jhumming annually while the horizontal axis OX measured the total amount of jhummable land at the disposal of the typical jhummia household in the village over the entire jhum cycle. The tan of angle *ZOX'* in the diagram measured the ratio 1/ (1+F) and the tan of the angle WOY' measures the ratio *R*, which gives the fixed amount of labour time that has to be devoted to an acre of land to produce jhum output *OP*, the production function, gives the output produced annually with any amount of land used with its corresponding labour time input consistent with *R*, the ratio in which land and labour are combined, given that the fallow period is fixed at *F*.

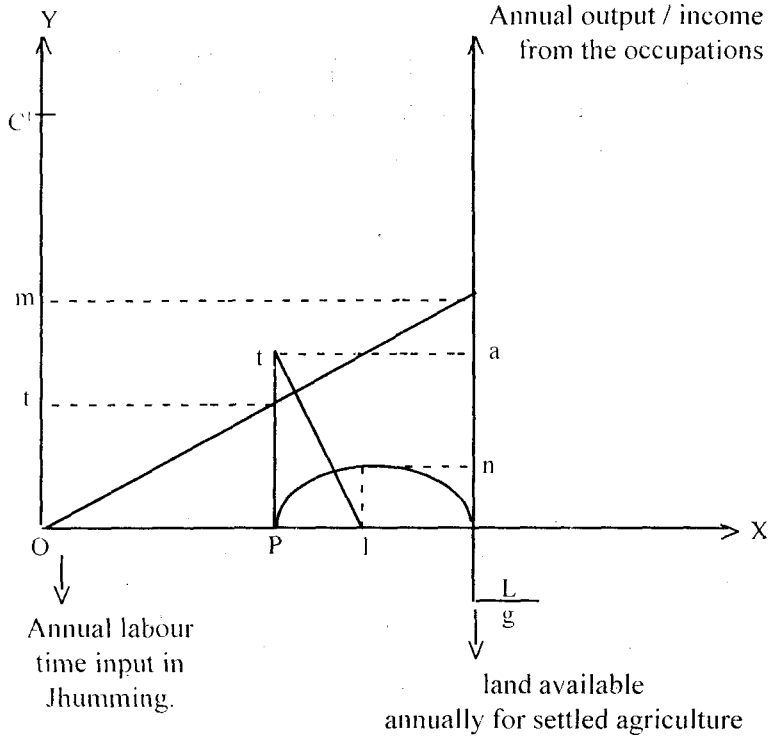
In any one year, to produce OC level of output to meet the requirement of the typical jhummia household, given R and F, OI amount of labour time and Oa level of land would be used by the typical jhummia household. For this level of production to be sustainable over time, OA amount of land would be required by the typical jhummia household over the jhum cycle as

OA= Oa (1+F).

If the requirement of the household and its production function remained unaltered over time, the jhummia household could go on producing the required level of output in a sustainable manner by maintaining F intact, using Ol amount of labour time and Oa amount of land every year. Therefore, jhumming was the only source of livelihood and the only occupation of the jhummias since it met the requirements of the jhummia households. If the requirements of the typical jhummia household went up, it could make use of the additional land outside the village and use more labour time on producing jhum output, split up the family or move to an area where more land was available as the traditional jhum economy had a lot of "give" and could absorb the impact of changed situations. Similarly, if the amount of land in the village was reduced due to landslides etc., then too, the traditional jhum economy could adjust to the change by migrating to new areas where OA amount of land could be available. Therefore, no change was required in the status of jhumming in the traditional set up to meet the requirements of the jhummia family.

To summarise, jhumming was the only occupation and the only source of earning a living of the tribals of the North East in the past because it was economically appropriate as it could traditionally provide the jhummia households with enough to meet their requirements in a sustainable manner when nothing changed and was also capable of adjusting to changes which occured[2]

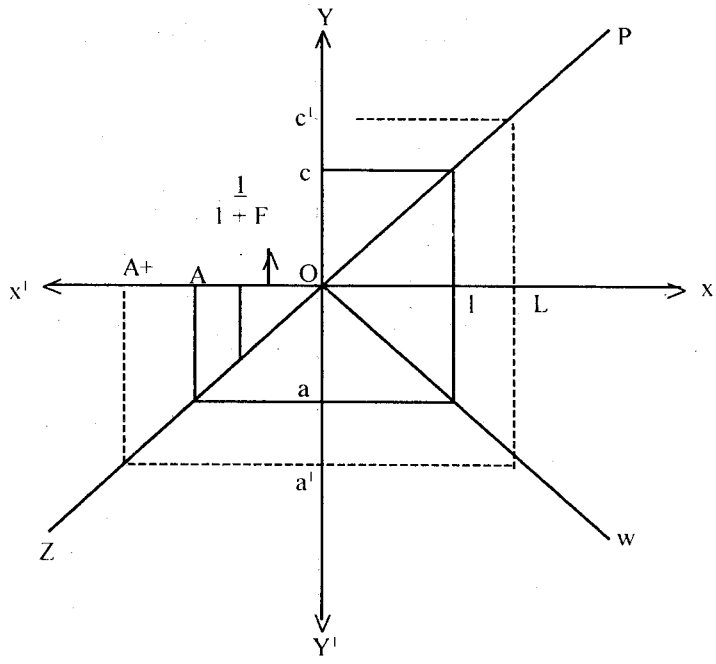
Diagram 2.
Status of Jhumming today.



WHY HAS THE STATUS OF *JHUMMING* CHANGED SINCE THEN ?

The status of jhumming has changed today. This can be depicted with a stylized model of jhumming today which is shown in diagram 2. Today, the jhummia household is capable of producing only *Om* amount of output per year if *OL* amount of labour time is used and the requirement of the household is *Oc* ' per annum. *Lg* amount of land for settled cultivation is available to the household and the production function of settled agriculture is as shown in diagram 2, so that *Ln* amount of output per annum is produced from settled agriculture by the jhummia household. The *lp* amount of wage employment is available to the family where the wage payment in kind is *Lq*. Since (*Ln*+*Lq*) is less than *Oc'*, *Op* amount of labour time is devoted to jhumming and *pt* is the annual output from jhumming.

Diagram 3.
Living on the Edge.



As jhumming yields very little output today, jhumming is no longer the only occupation of the jhummias of the North East.

In order to see how the situation has come about, we start with a situation depicted in diagram 3 where jhumming is still sustainable and the only occupation and the only source of satisfying the requirements of the jhummia household but the jhummia family is living on the edge while producing *Oc'* output. It is maintaining *F* intact but it is using its available labour time *OL* fully and it does not have more than *OA+* land on which it can practise jhum cultivation where,

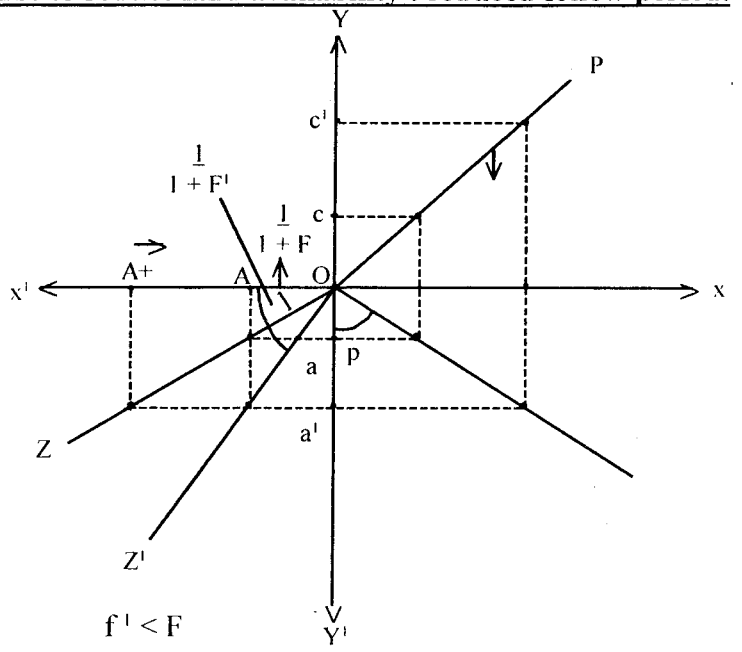
$$OA + = OA + AA+,$$

Where *AA+* being land outside the jhummia village which is used for shifting cultivation by the typical jhummia family. The family has reached this situation by virtue of the fact that over time, its requirements have risen above *Oc* and development has led to the encroachment of land which is available in plenty for jhumming outside the village in the traditional set up.

The changed status of jhumming as the only occupation and the only source of supply of the requirements of the households occurs in such a situation due to (i) a reduction in the area available for jhumming, (ii) an increase in the size of the family of the jhummia household and (iii) an increase in the requirement of the typical jhummia household even when its population remains fixed. The change in status of jhumming is hastened if (i) or (ii) or (iii) is combined with the availability of other employment and income earning opportunities either because of conscious policies adopted by the government or because of general economic development which does not leave the jhummias untouched.

1. **Reduction in area available for jhumming** – Starting with a situation as depicted in diagram 3, consider first a reduction in the area available for jhumming over the jhum cycle from *OA+* to *OA*. The land outside the village boundary that was previously available to the jhummia household is now not available to it because of the reservation of forest areas, urbanisation and setting up of plantations etc. If the land at the disposal of the household shrinks to

Diagram 4.
Response to reduce land availability : reduced follow period.



OA, while maintaining *F* only *Oc* amount of output can be produced annually, making use of *Oa* amount of land and *Ol* amount of labour time used annually and a consumption gap of *cc'* emerges as shown in diagram 4.(Next Page)

The typical jhummia household can try to cope with the situation by altering the way in which jhumming was traditionally done.

(a) It can reduce the fallow period from *F* to *f1*. When *F* is reduce to *f1*, the tan of angle *Z' OZ'* measures the ratio *1/(1+f1)*. The land availability per annum increases to *OA'* because *Oa' = OA. 1/(1+f1)* and *f1* is lower than *F*. Given *R*, *OL* amount of labour time can be combined with *Oa'* amount of land to produce *Oc'* level of output in the short run as shown in diagram 4. Though this strategy will restore output to *Oc'* in the short run, in the long run, reducing the fallow period below *F* will not allow the fallow period to play its restorative role and the production function will move in the downward direction so that *OA'* amount of land coupled with *OL* amount of labour time used will produce less than *Oc'* amount of output annually in the long run. Therefore, when other occupations are available in the long run, the typical jhummia household will combine jhumming with other occupations and other sources of earning in the long run.

(b) Again, the typical jhumia household can draw on *D*, the land with steep slope which was kept under permanent forest cover by the traditional jhumias to add to their cultivate land to produce more output. However, cultivating steep slope will cause landslides and reduce the supply of land below *OA+* in the long run and reduce output below *Oc'* so that the status of jhumming will change especially when new income and employment opportunities are forthcoming.

2. **An increase in the population of the typical jhumia household** – An increase in the number of people in the household without a corresponding increase in the number of workers and labour time use will also lead to a consumption gap if *F* is maintained intact as with *OA+* land and *OL* units of labour time use as in diagram 3 not more than *Oc'* amount of output can be produced to meet the increased requirement. Even if *f* is reduced below *F* or steep slopes are cultivated, as in case 1 above, the jhum output will fall and lead to a changed status of jhumming.

3. **Increase in the requirement of the typical jhummia household even when its population remains fixed** – Starting with a situation as depicted in diagram 3 the requirements of the household can increase even when its population remains stationary because it requires more jhum output to exchange for goods produced outside the jhum economy because of exposure to the outside world or in order to pay taxes on jhum output. Trying to cope by reducing the fallow period below F or cultivating steep slopes will reduce the output of jhumming in the long run and lead to a changed status of jhumming in the presence of new employment opportunities.

HOW FAR IS THE POVERTY OF THE JHUMMIAS OF THE NORTH EAST TODAY RELATED TO THE PRESENT – DAY STATUS OF JHUMMING IN THE REGION ?

It can be seen from diagram 2 that at present the total output that the typical jhummia household can have access to annually is pt from jhumming, Lq from wage employment and Ln from settled agriculture. These three components of income added together yield less than what the family requires and the family suffers from poverty as a result of it. *How far is the poverty of the jhumias of the north east today related to the present day status of jhumming in the region ?.*

Because of reasons discussed in the previous section, jhumming yields very little output to the jhummias of the North East today. This explains why the traditional occupation of the jhummias contributes to their poverty. Had the jhummias been able to earn a high income from their other sources of earning, this would not have created problems for them. In all probability, in that situation, they would have gradually switched over completely to the other source of earning a living in the long run and jhumming would have become a thing of the past in the North East. However, their poor access to land suitable for producing non-jhum products, their lack of education and training, their inability to mobilise capital and secure an access to credit and marketing facilities do not allow them opportunities to avail of highly paid occupations in lieu of, or in addition to jhumming. Even when the government provides them with land and other inputs to diversify their occupational structure and reduce their dependence on jhumming, their poor economic position and bargaining strength make them vulnerable to land alienation and contributes to their inability to hold on to their other productive assets or to make the best use of the new opportunities.

Any programme to uplift the present day jhummias of the region must have in its arsenal, policies designed to make jhumming more productive in the short run as the jhummias of the region are not likely to give up jhumming totally in the near future. They will continue to do jhum cultivation for some time to come as it gives them partial food security for some months of the year, provides them with the type of food they are accustomed to and insulates them partially at least from the risk and uncertainty that accompanies switching over completely to other occupations.

Jhumming can be made more productive by introducing new strains of high-yielding jhum crops, introducing new inputs in jhumming, ensuring that the jhum fields do not have to be abandoned after every harvest and can be cultivated repeatedly without any loss of productivity and minimising pre and post harvest crop losses. In making jhumming more productive, the conventional wisdom of the jhummias which is slowly being lost because of the extenuating circumstances surrounding jhumming today, should be made use of. In the short run, jhummias can be provided with subsidised food through the public distribution system to raise them from their abject poverty.

However, in the long run, giving them control over productive assets like plain lands and hill slopes which can be used for cultivating non-jhum crops, improving their educational level, imparting new skills to them and providing them with capital, marketing and other infrastructural facilities so that they can effectively diversify their economy and sustain themselves on their alternative sources of earning a living will provide an ultimate and long run solution to their problem of poverty in view of the fact that the status of jhum cultivation in the North East has changed for the worse and the wheels of history cannot be turned back.

Key paper on the sub-theme, "Status of Jhum cultivation in the North East"

1. (Das Gupta, 2000) forms the source material for this and the following sections of the paper.

2. In addition, jhumming enjoyed its unique status as the sole occupation and sole source of supply of the requirements of the jhummia households of the region because jhumming was the ecologically appropriate method of cultivation for the high rainfall, hilly areas where the jhummias of the region lived. Besides, traditionally, the jhummias were not aware of other methods of cultivation and alternative occupations. Even if they were aware of them, they were not in a position to practise them because of their lack of capital, education and skill and the absence of encouragement from the government to take up other occupations.

REFERENCE:

1. Bose, S. (ed), *Shifting Cultivation in India*, Calcutta: Anthropological Survey of India, 1991.
2. Das Gupta, M. *Transition in the Economy of the Tribals of Tripura*: An Exercise in the Economic Theory, (unpublished report submitted to the ICSSR), 2000.

JHUMMING IN MANIPUR – A FEW CRITICAL ISSUES

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Agricultural sector has to make better and lasting sense in the development process of the North East - punctuated possibly by a strong temptation to produce 'exportable surplus' - not plagued with the visible concern of food deficit to the extent of Rs. 2500 crores per annum. Prolonged dependence on the age-old practice is, perhaps, a sign of primitive economy. The urgency for the structural change in the farm sector of the region has been occasioned by the rising wave of competitive global interaction- pregnant with liberalised flow of new economic ideas and new economic activities beyond traditional geographical frontiers.

Interestingly, a shift of plan priority is seen in favour of agricultural sector in the coming Tenth Five Year Plan. Highlighting the national commitment to making agriculture more science-based and knowledge linked, the Draft Approach Paper to the Tenth Five Year Plan (2002- 2007) states :

"First, agricultural development must be viewed as a core element of the Plan since growth in this sector is likely to lead to the widest spread of benefits especially to the rural poor. The first generation of reforms concentrated on reforms in the industrial economy and reforms in the agricultural sector were neglected. This must change in the Tenth Plan" (P-4).

The Plan takes note of the fact also that the tribals grapple with a number of problems and "to tackle the various unsolved problems of the tribal (like shifting cultivation), the Tenth Plan shall formulate a comprehensive National Policy for Empowering Tribals through their integrated development, which will lay down the responsibilities of the different wings of Government with appropriate accountability." (P-7).

One of the age-old concerns in the North- Eastern Region has been Jhumming and Fundamental backwardness. The implication of Jhum cultivation in the economy of Manipur remains "**marked**" in view of its geo-physical peculiarity. The hill areas account for 9/10th of the total geographical area i.e. 22094 sq.kms. while the valley area for 1/10th i.e. 2233 sq.kms. Consequently, the density of population in the valley is much higher. The density of population in the valley increases from 534 in 1990-91 to 632.5 in 2001 while the density of population in the hill districts from 33.6 in 1990-91 to 51.8 in 2001. In Tamenglong hill districts the density of population is only 25 while in Imphal West (valley) it is 847 in 2001, - the highest in the state. This, perhaps, suggests that the future agricultural development may require extensive utilisation of available land in the hill areas. At the moment, the hill districts provide only 42.59 percent of the total agricultural area of 1.62 lakh hectares.

AREA UNDER *JHUM* :

Of the agri-land, the major portion is accounted for by the jhum area. This is the cause of concern. On an average, the jhum area under paddy accounts for 39.22 percent. In Tamenglong, the incidence is highest with 79.38 percent. In Churachanpur and Chandel districts, the jhum area under paddy accounts for 65.11 percent and 66.53 percent respectively.

Area under jhum records a rising trend. In Churachanpur, the area under jhum as percentage of the total geographical area of the district increases from 18.36 in 1986-87 to 48.09 in 1993-94. In Ukhrul and Senapati districts, also one observes the same dismal trend. Senapati experiences a rise from 39.83 percent in 1986-87 to 44.56 percent in 1993-94. The onslaught of jhum area in Ukhrul district increases from 21.82 to 35.77 percent.

INCIDENCE :

One tries to take note of the incidence of jhumming with reference to the customary practice of keeping 'land idle' (fallow), deforestation (flood-induced), soil erosion, low productivity and ecological delinquency. The net result is, perhaps, rising web of poverty suffered by the jhummias.

Perhaps, as in the case of other states, a large portion of area remains "idle" (fallow) in due course of rotation of fields – rather than rotation of crops. To that extent, the economy suffers. Only 11.52 percent of the total jhum area is currently used for production. Can we hope to make use of the remaining 88 percent for any economic production ?.

Secondly, two observations can be made on the two jhum cycles. Regarding jhum cycle of 1-5 years, the percentage of land use during this cycle is getting lesser i.e. larger portion of land is allowed to remain "**abandoned**" – not being used too frequently. Not a bad sign. The other cycle of 5-10 years speak of the longer period of rest given to land to regain fertility. About 59 percent of the jhum area have this advantage in Manipur in 1993-94. Except Tamenglong, other hill districts have larger percentage of land under-abandoned jhum of 5-10 years.

Another concern is the size of the '**Secondary or regenerated forest**' having '**Secondary growth**' of bamboo mixed with other vegetation,- after a spell of a few years of jhum activities,- a sign of temporary deforestation. Once the area was forest-area. The character of forest disappeared on account of jhumming. Now the character of forest has been regained. Not much change is seen during the period 1990-91 to 1993-94. Till 1993-94, the area under secondary forest accounts for 61% of total geographical area of Ukhrul district, 48% of Senapati, 45%in Tamenglong and 26% in Churachanpur. The evidence of temporary deforestation as a result of aggression of shifting cultivation is convincing.

The fourth concern is low productivity. Five factors, it appears, are working against jhummias. The soil is getting eroded. Irrigation (36.45% of the agricultural land) in the hills- particularly in jhum area practically means percolation of moisture at different levels of the slope of the hills. Stronger flow of water through channels may cause the run-off of the prepared soil. The HYV is less popular as it requires assured irrigation and greater care. The local variety (seed), therefore, has better compliance with the local situation in terms of resistance and less care. The area under local variety accounts for 87% of the total area under paddy in the hill district of Manipur. In the subsistence economy "**certainty**" is more important and better option than "**doubtful plenty**". The whole exercise of production is undertaken to meet just domestic requirement, - not for marketable surplus. Besides, the customary mandate does not permit personal ownership of land **permanently**. Lack of proper transport and communication means limited sphere of exchange, low market interaction and absence of innovative practice. One has to note the "**fact of deficiencies**". By and large, the place of "**economy**" in the tribal society is low. The imperatives of social orientation outweigh the economic orientation. In Manipur, one comes across another institutional problem. The Manipur Land Revenue and Land Reform Act, 1960 does not allow any citizen of India other than tribals to acquire land and settle in the unsurveyed area.

Who would like to invest his hard-won-life-long savings of money, skill and enterprising spirit without being allowed to acquire land and stay permanently ?. Under this uneasy social atmosphere, one can hardly look forward to larger inflow of investment. Economic isolation characterised by '**constant give and take**' cannot be ruled out.

The yield of the jhum area in Manipur was1213 kgs/Ha in 1976-77 as against the state average of 2659 kgs/Ha. In Moirang Block (valley) yield could be increased to 3039 kgs/Ha, - the highest in the state in 1993-94. As such, the per capita shortage of food was 140 kgs in Chandel district, 127 kgs in Tamenglong, 108 kgs in Churachandpur, 69 kgs in Senapati district and 23 kgs in Ukhrul district. In spite of the networks of the Public Distribution System

operating all over the State, much remains to be done to meet both quantitative and qualitative requirements.

WAY OUT :

We must admit that it is essentially the issue of underdevelopment, issue of reduction of mass poverty and the issue of intra-regional disparity. We must also admit that the poor usually lack assets as well as income. They also lack **human capital**. Therefore the policy design should be governed by (a) access to income generating opportunities and (b) capacity to respond. Availability of opportunity is one while utilisation of the opportunity is another.

We have to think how to sensitise the tempo of agricultural self-employment in the jhum areas. The policy of self-employment should focus on raising the reasonable extent of education, hard-working nature, ambition and enterprising spirit.

Apart from other major policy intervention, integrated area specific approach may be considered important. The foundation of agricultural performance should be strengthened. The linked-programme of **Trial-Cum-Demonstration** with village Chiefs, NGOs and government may prove **rewarding**. The use of improved variety, water shed management, better agronomic practices, appropriate land use pattern and effective **Extensive Services** could certainly be hopeful policy instruments. Unfortunately, the district administration, - particularly district development administration in Manipur, has to pick up with a "**new culture**" devoid of deficiencies and leakages. There is, it appears, a strong tendency of depending on the "**mercy**" of "**Link-men**" who centralise the powers at the cost of social and economic advancement. Very few jhummias have the idea about the programmes of rural development, social welfare and plan schemes. Cases of "**collective collections**" of subsidies and grants by "**one leader**" are not uncommon in the hill districts of Manipur.

In this connection, the Working Group on Development of North Eastern Region during 7th Plan observes :-

"Though shifting cultivation has been accepted as the major problem in the tribal areas of the North-East, the impacts of various schemes being implemented are not readily available". (P-50).

Various studies have been conducted to evolve models for conversion of jhum areas to some kind of settled cultivation. Four models have so far emerged :-

(a) Conversion to plantation (tea, rubber etc.).
(b) Conversion to terrace cultivation,
(c) Conversion to grass lands,
(d) Conversion to a three-tier system of forestry, horticulture and agriculture.

Depending upon natural endowments and comparative advantage of the area, attempts may be made to apply the models. A comprehensive survey is, perhaps, the crying need of the hour. It may be imperative for us to analyse the details of physiography, level of agricultural technology, land tenure system, scarcity of skilled labour and credit and the general reluctance of jhummias to surrender the right to jhumming. (Tables follow)

Table 1.

POPULATION –TREND
MANIPUR

STATE / DISTRICT	Percentage decadal Growth rate		Population Density Per sq.km..	
	1981-91	1991-01	1991	2001
Senapati	36.13	81.96	64	116
Tamenglong	38.51	29.23	20	25
Churachandpur	31.00	29.81	39	50
Ukhrul	31.74	28.98	24	31
Chandel	25.81	72.80	21	37
Hill Average >	32.63	48.55	33.6	51.8
Bishnapur	27.52	13.90	364	415
Imphal West	26.14	15.42	734	847
Imphal East	29.41	19.16	466	555
Thoubal	26.34	24.62	572	713
Valley Average >	27.35	18.27	534	632.5

Table 2.

TRIENNIAL ENDING AVERAGE OF JHUM AREA UNDER PADDY, MANIPUR (1991-92 TO 1993-94)
(PERCENTAGE)

District	Permanent Cultivation	Jhum Cultivation
Senapati	93.14	6.86
Tamenglong	20.62	79.38
Churachandpur	34.86	65.11
Chandel	33.47	66.53
Ukhrul	69.68	30.32
Hill District Total	**60.78**	**39.22**

Source : Government of Manipur,
Director of Economics & Statistics
Report on Crop Estimation Survey in Manipur (1993-94)

Table 3. **AREA UNDER JHUM AS PERCENTAGE OF TGA**

District	1986-87	1993-94
Senapati	39.83	44.56
Ukhrul	21.82	35.77
Tamenglong	37.94	34.74
Churachandpur	18.36	48.09

TABLE. 4: **JHUM AREA, MANIPUR (PERCENTAGE)**

Year	Paddy-area in hill district ('000 hects)		Jhum area under paddy As P.C to the district total (Hills) under paddy	P.C. of Jhum area Under paddy to the State total under paddy
	All types	Jhum		
1985 - 86	66.45	25.23	27.97	15.33
1990 - 91	56.07	23.81	42.46	15.13
1995 - 96	57.41	29.79	51.89	22.08
1996 - 97	77.15	43.48	56.36	26.18
1997 - 98	69.48	40.45	58.22	25.62
1998 - 99	68.96	36.90	53.51	22.11
1999 - 2000	67.81	40.54	59.78	25.82
2000 - 2001	67.96	39.79	58.55	25.35
Average	**66.41**	**35.00**	**52.34**	**22.20**

Source: Government of Manipur,
Directorate of Economics & Statistics, Manipur

Table 5. **PERCENTAGE OF JHUM AREAS**

Type	SENAPATI		UKHRUL		TAMENGLONG		CHURACHANDPUR	
	1986-87	1993-94	1986-87	1993-94	1986-87	1993-94	1986-87	1993-94
Current Jhum	7.9	6.1	14.35	5.2	13.79	17.7	40.23	17.11
Abandoned Jhum								
1-5 Years	44.56	30.24	20.95	17.87	25.25	26.9	32.95	20.29
5-10 Years	47.52	63.63	64.69	79.9	58.66	29.49	25	62.59
10 Years and above	-	-	-	-	2.28	25.91	1.81	-

Source : Government of Manipur,
Directorate of Science, Technology & Environment
Remote Sensing Centre,
Land Use / Land Cover Analysis

Table 6.

YEILD OF JHUM AREA (kg/HA), MANIPUR

Year	All types (State)	Jhum Area
1976-1977	2659	1213
2000-2001	2805	1530

Source : Department of Economics & Statistic, Manipur

Table 7.

SOIL EROSION IN JHUM AREA FROM 60° - 70°

	Soil erosion t/ha/yr
First Year	146.6
Second	170.2
Abandoned Jhum (First Year fallow)	30.2
Natural Bamboo Forest	8.2

(Ibid. - p22)

MODELS OF CONVERSION FROM JHUM TO SETTLED CULTIVATION

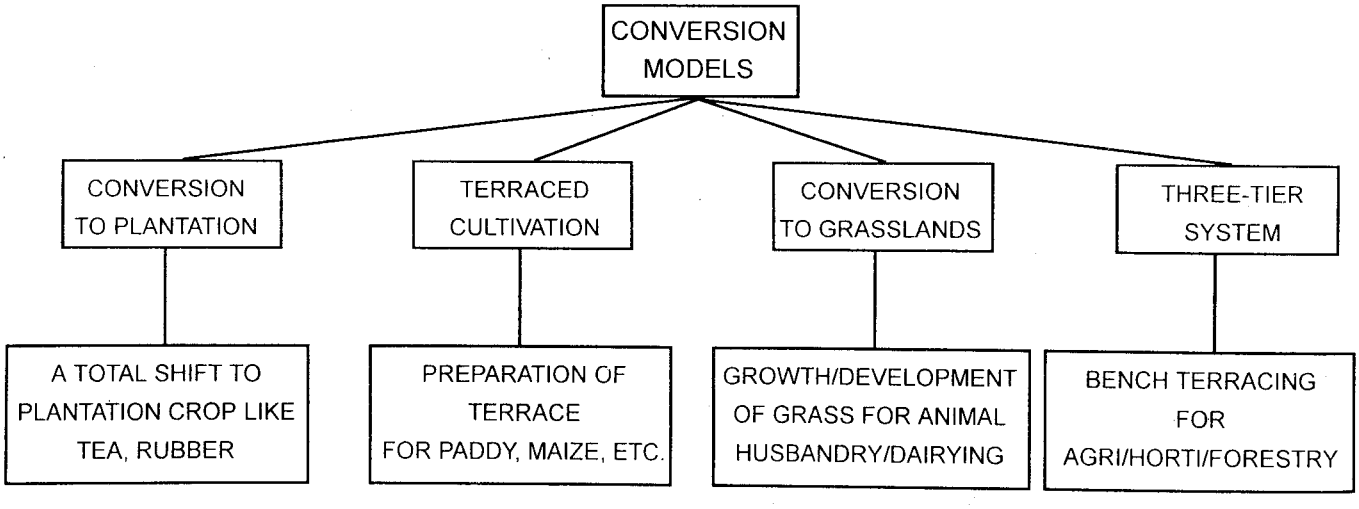

Table 8. **AREA OF SECONDARY FOREST AS PERCENTAGE OF TGA**
(Hill district of Manipur)

Year	Tamengiong	Churachandpur	Ukhrul	Senapati
1989-90	45.40	65.17	75.00	53.00
1993-94	44.90	25.84	61.00	48.00

Source : Government of Manipur
Directorate of Science, Technology & Environment
Remote Sensing Centre
Land use/land Cover analysis

Table 9. **IRRIGATED AREA IN MANIPUR**
(Percentage)

Region	1990-91	1991-92	1992-93	1993-94
Hill	20.66	17.77	34.77	36.45
Valley	46.20	52.00	36.00	23.71

Source : Government of Manipur
Directorate of Economics & Statistics
Report on Crop Estimation Survey in Manipur

Table 10. **PROPORTION OF AREA UNDER HYV AND LOCAL VARIETY OF PADDY IN MANIPUR**
(Triennium average Of 1991-1994)

Variety	Valley	Hill
H.Y.V.	45.15	12.91
Local variety & others	54.54	87.09

Source : Government of Manipur
Directorate of Economics & Statistics
Report on Crop Estimation Survey in Manipur

READING / REFERENCES :

1. Andre Beteille, *The Backward Classes and the New Social Order,* Oxford University Press
2. B.D.Sharma, *The Web of Poverty*
3. Edward e. Lectair Jr. *Economic Anthropology* (Edited) Reading in Theory and Analysis
4. Government of India, Ministry of Agriculture, Department of Agriculture and Cooperation, . *Report of the Committee of Experts on Draft Outline of the National Land Use Policy*, 1988.
5. Government of India, Planning Commission, *Draft Approach Paper to the Tenth Five Year Plan* (2002-2007)
6. Government of India, National Committee on Development of Backward Areas, *Report on Development of North Eastern Region*, 1981
7. Government of India, Planning Commission, *Transforming the North East,* 1997
8. Government of India, Ministry of Home Affairs, *Approach to Tribal Development in the Sixth Plan -A preliminary Perspective* Occasional Paper 17
9. Government of India, Ministry of Home Affairs, *A Report of the Working Group On Tribal Development during Sixth Plan,* (1980-85)
10. North Eastern Council, *Report of the Working Group on Development of North – Eastern Region during the Seventh Five Year Plan,* March, 1985
11. North-Eastern Council *Development Large in North Eastern region,* 1988
12. Government of Manipur, Department of Science, Technology & Environment, Remote Sensing Application Centre, *Land Use/ Land Cover Analysis with Special references to Ukhrul, Senapati, Tamenglong and Churachandpur.*
13. Government of Manipur, Directorate of Economics and Statistics, *Report on Crop Estimation Survey,* 1993-94
14. Releigh Barlowe, *Land Resource Economics* Prentice Hall.
15. World Bank, *World Development Report, (on poverty)*, 1990.

STATUS OF SHIFTING CULTIVATION IN NORTH EASTERN REGION AND STRATEGY TO CHANGE SUCH STATUS.

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ABSTRACT:

1. **Introduction:**

Origin of Shifting cultivation and its status in the minds of tribal people of North Eastern Region.

Analysis of the process of shifting cultivation and the jhum cycle.

2. **Area under Shifting Cultivation:**

Total area under shifting cultivation and area under shifting cultivation in a year in various N.E.States and other states of India. Task Force Report on shifting cultivation, 1983 and N.E.C.'s latest statistics and its comparative analysis.

3. **Involvement of Tribal Families in Shifting Cultivation:**

Analysis of the involvement of tribal families in jhum cultivation and their extent in different states of N.E.Region along with area cultivated per tribal family.

4. **Cropping Pattern in Jhum Cultivation:**

5. **Evil Effect of shifting cultivation in North-Eastern Region:**

Analysis of the various evil effect of shifting cultivation, viz., Soil erosion, deforestation, absence of soil conservation measure, national water and environmental imbalance.

6. **Strategy to change the Status of Shifting Cultivation:**

Analysis of the strategy of "Sustainable Agricultural Development" and mixed land use system.

Analysis of various efforts undertaken by the State Government of N.E.States, future strategy, settlement of jhummias, and development status of rubber, oil-palm and coffee cultivation and their success and future prospect.

7. **Conclusion:**

Lack of whole-hearted effort on the part of the Government agencies and the NGOs. Initiating motivational process to convince the tribal people of the region about the real status of Jhum Cultivation and its deleterious effects so as to save the entire region from the impending ecological disaster.

INTRODUCTION:

Shifting or jhum cultivation has been maintaining a relatively high status in the minds of tribal people of North Eastern Region due to their traditional bound approach, intimacy and belief in it. The major advantage of shifting cultivation to the hill people is that it provides a very easy method for the preparation of land for cultivation, where there is no danger from either floods or draught.

Shifting cultivation is a primitive method of cultivation which might have originate in the Neolithic period covering the ages between 13,000 to 3,000 B.C [1]. Perhaps the system of shifting cultivation is the first stage in the use of soil for the production of crops. This system of cultivation was practised over a long period of time as a regular system by the hill inhabitants of Black Africa and America. In the remote parts of Sweden, this system of cultivation was followed until 1920. Till the middle of the last century, Europeans in Brazil and English settlers of seventeenth century in Virginia of the U.S.A. also practised this shifting cultivation.[2] In India shifting cultivation is still practised in the hill areas of north-eastern region, Sikkim, Bihar, Orissa, Andhra Pradesh, Madhya Pradesh, Tamil Nadu, Kerela, Karnataka and Maharashtra.

Shifting cultivation is known as slash-and-burn agriculture, migratory primitive agriculture, nomadic agriculture, hoe and burn, forest field rotation, land rotation agriculture and in the North-East India it is known as 'Jhum' cultivation or 'jhumming'. Owing to diminution of fertility, 'jhummias' will have to shift from one area to another area and thus it is known as Shifting Cultivation.

In this process of shifting cultivation, the original fertility of land along with the burnt ashes make it possible to raise a good yield of crops for a year or two. After that, all the nutrients of the soil will become exhausted and thus yields falls drastically. This will force the farmers to shift into new areas leaving the previous land as fallow land for gaining fertility and follow the same process of slash and burn in a new area as mentioned above.

JHUM CYCLE:

In shifting cultivation, cultivation in a particular area for one or two years and then moving into other areas and again returning to the first area for cultivation completes a cycle. Thus, the number of years between two consecutive jhum operations constitutes a 'jhum Cycle'. The cycle includes the number of years an area is under cultivation plus the years the area is kept under forest fallow. Previously, the fallow period was of 30 years duration and at present due to high pressure of population and heavy erosion of soil this fallow period has declined to 4 to 9 years or even less in different states of our country. Among the North-Eastern states, Meghalaya and Nagaland are having the longest jhum cycle of 9 years followed by Tripura-8 years, Mikir hills of Assam-7 years, Manipur-6 years and the states like Mizoram and Arunachal Pradesh are having the lowest jhum cycle of 3 to 4 years.

However, the area under shifting cultivation and the number of tribal families involved in it can reflect adequately about the status of shifting cultivation in this region.

2. AREA UNDER SHIFTING CULTIVATION:

Shifting cultivation requires a large amount of land but it can support only a small number of population. About the extent of shifting cultivation in terms of area or in terms of number of persons engaged in it, there is no definite reliable information. As per an old ICAR review, the total estimated area under shifting cultivation was 5.42 lakh hectares and about 26,441 lakh tribal population were engaged in it.

The report of the Dhebar Commission revealed that nearly 5.41 lakh hectares of area are covered per year by the shifting cultivation and about 25.89 lakh tribal population are depending on it. Again, as per the estimates

of Vidharthi, about 2.6 million tribal people are engaged in shifting cultivation covering nearly 135 million acres of land scattered in different parts of India.[3]

In North- Eastern region, the estimates framed by the state departments of the region in 1974 reveals that shifting cultivation is prevalent in nearly 2.4 per cent of the total area of the entire NE Region at a point of time. About 2.7 million hectares of area i.e., about 14.19 per cent of the area of the entire NE Region is at present available for shifting cultivation and out of which only 16.8 per cent (i.e., about 4.3 lakh hectares) of the area is cultivated at one point of time leaving the rest for natural regeneration of fertility. Further, about 4.25 lakh tribal families of the entire NE Region are found engaged in shifting cultivation and total area cultivated per tribal family in the region is 1.07 hectares[4]

As per an earlier estimate, it is found that total area under shifting cultivation in a year in all North Eastern States was nearly 4.16 lakh hectares in comparison to that 9.89 lakh hectares of area in whole India. Again nearly 2.8 million hectares of land was at present available for shifting cultivation in the North-Eastern Region in comparison to that of 6.75 million hectares of land in the whole country. About 5.47 lakh tribal families of North-Eastern Region were involved in the shifting cultivation. Table 1. will make it clear.

Table 1. **Area under Shifting Cultivation.**

State/Union territorry	Area under Shifting Cultivation in a Year (hectares)	State/Union territorry (Years)	State/Union territorry area under (hectares)
1	2	3	4
Arunachal Pradesh	70,300	4	2,81,200
Assam	70,000	7	4,90,200
Manipur	50,000	6	3,00,200
Mizoram	60,000	3	4,80,000
Meghalaya	76,000	9	4,56,000
Nagaland	73,000	9	6,57,000
Tripura	17,000	8	1,36,000
Total N.E. Region	4,16,300		2,800,200
Andhra Pradesh	17,000	6	1,03,800
Bihar	16,000	6	97,200
Kerala	1,000	6	11,000
Madhya Pradesh	8,100	6	48,600
Orissa	5,29,800	7	3,700,600
Total India	**9,89,600**		**6,769,800**

Source : Kaul, G.L. 1981 Shifting Cultivation-Magnitude of the problem and Lessons learnt, JOU NEC, Vol. 4 pp. 19-20

Again the ministry of Agriculture send a task force to study the impact of shifting cultivation in the entire North Easter Region. The following table show the finding of that task force report submitted in 1983.

Table 2. **Shifting Cultivation in N . E . Region.**

States	Annual area under shifting cultivation (in sq.km)	Fallow period (in years)	Minimum area under shifting cultivation one time or other (sq.km)	No. Of families practicing shifting cultivation.
Arunachal Pradesh	700	3 - 10	2,000	54,000
Assam	696	2 - 10	1,392	58,000
Manipur	900	4 - 7	3,600	70,000
Meghalaya	530	5 - 7	2,650	52,290
Mizoram	630	3 - 4	1,890	50,000
Nagaland	190	5 - 8	1,913	1,16,046
Tripura	223	5 - 9	1,115	43,000
Total	3,865		14,660	4,43,336
	(1.5 %)		(5.7%)	

Source : Task Force Report on Shifting Cultivation, Ministry of Agriculture, 1983. (As reproduced in Basic Statistics of NER 1995,P.30).

Table .2, as available from the Task Force reveals that the annual area under shifting cultivation in the entire North-Eastern Region is 3869 sq. Km. which is nearly 1.5 per cent of the total of the geographical area of the region. Again the annual area under shifting cultivation in the various N.E. States are -900 sq. kms. in Manipur,700 sq. kms. in Arunachal Pradesh, 696 sq. kms. in Assam, 530 sq. kms. in Meghalaya, 630 sq.km. in Mizoram, 190 sq. kms. in Nagaland and 223 sq. kms. in Tripura.

Again the report further shows that the minimum area under shifting cultivation one time or other in the entire N.E. Region was 14,660 sq. kms. Which constituted nearly 5.7 per cent of the total geographical area of the region. Again the minimum area under shifting cultivation one time or other in the various N.E. states were - 2,650 sq.km. in Meghalaya, 2,100 sq. kms. In Arunachal Pradesh, 3,600 sq.km. in Manipur, 1913 sq.km. in Nagaland, 1,392 sq.km. in Assam, 2650 sq. km. in Meghalaya and 1,115 sq.km. in Tripura.

According to the Task Force Report on shifting cultivation in India (1983), total area affected due to shifting cultivation in the country is 4.37 million hectares. However, the National Remote Sensing Agency has also estimated the total area of 4.24 million hectares under shifting cultivation including forest blanks.

Moreover, the latest position about the area under Shifting Cultivation in various states of North- Eastern Region as per the information available with the North- Eastern Council is shown in Table.3.

Table.3. **Extent of Area of Shifting Cultivation in N. E. India.**

State	Area Available For shifting Cultivation (0,000 ha.)	Area sown At one time (0,000 ha.)	Tribal families Involved (0,000 Nos.)	Area Cultivated Per tribal Family (ha.)
1	2	3	4	5
Arunachal Pradesh	248.58	92.00	81	1.13
Assam	498.30	69.90	58	1.20
Manipur	100.00	60.00	50	1.20
Meghalaya	416.00	.76.00	68	1.12
Mizoram	604.00	61.61	45	1.37
Nagaland	608.00	73.54	80	0.92
Tripura	220.79	22.30	43	0.51
N.E. India	**2695.70**	**455.05**	**425**	**1.07**

Source : Barthakur, D. N., 1992, Agriculture of the North Eastern Region, pp. 138-39

Table. 3 reveals that in recent times the total area available for shifting cultivation in the entire North- Eastern Region is 2.69 million hectares, out of which total area sown at one time is 4.55 lakh hectares. Again the annual area under shifting cultivation in the various N.E. states are- 92.0 thousand hectares in Arunachal Pradesh, 76.0 thousand hectare in Meghalaya, 73.54 thousand hectare in Nagaland, 69.9 thousand hectares in Assam, 61.6 thousand hectare in Mizoram, 60.0 thousand hectare in Manipur and 22.3 thousand hectare in Tripura.

If we now compare the extent of the area under shifting cultivation in present times (shown in Table.3.) with that of the area engaged under such cultivation during eighties or earlier (shown in Table.1) then we could see that there is a marginal increase in the area sown at one time (annual area) in the entire N. E. Region from 4.16 lakh hectares to 4.55 hectares. However , the estimated total area under shifting cultivation has declined marginally from 2.8 million hectare to 2.69 million hectare. Again, the area sown at one time under shifting cultivation has recorded a modest increase in the states like Arunachal Pradesh, Manipur and Tripura and a marginal increase in Mizoram and Nagaland but remained almost same in Assam and Meghalaya.

However, as per the latest assessment made by Assam Remote Sensing Application Centre (ARSAC), total "jhum" area in both the hill districts of Assam, i.e. Karbi- Anglong and North Cachar Hills has recorded an increase from 1,74,757 hectares (11.4 per cent of the total geographical area) in 1986-87 to 2,01,944 hectare (13.18 per cent of the geographical area) in 1993-94. Thus it reveals that the area under jhum cultivation in the entire region is increasing gradually in the absence of alternative source of livelihood to the tribal people.

3. INVOLVEMENT OF TRIBAL FAMILIES IN SHIFTING CULTIVATION.

Involvement of tribal families in shifting cultivation can also reflect adequately about its status in the North- Eastern Region. Tribal people of the N.E. Region has been maintaining a special fascination towards shifting cultivation due their nomadic nature and also due to their traditional habit and belief on such age old practise. Total number of tribal families involved in the shifting cultivation of the entire North-Eastern Region is also substantial. As

per the Task Force Report on shifting Cultivation, 1983, (Table.2), total number of tribal families involved in shifting cultivation in the entire North-Eastern region was 4,43 lakh, out of which 1.16 lakh tribal families of Nagaland, 70,000 tribal families of Manipur, 58,000 tribal families of Assam, 54,000 tribal families of Arunachal Pradesh, 52,290 tribal families of Meghalaya, 50,000 tribal families of Mizoram and 43,000 tribal families of Tripura had been found practising shifting cultivation widely in this region at that point of time.[5]

Again as per the information available with the North Eastern Council as reflected in Table.3, it is observed that total number of tribal families involved in shifting cultivation in the entire North Eastern Region is 4.25 lakh and the total area cultivated per tribal family in the region is 1.07 hectare. Moreover, the participation of tribal families in shifting cultivation is substantial in the states like Arunachal Pradesh (81,000), Nagaland (80,000), Meghalaya (68,000), Assam (58,000), Manipur (50,000), Mizoram (45,000) and Tripura (43,000).[6]

Moreover, among the North-Eastern States, the area cultivated per tribal family was highest at 1.37 hectare in Mizoram and then followed by 1.20 hectare both in Assam and in Manipur, 1.13 hectare in Arunachal Pradesh, 1.12 hectare in Meghalaya, 0.92 hectare in Nagaland and only 0.51 hectare in Tripura.

4. CROPPING PATTERN IN JHUM CULTIVATION:

In Shifting or Jhum cultivation tribal farmers follow a mixed land use-pattern for raising various crops together. Thus they produce large variety of crops from the same field and these include food grains, vegetables and cash crops. The most common crop of 'jhummias' are high land paddy or jhum paddy which they produce along with maize, fox-tail miller, finger miller, beans, tapioca, yam sweet potato, ginger, tobacco, sea sum, chillies and leafy vegetables.[6]

5. EVIL EFFECTS OF SHIFTING CULTIVATION IN THE NORTH EASTERN REGION:

The shifting cultivation has been creating a serious impact on geographical and environmental conditions of the North- eastern Region. The following are some of its evil effects.

5.1 Soil erosion : The most important evil effect of shifting cultivation is the destruction of forest and green cover in the hill area and as a result, it causes heavy soil erosion during rainfall and consequent siltation in the major rivers like Brahmaputra and Barak leading to a heavy flood in the plain low lying areas. The most deleterious effect of this system of cultivation can be discernible from the fact that it results nearly 3.7 tonnes/ha. of soil material to slide or roll down to food hills annually. Estimates reveals that about 181 million tonnes of soil is lost every year as a result of shifting cultivation in the North-Eastern Hill Region.[8] Moreover, loss of top soil in the hill areas to the extent of 22 per cent of the total soil due to jhumming causes a serious fall in the fertility of the soil and thus it creates a serious economic problem for the tribal people.

5.2 Deforestation : Shifting cultivation causes deforestation on a large scale and is highly destructive to productive and protective values of forests. The report released by the Dehradun based Forest Survey of India (FSI), based on satellite data and extensive field surveys, shows Assam to be the main victim of shifting cultivation in recent years. As per an estimate of loss in the forest cover in 1993 assessment as compared to 1991 assessment in North-Eastern States, prepared by FSI, it is found that the total loss of forest cover in the N.E. Region was 983 sq.kms., out of which 702 sq.kms. (71.4 per cent) was lost due to shifting cultivation. Moreover, after adjusting the gain in forestry arising out of regeneration in abandoned shifting cultivation areas (315 sq. kms.) and other gains (33 sq. kms.) the net loss in forest cover in N.E. Region was 635 sq.Kms. The loss of forest cover during the same period in different North-Eastern States as a result of shifting cultivation were –165 sq.kms. in Assam, 256 sq.kms. in Mizoram, 110 sq.kms. in Meghalaya, 70 sq.kms. in Arunachal Pradesh, 63 sq.kms. in Nagaland, 28 sq.kms. in Manipur and 10

sq.kms. in Tripura.[9]

Moreover, the renewed cultivation has permanently rendered the land into waste. As for example, in Meghalaya, unabated jhumming has turned the once thick evergreen forest belt of Cherrapunji, a place that used to record the highest rainfall in the world, into a dry, brown scar. The jhumming practise has caused extensive climatic changes in the N.E. Region and destroyed its rare flora and fauna.

5.3 Absence of soil conservation measure : Another evil effect of jhumming is that as there is no private ownership of land thus the 'jhummias' do not undertake any measures for soil conservation and also for any permanent improvement of land.

5.4 National Waste : Shifting cultivation causes a high national waste as it converts a green land into a fallow land for the major parts of jhum cycle.

5.5 Environmental imbalance : Shifting cultivation upsets the ecological balance of nature. It is now widely believed that this shifting cultivation leads to environmental degradation and also disturbs the fragile eco-system. This occurs as a result of the destruction caused to the surrounding natural vegetation. In this way, thousand of valuable timber and medicinal plants are lost every year. This environmental imbalance has resulted uneven spread of monsoon rainfall leading to the problem of draught and excessive rainfall resulting floods in this region.

6. STRATEGY TO CHANGE THE STATUS OF SHIFTING CULTIVATION:

Considering the evil and deleterious effect of shifting cultivation, it is quite important to adopt a broad based strategy for changing the status of such cultivation in the minds of the tribal people of the N.E.Region as well as to wean away these tribal people from their nomadic agriculture practices into a settled and permanent agricultural practice.

Under the present context, the concept of "Sustainable Agricultural Development" can be an effective strategy for ensuring adequate supply of food, fiber, fuel and other amenities to the growing tribal population of the region. This strategy would pave the way for improving the living standard of the tribal people and also create a sense of security to their life as well. This concept of sustainable development of agriculture would also give due recognition to the geophysical and environmental factors of the region for developing a sound agricultural pattern for the people of this hilly region. Scientific studies suggest that mixed land use system are quite suitable for hilly areas from the point of view of production as well as conservation. In this context, the latest and most effective land and water management techniques, popularly known as 'watershed management programme' along with land development, soil conservation, agriculture, horticulture, plantation crops, forestry, animal husbandry and fishery can safely be considered as most vital and important strategy.[10] The alternative, which may come in the way, includes:

(a) Agricultural (settled) land use system through terracing and contour binding ;

(b) Horticultural and cash crop plantation land use system for developing fruit orchard, rubber, coffee and oil palm cultivation ;

(c) Multi-storey cropping land use pattern for differential harvesting of solar energy utilisation of soil fertility of variable depth ;

(d) Agri-Horti-Silvipastoral land use system with the strategy to adopt agriculture at the foot hills, horticulture at the mid portion of the hill slope and silvipastoral land use at the top of the hill ;

(e) Livestock based land use system for developing livestock farming along with fodder production system.

6.1. Efforts, Future strategy and Development Status. In the meantime government and other agencies have undertaken various measures for controlling shifting cultivation in desired directions. In the fifties, the Government of Assam took the earliest attempt for tackling the problems of shifting cultivation with the introduction of the plantation of cash crops like rubber, coffee, black pepper and cashew nuts for encouraging the 'jhummias' to accept these crops.

Under the North Eastern Council's Programme, 8 pilot projects of soil conservation and jhum control were under-taken in seven constituent units for the settlement of jhummias by providing financial assistance and 2 hectares of developed land to each family. Nearly 9698 hectares of land was developed under this scheme for settling 5187 families at a total expenditure of Rs. 436.16 lakh. At the end of the Fifth Plan, in total 60,000 hectares of land have been developed and nearly 25,000 families were settled up under the various programme of control of shifting cultivation undertaken by both NEC and North-Eastern States in their state plans.[11]

The most successful way of controlling shifting cultivation is to settle the jhum as on irrigated terraces by channeling water from mountain streams. This type of cultivation is also known as terrace cultivation and is practised in Khasi and Jaintia Hills of Meghalaya and Hills area of Punjab and Himachal Pradesh. But, rain fed or unirrigated terraces are not generally acceptable to jhummias. Moreover, practise of horticulture and cash-crops plantation is becoming popular in the slope areas.

However, due to complete absence of extension service and ignorance of farmers on improved agricultural technology, tribal farmers could not achieve maximum benefit from settled agriculture.

6.2 Watershed Management : During the sixth plan, the NEC has introduced a concept of watershed management on pilot basis for optimum use of land and water resources within a physiographic or hydrological unit governed by natural conditions. This watershed management makes provision for scientific survey and investigation of each unit for detailed planning and its implementation conducted by a technical team on each sub watershed. This unit provides guidelines to each sub watershed on soil and land capability, design, cropping programme, cost-estimates, economic analysis, etc. NEC is also helping these units and encouraging other units to develop in the catchment areas of major rivers.

Watershed management is now becoming very much popular in some North-Eastern States. The National Watershed Development for rain fed areas have been implemented in 8 of the 34 blocks in Meghalaya since 1996-97. The centrally sponsored scheme included soil and water conservation, innovation of mixed cropping, development of horticulture, animal husbandry, pisciculture, household production system and management of common property resources. The Government of India sanctioned one model watershed development project at Pyntherlynden in Mairang block in1990-91 and subsequently seven more projects were sanctioned. The total amount earmarked for these projects in Meghalaya during the Eight Plan was Rs.2.25 crores.

In Tripura, under the same National Watershed Development, another Rs.3.60 crores centrally sponsored project has been undertake to cover an area of 7.205 hectares in Dhalai and North Tripura districts which would benefit 1994 families.

Considering the geo-hydrological entity of the watershed, it is quite important to implement such programme systematically starting from upper reaches to lower reaches, irrespective of administrative boundaries for which inter-state co- ordination is a pre-requisite.

6.3 Future Strategy : The extent of the problem of shifting cultivation has gathered momentum with the increase in the number of tribal families practising shifting cultivation from 4.25 lakh tribal families in1974 to an

estimated number of 5.47 lakh families in 1984. The projected number of such families by 1994 and 2,000 AD stood at 6.75 lakh and 7.66 lakh respectively.[12] As per an estimate, for the resettlement of all such tribal families on settled agriculture it needs development of 1.5 million hectares of land at an estimated cost of Rs.750 crores by providing 2 hectares of developed land to each family at a cost of Rs.5,000 per hectare. Thus to complete this resettlement operation it will require a huge time and investment.

6.4 Settlement of Jhummias : Solution to the problem of shifting cultivation requires the settlement of tribal families on permanent agriculture. As per the projected estimates done by the NEC, it is found that for the settlement of jhummias by the end of 2000 A.D., 19.15 lakh labour units would be required and it would also require development of 9.80 lakh hectares of land for regular cultivation, 14.10 lakh hectares for pasture and homestead land and the remaining 3.7 lakh hectares for commercial forestry programme out of the total area of 27.6 lakh hectares presently engaged in shifting cultivation. Total cost estimated by NEC for this resettlement operation would be Rs.602.90 crores.

6.5 Development Status of Rubber, Oil-Palm and Coffee Cultivation : Development status of rubber, oil-palm and coffee cultivation in the North-Eastern Region is quite rich. In order to control shifting cultivation in the hill areas of N.E.Region, proper steps must be taken to take up intensive and extensive cultivation of rubber, coffee and oil-palm in this region. In Assam, the state Government in March 1997 has decided that a large area of the non-forest waste land would be brought under rubber block planting scheme where 65 per cent of the total investment would be contributed by the Rubber Board of India. Moreover, it was decided to bring 5,000 hectares of land under 'Robasta' variety coffee cultivation in Assam during 1997-98. Another 1,000 hectares of land in the Karbi-Anglong district have been earmarked for raising oil-palm cultivation. The prospect of rubber and coffee cultivation in other North-Eastern States is also quite bright. As per the statistic available with the Rubber Board's Guwahati Zonal Office, around 42,532 hectares of land has been brought under rubber cultivation till 1998-99 out of a potential hectare of 4,50,000 in the entire region. Total production of rubber in the N.E.Region was to the tune of 12,183 metric tones (MT) in 1998-99. Tripura is, by far, the biggest producer in the region with 8,588 MT of rubber produced from a planted area of 24,120 hectares. Assam has also produced 1,785 MT of rubber from its 10.805 hectares under rubber cultivation. Meghalaya and Nagaland have also produced 1424 MT and 167 MT respectively in 1998-99. In the North- East, the average yield per hectare in private sector farms is as high as 2,000 Kg. of rubber as compared to that of national average of 1563 Kg.[13]

InTripura, the state Government and Tripura Tribal Area Autonomous District Council (TTADC) has taken a joint initiative to rehabilated 15,000 tribal shifting cultivators in rubber plantation scheme. The project was undertaken since 1995-96 and envisaged to brought 55,000 hectares of land under the project to produce 10,000 MT of rubber per year. Moreover, another project has been undertaken in Tripura to bring about 1,00,000 hectares of land under rubber plantation on the basis of the survey conducted by the National Bureau of Science Survey (NBSS) and Land Use Planning (LUP). The project is being jointly aided by Central Rubber Board, Planning Commission and World Bank. The World Bank has earmarked Rs.28 crores for the project.

Thus it is observed that rubber cultivation has attracted large scale participation of the tribals and it is proving to be an effective mean to wean the jhum cultivators towards settled cultivation.

Moreover, the Coffee Board has launched an ambitious scheme in the N.E.Region so as to boost the coffee production from the current 2.5 lakh MT to 3 lakh MT by the end of the Ninth Plan and with the definite purpose of afforestation of jhum land as prospective socio-economic crop.

7. CONCLUSION:

Although various attempts have already been made by the state governments and various other agencies in

weaning the North- East tribals into modern scientific cultivation, however, most of these attempts have failed to achieve desirable results.

A field study of the Department of *Sociological Anthropology* of the North Eastern Hill University (NEHU), Shillong, showed that the tribals hardly used the subsidy given to them for starting a settled way of cultivation. In some cases they sold the land allotted to them, and went back to their old life. The study pointed out that jhumming is an ancient socio-economic tradition that the tribes like to cling to.

However, tribal resistance to change alone is not the only reason for the failure to halt jhumming in the North-East rather the lack of wholehearted effort on the part of Government agencies and Non-Government Organizations (NGOs) is also responsible for such failure.[14]

Such half-hearted official endeavors will hardly stop jhumming's silent march in the North-East. Thus under the present scenario, more planning and patience will be required in helping its tribal make the painful switch to settled agricultural existence.

Thus it will not be possible to wean away the traditional age old practice of cultivation completely, but the magnitude of the practise of this type of cultivation is being considerably reduced to divert and motivate the hill people for accepting a permanent and settled method of cultivation. Thus both the wholehearted efforts on the part of the government agencies and NGOs as well as the motivational process are equally important to transform these age-old tribal agricultural practices into a settled and developed farming practice.

Therefore, the Government as well as other organizations should come forward seriously to convince the tribal people of the North-Eastern Region about the real status of jhum cultivation and its deleterious effects so as to save the entire region from the impending ecological disaster.

NOTES AND REFENRENCES

FOOT NOTES:

1. FAO Paper, *Shifting Cultivation, Tropical Agriculture*, Vol. 34, No.3, 1957, P. 160
2. Gaurav, P. - *The Tropical World*, London, 1961, p.25.
3. Agarwal , A.K . , *Economic problems and Planning in North- Eastern India* , p. 321
4. NEC Secretariat , Shillong.
5. Basic Statistics NER , 1995, p.30.
6. Borthakur , D.N. , 1992, *Agriculture of the North Eastern Region,* Beecee Prakashan , Guwahati , p. 139
7. Dhar , P.K . , 1999, *The Economy of Assam*, Kalyani Publishers, New Delhi , pp. 443-44.
8. Prasad , R.N. , Pati Ram , Baroah , R.C. and Munna Ram , 1981, *Soil Fertility Management in N.E. Hill Region* , res. Bull . 9, ICAR Res. Complex for NER Region, Shillong.
9. *Report of Forest Survey of India*, Dehradun, 1993 as reproduced in Basic Statistics of NER, 1995, p. 32.
10. ICAR Research Complex for NER Region, Umiam, Meghalaya.
11. *Shifting cultivation in North-Eastern Region*, NEC Publication No. 17, and p. 8.
12. NEC Secretariat, Shillong.
13. Rubber Board of India, Zonal Office, Guwahati.
14. Dhar , P .K . , *The Economy of Assam*, 1995, p. 449.

SHIFTING CULTIVATION IN THE NORTH EASTERN REGION: A CONCERN FOR SUSTAINABILITY.

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ABSTRACT:

The principal occupation of the people on the North-Eastern Region of India is agriculture. Large section of the people of the region is Tibeto-Mongoloids. The Hills consisted about 70% of the total land area of the region where shifting agriculture locally called 'Jhum' is the chief land use. In the past the average 'jhum cycle' lasted for a period of 25 years to 30 years, but at present it has come down to 4 years to 5 years due to increasing pressure of population on land. There has been a gradual decrease in the output level under short cycle of jhum owing to reduced soil fertility. The resulted effect of jhum has also led to environmental degradation, loss of flora and fauna and climatic changes. Further there has been extensive loss of forestland.

While shifting cultivation is the natural way of life to the tribal population, there is also no other alternative method available to them for cultivation of their terrace land. It is therefore suggested that a pragmatic approach has to be initiated by the government authorities like resettlement of jhum families, provision of land and other agricultural inputs and infrastructural facilities. In all a specific area-oriented approach is called for to sustain the shifting cultivation in the region.

INTRODUCTION:

This paper tries to analyze the jhum cultivation in N.E.R. In this process an attempt has been made to assess the issues related to sustainability of this type of cultivation. This paper is divided into four sections. First section introduces the features of study area. Second deals with method of shifting cultivation. The concern for sustainability of shifting cultivation is analyzed in third section, and the fourth and last section contains the conclusions and suggestions for further research in this field.

STUDY AREA:

The North – Eastern Region of India consist of seven states, namely, Assam, Arunachal Pradesh, Meghalaya, Mizoram, Tripura & Nagaland. A large section of the people in the region are Tibeto-Mongoloids originally speaking variety of languages. The hills situated about 70% of the total land area, where shifting agriculture, locally called 'jhum' is the chief land use (Ramakrishnan, 1996). The Brahmaputra and the Barak valley in Assam is the largest valley land where settled agriculture is confined. The region covers 7.76% of the geographical area of the country. There are hundreds of different tribes in the region differing linguistically and culturally.

About 54% of the total geographical area of the North Eastern Region is covered by forest although there are inter- state variations. The percentage of forest area is highest in Mizoram (75.59%) and lowest in Assam (39.15%). The percentage of forest area in other North Eastern states are: Arunachal Pradesh (61.55%), Manipur (67.87%), Tripura (60.00%), Nagaland (52.02%) and in Meghalaya (42.34%). In the interior tribal areas, timber and minor forest produce are the principal source of livelihood. The ownership pattern of forest also differs in the different states of the region. In the hilly region, the ownership rests with the local communities and therefore, the proportion of reserved forest in those hilly states is quite well.

The growth rate of population is much larger in all the states of North Eastern Region as compared to the all India average. While some states like Assam, Tripura and to some extent Meghalaya and Mizoram have experienced a large- scale influx of the people from neighbouring countries like Bangladesh and Nepal, the other states are characterized by much higher birth rate than death rate (Lekhi & Choudhury, 1994). As a result the decadal variation in the North Eastern States seems to be very high as compared to all India average.

METHOD OF SHIFTING CULTIVATION:

Shifting cultivation is the simplest method available to the tribal population living in the hilly region. There is no other alternative way of cultivating the land in the hill areas. The shifting cultivation is the natural way of life to the tribal people in the hill areas. In fact man-nature relationship of a community is reflected in its mode of resource use across ideological axis. At a given level of ideology man' material requirements and his perception of nature and natural phenomena determines his interaction with nature and characterizes ideal type of the mode of resource use. At this level, ideology acts as determinant variable of mode of resource use and is external to the system. The ideological base of a community, for example, governs production relations, forces of production and exploitation of natural resources as well (Gadgil and Guha, 1992). Use of land resources for shifting cultivation by the different tribes is, however, not indiscriminate, rather it follows certain norms even at ideological level.

The system of shifting cultivation involves a number of operations. First, forest bushes are cut up to the stump level in the months of December- January and small trees and bamboos are felled. Short tree stumps and large tree boles are left intact. The underground organs of different species are not disturbed. Next, the stumps are allowed to dry after which they are set on fire. After the burning is completed the land is cleared and digging sticks and seeds of different crops as required are scattered in to the holes before the onset of the rains. The cultivation is confined to the area closed to the village. After every crop season or two, the area is left for 25 or 30 years and the cultivator moves to another area to slash and burn and cultivate (Lekhi & Choudhury, 1994). This laborious process often completed by men from two or three families. Such a joint effort is one of the essential ingredients of a well- knit social organization of a tribal society. This effort along with the process of allotment of sites for jhum by the village headman who is in charge of overall control of the village community (known as Gaobura) helps to promote kinship among the members of the village (Ramakrishnan, 1996). However, the system of allotment of land differs from tribes to tribes.

Paddy is the main crop in jhumming. Among the other crops cultivated are maize, millet, sweet potatoes, leafy vegetables etc. Each family chooses its own cropping pattern according to what it consume and in quantities enough to meet its own needs. The crops are all rain-fed and harvesting starts from August. The paddy grown in jhum fields matures earlier than the paddy grown in plains (Lekhi & Choudhury, 1994).

2.1 JHUM CYCLE:

In shifting agriculture, cultivator in a particular area for one or two years and then moving into other areas and again returning to the first area for cultivation completes a 'cycle'. The cycle includes the number of years an area is under cultivation plus the years the area is kept under forest fallow. Previously, the fallow period was 25 years to 30 years but has now come down to 4-5 years (Dhar, 1995). Long cycles were possible earlier because population pressure was not heavy and land availability did not limit the cycle. In North Eastern India, the average size of a jhum plot varies from 1.0 to 2.5 hectares. The average family consists of two adults and 3 to 4 children (Ramakrishnan, 1996). The fallow period in different North Eastern states can be inferred from Table- 1.

2.2 AGRICULTURE AND ENVIRONMENT AND CONCERN FOR SUSTAINABILITY:

Agriculture had escaped the mandatory environmental controls applied to other economic sectors, such as authorization of pollution sources, application of a polluter-pays principle, pollution taxes and so on. Today, such

measures are increasingly mooted as means to control modern agriculture, but widespread changes to landscapes to eco system and to natural resources have occurred already. Indeed agricultural modernization has been predicted upon processed that are inherently damaging to the environment, such as the increasing use of chemical additives, biological and genetic transformation, tree clearance land drainage and use of heavy machinery (Nature Conservancy Council, 1984). Initially, the scale and implication of change brought out by agricultural modernization took environmentalists and policy makers by surprise. Today, however, environmental impact of intensive agriculture is a major issue in all European countries (Buller. 1992). The agricultural change and its impact on environment, is a growing concern for all the countries of the World, developed or under developed. These concerns have led to new initiatives and policy commitments toward 'sustainable development', which shifts the emphasis from inputs like seeds and fertilizer to resource management.

Infact, there are at lease three classes of arguments one could make to justify a claim that economic activity should be sustainable. The first argument is a moral one. We the present generation has main obligation to those generations that will come after us. The second type of argument is ecological one. Suppose that you believe that ecological diversity is an important objective in its own right, then economic activity that threatens to reduce such diversity is intrinsically undesirable. The third approach of justifying a sustainability goal is an economic one. To develop an economic case, one should need to argue either that sustainable economic behaviour is more efficient than non- economic behaviour or that sustainable behaviour is that which maximizes inter- temporal social behaviour (Perman et. Al, 1996).

3. CONCERN FOR SUSTAINABLE SHIFTING AGRICULTURE:

The major advantage of the shifting cultivation to the hill people is that it provides a very easy method for preparing land for cultivation. Weeds and jungle can be easily cleared by slash and burn process and yield can be obtained in short period of time. However, the most important evil effect of shifting cultivation is that destruction of forest in hill area causes heavy soil erosion due to rainfall. Moreover, loss of the "top soil" in the hill area to the extent of 22% of the total soil due to "jhumming" causes a serious fall in the fertility of the soil and thus it creates a serious problem for the tribal society (Dhar, 1995). Infact, the major problems associated with jhum is the drastic shortening of the "jhum cycle" of 4 to 5 years during recent years. The main cause for shortening the cycle can be grouped into two classes - a) Economic effects and b) Environmental effects.

As a result of the reduction in the "jhum cycle", it has adversely affected the economic yield with gradual decline in the yield over a period of time (Ramakrishnan, 1996). The Table –2 compares the monetary output/input analysis of the jhum under different cycle in the North Eastern Region. The reduction in overall economic return is very obvious, when cost is calculated on the basis of prevailing market rates. The decrease in economic return under short cycle of jhum is related to reduced soil fertility and increase weed potential of the site.

Another most important effect of the shifting cultivation is that it leads to environmental degradation and disturb the fragile ecosystem of the North Eastern Region. This occurs as a result of the destruction caused to the surrounding natural vegetation. The environmental imbalance has resulted uneven spread of monsoon rainfall resulting floods in the region. In Meghalaya unabated jhumming has turned the once thick evergreen forest belt of Cherrapunji, a place which used to record the highest rainfall in the World into a dry brown scar. The jhumming practice has caused extensive climatic changes in the state and destroyed rare flora and fauna (Dhar, 1995). The Cherrapunji ecosystem that now stands decertified due to deforestation inflicted sometime in the distant past now refused to recover its original state. Linked with this drastic loss in biological diversity is the human suffering which now is immense. Water is a scarce commodity during the dry months in this high rainfall spot of the World, a contender for becoming the drier spot on earth along with the near Mawsynram in the Khasi Hills district of Meghalaya. The tribal who is traditionally bound to the land and forest has now been forced to seek other avenues for survival (Ramakrishnan, 1996). A relative scenario of change in forest cover in the north Eastern Region is depicted in Table – 3 and Table – 4.

4. CONCLUSIONS AND SUGGESTIONS:

The primitive economy of hunting, fishing and gathering of the tribal economy in the north eastern Region has been struck by the tragedy of the common property because of rapid growth of population in the region through exogenous processes. The land-intensive quasi-primitive method of shifting cultivation using labour as the strategic factor of production has been evolved in the tribal society on the assumption of high-land-man ratio that is no longer valid today. Infact the region appears to be over populated in the ecological sense given the land-intensive nature of agricultural production and preponderance of the primary sector in the occupational structure. In the circumstances, there is a need for an environment friendly change in technology in the primary sector. It is regrettable to note that no effective alternative to jhumming has yet been evolved in the region.

The fact that the Govt. and other agencies have undertaken various measures for controlling shifting cultivation in desired direction. The North Eastern Council and the Indian Council of Agricultural Research has been effectively involved to find way to solve the problem. From fifth plan onwards-different programme have also been undertaken in this direction.

Although various attempts have already been made by the state Govt. and various other agencies in weaving the north east tribal in to modern scientific cultivation but most of these attempts have failed to achieve the desired results. A field study of the department of Sociology Anthropology of the North Eastern Hill University; Shillong in 1994 showed the tribal hardly used the subsidy given to them for starting a settled way of cultivation. In some cases they sold the land allotted to them and went back to old life. The study pointed out that jhumming is an ancient socio-economic tradition that the tribes like to cling to (Dhar, 1995).

However, various resistances to change alone are not the only reason rather lack of wholehearted effort on the part of the Govt. agencies is responsible for such failure. It has been observed that in Garo Hills district of Meghalaya some area selected for terrace cultivation as part of the anti jhumming efforts were unsuitable for food crops. Seeds were often not supplied in time and proper infrastuctural facilities required in this connection are also not provided in the resettled colonies. Such half-hearted Official endeavours will hardly stop jhumming's silent march in the North-East.

The fact that recent jhum around Cherrapunji is banned by the village council is a positive indication of

TABLE – 1

State	Annual Area under Shifting Cultivation (sq. kms.)	Fallow Period (in years)
Arunachal Pradesh	700	3 - 10
Assam	696	2 - 10
Manipur	900	4 - 7
Meghalaya	530	5 - 7
Mizoram	630	3 - 4
Nagaland	190	5 - 8
Tripura	223	5 - 9

Source: *Task Force on Shifting Cultivation, Ministry of Agriculture (1983) in Basic Statistics N.E. Region 1995, N.E.C, Shillong.*

transformation. What is urgently needed is an "area-oriented approach" of planning and more patience on the part of the Govt. agencies and NGOs. In particular, the primary sector operations must be made eco-friendly. An effective substitute for shifting cultivation can be found only through area-specific crop planning with the hills specializing in horticulture and plantations and the valley in food crops. These will help in making the painful switch to settle agricultural existence. The Universities of the region must also come forward in arranging area-oriented specific short-term motivational programme on the issue.

TABLE – 2.

	JHUM		
	30yrs	10 yrs	5 yrs
Inpur	2616	1830	896
Output	5586	3354	1690
Net gain / loss	2970	1524	794
Output / input	2.13	1.83	1.88

Source : *Ramakrishnan : 1996: 25*

Table - 3.

Change in forest cover (1991 and 1993 assessment) **(sq. kms)**

State	1991 Assessment			1993 Assessment			Total change in 1993 Assessment
	D.F	O.F.	TOTAL	D.F	O.F.	TOTAL	
Arunachal Pradesh	54542	14215	68757	54510	14151	68661	- 96
Assam	15842	8908	24751	15998	8510	24508	- 243
Manipur	5309	12376	17685	5307	12314	17621	- 64
Meghalaya	3305	12570	15875	3305	12464	15769	- 106
Mizoram	4279	14574	18853	4238	14459	18697	- 156
Nagaland	3351	10790	14321	3487	10861	14348	+ 27
Tripura	1825	3710	5535	1819	3719	5538	+ 3
Total	88633	77144	165777	88664	76478	165142	- 635

D.F. = Dense Forest
O.F. = Open Forest
Source: *Basis Statistic of N.E. Region, N.E.H.U.*

TABLE - 4

Loss / Gain in the forest cover in 1993 assessment as compared to 1991 assessment in the North East State

STATE	LOSS DUE TO			GAIN DUE TO			NET (+)GAIN (-)LOSS
	SHIFTING CULTIVATION	OTHER REASON	TOTAL LOSS	REGENARATION IN ABONDONED SHIFTING CULTIVATION AREA	OTHER REASON	TOTAL GAIN	
Arunachal Pradesh	70	26	96	-	-	-	-96
Assam	165	190	335	104	8	112	-243
Manipur	28	36	64	-	-	-	-64
Meghalaya	110	2	112	6	-	6	-106
Mizoram	256	-	256	100	-	100	-156
Nagaland	63	-	63	90	-	90	+27
Tripura	10	27	37	15	25	40	+3
Total	702	281	983	315	33	348	-635

Therefore, net loss in forest cover in the N.E. States = 983-348=635 sq.km.

Source: *Govt. of India, Forest Survey of India (Min. of Environment and Forest), 1993, as mentioned in the Basic Statistic of North Eastern Region, 1995*

REFERENCES:

1. Barua, P.C. (1990), *Development Planning of North East India*, Mittal Publication.
2. Buller, J.Henry (1992), *Agricultural Change and the Environment in Western Europe; Agricultural Change Environment and Economy*, Edited by Keith Haggart, Mansell; 68-70.
3. Dhar, P.K. (1995), *The Economy of Assam (including Economy of N.E.India)*, Kalyani Publishers.
4. Gadgil, M. and Guha, R. (1992), *The Fissure Land; An Ecological History of India*, Oxford University Press, Delhi.
5. Lekhi, R.K. and Choudhury, R.K. (1994), *Economy of India including Assam and North East*, Kalyani Publishers.
6. Nature Conservancy Council (1984), Great Britain.
7. Perman Roger, Ma Yue and Mcgilvray James (1996), *Nature Resource and Environment Economics*, Longman, London and New York.
8. Ramakrishnan, P.S. (1996), *Shifting Agriculture and Sustainable Development*, UNESCO AND THE PARTHENON PUBLISHING GROUP.

AGRICULTURAL SCENARIO IN HILLS: A STUDY IN KARBI-ANGLONG DISTRICT OF ASSAM

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ABSTRACT:

The North East Region (NER) is predominantly agrarian and bulk of the rural people depends on agriculture for their livelihood. The region is mostly hilly terrain except in Assam, where a distinctive feature of agricultural practices of the people is Jhumming, which is the traditional way of their life.

Karbi- Anglong district is one of such district where jhumming cultivation is still practised. But due to its various shortcomings, now-a-days it is tried to popularise settle cultivation and to boost up agricultural production by using modern methods. As there are limited study at the district level particularly in hilly terrain about the rate of agricultural growth in respect of areas, production and productivity, an attempt has been made to measure the same by using exponential function and other growth methods. It is found that in almost all crops, production is influenced more by the expansion of area under cultivation than by the use of production raising factors. From the study, it may be opined that the importance of shifting cultivation over the years is decreasing slowly and people are going in for settled cultivation because of increased population as well as the increased awareness about the ill effects of shifting cultivation and benefits and usefulness of settled modern cultivation.

INTRODUCTION :

Karbi- Anglong district is the biggest and hilly terrain district of Assam. As per 1991 census only 11 percent of the total population in the district live in urban areas. More than 70 percent of the workers are engaged in agricultural sector. As most of the population are tribal a distinctive feature of agricultural practices of the tribal people in the district is jhumming which is the traditional way of their life. This is in fact the shifting process of cultivation of cycles. This cultivation is done in autumn season either as a single crop or sometime as a mixed crop along with maize, ginger, turmeric,chillies and vegetables, etc. Some horticultural crops cultivation, viz, pineapple, orange, papaya and banana occupies a vital role in agricultural economy of this district. Winter paddy cultivation in flat lands mostly in river valleys is done only in *Rabi* seasons. The production of this paddy is also not attractive. Shifting cultivation turns the hill slopes barren because of soil erosion and it is less productive and does not commensurate with time, labour and investment. Although, the difficulties of jhum is known, but still it is being practised widely as the traditional way due to various reasons. Therefore, it is tried to popularise settled cultivation and to boost up agricultural production by modern method, providing facilities of soil conservation and irrigation.

Studies relating to shifting cultivation at the district level particularly hilly terrain are extremely limited mainly due to non- availability of data, extreme geographical variation especially in terms of altitude, rainfall, soil and other characteristics. However, an attempt has been made here to study the agricultural growth based on acreage and production data for Karbi- Anglong district.

OBJECTIVES :

This study has been taken up with the following objectives:

1. To analyse the trend of agricultural growth with respect to three factors: viz, area under crop, production and

productivity.

2. To examine which of the factors (area and production) has greater importance in agricultural production.

MATERIAL AND DATA SOURCE :

Agricultural production includes production of vegetables and livestock products besides cereals, pulses, and other non-food crops like cotton, jute, etc. But as the statistic of the former items are scanty and unreliable, the analysis of agricultural growth has been confined to three items of study, viz, area under crop, production and productivity of important cereal - rice, maize, wheat, two oilseeds and fiber product-rape and mustard, jute and some miscellaneous crops such as – sugarcane, chillies, tapioca, potato, areca nut, banana, papaya and pineapple.

The study is based on secondary data. The data were collected from different organisations, Government Departments, journals and various other published sources. All collected data are tabulated and analysed. Since our interest is more on related growth than absolute, the index numbers of area under crop, production and productivity have been used. Here our data relates to from the year 1980-81 to 1997-98. The year 1980-81 was selected as the base year.

MODEL :

1 Among the various known methods of measuring growth, exponential growth model is better than linear growth model. For instance, the underlying assumption in the linear equation is that the growth of agricultural output in the current year does not depend upon the previous year. As this assumption is not reasonable, it seems that the used of linear equation for estimating the growth rate over a period of time is inappropriate. Like linear equation, exponential equation is also based on the assumption that the rate of growth of output would be constant over a period of time. However, if the equation of choice arises between linear and exponential form in the context of estimating growth rate, the latter is preferable to the former, because the underlying priority consideration in the exponential form is that the output in a year would depend upon the output in the preceding year. The exponential trend is given by the equation,

$$Y = a\, b^{x}$$

Putting the equation in logarithmic form, we get

$$\text{Log } Y = \log a + X \text{ Log } b$$

To obtain the value of constant a and b, the two normal equations to be solved are :

$$\Sigma \text{ Log } Y = N \text{ Log } a + \text{Log } b \, \Sigma \, X$$
$$\Sigma \, (X. \text{ Log } Y) = \text{Log } a \, \Sigma \, X + \text{Log } b \, \Sigma \, X^{2}$$

Where, Y is the trend value depending on X, which represents a particular year and 'a' is the Y intercept while 'b' is the slope of the curve, i.e., rate of growth. N is the number of years.

When deviations are taken from middle year (here we had taken 1987-88 as middle year), i.e., $\Sigma X=0$, the above equation takes the following form:

$\Sigma \text{ Log } Y = N \text{ Log } a$ so, $\text{Log } a = \Sigma \text{ Log} Y / N$

and, $\Sigma \, (X. \text{ Log } Y) = \text{Log } b \, \Sigma \, X^{2}$ so, $\text{Log } b = \Sigma \, (X.\text{Log } Y) / \, \Sigma \, X2$

$\Sigma \text{ Log } Y = N \text{ Log } a$ so, $\text{Log } a = \Sigma^{\text{Log } Y}/_{N}$

and $\Sigma \, (X. \text{ Log } Y) = \text{Log } b \, \Sigma X^{2}$ so, $\text{Log } b = \Sigma^{(X. \text{Log } Y)} / \, \Sigma \, X^{2}$

2. Now if F_t and F_0 are the values in t^{th} and initial year, then the comparative growth measured between the base year and the t^{th} year is denoted by G_{t-0} which is defined as:

$$G_{t-0} = {}^{Ft-F0}/_{F0} = I_{t-1}$$

When $I_t = F_t / F_0$

And 'growth between t^{th} and $t\wedge^{th}$ years, denoted by :

G_{t-t} is given by,

$$G_{t-t^{\wedge}} = {}^{F_t - F_{t^{\wedge}}}/_{F_{t^{\wedge}}} = {}^{I_t - I_{t^{\wedge}/}}I_{t^{\wedge}}$$
$$= Y_t - Y_{t^{\wedge}/\,Yt^{\wedge}} = {}^{b}{}_{(t-t^{\wedge})}/_{Yt^{\wedge}}$$

Where, Yt and $Y_{t'}$ are the trent values of I in t^{th} and $t\wedge^{th}$ years respectively. Thus $G_{t-t^{\wedge}}$ will be an 'indicator' of growth.

RESULT AND DISCUSSION :

The regression coefficient calculated to fit the trend of index numbers of the three characters viz, area under crop, production and productivity would be an estimate of growth rate. The compound growth rates with regard to area, production and productivity have been computed on the basis of the exponential equation. The compound growth rate is worked by using the relation (b-1)× 100 and results are given in Table. 1.

Table.1 Compound Growth Rates In Percentage During 1980-81 to 1987-88

Crops	Compound Growth rates of Index numbers of		
	Area under crop	Production	Productivity
Rice	-1.96	1.87	0.20
Maize	0.70	1.50	0.67
Wheat	2.30	3.32	0.88
Rape and Mustard	-1.46	-2.13	-0.83
Jute	-0.20	-0.76	0.14
Chilies	1.93	3.45	1.27
Sugarcane	-0.89	-1.73	-0.89
Tapioca	2.64	2.80	1.04
Potato	3.78	5.44	1.47
Areca nut	1.99	0.59	-2.17
Banana	0.96	0.16	0.70
Papaya	4.95	5.31	0.34
Pineapple	3.56	4.75	-0.14

Note : *Calculated on the basis of data collected from Statistical Handbook, 1998 Govt. of Assam*

(a) Percentage increase in per acre of output of all food items, excepting those of rape & mustard, jute and sugarcane had a high rate of increment in comparison to those in the base year. In terms of area, papaya had recorded the highest increase in the rate 4.95 percent followed by potato and pineapple by showing 3.78 percent and 3.56 percent increment respectively. Out of all crops maize, wheat, chillies, tapioca, potato, areca nut, banana, papaya and pineapple shows positive growth rate in area under crop. Though these crops shows positive growth rate but, wheat, chillies, tapioca, potato, areca nut, papaya and pineapple only shows growth rate in terms of area more than 1 percent and others shows very nominal increment. On the other hand rice, rape & mustard, jute and sugarcane shows negative growth rate in the

case of area under crop.

(b) In terms of production, potato take the first position showing 5.44 percent increase annually where area is the main factor for increasing production as productivity is increasing by only 1.47 percent. In case of papaya also, in a similar way, area plays vital role in the increase of production. Similarly in case of wheat, chilies, tapioca, pineapple, maize, areca nut and banana where production are positive area contributed positively. Rice is the only one factor in which productivity is the main factor to increase its production as area is declining by 1.96 percent. So almost in all crops, area contributed mainly to increase production and not the productivity.

The ratio between any two growth rates shows in Table 2. were used as 'indicator' for a comparative study of the growth rates of different factors, viz, area under crop, production and productivity. The 'indicator' β_1, β_2 and β_3 were thus given by the following relationship :

$$\beta_1 = b_P / b_A \qquad \beta_2 = b_P / b_R \qquad \beta_3 = b_R / b_A \qquad 1$$

Where b_p, b_a and b_r are the compound growth rates (in percentage) of index numbers of production, area under crop and productivity respectively.

Table 2.

Values of β_1, β_2 and β_3

Crops	β_1	β_2	β_3
Rice	-0.95	9.35	-0.10
Maize	2.14	2.24	0.96
Wheat	1.44	3.77	0.38
Rape and Mustard	1.46	2.57	0.57
Jute	3.80	-5.43	-0.70
Sugarcane	1.94	1.94	1.00
Chilies	1.78	2.72	0.66
Tapioca	1.06	2.69	0.39
Potato	1.43	3.70	0.39
Areca nut	0.29	-0.27	-1.09
Banana	0.17	0.23	0.73
Papaya	1.07	15.62	0.06
Pineapple	1.33	2.21	0.60

Note : Calculated on the basis of the data collected from Statistical Handbook,1998 Govt. of Assam.

When the growth of a particular factor under study is compared with another, it is seen that the ratio between the growth of production and the growth of area is above 2 percent for maize and jute. It is more than 1 percent for wheat, rape & mustard, sugarcane, chilies, tapioca, potato, papaya and pineapple. Others show less than 1 percent and for rice, the ratio between the growth of production and the growth of area is negative. Comparing the growth of production and the growth of productivity, the ratio is seen to be highest as 15.62 percent for papaya followed by rice showing 9.35 percent. Except for jute and areca nut, the ratio is positive for all other crops. Similarly when the growth of productivity is compared with the growth of area under crop, the ratio is less than 1 percent for all crops. For rice, jute and areca nut it is negative.

Table.3. (next page) show the growth of area under crop, production and productivity of each crop, in relation to the year 1980-81. The growth is found to be negative for rice, rape & mustard and sugarcane when the area under

crop is concerned. Similarly, in case of production, it is negative for rape & mustard, jute and sugarcane. On the other hand, while productivity is concerned, the ratio is negative for rape & mustard and pineapple.

TABLE - 3

Values of G_{81-98} Showing growth between 1981 and 1998

Crops	Area under crop	Production	Productivity
Rice	-0.23	0.30	0.16
Maize	0.67	1.23	0.34
Wheat	1.30	1.43	0.10
Rape and Mustard	-0.84	-0.95	-0.68
Jute	-0.04	-0.44	0.39
Chilies	-0.49	-0.12	0.39
Sugarcane	1.96	2.46	0.03
Tapioca	1.03	1.23	0.28
Potato	2.99	3.32	0.19
Areca nut	0.71	0.73	0.53
Banana	0.22	0.27	0.34
Papaya	2.51	3.56	0.03
Pineapple	1.86	2.05	-0.23

Note : *Calculated on the basis of data collected from Statistical Handbook, 1998 Govt. of Assam*

Thus an analysis of time series data relating to acreage, production and productivity for all crops except rice reveals that (i) the growth of output i.e. production is influenced more by the expansion of area under cultivation than by the used of productivity-raising factors. (ii) Among all crops only in the case of rice production is more influenced by the use of productivity – raising factor where impact of area is less than productivity. (iii) Potato and papaya records the highest growth of production showing more than 3 percent and the major contribution of growth of production comes from land. In the case of pineapple though there is a decline in productivity but still it's production is positive. This is because of positive effect of area. (iv) Out of all crops, production of rape & mustard, jute and sugarcane shows declines and it happens only because of more effect of area though there is positive effect of productivity in respect of jute and sugarcane.

CONCLUSION :

Shifting Cultivation, is one of the oldest method of crop production in most of the hill districts of North Eastern India including Karbi- Anglong district of Assam. It is clear from foregoing discussion, that the effect on production is more on account of expansion in area rather than productivity. However, shifting cultivation cannot be advocated for its various shortcomings. Over the years, may be shifting cultivation is giving way to settled cultivation using modern methods. Moreover, due to shortening of the jhum cycle in the hills, some of the farmers reclaimed wet land in the available narrow river valleys or between the ridges of the hills and started settled cultivation at their own initiatives. Now, it is necessary to increased the awareness among the hill people about the urgent need to increase productivity in agriculture by using modern and scientific methods of cultivation. This is more so as the supply of land is fixed and to be self-reliant in food production in a sustainable manner, we have no option but to increase productivity in agriculture.

REFERENCES :

1. Chatterji A. : *A study on Agricultural Growth During 1950-1963 in India* : Indian Journal of Agricultural Economics. Vol. 19 No.1

2. Dandekar V.M. : *The Indian Economy, 1947-92, Vol. 1 : Agriculture*, Sage publication. New Delhi. 1996

3. Goswami, P.C. (ed) : *Agriculture in Assam* : Assam Institute of Development Studies. 1989

4. Govt. of Assam, Statistical Handbook, Assam 1998

5. Sankhayan. P.L : *Introduction to the Economics of Agricultural Production* : Prentice Hall of India Pvt. Ltd. New Delhi. 1988

6. Singh, Parasar and singh : *Econometrics and Mathematical Economics* : S. Chand & Company Ltd.1997

7. Soni R.N. : *Leading Issues in Agricultural Economics* : Shoban Lal Nagin Chand & Co. 1992

8. Srivastava S.C. : *Development and Disparity : Agriculture in North East India* : The Indian Journal of Economics. No. 313 Vol. LXXIX October 1998.

JHUM CULTIVATION IN MANIPUR
AN ASPECT

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ABSTRACT:

In this paper, E.I. Singh has made attempts to highlight the importance of controlling jhum cultivation in view of the changing agro-climatic situations and environmental problems in Manipur. Manipur is a Hill State where the hilly regions constitute about nine-tenth of the total area and the central valley constitutes only about one-tenth of it. Main agricultural field are in the valley, which is better known as the 'rice bowl' of the State. Shifting cultivation is practised in the hill slopes by the tribals as a way of life. The pressure of population is becoming high in the State. As a result, jhum cycle has been reduced to even 3 to 4 years now as it was 20 to 30 years in the past. The hazardous effect of jhum cultivation in various forms and the necessity of controlling it was being felt now. Efforts are being made by the Government to control jhum cultivation by adopting alternative earning methods. In spite of huge expenditure made for controlling it, the achievements made are only partial and not satisfactory in consideration of the investment meant for this from the State Plans and Centrally Sponsored Schemes. It is evident that the area under shifting cultivation increases inspite of the efforts to control it. It seems that there is a lack of sincerity of government machinery and honesty of beneficiaries themselves in controlling jhum cultivation. The attempt needs strong determination both from the government and the people. The paper also highlights the importance of streamlining the measures being taken up to achieve the real targets by adopting real alternatives to jhum wherever possible. They should try to reap the fruits of the schemes being taken and to be taken up. Realisation should emerge from the hill people themselves who are directly involved in it in consideration of the future generation.

INTRODUCTION:

Manipur is a hilly state situated in the North- Eastern border of India with an oval shaped fertile valley in the centre. The State of Manipur is a beautiful piece of land in the lap of the North East of India with the twin combination of the encircling ranges of green hills all around and the central valley with the Loktak lake. On the whole, the state is a mountainous one, the Hill areas consisting of nine- tenth of the total area and the valley at the centre, one- tenth of it. It is this combination of hills and plains, which makes the state exquisitely beautiful. The state has a very salubrious climate.

The state has an area of 22,327 sq. kms with the population of 23,88,634 according to the census of 2001. Of the total population about two-third are thickly populated in the small valley and one-third are disperse thinly in the hill areas. The density of population in the valley is about 628 persons per sq.kms and in the hill areas is about 48 persons per sq.kms according to the census of 2001.

Agriculture and allied activities are the main stay of the economy of the State where about 70 per cent of the population depends on it. In short, the economy of the State depends on agriculture. The system of settled or permanent cultivation is practised in the valley areas, which is only one-tenth of the total areas whereas the areas under permanent /settled cultivation in the hill areas are very small in comparison with the valley areas. At the same time, there is limited areas in the valley where the pressure of population both for human settlement and cultivation is equally very high. Therefore, more areas in the Hills are to be brought under cultivation in order to meet the pressure of population in the State.

JHUM OR SHIFTING CULTIVATION IN THE HILL AREAS OF MANIPUR:

Jhum cultivation is the primitive method of cultivation as practised in the Hill areas of Manipur. It is known by various names in different parts of the world. In Manipur, shifting or jhum cultivation is known as "Pam-Lou" and is widely practised in all the Hill areas inhabited by different tribes.

Under this system, after having selected the site for jhum cultivation, the forest plants consisting of bamboos, shrubs, trees etc., are cut down during the cold season normally from January to March. They are allowed to dry and then set on fire before the break of monsoon. Ashes are racked and hoed and then seeds are sown after removing big trunks and unburned trees from the site. The crops raised comprised of paddy, maize, cotton, beans, chillies, spices and various kinds of vegetables. The main crop is paddy and it is harvested in September and October normally. After having harvested, the ground is prepared for the next season's sowing. Thus, the crops are harvested in successive years from the same field. After two to three years when the fertility of the soil is reduced or exhausted because of erosion of the topsoil, the fields are abandoned and jhumming is started in new areas leaving the previously cultivated land as fallow. The jhummias return to the same plot of land after a few years. This shifting of cultivation from plot to plot is known as jhum cycle. The jhum cycle was 20 to 30 years a few decades back but nowadays it has been reduced to 3 to 4 years in most of the Hill areas because of the pressure of population and other factors.

Table 1:

Distribution of areas under Jhum Cultivation in Manipur

SL NO	District	Area under paddy in ("000 hectares) Jhum Cultivation	TOTAL	Percentage under Jhum Cultivation to district total
1	2	3	4	5
1	Senapati	0.97 [3..84]	18.21 [12.04]	5.33
2	Tamenglong	7.07 [28.01]	9.09 [6.55]	71.41
3	Churachandpur	5.63 [22.30]	10.32 [22.30]	54.55
4	Chandel	6.63 [26.68]	8.17 [5.40]	81.15
5	Ukhrul	4.97 [19.57]	17.20 [11.38]	28.72
6	Valley District	N.A	87.39 [57.80]	NA
7	State total	25.24 [100.00]	25.24 [100.00]	16.69

Note: Figures in brackets indicate Percentage to total
Source: Report on Crop Estimation Survey in Manipur (1992-93), Directorate of Economics and Statistics, Government of Manipur

In the table above, the distrubution of areas under Jhum cultivation of puddy in hill districts is shown. The area under shifting cultivation as well as permanent cultivation is on the increase in the hill areas of Manipur. Wet-cultivation or flat land and terrace cultivation on the hill slopes constitutes the total areas under the permanent cultivation in the hill areas. Shifting cultivation is practised only in the hill areas of the state. Among the five hill districts, the areas under shifting cultivation are the lowest and those under permanent cultivation are the largest in Senapati district. In Ukhrul district also, area under permanent cultivation are greater than those under jhum cultivation. Tamenglong district occupies the largest area under jhum cultivation, followed by Chandel and Churachanpur districts. The figures shown in Table.1. indicates that the efforts made so far to control jhum cultivation have not yielded desired results due to various reasons. The present estimated area under jhum cultivation is about 90,000 hectares involving about 70,000 jhumias families annually (1997-98). About 65,000 hectares of land were under jhum cultivation every year and about 50,000 families were reported to resort to jhum cultivation (1984). Jhum cultivation has been expanding continuously in spite of various measures taken up by the State and Central Government.

IMPORTANCE OF JHUM CULTIVATION:

Jhum cultivation is important for the tribes of Manipur. The basic objective of jhum cultivation to them is to meet the primary necessities of life. A jhum cultivator tries to produce a number of items such as foodgrains, fruits, vegetables, etc. Jhum is not only a cultivation but a way of life to them since time immemorial. They have to cultivate in their community lands which are situated in the dense forest. They were so much adapted to such a way of life of shifting cultivation, which was helpful to them when population was very thin. Still, it goes on in remote interiors of the hill areas, which are away from the modern comforts of life. Working, singing and dancing together are the normal entertainment to their way of life.

The practice of shifting cultivation is so deeply rooted to and interwined with the way of life of hill people that one cannot possible dissociate jhumming from the socio-economic compulsion under which the system traditionally continues. The conditions of living of the jhummias are very poor in terms of food, clothing, shelter, proper education, medical care, transport and communication, etc.

Most of them are away from the modern comforts of life. Hence, as Agarwal observed "*The correct approach to the problem of shifting cultivation lies in accepting it not as a social evil practice but recognszing as a way of life, not condemning it as evil practice but regarding it as an agricultural practice evolve as a reflect to the physio-graphical character of land.*"

Here we cannot ignore the fact that the economic factors are always more powerful than social and religious factors in the long run. It may be observed that economic and demographic compulsion will bring changes in the practice of jhum cultivation in the long run.

HAZARDOUS EFFECT OF JHUMING:

It is a known fact that shifting cultivation has many hazardous effects particularly on the soil and natural environment. Soil lost means fertility lost and poor land will support poor people only. The adverse effects of jhumming are:

1. Wide scale soil erosion through surface run-off and wind erosion
2. Land degradation
3. Deforestation, loss of flora and fauna and other rare species
4. Siltation of riverbeds, lakes and reservoirs
5. Drying of perennial source of water
6. Frequent floods
7. Ecological imbalance, etc.

MEASURES BEING TAKEN UP TO CONTROL JHUM CULTIVATION:

Whatever merits and importance jhum cultivation might have in the past, it is now felt that jhum cultivation has many adverse effects. There is urgent necessity to check further expansion of jhum cultivation to wherever possible. In this regard, the Government of Manipur has taken up schemes for providing grants and subsidies for constructing terrace fields in the hill areas where irrigation facilities are available. At the same time 100% Centrally Sponsored Schemes (CSS) are being taken up in order to help controlling of jhum cultivation. The measures taken up by the state Government under the state plans and CSS for controlling shifting cultivation are as follows:

A. STATE PLAN:

Under the state plan, a number of measures are being taken up by the Government of Manipur to control shifting cultivation. These are:

1. Construction of terrace; 2. Horticulture plantation; 3. Irrigation; 4. Land development; 5. Pilot projects on water harvesting etc.

B. CENTRALLY SPONSORED SCHEMES (CSS)

For controlling shifting cultivation centrally sponsored schemes are also being taken up in the hill areas of Manipur in recent years. They are:

1. Land development; 2. Horticulture Plantation; 3. Agro-forestry; 4. Plantation crops; 5. Irrigation; 6. Watershed development projects.

At the same time, attempts are being made to wean away the jhummias from the practise of shifting cultivation through the integrated approach involving agriculture, forestry, horticulture, veterinary, etc.

In spite of the efforts made to control or check shifting cultivation, the areas under this system of cultivation are continuously expanding in the hill districts.

SUGESTED MEASURES:

1. Awareness: It is generally known that jhum cultivation has hazardous effect in various forms but many jhummias in the remote hill areas are not aware of it. Therefore, steps should be taken to make them aware of the adverse effects of jhumming by imparting required knowledge.

2. Selection of site: Construction of terrace fields of different types requires fulfillment of many conditions, which are well only to the experts. Farmers have to be properly trained in this direction. Officials or experts concerned in the selection of sites for terrace cultivation should be honest and efficient. Blanket recommendation of all the hill areas for terrace cultivation or settled cultivation may not serve the purpose. Very steep slopes for example, may not be suitable to terrace cultivation. All the areas under settled cultivation need proper irrigation and other facilities.

3. Skill formation: Most of the farmers in the hill areas may not have the required skill or habit for settled cultivation. Over and above the use of wooden plough, they should have enough knowledge of high yielding varieties, green manure, fertilizers, pesticides and management practices. Unless they acquire the required knowledge of permanent cultivation, the engaging/hiring of skill labour may be more costly. Consequently the jhummias may resort to jhum cultivation again. Therefore, it is necessary to impart the farmers of the hill areas working knowledge of settled cultivation by arranging frequent farmer's training programmes.

4. Alternative occupation: Manipur has great potential for horticulture, particularly in the hill areas. The

problem of controlling jhum cultivation is the question of providing real alternative means of earning. The hill areas are suitable for different kinds of fruits, plantation crops, vegetables and spices. Intensified horticultural programmes, establishments of coffee and tea gardens, plantation of rubber, growing spices and agro-forestry programmers may help in regulating jhum cultivation. The marketing of the products is another hurdle in the attempt for horticulture and plantation crops. The Government has to bear the responsibility of building up the transport and communications infrastructure. Improvement of inter-state and inter-district road network is essential for good transport and movement of the products. The North-East Regional Marketing Corporation should be properly co-coordinated so as to procure the horticultural products at a reasonable price directly from the farmers. The involvement of NGOs and private entrepreneurs in agro- based industries will be a welcome step.

5. Proper monitoring: The sincerity of the officials and the honesty of the beneficiaries are very important in the implementation of the state plans and centrally sponsored schemes. The Government often mentioned about the inadequacy of funds for the control of jhum cultivation in the hill areas. However, it is a well-known fact that there are many leakages in the process of implementation and huge amounts meant for the real jhummias are siphoned off. Proper implementation of plan programmes calls for a system of proper monitoring and evaluation.

6. Land ownership to the farmers in the hill areas: Entitlement and ownership of lands to the real farmers is bound to help in solving the problems of shifting cultivation to a great extent. The extension of Manipur Land Revenue and Land Reforms Acts 1960, with certain modifications suitable to hill areas, will help both the people and the Government to a considerable extent.

REFERENCES:

1. A.K. Agarwal, *North East India - An Economic Perspective*. P-130

2. Dr. N. Ram Singh, *Agriculture and Rural Economy of North East India*, Volume I

3. *Report of Crop Estimation Survey in Manipur* (1992-93) by Directorate of Economics and statistics, Govt. of Manipur.

4. Govt. of Manipur, Planning Department. *A General Review of Progress* (1980-85).

5. Planning Deptt. Govt. of Manipur. *Annual Plan* (1993-94).

6. Planning Department, Govt. of Manipur. *Seventh Five Year Plan* (1985-1990) and *Annual Plan* (1985-86) Vol. I.
Development Performance Approach and Outline.

7. Planning Deptt.Government of Manipur (1997). *Ninth Five Year Plan* (1997-2002) *An Annual Plan*, (1997-1998) Volume I.

8. *Mid-Term Appraisal for the Ninth Five Year Plan* (1997-2002) Planning Department, Government of Manipur.

9. *The Journal of MACDA*, Volume I No. 1, June- July 84.

AN ALTERNATIVE TO SHIFTING CULTIVATION

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INTRODUCTION:

The development of agriculture is influenced by the topography, the types of soil and the climate of the region. In North Eastern Region,though rice is the major crop both from the point of view of land utilisation and production, a uniform cropping pattern is not possible due to the variation in geo-ecological condition. The people of the hills are mostly practicing shifting cultivation for their livelihood.

What is Jhum?

The shifting cultivation involving slashes and burn method is known as Jhum in Assam. It is known as 'Farming' in West Africa and 'Sortage' in France and Belgium. Among the tribes of Orissa it is known as 'Dabi' or 'koman'. It is known as 'Bewar' in Madhya Pradesh. In Andhra Pradesh it is known as 'Podu'.

Process of Jhumming:

Shifting cultivation involves a number of operations. These are:

(1) Forest bushes are cut and allowed to dry in the month of December-January.
(2) Use of fire for clearing
(3) Making of holes by rudimentary tools and implements.

Now the field is prepared for Jhumming. All the family members are generally engaged in jhum cultivation. These farmers are known as Jhummias. Mixed cropping is a common practice in the Jhum land. Usually different crops are sown together in Jhum land. The mixture is highly diversified and therefore generalisation is difficult as the decision- making about crops to be sown differs from family to family depending on its requirement and input available. Thus shifting cultivation is the primitive way of land resource utilization in hilly areas.

Significance of Jhumming:

Under the shifting cultivation in the world, 36 million sq. kms of area and 200 million people are involved. In India 2.6 million people are engaged in shifting cultivation with a land area of 9,29,840 hectares. In North Eastern region nearly 3,865 sq. kms of land is utilised for 'Jhum' by almost 4 lakh 43 thousand families. The following table shows the area under shifting cultivation in North Eastern states.

It can be seen from the table that follows that Manipur leads the other North Eastern states in its annual area under shifting cultivation. Almost 92% of its total land area is hilly in this state. Yet the state made significant advancement in the field of agriculture. Jhum takes an important part in the state economy.

Next to Manipur, Arunachal Pradesh utilises 700 sq.km of land annually for Jhumming. But up to now Arunachal Pradesh is a deficit state in food production. Arunachal Pradesh is a land of forest. A great attention has been made on the cultivation of crops like mustard, ginger, potato, tobacco, sugarcane, turmeric, chillies, cotton, onion, garlic, etc and the results are very satisfactory. Potato is the main cash crop in this highland. In Meghalaya the border area is

Area under shifting cultivation in N.E.States.

States	Annual Area Under Shifting Cultivation (sq.Kms)	Fallow period (in years)	Minimum area under shifting cultivation one time or other (sq.Kms)	No. Of families practicing shifting cultivation.
1	2	3	4	5
Arunachal Pradesh	700	3 - 10	2,100	54,000
Assam	696	2 - 10	1,392	58,000
Manipur	900	4 - 7	3,600	70,000
Meghalaya	530	5 - 7	2,650	52,290
Mizoram	630	3 - 4	1,890	50,000
Nagaland	190	5 - 8	1,913	1,16,056
Tripura	223	5 - 9	1,115	43,000
	3,865			

Source: Compiled by the author.

important for fruits like pine apple, banana, litchi, papaya, orange, etc. In Mizoram, maize, millet, vegetables, cotton, paddy are the principal crops. Camila Cotton, which is purchased by Japan, is an important crop in Tripura. Nowadays, terrace farming is also a popular method adopted to reduce soil erosion.

DISECONOMICS OF JHUMMING:

Most of the dwellers of the hill areas are not aware of the diseconomies of Jhumming. It includes low productivity, soil erosion, reduction of Jhum cycle, disturbance of ecological balance, destruction of forests, etc.

Irrigation, power, roads, communication network, storage, processing and marketing can enhance agricultural growth. But, these measures meant for strengthening economic infrastructure seem to be absent, forcing the Jhummias to continue with their primitive method of cultivation.

HORTICULTURE AS AN ALTERNATIVE:

1. Horticulture is the only way to replace Jhumming. The economic liberalisation in India and the inclusion of agriculture in the purview of economic reforms is changing the economic scenario in the country. So, the future strategies of agricultural growth should be tied up with the high-valued crops under horticulture, floriculture etc. as these are likely to have high export potential.

2. Areas that have a slope of more than 45° are suitable for orchards and plantation crops. Fruit farming can help promote soil conservation and supplement farmer's income. There is a great potential for the production of almost all kinds of fruits, vegetables, pineapple, coffee, tea, etc. The experimental apple production in Meghalaya and Arunachal Pradesh shows very good success. In Arunachal Pradesh more than six lakh apple trees are grown. Besides apple, apricot, peaches, oranges, lemon, almond, etc. can be planted at appropriate hill slopes.

3. There are fairly good varieties of orchids and medicinal plants found in the region. There are a number of rare species of orchids in Arunachal Pradesh.

CONCLUSION:

There is great potentiality for horticultural development in the hill areas of N.E. India. So horticultural operation should be extended to such areas, as they are very feasible for the production of fruits and vegetables.

The fruits of the hill areas in the region have a good reputation in other parts of the country. With active government cooperation and support, horticulture products from the Region can capture both the domestic and foreign markets.

Although a Jhummia is enthusiastic for trying his land at horticulture, yet he is very much discouraged by the absence of requisite incentives and marketing facilities.

An average Jhummia is emotionally attached to the system. So they are not prepared to abandon Jhumming unless they are provided with attractive incentives for switching over to horticulture.

BIBLIOGRAPHY:

1. *Assam Economic Journal*, Vol XII, 1999, Dibrugarh University, Dept. of Economics.
2. Bareh, H. *'Meghalaya' Encyclopedia of India*, Vol XXII 1994 Rima Publishing House, New Delhi.
3. Bareh, H. *'Mizoram & Arunachal Pradesh', Encyclopedia of India*, Vol XXXI 1994, Rima Publishing House, New Delhi.
4. Chib, S.S. *'Tripura', 'Encyclopedia of India*, Vol XV 1994, Rima Publishing House, New Delhi.
5. Husain Majid, *'Assam', Encyclopedia of India*, Vol XXIII 1994, Rima Publishing House, New Delhi.
6. Husain Majid, *'Nagaland', Vol XIX 1994 Encyclopedia of India*, Rima Publishing House, New Delhi.
7. Husain Majid, *'Manipur', Encyclopedia of India*, Vol XXI, 1994, Rima Publishing House, New Delhi.
8. Lakhi, Dr. R.K.& Choudhury, Dr.R.K, *"Economy of India including Assam and North East"*, Kalyani Publisher, New Delhi, 1996.
9. Ramamani, V.S. *Tribal Economy.*

STATUS OF JHUM CULITVATION IN MIZORAM

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ABSTRACT:

The paper has eight parts viz., introduction, land use pattern, magnitude of shifting cultivation, productivity, rice import in the State, irrigated area and fertilizer used, new land use policy and Mizo method of permanent farming. The paper writer tries to show the status of jhum cultivation in Mizoram furnishing the latest available data. Comparison, wherever possible is made between Mizoram and other North-Eastern States.

Mizoram, till today is far from self sufficient in foodgrains production. Every year huge amount of rice has been imported from Food Corporation of India (FCI). As a substitute for jhumming the State authority introduced schemes like Jhum Control Project or the so-called New Land Use Policy. But the success of the said scheme is very much questionable. All Mizoram Farmers Union (AMFU) propagated pit-digging method and is gaining ground slowly. It is still too early to make judgement as to the method's sustainability, dependability etc.

It is a sad fact that because of the 'slash and burn' method of cultivation in Mizoram, wildlife, flora and fauna, have dwindled considerably. This unscientific method of cultivation results in wanton depletion of forest affecting the environment adversely. It is a high time for the State to look for a substitute, which can be implemented effectively.

INTRODUCTION:

Mizoram, known previously, as the 'Lushai Hill' was one of the districts under the State of Assam until it attained Union Territory status in 1972. It attained Statehood in February 1987. The State has eight districts and three autonomous districts councils. Number of Rural Development Block in Mizoram is twenty-two. The State has 722 Kms[1] long international boundary. Mizoram State stretches over 277 Kms along the North South while the East West width is 121 Kms. The per capita income of the state (at current prices) as provided by the Statistical Handbook 2000 is Rs. 11667 in 1997-98 against Rs. 11648 in 1996-97.

Till late 1950s, Mizoram was self-sufficient in most of its agricultural and other domestic requirements. However, the present state of the economy is far from satisfactory with very less improvement in the agricultural productivity level. The State is predominantly an agrarian one like most of the other states of the North East with more than 70% of its population engaged in agriculture. The method of agriculture in the state is shifting cultivation on a periodic cycle on the hill slopes. Shifting cultivation is not simply an occupation in Mizoram, but a way of life, which has already been practiced from time immemorial. Because of the pressure on land, the eight years cycle has come down to four years or so. The yield has to some extend declined.

There are no major industries in the State but about 3087 small scale and cottage industries like bakery, knitting, handloom, furniture etc. exist at present. Poultry and piggery are practiced on homestead by a number of people. The people of Mizoram largely depend on forest for fuel wood, small timber, bamboo and other minor forest produce, which is allowed to the people free of cost or by recovery of nominal royalty.

Traditionally, all activities and festival revolved round the jhum cycle. Some 40,000 hectares of land in Mizoram are under jhum rice and mixed crop cultivation including both traditional crops like maize, chillies, ginger, orange and banana, and naturalised crops like pineapple and sugarcane.[2] The jhumming area for each family is decided

by lottery, once in a year by the Village Council and the ownership of land during jhumming rests with the jhummia. Generally, jhumming is done for one year and the land is kept fallow for some years.

Population growth rate in Mizoram is rather rapid. During the decade 1981-1991, the State has the second highest population growth rate in India, next to Nagaland. As a result, the number of jhummia families has increased. Since the land available for jhumming is often limited the fallow decreased, leaving less time for the jhummed land to be rejuvenated. In steep slopes, the problem became more acute due to reduced productivity and land degradation as a result of increased top soil erosion.

LAND USE PATTERN:

Table 1.

The present land use pattern of the State

Sl. No.	Type	Area (Sq. Kms)
1.	State Owned Forest	9410
2.	District Council Forest	297
3.	Horticultural Land	580
4.	Water Bodies	16
5.	Area under Sericulture	17
6.	Cash Crop Plantation	1
7.	Jhum Lands	6000
8.	Rehabilitation/Towns	4766
	Total	21,087

One interesting thing in Mizoram is that the sixteen major river banks are all reserved for forest land viz. riverine reserve forest. If this riverine forest reserve can be converted into agricultural land, the productivity would automatically increase, as the said reserves are the most fertile land of the State.

3. MAGNITUDE OF SHIFTING CULTIVATION :

Basic Statistics of North Eastern Region 2000 published by North Eastern Council, Shillong indicates various aspects of Shifting Cultivation in N.E Region, which is reproduced in Table.2. (Next Page)

Table 2.

Magnitude of Shifting Cultivation

States	Annual Area Under Shifting Cultivation (sq.Kms)	Fallow period (in years)	Minimum area under shifting cultivation one time or other (sq.Kms)	No. Of families practicing shifting cultivation.
1	2	3	4	5
Arunachal Pradesh	700	3 - 10	2,100	54,000
Assam	696	2 - 10	1,392	58,000
Manipur	900	4 - 7	3,600	70,000
Meghalaya	530	5 - 7	2,650	52,290
Mizoram	630	3 - 4	1,890	50,000
Nagaland	190	5 - 8	1,913	1,16,056
Tripura	223	5 - 9	1,115	43,000
TOTAL	**3,869 (1.5 percent)**		**14,600 (5.7 percent)**	**4,43,336**

Source: *Task Force on Shifting Cultivation, Ministry of Agriculture (1993)*

Jhum area for cultivation of paddy in the Statistical Handbook, Mizoram 2000 is presented in Table.3.

Table.3.

Crop (Paddy	Area in Hectares 1998-99	1999-2000
Jhum	46,634	43,707
Wet Rice Cultivation (WRC)	16,814	15,963
HYV	4,944	2,747

Shri Lalrinthanga, in his study of Comparative Economics of Jhum and Settled Cultivation in Mizoram found that while there are numerous villages which practise jhum cultivation, there are hardly any villages which practise settled cultivation only. Settled Cultivation, if it is done in some rural areas, a number of household continue to practise jhum cultivation. In other words, mixed pattern of cultivation (jhumming and WRC) is practiced in some areas in Mizoram.

4. PRODUCTIVITY:

The estimated production of rice and foodgrain in Mizoram is presented in Table.4.

Table 4.

Year	Rice		Total Foodgrain	
	Area (Thousands ha)	Kgs / hectares	Area	Kgs / hectares
1	2	3	4	5
1984 - 85	47.5	861.0	54.0	870.0
1994 - 95	66.9	1498.0	80.2	1556.0
1995 - 96	65.8	1543.0	78.1	1584.0
1996 - 97	64.7	1719.0	77.5	1726.0
1997 - 98	68.1	1624.0	80.4	1600.0

From the Table.4 we can see that in 1997-98 Mizoram has a negative growth in the productivity of rice and total foodgrains.

Mizoram's position in the ranking of productivity in rice and total foodgrains in the North East in 1997-98 is the third in both cases. First is Manipur and second is Tripura in both rice and food grains respectively. North East average in that year in rice production is 1427 kg per hectare against national average of 1895 kg. In total foodgrains N.E average in 1997-98 is 1400 kg per hectare. The national average is 1551 kg.

As indicated by the Economic survey 1999-2000, Government of India, foodgrains production in Mizoram in 1998-99 (provisional) is reproduced in Table.5.

Table.5.

Sl.No.	Food grain item	Production in thousand tones
1	2	3
1.	Rice	113.8
2.	Total Cereals	130.2
3.	Total Pulses	9.4
4.	Total Food grains	139.6

The survey conducted in Mizoram about jhum and settled cultivation revealed the output per family, per holding and per worker in the settled cultivation is larger than under jhum cultivation. In other words, the productivity of land and labour are higher in the settled cultivation than in the jhum cultivation. Moreover, production under settled cultivation takes place under the overall increasing returns to scale while jhum cultivation operates under the diminishing returns to scale.[4]

Average yield of rice, oilseed, pulses and sugarcane in Mizoram in 1998-99 is shown in table.6.

Table 6.

Sl.No.	item	Yield per hectare in MT
1.	2	3
1.	Rice (Jhum)	1.29
2.	Rice (WRC)	2.39
3.	Oilseed	10.63
4.	Pulses	1.60
5.	Sugercane	5.83

The State, according to NEDFi paper entitled "Mizoram an Overview" is the second largest producer of ginger and chillies in the North Eastern Region. Ginger in 1994-95 was cultivated on 1,036 hectares, which yielded a production of 8,724 metric tones. In 1996-97, the production rose to 21,792 metric tones and the area under cultivation also increased to 4370.50 hectares.

5. IMPACT OF RICE:

Unfortunately, Mizoram is not self sufficient in rice production. Every year huge amount of rice came to Mizoram from Food Corporation of India (FCI). The import figure is as indicated below in Table.7.

Table 7.

Year	Rice import (inMT)
1	2
1990	93,174.4
1995	101,326.7
1997 - 98	112,380.7
1999	101,528

From the above figure it is clearly seen that even after thirteen years of Statehood the State has to import huge quantity of rice from FCI. This is a big challenge for the farmers and the State Government.

6. IRRIGATED AREA AND FERTILISER USED:

According to the figure provided by the Ministry of Agriculture, Department of Agriculture and Co-operation (April Census Division) net area irrigated in Mizoram is 7 thousand hectares in 1994 -95 In 1995-96 there is no change, it remains as the previous year.

Consumption of Plant Nutrient per unit of gross cropped area as shown in the Basic Statistics of North Eastern Region 2000 is shown in Table.8.

Table 8.

1997-98 (Kg / Hect) Provisional				
1	2	3	4	5
State	**N**	**P_{205}**	**5_{20}**	**Total**
Arunachal	1.3	0.5	0.4	2.2
Assam	10.0	3.9	4.6	18.6
Manipur	40.7	5.5	2.2	48.6
Meghalaya	9.3	4.2	0.3	13.9
Mizoram	1.8	3.9	2.9	8.7
Nagaland	1.3	1.1	0.3	2.6
Tripura	13.8	5.0	3.8	22.7
All India	58.0	20.0	7.3	86.1

7. NEW LAND USE POLICY:

To do away with jhum, in 1984 the Government of Mizoram devised the so-called New Land Use Policy (NLUP). Its first form was implemented by the Forest Department in 1984 –85 and terminated in 1989-90. Under this programme as many as 6086 families were assisted to raise plantations of teak, orange, rubber etc. The achievement of this short-lived programme was insignificant. It suffered from randomness in selection of beneficiaries and lacked specific guidelines and weak follow up action in implementation.[6]

In 1987 the NLUP was replaced by the centrally sponsored Jhum Control Project. This project is again short lived as the National Development Council decided to discontinue the Special Area Development Programme in eight states including Jhum Control Project in Mizoram. Again, in1989 NLUP was revived in the State and the Rural Development Department was entrusted with the implementation of the programme from 1990- 91. The target group under this project includes jhummia families who solely depend on jhumming for their livelihood and also those families who do not have permanent means of livelihood. In the modified programme, instead of mono scheme under the jhum control project, a composite scheme which can provide suitable subsidiary trades for the beneficiaries was introduced. These subsidiary trades were offered for generation of income during the gestation period of the main trade.

After huge amount of money had been spent on the NLUP scheme, the scheme as a whole is more or less stopped now because of the various reasons like inadequate achievements, mis-use of fund, and change of Government etc. In some areas jhumming has actually been reduced to some extent after the introduction of the NLUP but at the same time, in some other areas it rather increased. On the whole it is rather difficult to make correct assessment of the success of the said scheme.

8. MIZO METHOD:

The All Mizoram Farmers Union (AMFU) established in 1994 is trying its best to evolve a system that would give a substitute to jhumming. What the AMFU propagated is called the Mizo Method of Permanent Farming.[7] In the system, pits are to be dug soon after the harvesting of the jhum at an interval of one or two feet distance. The size of the pit can vary depending on the slope. Paddy straws and green weeds are compressed in the pits covered by the top soil excavated. When the pits are full with decomposed leaves, wood vinegar treatment is recommended to repel

harmful insects and also for the growth of healthy crop. This process is to be repeated every year to make it a permanent nature.

This, according to the AMFU would automatically stop felling of trees and burning of forest. At the same time, the production is expected to increase. Even though enough experimentation has not yet been conducted as desired, whatever limited experiment done has encouraged the AMFU to go ahead with high hope. However, it is still too early to make judgement whether this would really be a dependable and reliable substitute for the jhumming.

In the light of the proceeding discussion it is high time for the people of Mizoram to look for an alternative to jhumming. Because of its meager yield, it could not feed the people of the State. The system not only destroys the present but also destroys the future of Mizoram. The State of Mizoram, that could once boast of her rich variety of wildlife, flora and fauna can no longer do so. Wildlife, flora and fauna have dwindled considerably due to the age old practise of humming. To save Mizoram and her environment and for ensuring higher productivity of foodgrains jhumming should be stopped. Better land use system needs to be evolved.

REFERENCES:

1. *Statistical Handbook* Mizoram, 2000.
2. Government of Mizoram *Bamboo Development Plan* prepared by International Network for (INBAR).
3. *A Blue Print for Sustainable Agricultural and Rural Development* 1998 by M.S.swaminathan Research, Foundation, Chennai.
4. Pre-Submission Seminar Paper of Shri Lalrinthanga for Ph.D., held in NEHU, Mizoram Campus on 16.3.2000.
5. Government of Mizoram, *Draft Annual Plan* 1999-2000, Planning & Programme Implementation Department.
6. Singh Daman (1996): *The Last Frontier People and Forest in Mizoram*, Tata Energy Research Institute 1996.
7. *Mizo Method – Survival Package for Mountain Tribes in India* by All Mizoram Farmers Union (AMFU) Aizawl.

OTHER REFERENCES:

1. Awasthi, R. P., 1984, *Farming System Research,* Ann. Report, ICAR Complex, Shillong.
2. Goswami, P. C., 1968, *Shifting Cultivation and its control in the Garo Hills.* Soil Conservation Dept., Assam.
3. Rao, N.V. 1991, *Economic Aspects, Annual report, ICAR* Research Complex for NER Region.

RAPPORTEURS REPORT

BUSINESS SESSION – I

Status of Jhum Cultivation

Chairman- ***Mr. K. L.Tariang***
Director, Soil & Water Conservation
Government of Meghalaya

Rapporteurs – 1. *Dr. (Mrs) Jayanti Biswas*
2. *Dr Mrs).A.Ahmed*
3. *Dr. (Mrs) Indira Barua*

The first session of the seminar was marked by a lively and fruitful discourse on the ***Status of Jhum Cultivation*** in the North Eastern Region. The first paper of the session was presented by ***Dr. Malavika Das Gupta*** of Calcutta University . She was of the opinion that jhumming has ceased to be the sole occupation of the jhummias. In fact it has become a subsidiary occupation. With the help of a model, she has lucidly explained the deteriorating pattern of change in jhum cultivation. At present jhum cultivation is no longer sustainable. As a solution to the problem, she observed that in the short run, jhumming has to be improved But in the long run, alternative to jhumming has to be thought of like improving the education and skill of the jhummias so that they can take up other wage employment.

This paper was followed by a lively session of questions and answers. Dr. M.P.Bezbarua and Dr. A. Mahanta appreciated the paper. Dr.Mahanta questioned about raising the productivity. Dr.Das Gupta was not in favour of commercialisation of the product as it would not fulfill the basic demands of the jhummias.

The second paper of the session was presented by ***Prof. N. Mohendra Singh*** on the status of jhum in Manipur. Prof. Singh observed that the issue of jhumming was more important in Manipur because of the geographical peculiarities of the State and the density of population. According to him the jhum areas have increased very fast over the years. On the other hand, the yield has increased only marginally over a span of twenty years inspite of the many programmes undertaken by the government from time to time.The picture of jhum control in the hills of Manipur is not very encouraging. The issue of jhum cultivation cannot be isolated from the general problems of under-development. The solution of Jhum cultivation cannot be isolated from the issue of integrated development. He also observed that policy designs must be made at the macro-level. However, he laments that much remains to be done to improve the lot of the jhummias.

Dr.Hamlet Bareh suggested that a comparison should be made between jhum cultivation and settled cultivation for better analysis of the situation of the farmers.

The third paper on status of shifting cultivation was presented by ***Dr. P. K. Dhar*** of Bongaigoan College. His observation was that the area under shifting cultivation has increased. He referred to the evil effects of jhumming like soil erosion or destruction of forests and siltation of rivers leading to loss of fertility of the soil and creating serious environmental hazards, etc. According to him the jhummias are averse to settled cultivation. He suggested that they should be motivated to go in for coffee or rubber plantation.

Dr.A.Mahanta queried whether shifting cultivation was solely responsible for deforestation. Dr.M.P.Bezbaruah suggested some micro level studies on the problem of jhumming.

The next paper was delivered by ***Dr. N. Roy*** on *Shifting cultivation in NER- A concern for sustainability*. According to him, 70% of land in NER are under jhum cultivation. The main problem according to him are reduction in the jhum cycle which in turn led to the decrease in net gain and net loss of forest cover in the NE States. Prof. N. K: Deka wanted to know whether the reduction in the jhum cycle was indicating a trend towards settled cultivation.

The fifth paper of the session was presented by **Dr. S. Borbora** on *Agricultural Scenario in the Hills: A study in Karbi Anglong District in the state of Assam*. According to the author, the production of yield has increased because of the increase in the area under jhum cultivation rather than in the productivity. A member of the audience questioned the logic of using an exponential model to explain his argument.

This was followed by a paper on Jhum cultivation in Manipur by E.Iboyaima Singh. Mr. Singh made a general observation on the status of jhum cultivation in Manipur. According to him, it is not an easy task to control jhum cultivation in the hills. Jhumming is a way of life of the people. He observed that in the the Senapati and Ukhrul districts, large areas of land are under settled cultivation. But in Tamenglong and Churachandpur districts-shifting cultivation is more commonly practiced. As a solution to this problem, he suggested that the awareness level of the people should be raised regarding the hazards of jhum cultivation. Government machinery is to be blamed for recommending areas for jhum cultivation instead of providing alternative occupation for the jhummias.

The last paper of the session was presented by **Mrs. P. Borthakur**. The author referred to the dis-economies of jhumming like low productivity, soil erosion etc. She suggested that horticulture, floriculture, etc. can be taken up as an alternative to jhumming.

The Chairman, thanked all the participants for a very fruitful discussion on the status of jhum cultivation in the N.E.India.

The session ended with the vote of thanks by Dr.(Mrs.)Natalie West.

BUSINESS SESSION – II

NEW TRENDS IN CROPPING PATTERN

NEW TRENDS OF CROPPING PATTERN IN HILL AGRICULTURE.

(A case study of Meghalaya)

Smt.T. M. B. Lynser
S.D.A.O. (Hqr). Shillong.

ABSTRACT:

Meghalaya, one of the hilly states of North East India falls under the Monsoon type of climate and enjoys the highest rainfalls in the world. Its agricultural system also is based on its topography and climatic condition. Agro-climatically it falls under Zone-II.

The traditional mono-cropping and shifting cultivation are the main causes for the low production of food and wastage of land. Therefore, New Trends of Cropping Pattern in Hill Agriculture is to replace the old method and to meet the growing demand of the State.

Varietal change of the principal crops, introduction of Multiple Cropping Scheme and Watershed Projects are the main New Trends of Cropping Patterns in Hill Agriculture introduced and experimented in the State. The Department of Agriculture of the State Government has done this in order to educate and encourage the farmers to substitute the age-old handicapped method of agriculture.

From these demonstrations we find that there is positive signs of responses from the farmers as well as production and there is a good scope for furthering the New Trends not only in the State of Meghalaya but also to the other hilly states of North Eastern Region as well.

INTRODUCTION:

Meghalaya is one of the seven states in the North Eastern Region of India. The total area of the State is 22429 sq km, which is inhabited by a population of 2306069 (2001 census). It is amongst the highest rainfall areas in the world. The annual rainfall is 44997.22 mm. The temperature range varies between 2 degrees C - 36 degrees C which depending upon the altitude, which varies from 300 m to 2000 m above mean sea level. Meghalaya has a monsoon type of climate but with wide variation depending upon altitude and physiographic difference of landmass. The Shillong plateau has bracing climate varying towards the temperate. The lower region has a tropical climate and the middle section of Meghalaya plateau tends to be temperate towards the east and tropical towards the west. The natural vegetation profile ranges from tropical to temperate.

The Planning Commission divided the Indian peninsula into 15 (fifteen) Agro-climatic Zones. Meghalaya falls in the Eastern Himalayan Region (Zone-II). The Eastern Himalayan was further sub-divided into 5 (five) sub-regions. Taking into consideration topography, rainfall, temperature, soil type, cropping system and geographical continuity, Meghalaya falls within Sub-Region-II along with Arunachal Pradesh, Nagaland and Assam Hills. Based on the topography of the State, the agriculture systems in use are as follows:

A. Settle farming is practiced in the valleys, flat lands, in terrace in the low hills.
B. Shifting cultivation in the hill slopes.
C. Horticultural crops are grown in temperate and tropical/sub-tropical areas.

Mono-cropping pattern in the settle farming practiced in the past caused the low production per unit area, which is not

sufficient for the growing population of the State. On the other hand, shifting cultivation in the hill slopes of Meghalaya for centuries has greatly affected the eco-system in general and the soil in particular. Thousand metric tones of the top and loamy soil was carried down the slopes by the torrential rainwater and deposited in the plain. Torrential rainwater caused soil erosion, reducing fertility and loss of flora and fauna. These cause adverse affect on the sustained productivity of the land. The traditional methods and varieties of agriculture cause low production and wastage of land. In order to fully utilize the land and to enhance the per unit area production in the hill areas new cropping system have been introduced. These changes of cropping systems are briefly described as follows:

1. Varietal change of principal crops.
2. Introduction of Multiple Cropping Scheme.
3. Watershed Project.

VARIETAL CHANGE OF PRINCIPAL CROPS:

1. i. Rice

As rice is the major food of the State, special attention is taken on the rice sector. Three improved cold varieties of rice are introduced in the high altitude namely, US-I, Megha Rice-I and Megha Rice-II, whereas in the mid altitude region Ngoba, the short improved variety is cultivated by the farmers, besides the traditional varieties. In the lower altitude regions numbers of high yielding varieties have been introduced and accepted by the farmers. These are MTU-7029, IR-36, Pankaj and Bahadur, which are medium duration varieties and positively respond to fertilizers. In spite of the introduction of the new varieties of rice, the average state yield per unit area is far below in production when compared with the average national standard which is 1921 kgs (1996-97) per hectare. (Refer table1.)

1. ii. Maize

Maize is another important cereal crop widely grown in the State. Kharif Maize is generally planted during the month of March/April and harvested in September/October in the mid and high altitude regions whereas Rabi maize could also be cultivated in warmer areas of the State. Some of the high yielding varieties of maize are Vijay composite and hybrid maize-3438 have been distributed freely to the farmers in all districts of the State as trial and demonstration along with other inputs such as fertilisers and organic manure from the normal scheme as per availability of fund. The above varieties are growing well and produce more. However, local white and local yellow varieties of maize are still quite popular with the farmers in the high and mid altitude areas and could be included in the programme. This is because it suits well in the agro-climatic condition of the region, for increasing per unit area productivity.

1. iii. Oilseeds

In the oilseed sector crops included in the crop forecast data are sesamum, castor, rape, mustard and soya bean. In recent years sunflower has also been introduced but has not yet been included within the crop forecast data because the cultivated area is negligible. Though soyabean is included within the category of oilseeds, it is however mostly used as a pulse or condiment within the State; it is also marketed outside the State for converting into edible oils. Out of these four oilseeds crops the most important are mustard and rapeseed, which are mostly grown in East and West Garo Hills. The new varieties introduced are M-27, T-59, B-9 and Varuna. The area under rape and mustard cultivation in Garo Hills is increasing from year to year.

The cultivation of rape and mustard seed in the Rabi season will increase the oil seed produce of the State.

The annual production of oilseed is shown in Table-3

1. iv. Soyabean

Soyabean is a leguminous crop grown in different parts of the State as mixed or intercropping with other crops. It is cultivated mainly for local consumption and is a main source of protein. It serves as a nitrogen fixation crop and there is large scope of expansion of the area for its cultivation as the agronomic condition is suitable and there is increasing demand from the neighbouring states of Assam for oil extraction. It is also a remunerative crop, which may generate additional income to the farmer. The Department of Agriculture in the State has supplied high yielding variety of soyabean seed PR-472 to the farmers both at 50% subsidized sale as well as for demonstration purpose.

Crop Forecast Report in Meghalay

A-Area (in Hectares)
P-Production (in matric tonnes)
Y-Yield (in kg/ha)

Name of the crop	1997-1998			1998-1999			1999-2000			2000-2001			Target fot 2001-2002		
	A	P	Y	A	P	Y	A	P	Y	A	P	Y	A	P	Y
Autumn Rice	31865	36356	1142	30750	27967	881	31791	32620	1026	-	-	-	-	-	-
Winter Rice	70361	104007	1478	70649	111797	1582	70691	124267	1758	-	-	-	-	-	-
Spring Rice	2944	9708	3298	3003	9970	3320	3929	13846	3524	-	-	-	-	-	-
Total Rice	105170	150071	1427	105402	149734	1421	106411	170733	1604	105920	151200	1427	106160	152330	1435
Maize	17175	24878	1449	17219	25272	1468	16637	24051	1446	3004	5352	1781	30040	53520	1781
Pulse															
Tur (Arhar)	865	863	790	861	678	787	871	647	743	-	-	-	-	-	-
Gram	443	270	609	463	283	611	460	283	615	-	-	-	-	-	-
Other Rabi Pulses	1909	1511	792	1938	1527	788	1957	1540	787	-	-	-	-	-	-
Total Pulses	2317	2464	766	3262	2488	763	3288	2470	751	8660	6860	792	10040	8010	798
Oil Seed															
Rape & Mustard	6914	4467	646	6917	4576	661	7042	4648	660	8000	6440	805	-	-	-
Castor	30	15	500	30	15	500	27	14	518	30	20	666.6	-	-	-
Soyabean	898	814	906	899	812	903	1038	928	894	1130	1230	1088	-	-	-
Linseed	50	22	440	51	23	451	54	22	407	-	-	-	-	-	-

MULTIPLE CROPPING

Multiple cropping is a sequence of growing two or more crops in the same piece of land in a year without impairing the soil health. To make it successful, the selection of crops should be as follows:

(i) One pulse crops should be selected for one rotation of crop to increase the soil fertility e.g. groundnut, mung and urd

(ii) Two cereal crops e.g. maize, wheat, rice which require high dose of fertilizer.

(iii) One oilseed crop, which does not require high fertilizer dose.

To implement the multiple cropping in the State, the Department of Agriculture, Government of Meghalaya has sanctioned one scheme, which is known as Multiple Cropping Scheme (MCS). Under this scheme the main objective is to increase the productivity and production of various crops through full utilisation of the command areas of the completed irrigation projects and other areas where irrigation facilities are available. It is being extended also in rainfed areas having enough residual soil moisture to sustain the subsequent crop and to encourage the rural farming community to adopt Multiple Cropping System to improve their economic condition.

The following is the strategy of the scheme:

1. Popularising short duration high yielding varieties to fully utilise available soil moisture resources without the disadvantage of crop failure to which medium varieties are susceptible.

2. Popularising double and multiple cropping schemes in areas with potential irrigation.

3. Popularising high yielding varieties of cereals, pulses and oilseeds to boost production.

4. Popularising Integrated Pest Management System.

The scheme aims at teaching the farmers about the improved technologies of cultivation such as use of high yielding/improved varieties of seeds, proper method of fertiliser application, proper plant protection measures and other management practices. This is being done by conducting demonstrations in cultivation fields in all the Blocks of the districts in the State according to the suitability of the climate, soil etc. for different crops. Implementation of the scheme helps in increasing the productivity and production of the foodgrains in the State.

IMPACT OF THE DEMONSTRATION PROGRAMME UNDER MULTIPLE CROPPING SCHEME

Since the inception of the scheme, there was a great change in production and yield of crops observed from the crop cutting experiment data submitted by field functionaries from time to time. The variation is mostly due to the application of fertiliser, organic and micro-nutrients in addition to adoption of improved and high yielding varieties of seeds. Judicious application of fertiliser is also recommended after the soil in command areas is being tested by the Department. The scheme also provides control measures in case of outbreak of pests and diseases, which will affect the farmer's crops.

It has been observed that farmers who are involved in these programmes have been benefitted from the schemes and their economic position have also improved.

The command areas of the completed irrigation project in East Khasi Hills District are mentioned below:

SL.NO.	NAME OF PROJECT	BLOCK	COMMAND AREAS IN HECTARES
1.	Mylliem Banium	Mylliem	121.41
2.	Lapalang (Borhir Lyngkhat)	Pynursla	80.00
3.	Khawang	Mawphlang	12.14
4.	Sohiong	Mawphlang	56.00
5.	Weilyngkut	Mawphlang	148.00
6.	Mawthawan	Mawphlang	17.50
7.	Madan Mawsir	Mawphlang	25.00
8.	Sargam	Mawkynrew	73.00
9.	Umsi	Mawryngkneng	30.00
10.	Um Ryngjah	Mylliem	60.00
11	wahkdait	Pynursla	88.65
12.	Krang Umsier	Mawphlang	79.60
13.	Pyndeng Litha	Mawphlang	150.00
14.	Kyrdoh	Mawsynram	140.00
15.	Umsawrong	Mawsynram	13.00

The common crop rotations of the Multiple Cropping in Command areas are:

1. High elevation of the state: Potato- Paddy.

2. Medium and Low elevation: Paddy-Paddy- Pulse/oil seeds.

From our finding, the average yield of paddy in high altitude regions varies from 20-24 quintals/hectare in the farmer's field who implement the programme with technical assistances available in the scheme while those who practised traditional methods of cultivation the average yield of paddy is 12-15 quintals/hectare. In the lower altitude region the average yield of high yielding varieties paddy varies from 40-50 quintals/hectare.

WATERSHED PROJECT:

The watershed is geohydrological unit or a piece of land that drains at a common point. This natural unit is evolved through the inter-action of rainwater with land mass and typically comprises of arable lands, non-arable lands and natural drainage lines in rain fed areas. There are 32 watershed projects implemented in the Ninth Plan period. The scheme is a centrally sponsored funded by the Government of India and State Government on the basis of 75%: 35% share.

In the East Khasi Hills District 8(eight) projects were implemented during the Ninth Plan period. The names of the projects are as under:

SL.NO.	NAME OF MICROPROJECT	NAME OF THE BLOCK	GEOGRAPLICAL AREA
1.	Umsam Mawber	Mawryngkneng	605.52
2.	Khahmalai	Shella Bholaganj	758.50
3.	Wah Rina (model)	Mawphlang	709.00
4.	Mynsang	Mawkynrew	67.22
5.	Dwara Nongryrnem	Mawsynram	600.20
6.	Lumthangding	Pynursla	538.00
7.	Mawpynthih	Mylliem	550.00
8.	Sawsymper		

There are another 8 new identified watershed projects which are proposed to be implemented in the Tenth Plan period depending in the approval of the Government.

OBJECTIVES:

The project would endeavour to achieve the twin objectives of sustainable production of bio mass and restoration of ecological balance in the vast tracts of rainfed areas in the country. It will specifically focus on:

1. Conservation of land, water, plant, animals and human resources.

2. Generation of massive employment during the project period and after the project completion for enhancing the employment opportunities in the backward rainfed areas.

3. Improvement of production environment and restoration of ecological balance through scientific management of land and rainwater.

4. Reduction of inequalities between irrigated and rainfed areas.

5. In addition to food, fuel and fodder, the project would endeavour enhance cash flow to the rainfed farmers and landless agricultural labourer through increase in casual employment, marketable surplus of agricultural and dairy produce, growing of cash crops like vegetables, coriander, cummin, medicinal plants etc. in suitable areas.

Thus the ultimate objective of the project is to develop the natural resources base, sustain its productivity, improved the standard of living of millions of farmers and landless labourers and endeavour for restoration of ecological balance.

AGRICULTURE OF HILL AREAS IN ASSAM

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ABSTRACT:

In Assam there are two hills districts viz.; (i) Karbi Anglong and (ii) North Cachar hill districts. Jhumming, which is a primitive mode of cultivation, is found to be the main source of livelihood of the tribals living in the Karbi Anglong and N.C. Hills districts of Assam. The Jhum cultivation is usually carried out in a particular area for some years and then the 'Jhummias' move into another area and then finally return back to the first area for cultivation. Thus the jhum cycle is completed.

Forests are severely affected by shifting cultivation in North Eastern Region. There are some advantages of shifting cultivation besides, the disadvantages.

The government of Assam has taken the earliest attempt of tackling the problem of shifting cultivation. Settlement of tribal families in permanent agriculture is one of the solutions of the problem.

In the post-Independence period, the jhumming remains almost static in the two hilly districts of Assam. Now a days, owing to increasing pressure of growing population on land the jhum cycle has been considerably reduced. Jhumming is associated with grave consequences like soil erosion, loss of forest wealth etc.

The plain portions of the hilly areas of Assam produced very good Sali paddy, jute, mustard and so on.

The hilly tribes are now using improved seeds of high yielding varieties. Besides they are interested in horticultural gardens, plants and grafts of fruit bearing trees. They used chemical fertilizers, improved agricultural tools, implements, and pesticides.

The hilly districts get comparatively low rainfall .So irrigation is highly important. A few steps have been undertaken by the government, for the purpose of improvement and control of jhum cultivation.

To conclude, for the economic upliftment of the hilly tribes, it is necessary for people to switch over to settled agriculture as well as resort to alternative modes of farming such as horticulture, animal husbandry, fishery and poultry farming.

INTRODUCTION:

Hills Area of Assam:

In Assam, there are two hills districts, i.e., (i) Karbi- Anglong and (ii) North Cachar Hill Districts. Both of these two hills districts lie between the latitudes of 20°. 54 (N) and longitudes of 92° .8 (E) and 93° .53 (E).

These two districts are bounded on the North by Nagaon and Golaghat ditricts, on the South by Cachar district, on the East by Nagaland and Manipur and on the West by Meghalaya.

The total area of the two hill districts in 15,222 sq. kms. The area of karbi – Anglong is 10,434 sq. kms. and North Cachar Hills District is 4,888 sq. kms. per census of India, 1991. Diphu in Karbi- Anglong is the district headquarters while Halflong in N.C. hills district is the district headquarter.

In Karbi- Anglong, there are 3 (three) subdivisions and in N.C. hills district, there are 2 (two) subdivisions as administrative units. Both of these two hill districts are administered by two separate District Councils

According to the 1991 census report, the total population of two hill districts of Assam is 8,04,761. The population in Karbi- Anglong is 6,55,415 and in N.C. hills district is 1,49,346. In the two hill districts, there are 3.61 percent of the total population of the state, whereas 2.94 percent in Karbi- Anglong and 0.67 percent in N.C. hills district.

The density of population per square kilometer in Karbi Anglong district is 63, whereas in N.C. hills district is 31, as per 1991 census report.

From the point of view of literacy rate, the two hills districts of Assam occupied the lowest position. According to 1991 census report, the literacy rate of Karbi Anglong is 37.48 percent, whereas the literacy rate of N.C. hills district is 46.72 percent. Between these two hills districts, the literacy rate is higher in N.C. hills district than that of Karbi Anglong district.

The demographic pattern of the two hills districts of Assam are as follows: (i) Karbi, (ii) Dimasa Kachari, (iii) Hmar, (iv) Kuki, (v) Zeme Nagas, (vi) Rangma Nagas, (vii) Garos, (viii) The Khasis and the Jaintias, (ix) The Mizos, (x) The Lalungs, (xi) The Shyams or Aitunias, (xii) Scheduled caste and (xiii) others.

SHIFTING CULTIVATION IN HILLS AREAS OF ASSAM:

Shifting cultivation, which is known as jhumming, is found as a main source of livelihood of all the tribes living in Karbi- anglong and N.C. Hills districts in Assam. Shifting cultivation is a primitive method of cultivation, which might have originated in the Neolithic period covering the years between 13,000 to 3,000 B.C. This system of cultivation was practised by the hill inhabitants of Central Africa, South East Asia, West Indies and Sweden. In India, such system of cultivation is still practised in the hill areas of the entire North-East, Sikkim, Bihar, Orissa, Andhra Pradesh, Madhya Pradesh, Tamil Nadu, Kerela, Karnataka and Maharashtra.

In Assam, Jhum cultivation is practised in the hilly areas of Karbi-Anglong and North Cachar hill districts. Out of the 15,332 sq.kms of land in the hill districts, the area under jhum cultivation is estimated to be little over 60,000 hectares with a total population of 8.04 lakh as per 1991 census report

Shifting cultivation is known as Jhum cultivation or Jhumming in the North Eastern Region. In the hilly areas of N.E. Region, jhum cultivation is practised in paddy cultivation instead of transplantation or broad casting method.

In different countries, shifting cultivation is called as slash and burn- agriculture, migratory primitive agriculture, nomadic agriculture, hoe and burn, forest field rotation, land rotation agriculture and so on

PROCESS OF SHIFTING CULTIVATION:

There is process of shifting cultivation. At first, there is necessity of selection of a plot of land. The second step is to cut the forest and bushes up to slump level in the months of December and January. The third step is to burn the jungle for making it clear. The fourth step is to make holes on land for sowing seeds of several crops. Sowing of seeds is done practically by female workers. Harvesting starts from third month. After harvesting, it stays until December. After harvesting, storing, merry making are another step to be followed. Due to diminution of fertility of that particular plot of jhumming land, the farmers shift to a new area leaving the previous land of jhum cultivation.

JHUM CYCLE:

Jhum cultivation is done in a particular area for some years and the 'jhummias' are moving into other areas and again they return to the first area for cultivation to complete a cycle. Thus, Jhum operation constitutes a 'Jhum Cycle'.

Table 1.

Years of Jhumming cycles in States and U.T. of India:

States / U.T.	Jhumming Cycles (year)
1. Assam	7
2. Arunachal Pradesh	4
3. Manipur	6
4. Mizoram	3
5. Meghalaya	9
6. Nagaland	9
7. Tripura	8
8. Andhra Pradesh	6
9. Bihar	6
10. Kerela	6
11. Madhya Pradesh	6
12. Orissa	7

Source: Jou, NEC, Vol. 4,1981.

Table 1. shows the years of Jhumming cycle in different states and Union territories of India. Meghalaya and Nagaland have the longest cycle of 9 (nine) years. Tripura has a jhum cycle of 8 (eight) years, Assam and Orissa, 7(seven) years. Whereas, in Manipur, Andhra Pradesh, Bihar and Madhya Pradesh, the jhum cycles are of 6 (six) years. In Arunachal Pradesh and Mizoram, jhum cycles are of 4 (four) years and 3 (three) years respectively. In modern times, due to heavy pressure of population and heavy erosion of soil the fallow periods have declined from 30 (thirty) years to 9 (nine) years and even to 4 (four) years or less in different parts of our country.

FOREST AFFECTED BY SHIFTING CULTIVATION IN NER:

Shifting cultivation, which originated during the Neolithic period, is still practised in the tribal dominated areas of the North Eastern Region. About four lakhs families practise shifting cultivation in the region, accounting for less than 6(six) percent of the area (NER). Annually, about 1.5 percent of the area is under shifting cultivation. It has been reported that during the nine years period (1975-84) the area under shifting cultivation has been reduced by 10556 sq. kms. Since efforts to discourage shifting cultivation during the seventies and eighties have achieved positive results. The Table 2. summarises the results.

Table 2.

Forest affected by shifting cultivation in NER:

States	Geographical Area (sq.kms.)	Extent of forest Affected by shifting cultivation (sq.kms)		% Change in 1984 As compared to 1975
1	2	3 1975	4 1984	5
1. Assam	78,520	4,160	7,275	(+)74.9
2. A.P.	83,590	7,940	8,940	(+) 7.3
3. Manipur	22,360	17,770	13,846	(-) 22.1
4. Meghalaya	22,480	10,240	6,812	(-) 33.5
5. Mizoram	21,090	16,110	12,442	(-) 22.8
6. Nagaland	16,520	10,970	10,641	(-) 3.0
7. Tripura	10,490	6,220	3,315	(-) 46.7
Total	2,55,050	73,410	62,854	(-) 14.4
Percent	(100)	(28.8)	(24.6)	

Source : Forest Survey Report, 1987.

Amongst all the seven states of the North Eastern Region, the extent of forest affected by shifting cultivation in percentage change in 1984 as compared to 1975, shows a positive trend in Assam and Arunachal Pradesh. However, in the remaining states, there is a negative trend in percentage change. In between Assam and Arunachal Pradesh, the trend of percentage change is much higher in Assam than that of the Arunachal Pradesh.

ADVANTAGE OF SHIFITNG CULTIVATION:

There are some advantages of shifting cultivation. Some of the advantages are mentioned below:

(i) One of the advantages of the shifting cultivation to the hilly people is that it provides a very easy method for the preparation of land for cultivation.

(ii) Within a very short period, crops can be produced and harvested.

(iii) In shifting cultivation, there is no danger for either flood or drought.

(iv) The mountain streams provide regular water supply for shifting cultivation.

DISADVANTAGES OF SHIFTING CULTIVATION:

There are also disadvantages of shifting cultivation. These are as follows:

(i) Shifting cultivation has generated a nomadic tendency among the hilly people. The shifting cultivation is associated with shifting village. Very often the whole village is shifted to the place of their jhum cultivation. This nomadic tendency is almost harmful as no development work of permanent nature can be undertaken for the people of such villages.

(ii) Shifting cultivation causes deforestation on large scale.

(iii) As there is no private ownership of land, thus the farmers do not undertake any measure for soil conservation and its improvement.

(iv) Loss of the topsoil in hilly areas, due to jhum cultivation causes a serious fall in fertility of the soil.

(v) Destruction of forests in hilly areas and heavy erosion during rainfall, cause heavy flood in low-lying plain areas.

(vi) Shifting cultivation converts the free land to fallow land, which causes a high national waste.

(vii) Shifting cultivation upsets the ecological balance.

SETTLEMENT OF JHUMMIAS:

In the fifties, the government of Assam has taken the earliest attempt of tackling the problem of shifting cultivation with growing plantation of rubber, coffee, black-pepper and cashew nuts.

During the Fifth Plan period, a major thrust was given on the control of shifting cultivation in all the North-Eastern Sstates. Under the North Eastern Council's Programme, 8 (eight) pilot projects of soil conservation and jhum control were under-taken in seven constituent units for the settlement of jhummias.

During the Sixth Plan, the North Eastern Council has introduced the concept of watershed management on pilot basis for optimum use of land and water resources with a physiographic or hydrological unit governed by natural conditions.

Settlement of tribal families in permanent agriculture is one of the solutions of the problem of the settlement of jhummias. Total cost estimates by North Eastern Council for this resettlement operation would be Rs. 602.99 crores.

MODERNISATION – A NEW TREND:

Although the land is good for jhumming in Assam, the yield is very poor. Because the methods they practised are crude, and implements they use, are almost primitive. Rice is cultivated in a larger area of land. However, because of its low yield of production, the people raise mixed crops in their jhums. Along with paddy, they generally cultivate maize, sesame, cotton, chilli, pumpkin, ginger, castor, sweet potato, tobacco and vegetables etc.

In the post-independence period, the jhumming remains almost static in the two hilly districts of Assam. Now a days, owing to increasing pressure of a growing population on land the jhum cycles become shorter. Jhumming is associated with grave consequences like soil erosion, loss of forest wealth etc.

In the interior parts of the hilly region, instead of ploughing or hoeing, a herd of buffaloes was allowed to trample down the plot of land until it would become muddy. Now a days, such a practice has already been replaced by ploughing.

The plain portion of the hilly areas produced very good Sali paddy. Jute and mustard are also cultivated in the plain areas of the two hilly districts to a considerable extent. In the N.C. hill district, good varieties of pineapples and oranges are produced to a limited extent. Lac is also an important product of these districts.

It is to be mentioned that the area under high yielding varieties and improved varieties of paddy in Karbi-Anglong district was 6130 hectares in autumn season and 48,645 hectares in winter season during 1987-88. On the other hand, the area under high yielding varieties and improved varieties of paddy in N.C. Hills district was 2,495 hectares in autumn season and 3,450 hectares in winter season during 1987-88. Hence, it is clear that the area of high yielding varieties in Karbi-Anglong district is found to be more extensive than that of the area of high yielding varieties in N.C. Hills district.

The hilly tribes are now using improved seeds like hybrid maize, Taichung Native-1, I.R-8, Monoharsali, Izone etc in their cultivation and are getting better yields. Cultivation of cash crops like cashew nuts, black pepper, jute, mustard etc. has been taken up by them. Besides, they are interested in horticultural garden, plants and grafts of fruit-bearing trees. They use the chemical fertilisers, improved agricultural tools, implements, and pesticides to control pests in cultivation in modern times.

There are some seed farms in the hilly districts, the primary object of which is to raise improved seeds, technically known as 'A' class seeds for distribution among the Registered growers. All the nucleus seeds brought from Research Farms are cultivated in these farms. Improved horticultural plants and grafts are raised in the Fruit Nurseries and distributed to growers according to the demand.

The hilly districts get comparatively low rainfall and rainfall is neither certain nor assured. Therefore, irrigation is highly important for these hilly areas of Assam. The minor irrigation schemes are executed by the District Agricultural Authorities through the Development Blocks. The minor irrigation schemes are taken up and executed by the Flood Control and irrigation wing of the Public Works Department. The construction of bunds, digging up of dungs and canals, channelisation of hill streams to the cultivated fields, lift irrigation by the power pumps etc. are the minor irrigation schemes.

STEPS TAKEN BY THE GOVERNMENT:

A few steps have been undertaken by the Government for the purpose of improvement as well as control of Jhum. These are as follows:

(i) Introduction of the cultivation of cash crops like coffee, black pepper, cashew nuts, etc. as a soil conservation measure.

(ii) Top dressing of prepared jhum land with chemical fertilisers.

(iii) Establishment of compact villages in the plain areas of the district by rehabilitating the people drawn from the hilltops.

(iv) Introduction of terrace cultivation.

(v) Reclamation of wasteland suitable for wet land cultivation.

CONCLUSION:

We may conclude that it will require huge investment for many years to stop jhumming completely. With the help of short-term measures the productivity can be improved and the soil erosion can be checked. For the upliftment of the economic conditions of the hilly tribes, agriculture as well as horticulture, animal husbandry, fishery, poultry farming etc. can be developed.

STATUS OF JHUM CULTIVATION AND ALTERNATIVE PLAN FOR JHUM AREA DEVELOPMENT IN NORTH EASTERN INDIA.

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INTRODUCTION:

Present paper analyses the status of jhum cultivation and suggest an alternative plan for jhum, in order to develop the jhum area in NE India. To achieve this objective this paper discusses, firstly, historical background of jhum cultivation in the North Eastern Region of India with its advantages and disadvantages, secondly, searches for any alternative plan for jhum area development. In this connection the role and contribution of IFAD in Agriculture development in the north East is highlighted. Concept of MOSSULT as a viable alternative, which incorporate jhumming and Permanent cultivation, is introduced and discussed in detail. Some case studies are included in the paper, where such schemes are undertaken by the Government in the Karbi- Anglong District and North Cachar Hills.

AGRICULTURE PRACTICES IN THE NORTH EASTERN REGION OF INDIA:

Jhum as a mode of cultivation dominates the prevailing agricultural practices in the N.E. Hills. Nevertheless, amongst some of the relatively advanced tribes, terrace cultivation has also become gradually popular. The inhabitants of Dimasas of the North Cachar Hills mainly practise jhum. They also practise wet-land cultivation wherever they find suitable low-lying land. Similarly, the Karbis people also practise jhum and in the plain portion of the Karbi-Anglong they have resorted to settled cultivation.

In Arunachal Pradesh the Mishing and Nishi Tribes depend highly on jhumming than terrace or wet cultivation mainly due to lack of suitable agricultural land for wet cultivation and the reliable irrigation facilities.

The Khasi tribes of Meghalaya have been traditionally practising diversified modes of cultivation. Similarly the Garos are traditionally advanced in agricultural practices both of jhum and terrace cultivation.

Many debates have taken place over the real nature the problems that afflict the people practising shifting cultivation. In this context we venture to say that the malady lies in the non-availability of alternative occupational facility as well as lack of sufficient exposure to the flourishing and worthwhile vocations for the people who still continue with this pristine mode of cultivation. Without sufficient infrastructural support, developed skilled labourers and a state sponsored marketing network etc.- the sleeping genius of the hill tribes will have a tough time to blossom. Swidden cultivation has been a popular subject of anthropological research but today efforts are being made to study the subject of shifting cultivation in an integrated or inter disciplinary manner so as to get a total picture of Swiddening.

Directly or indirectly, Swiddeners are drawn into the main current of development although most of them live in the hills. They are under a continuous and systematic pressure to give up their age-old practices of cultivation and life and adopt the modern style of life, which is actually very painful for them.

More recently the subject has attracted the attention of the ecologists. Instead of holding extreme views favouring either culture or environment, the present trend is to view these as part of inter-active system and also see the problem in a symbiotic frame of reference. An effort must be made to see the entire problem through the perspective of the tribal himself.

In the present context three basic questions come to the fore and they need to be addressed –

1. Is shifting cultivation viewed as an economic activity or does it need to be studied in a specific historical and socio-political context? Exploitation of small tribal communities may have created a situation whereby the tribal have become a refugee in his own habitat

2. Is shifting cultivation really uneconomical? Does it destroy the environment?

3. Can there be a positive policy towards shifting cultivation rather than condemning it as bad? Will it not be advisable to improve the methodology of shifting cultivation so that the yield is increased and damage done to the environment minimised? It is argued that in any situation of man-environment interaction some damage to the environment is inevitable no matter what form of agriculture people practise. Therefore, there is no reason to single out this form of environmental exploitation for wholesale condemnation.

The basic feature and qualitative elements of shifting cultivation are enumerated below –

1. It is practised chiefly by simpler cultures.

2. Human labour is the main factor of production in operation with a few hand tools.

3. Fields are cleared by felling, cutting, slashing and burning.

4. Frequent shifting of cropped fields, normally in some kind of sequence in land control under, customary law, but sometimes occurring under other legal institutions of land control.

5. Both multiple cropping and specialised cropping are present.

6. Yields per acre and per man-hour normally compared with those of permanent field agriculture within regions in which comparison is properly made, but yields are often below those of mechanically- powered permanent-field agriculture.

7. Use of vegetative cover as soil condition.

8. When the system is efficiently operated, soil erosion is not greater than soil erosion under other system that is being efficiently operated.

9. Details of practice vary greatly depending upon the physical environment and the cultural milieu.

10. Operative chiefly in the regions where more technologically advanced system of agriculture has not become economically or culturally possible.

11. Destructive of natural resources only when operate inefficiently.

In the words of M. D. Chaturvedi Inspector General of Forests to the Government of India in 1953, "The notion widely held that shifting cultivation is responsible in the main for large scale erosion needs to be effectively dispelled"

M.S. Swaviram the then Advisor to the Planning Commission, to the Government of India observed that "It is a mistake to assume that shifting cultivation is an unscientific land-use. Actually it is a practical approach to some

inherent difficulties in preparing proper seed beds in steep slopes where any disturbance of the surface by hoeing and ploughing will result in washing away the fertile top soil. The tribal people, therefore, take care not to plough or disturb the soil before sowing. The destruction of weeds and the improvement of tilts necessary for the proper seedbed are achieved with the help of fire. In most of the hill areas the communication is not developed and sufficient land suitable for terracing is not available. Jhumming alone can be done for the present and as such every effort should be made to improve the fertility of the jhummed land."

While discussing reasons for soil erosion Verrier Elwin said that shifting cultivation was not responsible for it. The areas for jhumming are immediately covered by fresh out growth. No area remains bare for even a few days. The rainfall and humidity are quite favourable for growth. So there cannot be any soil erosion due to jhumming. Mr. S.M. Howard another former Inspector General of Forests recommended regulation and not abolition of shifting cultivation. Hence the harmful effects of jhumming have often been exaggerated, but how to increase the productivity of the jhum cultivation is the main question that confronts all. A review of shifting cultivators among the tribes of India has revealed that over the past few decades the jhumming cycle has become shorter. The main factors influencing the jhum cycle are, (a) increase in population and (b) destruction of forests.

The North East of India happens to be one of those rare places on the earth where wild rice grows. Therefore, the history of shifting cultivation in North Eastern India is the history of agriculture itself. So it becomes as issue of culture, sentiment and emotion. Subsistence and livelihood factors come only later. Thus any deliberate attempt by the modernists and proponents of permanent agriculture, horticulture etc. may very well offend the sensitive people of this region who thereafter would not take the government policy and programmes by heart. Economics and pragmatism will not prevail upon the psyche of the people.

Almost all the varieties of cereals and vegetables are grown in one jhum field, which is impossible in case of wet plain land. This is probably one of the reasons as to why the simple communities still cling to this method of food production. Many of the new methods of cultivation recently introduced in the tribal areas are yet to generate the process of cultural acceptability. Moreover, adoption of new techniques of agriculture may not provide facilities to worship the appropriate deities. The shift from traditional type of cultivation means partial shift from their traditional way of life itself. Hence, the introduction of settled cultivation among the traditional- bound shifting cultivators will be a long process, because it will contain in itself the seed of a vital change in their lives.

In many regions of the North East states subsidies were given by the Government to persuade the tribal people to take to terrace cultivation. However, even grant of subsidies could not make much headway in introducing terrace cultivation.

A study conducted in Nagaland gave many reasons for the lack of response to the scheme of terrace cultivation. One of the most important reasons given by the villagers was that in the first three years after construction of terrace, the yield was not sufficient enough even to meet their bare necessity. Hence, only those people who were prepared to live a life of austerity for a few years back for the sake of prosperity could take to terrace cultivation. A few farmers take to terrace cultivation just to keep possession of land allotted to them. The potentiality created in the terrace field was found to remain under- utilised. This tends to confirm the belief that shifting cultivation has deeper roots in the socio-economic life of the tribals. Steps have also been taken to control shifting **cultivation by changing land use pattern.**

In Assam the following steps have been undertaken –

1. **Cash crops**: A number of nurseries have been started for cashew-nuts, black pepper, coffee and cardamom. The coffee produced in Mikir Hills and North Cachar Hills district is reported to be of a superior quality.
2. A number of afforestation centres have been opened.

Horticulture: In the hill areas of Assam and Manipur, horticulture has been introduced extensively on the fields normally given to jhum cultivation. Under the scheme, pineapples, oranges, bananas and apples are being grown in many places. Apple cultivation has been very successful in the Kameng district of Arunachal Pradesh. Problems of transport and marketing have, however, appeared as the main hurdle in the growth of horticulture.

No single remedy to deal with the problems for the entire region in conceivable. Depending upon the agro-climatic conditions a series of activities such as terracing, orchard plantations, forestry and forest-based industries will have to be introduced as is being done in many places now. Some extent of jhum cultivation will have to continue. Because it seems to represent the best economic opportunity in relatively remote and sparsely populated pockets of Nagaland, Arunachal Pradesh, Meghalaya, Mizoram etc.

A very simple solution to this complex problem would be to adopt a strategy to promote scientific shifting cultivation. Efforts should be made to encourage the cultivation of perennial and other cash crops. In order to supplement the incomes of the shifting cultivators, animal husbandry programmes should be undertaken.

ROLE OF IFAD:

Against the background of failed developments initiatives in the North Eastern Region, the IFAD has initiated a new approach to development, which focuses on interventions, which are technically appropriate, culturally sensitive and institutionally effective. The overall objective is to improve the livelihood of the vulnerable groups in a sustainable manner through improved management of their resource base in a way that contributes to protecting and restoring the environment.

The objectives of the project undertaken by the IFAD include increase of incomes through the development of more sustainable farming systems and the establishment of non-farm enterprises. The project's emphasis is on introducing approaches that will encourage planning processes through the involvement of the entire community by the formation of a Community Resource Management Plan (CRMP), which reflects more productive and sustainable use of the available resources.

The CRMPs will

1. Adopt an inter-disciplinary, multi-sectoral approach,

2. To assist farmers in the gradual conversion of their presently unsustainable farming systems into a more sustainable system through
   a. Increasing the productivity of short fallow-cycle jhum plots through modifying the crop mix towards more productive and profitable crops and introducing crops and agronomic practices which contribute the soil conservation and
   b. Promoting permanent plantation crops in fallow jhum fields,

3. Expand settled cultivated land through constructing perennial irrigation facilities and rehabilitating poor performing irrigation schemes in order to increase food production,

4. Build on the natural advantages of the area through greater emphasis on forestry and agro-forestry as sources of livelihood as well as environmental protection,

5. Offering windows of opportunity for marketing outside the region (e.g. tea, timber, forest products, cashew, areca-nut, essential oils) or products for the local market (e.g. livestock products and fisheries). Emphasis will be given to proper land utilisation according to its suitability for different purposes.

MOSSCULT:

In this connection, a technology is developed by Arup Rai. This technology which is named as MOSSCULT is an integrated technology for:-

1. Soil and water conservation,
2. Advocation of permanent settled cultivation,
3. Meeting all social parameters and
4. Upliftment of high land farmers.

'MOSSCULT' aims to rejuvenate the leached soil by fixing atmospheric nitrogen in the soil. The dwindling yields of the jhum fields are due to the leaching of essential nutrients of the soil. In 'MOSSCULT' the atmospheric nitrogen is fixed into the soil by the nitrogen-fixing bacteria present in the roots of the leguminous plants. Phosphorus and potassium are added from the bio-mass of the plants.

To meet the cultural and economic needs of the people, the sloping area land technology (salt), the Mizoram – New Method of cultivation (MNMC) and the experience of the writer in the field are infused and integrated to formulate "Modified scientific shifting cultivation technology" (MOSSCULT). The Mosscult is equipped with the technology of replenishing the depleted soil of its nutrients. This is done firstly, by fixing the atmospheric nitrogen to the soil by the help of the strip-planted leguminous plant whose root systems nodules have nitrogen-fixing bacteria. Secondly, the penned cattle's bio-manure is distributed into the fields by the orthodox bamboo conduits.

MOSSCULT conserves soil and water on the one hand, and on the other it keeps time with the age old rituals and customs i.e. it allows jhum like cultivation in a scientific way, by allowing the people to bear a patch of legumes strip in a controlled way. The ridgeline of the watershed area is to be covered by natural forests with indigenous species. The next lower reach area is prescribed for optional peening of the stray cattle. Further, lower are the areas prescribed for growing paddy, cash crops, horticulture etc. The lower most reaches i.e. the valley bottom areas are so modified that pond are dugged where fishery and duckery could be practised. Similarly, ponds and Polly-ponds are to be digged at feasible places in the upper reaches facilitate irrigation and for drinking purpose.

At definite intervals, governed by the slope of the land, contour trenches are to be digged on the delineated contour lines. These contour trenches would arrest the rain-run –off water and the washed away silts in them and facilitate in-situ-infiltration of water, thereby, recharging the ground water table. The silts, so arrested are to be ploughed back into the agricultural field from time to time. The arrested silts contain natural microorganisms and organic manure.

It is presumed that this may be one of the factors, which is responsible for the much sought after taste, and flavour of the jhum yield. Hence, it is expected that the yield from the project area will be at par with the jhum yield. The chosen areas are to be planted with two types of leguminous plants basically for two purposes - one type with cash crop and the other for purely infusing the atmospheric nitrogen available. So that in the gestation period the farmer can also avail some financial return from the cash crops. The leguminous plants planted for infusing atmospheric nitrogen into the soil are allowed to be cut and burn after two years. This will add to the soil the N.P.K. (Nitrogen, Phosphorus, Potassium) and other essential nutrients. Hence, it is expected that the barren jhum field would be infused with its lifeline N.P.K., and the essential nutrients to produce bumper crops on a sustainable basis. This will ultimately be cultivated and give the jhummias a sense of permanency in hill cultivation.

The full benefit of the MOSSCULT would be felt after an incubation period of four years. However, the cash crops, the different beans, the fishery, the duckery etc. would definitely give economical support to the hilly people during the gestation period. The MOSSCULT is especially meant for the uphill farmers. This can also be used by the

farmers living at the bottom of the valley to discourage the applicated of harmful chemical fertilisers.

EXPECTATION FROM MOSSCULT:

The MOSSCULT will help in the conservation of the soil and water in the hills; side-by-side it will also help in balancing the fragile eco system.

The MOSSCULT will help in checking the devastating floods in the plains. The MOSSCULT will instill in the minds of the jhummias the essence of permanence and stability and this will help them to realise the paramount importance of permanent settled cultivation.

Last but not the lease MOSSCULT will give a befitting boost to the pitiable economy of the hilly farmers. The technology of MOSSCULT can be used as a tool to reclaim the abandoned jhum land for meaningful agricultural pursuit to meet the challenge of food shortage in the coming next decades.

The average foodgrain production of the North East is about 5 million tonnes (about 2.5 % of India's total). From data collected from NERIWALAM, Dolabari. Tezpur, the projected foodgrain requirement of the North East will be 110.09 Lakh M. T. in 2011, 1143.11 Lakh M.T. in 2021 and 186.11 Lakh M.T. in 2031. Whereas, estimated production is 75.394 Lakh M.T. in 2011, 90.472 Lakh M.T. in 2021 and 108.554 Lakh M.T. in 2031. This leaves a gap of 34.696 Lakh M.T., 52.638 Lakh M.T. and 77.576 Lakh M.T. in 2011, 2021 and 2031 respectively. This is clear from the table given below:

Table 1.

Projected food grain requirement and production (lakh m.t).

Year	Population in lakhs	Grain requirement	Total production	Gap
1991	315.47	65.24	52.357	12.883
2001	409.11	84.69	62.394	21.861
2011	531.83	110.01	75.394	34.696
2021	691.38	148.11	90.472	52.638
2031	899.19	186.13	108.554	77.576

Source: NERIWALM, Dolabari , Tezpur.

From the table, we can see that the foodgrain requirement of the North East will be far more than the projected foodgrain production. Hence, we have to increase production from all the fallow abandoned jhum land, waste land etc. – not only in foodgrains but also in horticulture, animal husbandry etc. – so that the products may be exchanged for foodgrains. The MOSSCULT technology has been accepted by IFAD and it has agreed to experiment the concept in the North Cachar Hills district for a period of five years.

It will be pertinent to mention here that several attempts have been made by the State Government of Assam with 100% central government assistance to control and modernise shifting agriculture in Karbi-Anglong through various State Government Agencies like Agriculture Department, Soil Conservation Department, Forest Department, Sericulture Department, Veterinary & Animal Husbandry Department with active participation of the Autonomous Council. Several schemes have been launched for jhum control. Permanent settlement of the Jhummias of both the

hills districts of Assam in North Cachar Hills and Karbi- Anglong Hills have been attempted with schemes such as –

1. Integrated Jhummia Development Project (IJDP)
2. Compact Area Development Project (CADP)
3. Mini Compact Area Development project (MCADP)
4. Watershed Development Project for Shifting Cultivation Areas (WDPSCA)

The WDPSCA is now under implementation.

With 100% Central Government Assistance, Watershed Development Project for shifting cultivation areas (WDPSCA) has been initiated in both the districts of North Cachar Hills and Karbi- Anglong. Under the new approach the following strategies are adopted. The Agricultural Engineering Wing of Department of Agriculture along with Agricultural Scientists has already conducted some experiments relevant to hill agriculture with special reference to modifying rather than total replacement of shifting cultivation.

The WDPSCA project uses simple techniques such as construction of trenches along contour lines and lining them with vegetative hedges, water harvesting techniques with the help of bunds etc.- crops are growth in line across the slope to conserve soil and moisture. Adoption of WDPSCA has benefitted about 320 families in the Hapjan Project and the number of families is increasing. Instead of weaning the people away from shifting cultivation which is so deeply ingrained in the cultural ethos of the North East people, laudable efforts are being made by various agencies, individuals, institutions etc. to integrate and incorporate the idea of settled cultivation without eliminating or destroying the Swiddening culture. The detail of the works undertaken by the Assam Government in Karbi- Anglong district was supplied by Shri Kanak Ch. Gogoi, Assistant Agricultural Engineer, Hills, Diphu.

Further investigation is needed to assess, whether all the concerned agencies – Government or Non-Government, being able to perceive and implement plans and policies that will benefit the people of the North Eastern Region by raising the standard of living – particularly the jhummias? The pecuniary consideration made by the Central Government for the betterment of these people in such a light has had an opposite effect. The money which a layperson would term as easy money has percolated down to the in the guise of many tertiary activities. These tertiary sector activities, which also include political expenditure, do not really have elements of quid pro quo. The new purchasing power so created has led to the birth of a consumerist culture, which has gone towards undoing the cultural fabric of the tribals. There is an increase in general opinion that these practises of pushing in funds with the vague purpose of tribal up-liftment should be changed to specific project based and well monitored funding of these people.

TRANSITION IN AGRICULTURE OF NORTH EASTERN HILL STATES OF INDIA-IMPLICATIONS FOR DEVELOPMENT.

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ABSTRACT:

An analysis of transition in agriculture of North-Eastern Hill States, using secondary data collected from various Government publications revealed that agriculture still occupies a major share in Net Domestic Product (NDP) and employment. The distribution of land holdings in the region is highly skewed which widens the inter-personal distribution of income. It suggests development of off-farm income and the employment opportunities. The decreasing average size of holding resulted agriculture uneconomical and more intensive use of natural resources. In this regard, suitable land reform policy may be formulated and implemented. It will scale up the farm size and productivity. The minimally low sown area and cropping intensity indicate potential scope for increasing area available for cultivation either through land development activities or improvement in rural infrastructure development. As shown by cropping pattern, production is highly specialised dominated by paddy. Crop diversification based on comparative advantage and the food security needs to mention. Maintenance of genetic diversity, development of cold and drought tolerance crops and high second round employment effect crops, high yielding technology for pulses and oil-seeds, balanced development of all crops in harmony with nature are felt needs. High significant complementary relations exist among fertiliser use, area under HYVs and availability of irrigation infrastructure. Development of water harvesting techniques such as micro-watershed based farming system on hill areas can go a long way in increasing agricultural productivity in the region. There is also enough scope to narrow down the adoption gap in the use of fertilisers and the high yielding varieties through intensification of extension services and institutional support. Since investment in land infrastructure development is costlier, financing and credit policy of the institutions should be liberalised. These measures will facilitate an equitable growth and development of the region.

INTRODUCTION:

Agriculture in India has made great strides, thanks to the agricultural technology being gradually introduced since the mid 1960s. It encompasses the use of high-yielding variety (HYV) seeds, chemicals, fertilisers, irrigation and plant protection measures along with the use of agricultural machinery and implements. The new technology has not been uniform among different states/regions, it has spread thoroughly in a few favourably endowed states like Punjab, Haryana and Western Uttar Pradesh while the hill mountainous states of North Eastern Hill (NEH) region and western Himalaya have lagged behind. The net result has been that regional imbalances in agricultural development have grown across states. This may not be entirely due to any policy neglect but could have arisen out of the inherent differences in resource endowments and the extent to which potential resources are being utilised and also, differences in the levels of infrastructure developments. Thus, to ensure overall rapid growth in the agricultural economy of the region, there is a need to examine the extent of regional variation in agricultural growth and to identify the factors associated with it.

METHODOLOGY:

Time series data on various aspects of agriculture for the period 1975-76 to 1997-98 for the seven North-Eastern States including Assam and all India level were collected from the various issues of Basic Statistics of North-East India, Fertiliser Statistics and Area and production of Principal Crops in India and Economic Survey of India. Specific period has been selected as the reorganisation of North-Eastern States was completed only in 1972. Appropriate

statistical techniques were also used for the analysis of time series data. Annual compound growth rates of area, production and productivity were calculated by using the following log linear function (Dandekar, 980).

$$Y_t = A (1+r)^t \quad \ldots\ldots\ldots\ldots\ldots\ldots (1)$$

Where,

Y= the value for which growth rate is to be calculated
T= time in year
r = growth rate.

Taking log both sides of equation (1)

$$\log Y_t = \log A + t \log (1+r)$$

Putting $\log Y_t = Y$, $\log A = a$ and $\log (1+r) = b$

$$Y = a + bt$$

$$1 + r = e^b$$

Therefore, $r = e^b - 1$.

RESULTS AND DISCUSSION:

A. OVERALL GROWTH.

In the process of economic development, it is expected than non- agricultural sector would grow faster than agricultural sector in terms of output and labour absorption. As shown in Table 1. This process has started though slow in the country as a whole as well as in NEH states. However, the share of agriculture in Net Domestic Product (NDP) is higher in NEH states except Nagaland than that for all India. This is because of comparatively lower industrial growth in the NEH states. Table 1. further shows that the decline in the share of agriculture in NDP is higher than the decline in labour force in agriculture. This coupled with population growth has led to an increase in the number of workers per hectare of land in the country as well as for the NEH region.

B. AGRICULTURAL GROWTH-PACE AND COMPOSITION.

Before we analyse the pace and composition of agricultural growth, it should be appropriate to study the changes in land distribution and utilisation pattern, which in turn determine to a great extent, the growth in agriculture.

(i) Changes in land distribution.

The distribution of number of holdings are occupied by various size groups of holdings in the NEH states and all India are given in Table 2. This clearly shows that agrarian structure is still highly skewed in India as well as in the NEH states. It could be seen from the Table 2. that the number of holdings less than 2 ha. was highest in all India and NEH states except Nagaland where there is a uniform distribution of holdings. The number as well as area under the holdings less than 2 ha. continued to be substantially high in Tripura than those in other states of the region, and thus leading to the lowest average size of holding. Nagaland had the highest average size of holding due to the highest proportion in area and number of holdings above 10 ha. The temporal changes in agrarian structure reveals two distinct patterns, Firstly, in the case of Manipur, there has been a sharp decline in the area as well as in the number of holdings below 2 ha, while the reverse holds true for the holdings above 4 -10 ha. Consequently, average size of

holdings increased from 1.12 ha in 1976-77 to 2.3 in 1990-91. This could be because of selling of land by small and marginal farmers as they seek gainful employment outside agriculture. Secondly, a decline in area and number of holdings of large farmers in Tripura, Sikkim and Nagaland imply that sub-division of holdings is stronger in these states. The similar sub-division of holdings was observed for the country as a whole resulting moderate decline of the average size of holdings for both the country as well as NEH states.

(ii) Changes in land use pattern.

The land use and cropping pattern in NEH states and all India level collected in Table 3. indicate that the area put to agricultural use was significantly low in NE states compared to all India level of 46.73 %. It was highest in Tripura (22.90 %) and lowest in Arunachal Pradesh (2.04 %). It is due to inherent characteristics of terrain, fragility, inaccessibility of hilly ecosystem coupled with traditional land tenure system. There was moderate increase in net sown area of the NEH states during 1975-76 to 1995-96 although the all India level remained more or less stagnant. This shows that land was either made suitable for cultivation through land development activities or was considered suitable (exploitation motive) for cultivation in these states. The area under forests increased from low to moderate in NEH states and also, significantly higher than all India averages (21.98 %). However, there is a sharp increase in area under forest in Nagaland during the period of study. The reverse was true in the case of area not available for cultivation. It could be further seen from Table 3 that the cropping pattern in NEH states except Sikkim remained highly specialised in foodgrains. In Arunachal Pradesh, Meghalaya, Mizoram, Nagaland and Tripura, pulses and oil seeds gained area mainly through a shift away from rice. However, Nagaland gained in area under rice, maize and total foodgrains. It is because of sharp increase in net sown area from 6.80 % to 13.65 %. Unlike other states, Sikkim experienced drastic decline in area under foodgrains crops, owing to diversification towards horticultural crops including spices. There was a low to moderate increase in cropping intensity in most of the NEH states. However, in Sikkim, the cropping intensity decreased from 106.3 % in 1975 to 100 % in 1995.

(iii) Growth in production and productivity.

Since crop production is the main activity of agriculture in NEH states, the growth in production of major crops, as analysed in this section, should reflect the performance of agriculture in this region. Compound growth rate of major crops in different states of NEH region during 1975-76 to 1977-78 is presented in Table 4. In the case of rice, there was significant growth in area in Arunachal Pradesh and Nagaland while the other states showed negative growth rates. It is because of the diversion of rice crop to other high value crops. Despite declining area under rice the production of rice in NEH states except Meghalaya could increase significantly due to the improvement in productivity. In Meghalaya, the production of rice decreased by 0.16 % per annum due to decline in both area and productivity. Mizoram experienced the highest growth rate of 7.5 % per annum mostly by increasing productivity. However, in Arunachal Pradesh the increased production was mainly due to area expansion.

The area expansion as well as yield increase caused the maize output to grow significantly in Arunachal Pradesh, Mizoram, Nagaland and Sikkim. However, in Meghalaya the increase in production was significantly contributed by yield increase. The significant increase in yield of maize in Manipur (3.1 %) could not offset the negative growth of area, thus declined the production of 2.0 % per annum.

The production of total pulses in NEH states except Manipur increased significantly due to increase in both area and productivity. But, the reverse was true in Manipur where the production decline by 5.90 % per annum. The growth in productivity was highest in Sikkim (13.84 %) and least in Meghalaya (0.74 %). Mizoram could increase the area under pulses by 12.41 % per annum followed by Nagaland (6.16 %) and Meghalaya (3.58 %) and Sikkim (2.90 %).

In totality, the foodgrains production in Manipur, Mizoram, Sikkim and Tripura increased significantly mostly due to the improvement in productivity. Although there was moderate improvement in productivity in Arunachal

Pradesh and Nagaland, the production increase was mostly by area expansion. However, in Meghalaya, there was insignificant increase in production resulting from slight improvement in productivity and area. For all India average, productivity improvement offsets negative area expansion, thus increasing rice production by 2.60 % per annum. Both area expansion and improvement in yield resulted significant growth of oilseeds production in Arunachal Pradesh, Mizoram, Nagaland and Tripura. However, Meghalaya and Sikkim showed low area expansion and yield improvement causing moderate increase in production. Area and Yield grow more or less at the same rate in Meghalaya, Mizoram and Sikkim. The same trend followed in all India level. However, increase in production in Arunachal Pradesh, Mizoram and Nagaland was mostly due to area expansion. In Manipur, positive growth in area could not offset negative growth in yield, thereby declined production by 0.32 % per annum.

C. DETERMINANT OF AGRICULTURAL GROWTH.

Infrastructural development and input used.

Infrastructural developments and inputs used analysis in relation to output gains (Table 5.), points out that the development of irrigation has been quite uneven across NEH states since organised efforts to harness the water resources started in the country. In the states of Manipur and Tripura where percentage of net irrigated area to net cultivated area was high, foodgrains productivity was also highest. However, due to stagnant growth in net-irrigated area in these States there had been restricted expansion of area under foodgrains. In other states also, the growth of percentage of irrigated area to net cultivated area remained stagnant due to either increasing net cultivated area or low investment in irrigation development.

Fertilizer consumption per hectare was also higher in Manipur and Tripura, (84.5 kg and 31.3 kg recpectively) while in other states it was abysmally low. It follows that fertiliser use had almost a complementary relationship with the availability of irrigation facilities. All the NEH states had less fertilizer consumption than all India level of 97.5 kg/ha (Table 6.).

In the higher growth states of Mizoram, Manipur, Sikkim and Tripura, the percentage area under high yielding varieties varied from 31.19 to 75.19. In the remaining states, it ranged from 17.84 % (Arunachal Pradesh) to 29.13 % (Meghalaya). Similarly, the average size of holding was also low in higher growth states. It shows high negative relationship between farm size and agricultural growth. The number of pump sets per unit area was negligible in NE states except Tripura (5.26 per '000 ha). There was significant growth in rural electrification in NE states, which varied from 46.3 % in Arunachal Pradesh to 98 % in Nagaland.

As shown by low tractor density per unit area in NEH states, agriculture in the NEH states is highly labour intensive. The extensive sloppy and undulating terrain restricts the use of tractor in the region. However, Nagaland, Manipur and Mizoram have comparatively higher growth rate of tractorisation. Only 3 states, viz. Meghalaya, Mizoram and Nagaland showed higher per hectare credit availability than all India average of Rs.1046. The use of pesticides in NEH states was declining between the year 1990-91 to 1995-96 and very low as compared to all India average of 0.43 kg per hectare. On an average, the effect of pesticides use on the agricultural growth was not significant as compared to other inputs.

D. CONCLUSION AND POLICY IMPLICATIONS.

As discussed above, land distribution is highly skew in North Eastern States, which implied widening of interpersonal distribution of income. It suggests development of off- farm income and employment opportunities. The decreasing average size of holding resulted in agriculture uneconomical and more intensive use of natural resources. As review of land tenure system, the lands mostly belong either to village chief or a particular community. In this regard suitable land reform policy may be formulated and implemented. It will scale up the farm size and productivity.

The minimally low net sown area and cropping intensify indicate potential scope for increasing area available for cultivation either through land development activities or improvement in rural infrastructure development. As shown by cropping pattern, production is highly specialised dominated by paddy. It causes imbalance crop production, narrow-genetic base, and increased dependence on other parts of the country. Crop diversification based on comparative advantage and the food security needs to mention. Maintenance of genetic diversity, development of cold and drought tolerance crops and high second round employment effect crops, high yielding technology for pulses and oilseed, balance development of all crops in harmony with nature are felt needs. High significant complementary relations exist. It will scale up the farm size and productivity among fertiliser use, area under HYVs and availability of irrigation infrastructure. Development of water harvesting techniques such as micro-watershed based farming system on hill areas can go a long way in increasing agricultural productivity in the region. There is also enough scope to narrow down the adoption gap in the use of fertilisers and the high yielding varieties through intensification of extension services and institutional support. Since investment in land infrastructure development is costlier, financing and credit policy of the institutions should be liberalised. These measures will facilitate an equitable growth and development of the region.

Table 1:

Share (%) of agriculture in net domestic product and employment in NEH states.

States	Net domestic product			Employment		
	1970-71	1980-81	1990-91	1970-71	1980-81	1990-91
Arunachal pradesh	59.1	-		80.3	69.6	64.0
Manipur	48.0	44.7	44.5	67.0	64.2	62.5
Meghalaya	-	37.8	29.1	78.9	68.6	64.1
Mizoram	-	-	-	-	67.4	55.8
Nagaland	-	28.69	17.4	79.0	71.9	73.4
Sikkim	-	-	-	85.6	61.4	64.3
Tripura	70.0	45.6	38.7	74.3	61.8	57.6
All India	49.2	36.3	31.6	69.7	60.5	58.9

Source: CMIE Publications (various issues)

Table 2.

Changes in agrarian structures in NEH states and India.

State		No. of holdings (000)					Area in (000)					Average size of holding (Ha.)
		0-2	2-4	4-10	above 10	Total	0-2	2-4	4-10	above 10	Total	
Arunachal pradesh	1976 - 77	-	-	-	-	-	-	-	-	-	-	4.27
	1990 - 91	-	-	-	-	-	-	-	-	-	-	3.71
Manipur	1976 - 77	119.6 (84.40)	20 (14.18)	2.1 (1.48)	Neg.	141.7 (100.0)	99 (62.58)	48.8 (30.85)	9.9 (6.26)	0.5 (0.32)	158.2 (100.0)	1.12
	1990 - 91	118 (83.10)	21 (14.79)	3 (2.11)	Neg.	142 (100.0)	105 (34.77)	117 (38.74)	71 (23.51)	1 (0.33)	302 (100.0)	2.13
Meghalaya	1976 - 77	110.2 (64.75)	45.2 (26.56)	13.8 (8.11)	1 (0.59)	170.2 (100.0)	98.6 (33.36)	114.5 (38.73)	69.1 (23.38)	13.4 (4.53)	259.6 (100.0)	1.74
	1990 - 91	110 (64.33)	46 (26.90)	13 (7.60)	1 (0.59)	171 (100.0)	100 (33.11)	117 (38.74)	71 13.51)	13 (4.30)	302 (100.0)	1.77
Mizoram	1976 - 77	-	-	-	-	-	-	-	-	-	-	1.48
	1990 - 91	-	-	-	-	-	-	-	-	-	-	1.37
Nagaland	1976 - 77	24.5 (23.72)	20 (19.36)	33.7 (32.62)	25.3 (24.49)	103.3 (100.0)	28.6 (3.64)	60.1 (7.65)	228.3 (29.06)	468 (59.65)	785.6 (100.0)	7.61
	1990 - 91	34 (23.94)	26 (18.31)	47 33.10	33 (23.24)	142 (100.0)	39 (4.03)	76 (71.85)	298 (30.79)	556 (57.44)	968 (100.0)	6.82
Sikkim	1976 - 77	18.5 (59.49)	7.4 (23.79)	4.3 (13.83)	0.9 (2.89)	31.1 (100.0)	16.9 (21.20)	21 (26.35)	25.2 (31.62)	16.6 (20.83)	79.7 (100.0)	2.56
	1990 - 91	37 (69.81)	9 (16.98)	5 (9.43)	1 (1.89)	53 (100.0)	30 (27.03)	27 (24.32)	31 (27.93)	22 (19.82)	111 (100.0)	2.09
Tripura	1976 - 77	205 (83.13)	32.9 (13.34)	8.1 (3.28)	0.6 (90.24)	246.6 (100.0)	152.3 (49.26)	881.1 (28.49)	43.5 (14.07)	25.3 (8.18)	309.2 (ioo.0)	1.25
	1990 - 91	286 (89.94)	28 (8.81)	4.0 (1.26)	neg	318 (100.0)	193 (62.66)	77 (25.00)	18 (5.84)	20 (6.49)	308 (100.0)	0.97
All India	1976 - 77	59251.3 (7264)	11666.1 (14.30)	8212.5 (10.07)	2439 (2.99)	81568.9 (100.0)	38414.1 (23.52)	32427.8 (19.85)	49628.4 (30.38)	42874 (26.25)	163344.3 (100.0)	2.00
	1990 - 91	83481 (78.29)	13923 (13.06)	7580 (7.11)	1654 (1.55)	106637 (100.0)	53721 (32.56)	38375 (23.19)	44752 (27.04)	28659 (17.32)	165507 (100.0)	1.55

* Figures in parentheses indicate percentage to total

Source: Fertilizer statistics, Fertilizer Association of India (various issues- 1997 to 1992)

Table 3. Changes in land use and cropping pattern in NEH states

	Arunachal Pradesh		Manipur		Meghalaya		Mizoram		Nagaland		Sikkim		Tripura		All India	
	1975	1995	1975	1995	1975	1995	1975	1995	1975	1995	1975*	1995	1975	1995	1975	1995
Land use pattern (per cent)																
Forest	91.33	93.79	27.23	27.23	36.59	41.81	61.99	76.53	17.42	55.82	37.11	36.20	59.92	57.77	21.98	22.57
Area not available for cultivation	0.66	0.87	65.36	65.36	13.74	10.26	10.04	10.10	75.74	3.69	39.08	38.03	5.05	12.68	12.97	13.57
Permanent Pasters,grazing Land and misc	-	-	-	-	0.76	0.76	0.19	0.19	-	-	14.43	9.72	2.86	-	4.15	3.63
Cultivable wasteland	2.64	-	-	-	20.14	21.20	3.52	3.54	-	4.79	0.140	0.141	0.67	0.95	5.71	4.63
Others	0.33	0.80	1.09	1.09	6.40	7.23	0.14	0.14	-	8.41	0.56	0.70	7.92	2.57	1.31	1.14
Current fallow	0.34	0.51	-	-	2.45	2.95	8.71	8.76	-	7.37	-	0.56	0.48	0.38	4.09	4.53
Fallow other than current fallow	2.09	0.66	-	-	12.18	7.36	12.32	7.76	-	6.27	0.140	1.27	0.20	0.95	3.13	3.28
Net sown area	2.04	3.37	6.33	6.33	7.74	9.19	3.09	5.22	6.80	13.65	8.54	13.38	22.90	26.41	46.73	46.65
Cropping pattern (per cent)																
Rice	52.0	49.18	84.38	86.76	51.38	42.59	72.94	62.57	58.33	63.60	16.59	5.6	80.27	60.52	22.91	23.27
Maize	14.85	14.14	5.19	2.20	7.98	6.96	5.44	7.71	9.21	13.16	33.96	27.8	Neg.	0.47	3.50	3.38
Total foodgrains	78.62	75.12	92.52	88.74	96.46	53.73	78.97	73.76	88.42	90.0	72.42	53.66	82.05	63.62	74.39	66.50
Total pulses	Neg.	2.66	2.71	Neg.	0.74	1.30	0.59	3.67	3.42	7.19	5.38	4.12	1.26	2.16	14.19	12.25
Total Oilseeds	Neg.	9.88	2.0	1.7	3.5	3.72	-	6.15	1.84	12.5	6.92	6.76	1.85	2.42	9.82	13.94
Sugarcane	-	-	2.19	0.99	0.09	0.004	2.94	0.83	2.37	1.10	-	-	0.56	0.38	1.60	2.22
Cotton	-	-	0.05	0.06	3.69	3.04	1.6	1.01	-	0.09	-	-	0.56	0.35	4.27	4.85
Croping Intensity	113.0	131.9	145.0	176.0	116.7	119.9	106.3	100.0	100.9	108.1	105.8	149.5	155.4	153.8	121.2	131.2

* Relates to 1980

Source:Fertilizer statistics, Fertilizer Association of India (various issues)
Basic Statistics of NEH Region, NEC, Shillong (various issues)
Statistical Abstracts, Govt. of India, CSO, Dept. of Statistics (Various issues)

Trend in area, production and yield of Crops in NEH states (contd)

(Area = 000 ha, prod = 000 tones,yield=t/ha)

Year	Rice			Maize			Total Pulses			Total Foodgrains			Total Oilseeds		
	A	P	Y	A	P	Y	A	P	Y	A	P	Y	A	P	Y
Sikkim	15.1	12.0	8.0	30.9	30.5	9.9	4.9	3.9	8.0	.65.9	63.7	9.7	6.3	4.3	6.3
1975	8.0	15.0	18.2	39.5	55.7	14.1	6.7	5.9	8.8	76.2	103.4	13.6	9.6	7.6	7.9
1997	-5.03	0.50	5.67	1.64	3.83	2.20	2.90	3.78	1.34	0.86	3.24	3.24	1.18	1.70	0.50
C.g.r.															
Tripura	15.1	12.0	8.0	30.9	30.5	9.9	4.9	3.9	8.0	.65.9	63.7	9.7	6.3	4.3	6.3
1975	8.0	15.0	18.2	39.5	55.7	14.1	6.7	5.9	8.8	76.2	103.4	13.6	9.6	7.6	7.9
1997	-5.03	0.50	5.67	1.64	3.83	2.20	2.90	3.78	1.34	0.86	3.24	3.24	1.18	1.70	0.50
C.g.r															
All India	39475	48470	12.4	6031	7256	12.0	24452	13039	5.3	128181	121034	9.4	16922	10607	6.3
1975	43420	82300	19.0	6305	10852	17.2	22847	13.70	5.7	124068	192434	15.5	26013	22015	8.5
1997	0.47	3.02	2.53	0.23	2.51	2.28	-0.11	0.95	1.06	-0.17	2.60	2.78	2.55	5.03	2.42
C.g.r															

c.g.r = Compound growth rate

*** Relates to 1983

** Relates to 1990

* Relates to 1992

Sources : Fertilizer statistics, Fertilizer Association of India (various issues)
Basic Statistics of NEH region, NEC, Shillong (various issues)
Statistical Abstracts, Govt.of India, CSO, Dept.of Statistics (various issues)
Area and production of Principal Crops in Indis, Dirtt. Of Economics and Statistics, Govt.of India (various issues)

Infrastructural development and input use in NEH states

	A.Pradesh		Manipur		Meghalaya		Mizoram		Nagaland		Sikkim		Tripura		All India	
	1975	1995	1975	1995	1975	1995	1975	1995	1975	1995	1975	1995	1975	1995	1975	1995
Net irrigated area (000 ha)	23	36*	65	65*	43	45*	8	8	37	61*	-	16*	30	35*	35149	51210
% Of Net Cultivated area	20	24	46.4	46.4	24.7	22.39	12.3	12.3	32.74	32.28	-	16.84	12.5	12.64	24.8	36.04
Fertilizer Consumption (Kg/ha)	N.A	2.05*	10.29	84.5*	9.71	13.54	N.A	7.15	0.97	2.47	N.A	11.05	1.21	31.3	20.43	97.5
Area Under H.Y.V. (000 ha)	-	33	40	80	13	60	-	34	5	40	-	33	106	203	31888	72119
% of Net Cultivated Area	-	17.84	28.57	57.14	7.41	29.13	-	31.19	4.42	19.05	-	34.74	44.17	75.19	22.51	50.70
Average Size of Operational Holding (ha)	4.27	3.71	1.12	2.13	1.74	1.77	1.48	1.37	7.61	6.82	2.56	2.09	1.25	0.97	2.00	1.55
No. of Pump sets / Tube wells	Nil	Nil	Nil	45	18	65	Nil	Nil	1	172	Nil	Nil	126	1422	3034191	8992102
No of net/net Cultivated area (No/000 ha)	-	-	-	0.32	0.10	0.32	-	-	0.01	0.91	-	-	0.52	5026	21.75	63.2
% of Village Electrified	2.1	46.3	12.06	74.3	7.38	46.7	2.18	63.4	20.75	98.0	11.65	92.0	6.14	60.2	6.68	83.2
No. of Tractors/ 000 ha.		0.94		3.27	-	1.79		2.11	-	7.51	-	-	-	0.38	-	8.72
Credit Availability (Rs/ha)	-	419	-	605	-	1222		1305	-	1251	-	-	-	780	-	1046
Consumption of Pesticides (Kg /Net C. area)	0.24	0.11	0.36	0.29	0.09	0.10	0.27	0.19	0.10	0.04	0.31	0.27	0.50	0.09	0.50	0.43

* Relates to 1995; * * Relates to 1992 * * * relates to 1990

Source : Fertilizer Association of India (various issues)
Basic Statistics of NEH region, NEC, Shillong (various issues)
Statistical Abstracts, Govt. of India, CSO, Dept. of Statistics (Various)

Table 6.

Trend in fertilizer consumption in NEH states (consumption in '000 tonnes)

States	1975 - 76	1980 -81	1985 - 90	1990 - 95	1996 - 97	c.g.r.
Arunachal Pradesh	0.06	0.06	0.10	0.15	0.32	10.9
N	0.01	0.01	0.05	0.09	0.13	17.8
P205	0.08	0.09	0.18	0.27	0.55	12.25
Total						
Manipur	1.00	2.28	3.90	8.66	11.39	10.41
N	0.30	0.56	0.80	4.37	1.25	9.14
P205	1.34	2.50	4.89	13.52	13.18	9.90
Total						
Meghalaya	1.20	1.22	1.60	1.79	2.20	2.59
N	0.40	0.55	1.30	0.64	1.05	4.20
P205	1.69	2.50	3.07	2.61	3.43	3.06
Total						
Mizoram	0.03	0.02	0.05	2.61	0.23	16.04
N	0.06	0.03	0.03	0.36	0.10	12.95
P205	0.10	0.07	0.08	0.90	0.39	14.74
Total						
Nagaland	0.07	0.06	0.18	0.42	0.41	8.33
N	0.03	0.01	0.06	0.28	0.35	15.77
P205	0.11	0.08	0.25	0.87	0.85	10.89
Total						
Sikkim	0.06	0.33	0.62	0.58	0.55	10.92
N	0.09	0.23	0.51	0.38	0.18	9.66
P205	1.00	073	1.17	1.13	0.75	9.85
Total						
Tripura	0.20	1.39	3.50	6.00	5.41	14.74
N	0.04	10.35	1.00	1.58	1.88	20.38
P205	0.29	2.13	4.22	8.43	8.72	15.71
Total						
All India	2148.6	3678.1	5660.8	7997.2	10301.8	7.33
N	466.8	1213.6	2005.2	3221.0	2976.8	8.26
P205	1893.7	5515.6	847401	12546.2	14308.1	7.36
Total						

Source : Fertilizer, Statistics, FAI (various issues)

REFERENCES:

Dandekar, V.M. (1980): *Introduction to Lonavla Seminar on Data Base Methodology for the study of Growth Rates in Agriculture*, Indian Journal of Agricultural Economics. Vol. 30, No. 2, May- August, Mumbai.

Pal, S; Mruthyunjaya; and Birthal, P.S. (1992): *Changes in Agriculture of Green Revolution States: Implications for Agriculture Development*, Agriculture Economic Research Review, Vol. 5, No. 1, January-June, New Delhi.

Singh, S.B. and Goswami, S.N. (1998): *Inter-State Disparities in Agriculture Growth in North-Eastern Hill Region of India*, Journal of Hill research, Vol.11, No.2, July- December, and Sikkim.

JHUM CULTIVATION & AGRICULTURAL PRODUCTIVITY IN ARUNACHAL PRADESH – SOME ANALYSIS.

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Arunachal economy is predominantly agrarian. The predominant agricultural practice is jhum cultivation but few tribes in the plain areas of Arunachal Pradesh practice permanent cultivation. The geographical condition of the hill and its topography has compelled the people to practice these two methods of cultivation according to the nature of land and its suitability. Agricultural development in Arunachal Pradesh marked a beginning after independence with the launching of the First Five- Year Plan. Before that the traditional agriculture, which was based on jhum cultivation, was marked by low productivity. The output obtained from the jhum field was mainly meant for self-consumption. This low productivity in the jhum cultivation does not create any incentives and interest in applying modern inputs and techniques in jhum fields. In this paper an attempt has been made to have an overview of agricultural productivity in Arunachal Pradesh and some of the major causes, which have influenced the growth of productivity in the state.

Agricultural productivity in Arunachal Pradesh experienced a boost with the initiation of development programmes by the Goverment after Independence. The area under shifting cultivation has shown a declining trend owing to the conversion of jhum fields into permanent uses like terrace, horticultural gardens etc. by the Government. Moreover, Government raised the amount of allocation to agriculture from Rs.30.76 lakh in the First Five-Year Plan. New crops were introduced. New varieties of HYV seeds and chemical fertilisers were distributed to the farmers at subsidised price. In every village, trained village level workers (VLWs) were appointed for providing necessary information related to agriculture, like the use of chemical fertilisers, better and improved varieties of seeds, use of modern technology etc. In 1993-94 the number of farmers trained were 4750, which increased to 5000 in1997-98 though the number ofVLW's trained remain constant during the same period.

(II)

In Arunachal Pradesh the people have been practising the shifting cultivation ever since their settlement in this area hundred of years ago. In shifting cultivation locally known as jhum cultivation, the jungles are either cleared or burnt. This form of cultivation is also termed as 'slash and burn' method. In Arunachal Pradesh right from the selection of a jhum plot up to harvesting, the farmers perform some traditional rites, which encourage mutual co-operation among the community members. Generally, after the selection of plots jungles are burnt down in order to maintain the soil fertility and protection from harmful insects and pests. In jhum, cultivation are generally done by family labour and in some case of shortage of labour community members are invited by offering them food, drinks etc.

Jhum cycle is taken to be 5 to 10 years normally. In earlier days of Arunachal Pradesh the jhum cycle was kept between 6 to 15 years to regain and regenerate the fertility and jungles respectively. But with the passage of time the jhum cycle has been reduced drastically owing to scarcity of land due to increase of population and governments encouragement to transfer the land from jhum to permanent cultivation. This transformation has been done in order to raise agricultural productivity in the State. Because in jhum field due to the difficulty of applying modern inputs and techniques the production has remained very low. This decline in jhum land is due to the increase in permanent cultivation, which has been depicted in Table 1.

Table 1.

Percentage change in Jhum & Permanent land from 1970-71 to 1990-91 to total Operated area & Net area sown

Year	Operated area	Percentage change in Permanent Land	Percentage Change in Jhum land	Net area sown	Percentage change in Permanent Land	Percentage Change in Jhum land
1970 - 71	489011	5.73	94.27	115226	24.31	75.69
1976 - 77	395526	10.12	89.88	111914	35.75	64.25
1980 - 81	335732	15.49	84.51	118232	43.99	56.01
1985 - 86	344254	22.30	77.70	149314	51.41	48.59
1990 - 91	349891	31.10	68.90	165616	55.92	44.04

Table 1. shows that the percentage change of land area to total operated area and net sown area for permanent cultivation is showing an increasing trend that is in 1970-71, 5.73 percent of area was under permanent cultivation which increased to 10.12 percent in 1976-77, 15.49 percent in 1980-81, 22.30 percent in 1985-86 to 31.10 in 1990-91. However, during the same period percentage change in land under jhum area has shown a declining trend. Similarly the percentage of land area of permanent and jhum land to area sown shows a similar trend. In 1970-71 permanent land was 24.31 percent, which increased to 35.75 percent in 1976-77 to 43.99 percent in 1980-81, to 51.41 percent in 1985-96 and to 55.92 percent in 1990-91. Moreover, jhum land during the same period has decline from 75.69 percent in 1970-71 to 44.08 percent in 1990-91.

(II)

It has been generally assumed that individualisation of land will bring greater productivity. However, in Arunachal Pradesh the situation is quite different. In spite of the individualisation of land the productivity in some major crops has almost remained stagnant. Though no reliable time-series data exists for the plan period, analysis was confined mainly to the seventies, eighties and nineties as shown in Table 2.

Table 2.

Agricultural growth rate of various food crops from 1970-71 to 1997-98

Name of the crops	Growth rate of area	Growth rate of production	Growth rate in yield
Rice	3.84	3.83	-0.01
Maize	3.29	4.14	0.85
Millet	2.23	4.04	1.81
Wheat	0.14	0.19	0.049

From Table 2. It is clear that in spite of Goverment initiative and establishment of individual property right in land the agricultural growth has been very slow. However, the agricultural production in some major crops has shown an increasing trend. The expansion of agriculture seems to have been caused mainly because of the extension of permanent cultivation to new area. This is the possibility because the overall growth of agriculture during the post 25 years is around 7 percent per annum. Table 2. also shows the insignificant yield rate of various foodgrain crops. Rice, which is the main agricultural crop in Arunachal Pradesh, has been shown a negative growth rate of yield from the period 1970-71 to 1997-98. However, the growth rate of production of rice for the same period works out to be 3.83

percent. The growth rate of area under rice has increased at the annual coverage of 3.83 percent. Production of maize, another significant crop of the state has increased at the rate of 4.14 percent. While area under maize has increased at the rate of 3.29 percent and yield has increased at the rate of 0.85 percent per annum. Millet has shown a growth rate of 4.04 percent in production. 2.23 percent in area and 1.81 percent in yield. Wheat production, however, shows a dismal picture.

The yield rate in Arunachal Pradesh except millet from 1970-71 to 1995-96 and rice for the period 1970-71 and 1995-96 is much lower than the all India average. The yield rate of some principal crops in Arunachal Pradesh has been depicted in Table 3.

Table 3.

Yield –rate of Principal Crops in Arunachal Pradesh.

Year	Rice	Maize	Millet	Wheat
1970 - 71	1.387 (1.12)	1.019 (1.20)	0.586 (0.42)	0.645 (1.31)
1980 - 81	1.057 (1.34)	1.125 (1.16)	0.880 (0.40)	1.376 (1.63)
1990 - 91	1.170 (1.175)	1.217 (1.52)	0.978 (0.49)	1.905 (2.27)
1995 - 96	1.146* (1.921)	1.329 (1.493)*	1.062 (N.A.)	1.889 (2.553)*

N.B. Yield rate in MT/Hect = for 1994-95

From Table 3. it is clear that the yield rate of rice is much less than the All India level. Figures in the bracket shows the yield-rate of major crops at All India level.

Similarly, the growth rate in other crops shows the similar picture. But in Arunachal Pradesh crop diversification is another emerging feature of Arunachal agriculture, which can be seen from Table 4. below.

Table 4.

Annual average growth-rate of some other crops

Name of the crops	Growth rate of area	Growth rate of production	Growth rate in yield
Vegetables	4.27	3.95	-0.32
Pulses	0.11	0.15	0.02
Oilseeds	7.64	9.46	1.81
Spices	8.36	0.17	5.76
Sugercane	2.40	5.48	3.08

The growth rate of production of vegetables works out to be 3.95 percent while the growth rate of area under vegetables has increased at the annual rate of 4.27 percent. Pulses has increased at the rate of 0.15 percent while area under pulses has increased at the rate of 0.11percent . Oilseed rate has shown an encouraging trend. Its growth rate of

production has been 9.46, while area under oilseeds works out to be 7.64 percent. Similarly, spices have shown a growth rate of 0.17 percent in production 8.36 percent in area. Sugarcane has also shows 5.48 percent in production and 2.40 percent in area. Therefore, in Arunachal Pradesh these crops have great potentialities to develop.

To conclude Arunachal Pradesh in recent decades has experienced diversified agricultural growth. This growth in productivity is due to the process of modernisation of agriculture individualisation of land. The most important factor is the extension of area under permanent cultivation. This area expansion is possible because of the low man land ratio and also because of the Government's interest to convert the jhum land in to permanent land and horticultural land. In addition, for this, Government has been providing fertilisers, HYV seeds and other inputs at a very subsidised rate. In order to raise the productivity of land, this crop diversification is necessary.

REFERENCE:

1. Government of Arunachal Pradesh (1993): Arunachal Agriculture in Brief. Series – 3

2. Government of Arunachal Pradesh (1998): Arunachal Agriculture at a Glance.

3. Roy, N.C (1997): "Agricultural Productivity in Arunachal Pradesh" In Trends in Agrarian Structure in the Hills of North – East India, M.C.Behera & N.C.Roy (eds), Commonwealth publishers, New Delhi.

4. Bhattacharjee, R.P. (1998): Modernization of Agriculture in Arunachal Pradesh. An Analysis in Agricultural modernization in Eastern Himalayas, M.C.Behera (ed). Commonwealth Publishers, New Delhi.

RAPPORTEURS REPORT

BUSINESS SESSION II

NEW TRENDS IN CROPPING PATTERN

Chairman : ***Dr.N.Srivastava***
Professor of Economics
N. E. H. U.

Rapporteurs –
1.Mr. K.S. Rajput &
2.Dr. (Mrs) E.Kharkongor

This session started with a discussion on the paper presented by *Smt. T.M.B.Lynser* on the topic , "*New trend in cropping pattern in hill agriculture*"- *a case study of Meghalaya*.Dwelling on the traditional practise of cultivation in the hills such as shifting cultivation and mono – cropping as a major cause of low productivity in Meghalaya , this paper calls for the introduction of technological improvement in agriculture such as HYV seeds for rice ,maize ,rape and mustard, oilseeds etc. the adoption of multiple cropping and others.Agricultural changes should be adopted taking into account the ecological balance.Questions were ask as to the slow adoption of these technologies in Meghalaya of which the answer was that if improvement were to be made ,incentives were to be given to the farmers.

The second paper was presented by *Dr. Jagdish Kalita on "Agriculture in the hill areas of Assam*" and there was a lively discussion during the course of presentation of this paper. This paper highlighted the incidence of Jhum cultivation on the Karbi Anglong and North Kachar Hill Districts of Assam.Jhum cultivation still persist despite the fact that the tribals have adopted new technology in agriculture such as HYV seeds in terms of paddy,mustard etc. Efforts by the government should be taken up in terms of horticulture,animal husbandry etc. to uplift the economic life of the farmers.

The paper presented by *Dr.S.Islam on the 'Status of Jhum Cultivation and Alternative Plan for Jhum Area Development in the North Eastern Region"* highlighted the fact that the practise of Jhum is a way of life of the tribals in the NER and it should be dealt in the right perspective taking into account the social and cultural norms associated with it.The absence of job opportunities indicates the importance of jhum cultivation in the NER and an important question that concern the policy makers is; how can productivity can be increased if jhum is allowed to practise.The authour also pointed out that programmes for jhum area development in the NER has been adopted emphasizing that scientific alternative technology for improvement of jhum cultivation has been formulated and has been accepted by IFAD.

A joint paper on "*Transition in Agriculture of North Eastern Hill States of India*"- *Implications for Development*, presented by S.B.Singh has highlighted the fact that although the North Eastern Region is charactarised by low net area sown and low cropping intensity ,agriculture still play a dominant role in the Hill Areas of the NER.However, it was pointed out that althought the Cuontry had witnessed the Green Revolution , the NER have remained neglected . This paper stressed on the need of investment on land and infrastructure such as irrigationfacilities and others.A lively dicussion followed and many questions were raised.A pertinent question was raised on the reason as to the presence of highly skewed land distribution in the NER. The answer may be due to the land system in the hills, the topograpry of the region and other factors.

The last paper was presented by Mrs. P. Priyadarshini on "Jhum cultivation and agricultural development in Arunachal Pradesh". This paper pointed out that there is a declining trend of jhum cultivation in Arunachal Pradesh over the years.

BUSINESS SESSION – III

DAIRY FARMING AND ANIMAL HUSBANDRY

SCOPE AND PROSPECT OF LIVESTOCK AND POULTRY DEVELOPMENT IN THE HILL AREAS OF NORTH EASTERN REGION WITH SPECIAL REFERENCE TO THE STATE OF MEGHALAYA

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ABSTRACT:

Livestock and Poultry rearing is an age-old practice as man and animal have been associated since time immemorial. Man has used animal both for food and other food products. Animals provide a diverse range of output varying from draught for cultivation, irrigation and transport; to fibre and leather goods; to manure for fertiliser and fuel; to self-employment throughout the year, as well as direct production of milk, meat and eggs for human consumption. Considering the need to increase the production in food of animal origin, various state governments in the North-Eastern Region including Meghalaya have been striving hard especially when the region is far lagging behind the National level.

The Hill areas of the North East have been blessed with favourable agro-climatic condition, which is very conducive for advocating Livestock and Poultry farming. Besides, majority of its inhabitants are tribal who are non-vegetarian having no social taboos for consumption of meat. Hence, there is an immense potential for development of Animal Husbandry activities which play a vital role in uplifting the socio-economic status of the rural poor who constitute 80% of the total population.

As of today, because of the saturation of government jobs, Livestock and Poultry production can greatly contribute to manpower employment. It can also contribute to improving the nutritional status of thousands of people suffering from protein and vitamin deficiencies.

To bring about self-sufficiency of Livestock and Poultry products and by-products, a strategic plan needs to be worked out initiating from the grass-root level. To start with, general awareness programmes and motivation of the rural population to be followed with massive training both at the village level as well as the farms/institutions as majority of our farmers are still ignorant about the various technologies and improved methods as practised in other parts of the country. Since it is also a fact that government alone cannot do everything especially for rural development, importance should be given to the Non-Government Organizations (NGOs) and encouragement should be given for formation of Co-operative Societies in different localities. In a nutshell, it can be said that people's participation in production is the key to improve the production status thereby improving the rural economy.

INTRODUCTION:

Livestock and Poultry rearing is an age-old practice as man and animal have been associated since time immemorial. Animals provide a diverse range of output ranging from draught for cultivation, irrigation and transport; to fiber and leather goods; to manure for fertiliser and fuel; to self employment throughout the year, as well as direct production of milk, meat and eggs for human consumption. The agro-climatic condition that prevails throughout the hill areas of the North- Eastern Region is very conducive for rearing of livestock and poultry, coupled with the tribal inhabitants, who formed the majority of the population and are being non-vegetarian in nature, having no social taboo for eating meat.

As less percentage of the land in Meghalaya is available for agricultural activities which is presumed to be the same for the entire hill areas of the North-Eastern States, Livestock and Poultry plays an important role in upliftment the social-economic conditions of the rural mass. It serves as an avocation to many a household as a source of subsidiary income besides creating an employment avenue for the educated youths. Livestock and poultry rearing have tremendous potential for improving the nutritional status of thousands of people suffering from protein and vitamin deficiencies. In fact, rearing of livestock and poultry is a part and parcel in the daily life of rural people.

In Meghalaya and the other Hill areas of the North-Eastern Region, the production from Livestock and poultry is still low in comparison with other States in the rest of the Country. The demand for meat and meat products is very high that no meat would be left unsold in the market even though the selling price which is perhaps, the highest in the country. Animals like cattle and pigs are coming from different parts of the country to fetch the beef and pork requirement of the local consumers. Same as the case of eggs where in Meghalaya alone, around 32 million nos. were imported annually, most of which are coming from as far as Andhra Pradesh. Hence, crores of rupees are going out instead of circulating within, if such a demand could be met from the region.

PRESENT STATUS:

The Present Status depicted in table 1 & 2.

Table 1.

Showing Livestock and Poultry Census (1997) of the North-Eastern Region.

State	Cattle	Buffalo	Sheep	Goat	Pigs	House Ponnies	Rabbit	Poultry
Arunachal Pradesh	448683	11051	28472	182582	275372	6758	-	1301269
Assam	8029865	757707	83608	2677357	1082335	12476	2417	17979875
Manipur	508264	95249	7533	32942	388066	2327	2212	3056634
Meghalaya	755194	17429	17158	280377	350819	1657	8410	2414498
Mizoram	33312	5365	669	16036	163181	2002	1574	1306660
Nagaland	383308	36131	2339	160761	571176	1133	20207	2363058
Tripura	1227568	17892	6154	639415	236897	2079	1566	3553772

Source: Ministry of Agriculture, Department of Animal Husbandry & Dairying New – Delhi.

Table 2.

Showing Livestock Population with density in Meghalaya.

Category	Population (In thousand	Density per Sq. Km
Cattle	755.2	
(a) Cross Bred	16.9*	
(b) Indigenous	738.3*	
Buffaloes	17.4	
Pigs	350.8	
Goats	280.4	
Sheep	17.2	
Horses and Ponies	1.7	
Rabbits	8.4	
Poultry	2414.5	
(a) Desi	2304.4*	
(b) Improved	110.1*	

* In case of Cattle, Cross-Bred comprised of only 2.24% while improved birds constituted to only 4.56%.

DEVELOPMENT NEEDS:

To bring about developmental changes, the State departments in the region have been striving hard to enhance the Livestock and poultry production by implementing various programmes where the activities are mainly centred around the following broad objectives: -

1. Providing protection to Livestock and Poultry from the ravages of contagious diseases through treatments and preventive vaccinations.

2. Introducing improved breeding techniques for upgrading the local stock.

3. Ensuring better Animal Husbandry practices through adoption approach of extension and research.

4. Building up of adequate technical and professional manpower through education and training.

5. Encouraging for setting up of livestock and poultry industries.

In the State of Meghalaya, there has been an increase in the production as compared to the 8th Plan. Milk rose to 61,600 tonnes from 51,900 tonnes. Meat increased from 21,000 tonnes to 31,600 tonnes, whereas egg production reached to 84.7 million nos. from 64 million nos. This indicates an annual growth rate of 3.94%, 8.39% and 6.11% in the production of milk, meat and eggs respectively.

The figures in Table 2. in respect with the population of Cross-Bred Cattle is only 2.24% and that of improved birds which is 4.56% indicates that there is an ample scope for substantial enhancement of milk and egg production in the State. With regards to Cattle development, if the Cross-Bred population could be increased, there is no doubt that Meghalaya can export milk, milk products and by-products.

PRODUCTION STATUS:

Table 3.

Show the production of milk, meat and eggs during 1997 – 1998

States	Milk (in 000 tones)	Meat (in 000 tones)	Eggs (in million nos)
Arunachal Pradesh	44.00	17.4	
Assam	N. A.	N. A.	
Manipur	61.99	18.05	
Meghalaya	59.15	28.8	
Mizoram	8.61	7.45	
Nagaland	47.62	18.22	
Tripura	56.67	4.12	

Source: Basic Statistic of North Eastern Region, N.E.C.

In Meghalaya the per capita availability of milk, meat and eggs are as follows: -

Items	Availability	Recommended Requirements
Milk	75 gms/head/day	350 gms/head/day
Meat	36.9 gms/head/day	90 gms/head/day
Eggs	38 nos/head/year	180 nos/head/day

CONSTRAINTS:

Although Livestock and Poultry rearing is having a great potential in the hilly areas of the North East but the production figures as shown in the tables above indicates that we are still lagging behind in comparison with other States of the country because of the following main constraints: -

1. **Lack of Education** – Majority of our farmers are still ignorant about the modern technology and Improved practices of livestock and poultry rearing. Various schemes implemented by the department were benefited by a meager percentage of farmers where application of modern technological practices hardly affected the masses. Besides rural folks are also ignorant about the funding source from where they can avail necessary assistance as required by them.

2. **Low Production** – Low production and slow growth rate of the indigenous stock.

3. **Feeds** – Almost all the feed ingredients needed for preparation of a balance feed are being procured from outside the region, resulting in very high feed cost not affordable to general farmers.

4. **Diseases** – Various diseases caused morbidity and mortality to livestock and poultry.

5. **Biological Products** – Non-availability of biological products in most of the States caused difficulty in control against some specific diseases.

6. **Market** – There is no organized marketing facility.

POLICY:

It is a well- known fact that for a sustainable development in any sector, there must be a definite policy so that a systematic approach can be made in a right direction. The policy so adopted should also be in the line with the one framed for the country as a whole. The salient points are: -

1. Improvement of production system.
2. Improvement in livestock and human health.
3. Development of technology and infrastructure.

The programmes emerging from the adoption of such points should take care of :-

a. Conservation of Animal Bio- diversity.
b. Livestock breeding policy.
c. Self sufficiency in food of animal origin.
d. Better production of quality feeds and fodder.

e. Improvement of Animal Health Care System.
f. Insurance programmes for compensation of losses.
g. Training programmes to ensure people's participation.

STRATEGY:

It is necessary that strategy should be formulated for both Short term and Long term for development of Livestock and Poultry sectors. The aim will be for: -

1. Upgrading the existing quality of livestock and imparting such processes which would improve the quality further through various measure.

2. Increasing the productivity to augment production of milk, meat, eggs and other products and by-products.

3. Adoption of measures to improve the marketable quality of the products including processing for long storage quality and better acceptability to the consumers, and

4. Arrangement for efficient marketing of the products.

ACTION PROPOSED TO BE TAKEN:

Proposal for action to be taken will be mostly on the following lines: -

1. Introduction of quality germ plasm at the village level by supplying livestock and poultry. In order to ensure availability of inputs to be supplied to the prospective farmers, Government and other private farms need to be strengthened.

2. Increase in the supply of vaccines, deworming medicines and prompt attention to disease control for better Animal Health Care and thereby improvement in production because only healthy animals can produce better.

3. Formation of Primary Co-operative Societies and Unions at different levels.

4. Establishment of commercial and entrepreneurship development programme for livestock and poultry production through Bank finance should be encouraged.

5. Establishment of Dressing Units and Slaughtering – cum – Processing Plants.

6. Adequate Publicity through various media for such activities along with extension service.

7. Impart massive training at different stages starting from the grass-root level.

8. Development of network of marketing infrastructure so that farmer can get a better remunerative price for their products.

9. Increase in fodder and fodder-seeds production, improve the facilities for fodder conservation and preservation methods.

10. Research works on performance and adaptability of improved breed under village condition and also performance of such breeds fed with locally available feedstuff.

PIGGERY INDUSTRY

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ABSTRACT:

At present there are no Indian breeds of Pigs. However, the type of pigs which are found throughout the country may be divided into four kinds, viz. wild pigs, domesticated or indigenous pigs, exotic breeds of pigs and upgraded stock of pigs such as large-white Yorkshire, middle-white Yorkshire, Landrace, Saddle-Back, Berk-Shire, Hampshire etc.

In India pig raising and pork industry are in the hands of traditional pig keepers belonging to the lowest socio-economic stratum with no means to undertake intensive pig farming with good foundation stock, proper housing, feeding and management. They are compelled to follow old and primitive methods with common village hogs, which could properly be designated as scrub animals. The small sized animals do not have any definite characteristics, grow slowly, produce small litters and the meat type is of inferior quality. The poor farmers cannot afford to provide the minimum attention in their managerial affairs and as such most of the time the animals are left loose to pick up feedstuffs from waste areas of surrounding localities. The most unhygienic and unimpressive life of the indigenous breeds creates an aversion to such animals products in the minds of the majority of Indian. For the Hebrews and Muslims, pork products are forbidden because of religious precept. However, nowhere in the Hindu scriptures have pork products been forbidden.

Among domestic animals pigs are the most prolific, 6-17 piglets in every litter and they are all fast growing, attain a weight of about 68 kgs in about 6-8 months time, when they can be slaughtered (shortest generation interval among meat producing livestock). Pig products such as pork, bacon, ham; sausages, lard (pig fat) etc are increasingly in demand for local consumption and for export. Throughout the world the secondary consideration of pig farming are the production of pigskin, bristles and manure.

INTRODUCTION:

The present problem of increasing demand of animal protein in developing India warrants intensifying of efforts for improvement and multiplication of all meat-producing animals. Because of its several biological advantages like faster growth, high prolificacy, shorter generation interval and higher efficiency of food conversion, pig can play an appreciable role in contributing to the solution of this problem. Its high prolificacy and shorter generation interval also provide a definite opportunity for bringing about rapid genetic improvement in its economic traits through scientific methods of selection and breeding.

The Swine enterprise in its primitive and present form has been largely in the hands of the poorer sections of the Indian community including the landless labourers, small and marginal farmers and the tribals. Pig rearing has been the traditional occupation and important supplementary source of income of the people belonging to these weaker strata. In several parts of the country especially in the tribal areas, Pig meat is an important source of food, because of the consuming habits of the people. It is therefore all the more essential to develop swine industry, which would to some extent help improve the economic condition of the people of these weaker sections involved in this enterprise.

India possesses around 6.5 million pigs which include in general four types namely, the wild type, the domesticated indigenous pig, the pigs of exotic origin and the crosses of indigenous and exotic pigs. During the last some years research in the Pig breeding conducted at different Research Centers/Agricultural Universities/Institutes has been focused mainly on assessing the performance of pigs of exotic breeds, bred and maintained. From the

performance of animals of some of the exotic breeds appear to have acclimatized to Indian Farm conditions. Replacement of indigenous pigs with superior exotic germ plasm of higher grades of exotic inheritance, therefore, does not appear to be an impossibility. Black varieties are preferred for North – Eastern Region of India.

SELECTION OF INDIVIDUAL BOARS AND SOWS:

The factors considered in selecting boars and sows for the breeding herd are much the same regardless of the breeds and breeding programme which are involved.

Ideal type of breeding animal:

Sow - The brood sow should have a medium long body and strong, well-arched back, deep sided, well- developed full hams, with good feet and legs. The head and jowl should be trim. (Coarse headed and heavy jowled sows should be culled). Shoulders should be wide with well muscled loin. The udder should be well developed with twelve or fourteen sound teats. A good brood sow should permit a person to enter the pen at any time even during farrowing.

Boar - The Boar should have strong back, straight heavy boned legs. Body confirmation similar to brood sow is desired. The boar should be active and should be rugged.

Other factors in selection of breeding stock:

In addition to type, the following other factors would be considered in selection of breeding stock.

- **Age** - Mature sows usually produce more and larger pigs per litter than do gilts, and are usually better milkers . Mature boars serve more sows but require more feed. The young animals require a smaller investment, require less feed and less space.
- **Pedigree.**
- **Production records.**

Important Characteristics for Selection:

Low productivity, rate and efficiency of gain are the most important characteristics in hog production. Price differential for superior conformation has generally been small. At present there is a tendency towards a demand for more lean and less fat. Since this appears to be biologically as well as economically sound, a producer may well consider raising the leaner type of hog. Fertility, mothering ability, rate of gain, fed efficiency, carcass merit and freedom from defects are the important characteristics to be considered in swine selection.

The productive traits such as rate of gain, efficiency of feed and milk production have intermediate habitability. Thus these traits can be improved by selection and also show some response in carcasses. The reproductive traits such as number of farrows per litter, and number weaned per litter have low heritability. However, they show greatest response to crossing. The structural traits such as carcass characteristics and mature body size are highly heritable and can be improved by selection. They show less response to cross breeding.

Identification of Pigs :

To facilitate the maintenance of herd record, and selection of breeding stock on the basis of quality especially where pure breed stock is maintained. It is necessary to give each pig an identification mark. For this purpose ear-notches with a special ear-punch can be used for marking. Tatooing is also sometimes done for identification. Various types of ear tags both plastic and metallic are also used for identification.

In another register, records should be maintained about the performance of each breeding boar giving the number of sows served and their results in each breeding season. The purchase and sale of animals, etc. and the occurrence of disease, mortality and details of vaccination and other preventive measures adopted should also be recorded. Besides, feeding records of various lots, e.g. boars, broods, sows, young stock and fattening stock should be maintained showing the details of ration fed so that their economics may be determined. These records should be maintained correctly and on a permanent basis so that the breeders should be able to derive full advantage from them.

Culling of Sows :

Gilts should farrow and wean large thrifty litters when they are at or near one year of age. Enough gilts should be bred so that a few can be culled on the basis of their first litter productivity. The number of pigs farrowed measures the prolificacy or fertility of the sow, while the number weaned and the total weaning weight of the pigs measure the mothering ability. Both measures are extremely important in the culling of sow.

Principal reasons for culling sows:

- Failure to conceive : 31%
- Decline in productivity due to age : 27.2%
- Locomotory disturbances : 8.8%
- Poor performance at birth wearing : 8.4%
- Death : 6.5%

HOUSING OF PIGS:

The first requirement for any livestock production programme is housing. It is more so in hot temperature countries like ours. But, the capital cost for providing housing and equipments has to be kept as low as possible, using locally available cheap materials.

Conversion of the existing old house or cattle shed is more desirable. The traditional round pig house adopted by traditional pig breeders can also be converted into a comfortable pig house by increasing the height, by providing windows and side creeps. Cement concrete flooring has to be provided.

The pigs will be safe from most troubles after 10 weeks of age. Most losses are during this period only.

The pigs does not have an efficient heat regulatory system like cattle and consumes lots of concentrates which produce lot of heat. So, optimum pig house temperature is important.

Housing depends upon the types of animals whether they are hogs, fattening pigs or sow with litter. The purpose and herd size, local climate conditions and method of rearing also affect the type of housing.

Location :

The structures should be located on a fairly raised and well- drained site, not liable to flood. The ground should not be clayey or slushy.

The structures should be at least 15m away from dwelling and factories, 30m away from dairies, animal and poultry houses and food-grain storage, structures, 45m away from fire sources and 1km away from garbage dumping grounds, slaughter houses, hide curing centers and tanneries.

The boundaries of the site should be at least 50m away from the nearest transit roads and should be surrounded by a fence. In locating buildings and structures on the site, suitable place should be left for sanitary purpose.

The site should be so selected where adequate water supply is assured.

Records :

To maintain a pure-bred herd of pigs for breeding and development, it is highly desirable that permanent records should be kept. A register should be maintained for the breeding sows in which each sow may be given a page on which the details of litters produced, the number of piglets farrowed and raised on each occasion, the number retained and the number sold with total value should be recorded which would help to evaluate each brood sow on its performance.

The structures should be so located and oriented as to avoid heavy draughts but at the same time it should have plenty of sunlight and circulation of fresh air.

Space Requirements :

For a sow with litter, 64 Sq. ft. floor area is required. For a big sow 100 Sq. ft. may be kept. For any other type of adult pigs 5" x 7" pr 6" x 6" floor space i.e., 36 Sq. ft. per pig is needed. The doors and gates of the pig houses should be 24" to 36" wide and 36" to 42" height. Alleys for the workers should be 4 ft. wide.

The walls may be of single brick plastered with cement with inner side surface smooth for easy cleaning. The flooring should be of cement concrete. The roof may be of asbestos sheets with an insulation by means of thatch or straw.

SWINE MANAGEMENT:

Profitable pig production revolves around few factors:

- No. of pigs weaned per sow per annum.
- Rapidity of growth and feed conversion efficiency.
- Cost of feed ingredients.

No. of pigs weaned per sow per annum is more a management problem though heredity has got its own influence. Similarly, growth rate and feed conversion are mostly influenced by the quality of the feed rather than heredity. Hence, scientific management of the herd is mainly responsible for getting profits.

Broadly, management of pigs can be classified into 4 groups :

1. Management of gilts and young boars.
2. Management of in-pig sows
3. Management of nursing sows and litters.
4. Management of weaners.

Management of gilts and young boars :

GILTS : The gilt attains maturity in about 6 to 7 months. However, they are bred only when they are over 9 months old and weigh about 85 to 90 kgs. The gilts selected for breeding on phenotypical and genotypical characters are kept in age and size groups of 6 to 8. All gilts of breedable age are examined for signs of heat. When they are in heat the vulva is swollen and red in colour. Pig is restless, mounts on other pigs and allows other pigs to mount on it. It stands firm for the riding test. When they stand for the riding test they are taken to the boar for mating. Usually one service is enough for conception but two services in 24 hours interval always ensures bigger litter. If they do not come to heat in 21 days after the 1st service it is considered as pregnant. Any gilt that repeats more than twice consequently may be culled and sent for slaughter. Heat saved is money saved. The management should be very vigilant to detect sows and gilts in heat in time.

YOUNG BOARS : They should not be allowed to mate till they are 8 to 9 months old and weigh about 90 kgs, live weight. Over use of young boars, adult boars also require exercise to keep them trim and fit and they should be housed

in separate pens with runs attached for exercise and dunging. 100 services per annum can be taken from each boar and on an average one boar is required for 15 to 20 sows. Always the sow is taken to the boar when it is in heat. Tusks should be cut if they are excessively long and sharp to avoid injury to other stock.

Management of In-Pig Gilts and Sows :

The sows and gilts, which are confirmed as pregnant, are grouped into 5 to 6 as per their size and housed in separate pens. They require exercise to keep them lean and fit, over fattening results in farrowing troubles. They may be given 11/2 to 2 kg concentration and let out for grazing if there are facilities. The gestation period is about 114 days (3 months, 3 weeks and 3 days). Wallowing in ditches and pools, driving through narrow gates and over crowding in pens should be avoided. The boar should not be allowed to run along with in-pig sows and gilts. About a week prior to the expected date of farrowing the sows and gilts are dewormed. The pigs thoroughly washed especially the udder to shed off ova that are attached to it. Then they are transferred to a perfectly cleaned and washed farrowing pen. During the second half of the pregnancy, the ration can gradually be raised to 3 kgs. One or two days before farrowing, only 1 kg. of easily digestable ration is given to avoid indigestion and post farrowing troubles.

Farrowing :

It is an act of expulsion of piglets by sows. The signs are:-

1. Making its bed by the sows.
2. Dropping of udder and letting out of milk just before farrowing.
3. Restlessness and labour pains.
4. Sinking of ligaments.

Farrowing is completed in about 1 to 2 hours and the interval between each piglet may be 5 minutes or half an hour. Sows farrow easily than gilts. Usually placenta is passed at the end of the farrowing but in very rare cases, it may be expelled 2 or 3 times during the course of farrowing. One trained attendant must be kept at the time of farrowing to avoid the loss of piglets by crushing and other reasons. Good bedding has to be provided to the sow at the time of farrowing.

Care of nursing sow and litter :

After farrowing, the sow is cleaned and fresh bedding is provided. The umbilical cords are cut and Tr.IODINE is applied. The pointed teeth (incisors) are cut to avoid injury to nipples and the weight of the litter is recorded. The sow is not given any feed on the day of farrowing and only water is given for drinking. From second day onwards easily digestible concentrate ration is started with 1 kg, and increased up to 4 kgs, by end of 4th week. Generally feed is calculated @ 0.25 kg/piglet and 2 kgs for the mother.

On the 4th day and 14th day, injections of iron (inferno and uninferon) are given to prevent piglet anaemia. Broad spectrum anti-biotic powders are also administered with water or milk to prevent scours.

The piglets start taking feed by the end of 2nd week onwards, and they are given palatable and easily digestible ration containing more proteins, minerals and vitamins. The feed is provided in the 'creep'.

Castration :

The males that are not required for breeding are castrated in the 6th week. The pigs can be secured easily, the operation can be performed with much ease and healing is quick at this age. Castration is done by open method and usually there are no complications.

Weaning :

Separation of piglets from the mother is called weaning. Universally weaning is practiced on the 56th day. Science is so much advanced that the piglets are separated on the 1st day and raised on artificial feed. This enables the breeder to get 3 litters per sow per annum and thus increase productivity of breeding sow. But, due to non-availability of suitable substitutes for sows milk and lack of other facilities this is not feasible in this country and conventional method of weaning at 8 week is still followed. At the time of weaning, piglets are allowed to remain in the same pen for a week to avoid weaning stock before grouping them to different pens. It is during this period that the following procedures are done.

1. Identification to know pigs individually is provided either, by tattooing, tagging or notching.
2. The weights of individual pigs are recorded.
3. Vaccination against swine fever, and H.S. with reasonable interval.

Management of weaners :

After weaning, the weaners are grouped as per sex and size and fed as per schedule. The stock meant for fattening, are fed adlib and as soon as they reach 70 kgs they are ready for slaughter.

The pigs intended for breeding are maintained separately and selection is made on the 3rd month basing on phenotypical and genetypical characters. For all classes of pigs, plan of Nutrition is essential to start with since retardation in the initial stages results in poor carcass.

NUTRITION:

Balanced feeding according to the I.S.I recommendation should be followed, which are given below:

Types of feeds:

Type – I :	Pig starter/creep feed-to be fed up to 15 kg body weight when the litter is with sow.
Type – II :	Pig grower meal-to be fed from weaning to 35 kg body weight.
Type – III :	Pig finishing/breeding meal after 35 kg body weight

Feeding schedule :

All the feed ingredients should be well mixed. Either dry feeding or wet feeding can be followed. However, it is advantageous to feed wet feeding in all pigs except greep feed given to suckling. Generally,pigs are fed twice a day. Nursing sow are fed 3 times a day. The following are the quantities of feed that can be fed to various types of feeds in a day.

1.	Dry sows and boars	:	2 kg.
2.	Pregnant sows	:	
a.	Early pregnancy	:	1.5 to 1.75 kgs.
b.	Late pregnancy	:	2 to 2.5 kgs.
3.	Sow with suckling piglets	:	2 kg + 100 to 200 gms per each piglet borne.
4.	Weaners:-		
a.	1 to 2 months age	:	0.25 kg – 0.500 kg
b.	2 to 3 months age	:	0.50 kg – 1.000 kg
c.	3 to 4 months age	:	0.75 kg - 1.250 kg
d.	4 to 5 months age	:	1.00 kg - 1.500 kg
e.	5 to 6 months age	:	1.25 kg - 2.000 kg
f.	Above 6 months age	:	2.00 kg - 2.500 kg

g. For pregnant animals 3.00 kg - 3.250 kg

The above quantities of feed has to be reduced, if Garbage, Hotel waste etc., are fed.

CONCLUSION:

Even though the demand for pork and pork products is very high in North Eastern Region of India, yet pig farming has not become popular to any considerable extent in this region. Thousand and thousand of pigs were brought annually from some other states of India to meet the heavy demand. In view of the above, pig industry can be classed as one of the profitable industry in this region, as it helps to meet the demand and generate employment at the same time.

Furthermore, Pig rearing is an integral part of rural life in Meghalaya. The pig is an amazing creation for the service of mankind. Its high adaptability to a wide range of environments, resistance to diseases, high reproductive efficiency and adjustable feeding habits makes the pig the ideal meat animal of choice for the North Eastern like Meghalaya. It is this pig which can meet the challenge of Protein Hunger of the State.

Given the adequate environment including housing, feeding, management and disease control, rearing of pigs throughout the State would be ideal as is already noticed in the State Pig Farms particularly the one at Kyrdemkulai. Department efforts in the next 4 plans should be directed to extend supply of quality pigs, along with infrastructural support for input supplies, services, disease control and marketing in all the organization of Primary Pig Farmers' Co-operative Societies, District Co-operative Pig Farmers Unions. A state level 'Meghalaya Pig Farmers Co-operative Federation Ltd' is the need of the hour and sooner the State emulates the 'AMUL' pattern Piggery Co-operative system the better.

Action proposed to be taken to achieve the objectives :

a. Re-organise the State Pig Farms to supply larger number of quality pigs to the prospective farmers.

b. For this purpose, there should be one Pig Farm in each block, under the administrative control of the proposed District pig farmers Co-operative Union and under the overall supervision of the proposed Federation. The infrastructure for such farms would be funded by the Department.

c. The Department should encourage entrepreneurship development programmes for setting up commercially viable pig farms with bank finance.

d. The Department would be required to strengthen its health care units through increased supply of vaccines and de-wormers and prompt attention to disease control. Pig Farmers' Co-operative societies may also be involved in such activities to reduce the pressure on the Department.

e. Establishment of Pig Farmers' Co-operative Societies and District Union may be initiated by the Department through setting up of SPEARHEAD TEAMS in the potential area followed by covering other areas gradually.

f. Adequate publicity for such activities will be necessary along with extension services for taking up the activities to the desired extent.

g. Establishment of small Pig Dressing Units in each society and a Pig Slaughter-cum-Processing Plant in each District to be overseen and co-ordinated by the proposed federation would provide the necessary marketing support to the pig farmers and these units are to be established as quickly as possible.

h. Infact, Piggery Development in Meghalaya demands a massive effort on priority basis. It is here the state can build an All India reputation which no other Livestock in the State can ever match.

REARING AND MANAGEMENT OF DAIRY CATTLE (DAIRY FARMING)

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INTRODUCTION:

With the advent of modern time, scientific rearing and management of Dairy Cattle is a necessity not only to advance countries but to developing countries as well. In India, including our State of Meghalaya, we are still lacking behind in this respect. However, pressure has built up to be self-employed for generating income to sustain one's life. Therefore, acceptance of scientific methods of rearing and management of Dairy Cattle is becoming a necessity. There is a huge market for absorption of supply of milk and dairy products in the country. As we are aware that we have not yet achieved the 250gm level recommended for each individual/per day of milk consumption. there is therefore, an ample scope for taking up Dairy Farming to bridge this gap as well as for self-employment.

TYPE AND BREEDS OF CATTLE (MILCH CATTLE).

Type and Breeds – Selection of the type of animal and the breed is most important before setting up a farm. Since type and breed, also play an important role in profitable farming, the following are some of the type of animals and breeds, which have proved to be reliable:

Indian Breeds: Sahiwal, Sindhi, Tharparkar, Gir, Kankrej and Ongole.

Table 1.

Milk yield of Selected Cow

	States	Milk (in 000 tones)	Meat (in 000 tones)	Eggs (in million nos)
I.	Sahiwal	6th	5,911	306
II.	Sindhi	4th	4,893	298
III.	Tharparkar	2nd	4,761	306
IV.	Gir	6th	3,247	378

1. Sahiwal: - Origin and distribution in Central and Southern areas of Punjab, Pedigree herds are found in Delhi, U.P., Bihar and M.P.

2. Sindhi - Origin and distribution in Karachi (Pakistan), Hyderabad (Pakistan). This breed is also considered to be very good.

Exotic Breed in India: Jersey, Holstein-Friesian and Brown Swiss, Red Danes and Guernsey. Of all the exotic breeds , Jersey and Holstein-Friesian have been most extensively used. Of late, Jersey is found to be in great demand in the country.

1. Jersey: - is said to be the true dairy type of Cattle. It is the smallest economical producer of milk, with fat percentage of 5.3% and 13,000 kgs of milk in 365 days. It is also found to have been acclimatized the Indian weather condition.

2. Holstein-Friesian: - This breed is big and ruggedly built, and possess large feeding capacity and udder. It is by far the highest producer of milk, but having low fat percentage of 3.6% at an average (varying from 2.8 – 4%). It is

recorded to have produced 19,000 kgs of milk in 365 days (at an average of 52 kg/daily)

3. Crossed Bred: - Crossbred Dairy Cattle with Jersey and Holstein-Friesian are found to be stable producer of milk although susceptible to F.M.D.

A dairy production of 15 – 18 kgs/day in Jersey cross and 20-23 kgs/day in Friesian cross is common.

HOUSING AND EQUIPMENTS FOR DAIRY ANIMALS:

Labour cost is second only to feeding cost in Dairy expenses. Therefore, every effort should be made to modernise the housing system of dairy cattle to reduce labour cost, but not at the expenses of the animal health. With the most effective management of cattle, it will be essential also to have a well-planned and adequate housing. However, housing should be made by taking into consideration the prevailing weather condition of the area throughout the year.

Comfortable accommodation of individual cattle should be provided taking note of the following important points –

Location – A dairy building should be on higher elevation than the surrounding for easier drainage facility in order to avoid stagnation within. The following points should also be considered –

a. Exposure to sun and protection from wind.

b. Accessibility.

c. Durability.

d. Water supply.

e. Marketing.

f. Electricity.

The most common type of housing of dairy cattle is stanchion barn. Generally they feed and drink from the stanchion barn area. Normally, each cow required about 6 sq. meters of space. There should be separate stall for each animal. Each stall has feeding passage in front, a feeding trough, housing space and drainage at the back. Floor should be made of cement non-slippery concrete for easy cleaning. It should be well ventilated.

Feeding – Apart from green fodder of 40 kgs/cow, concentrate feed should also be mixed and provided as per the following schedule and specification for milch cows.

Table 1.

Mixture of Concentrated Feed

I.	Wheat Bran	40%
II.	Maize (crushed)	37%
III.	Mustard oil cake	20%
IV.	Mineral mixture	2%
V.	Salt	1%
	TOTAL	**100 Kgs**

Table 2.

From :	0 litres	-	2 litres	-	1 kg concentrated feed
	3 litres	-	4 litres	-	2 kg "
	5 litres	-	6 litres	-	3 kg "
	7 litres	-	8 litres	-	4 kg "
	9 litres	-	10 litres	-	5 kg "
	11 litres	-	12 litres	-	6 kg "
	13 litres	-	14 litres	-	7 kg "
	15 litres	-	16 litres	-	8 kg 2
	17 litres	-	18 litres	-	9 kg "
	19 litres	-	20litres	-	10 kg "

Table 3.

Feeding of Calf.

Age in days	Colestrum (kg)	Whole milk kg	Skim milk	Kg conc. Feed kg
1 - 4	1/10 body weight	-	-	-
5 - 14	-	1/10 weight	-	-
15 - 28	-	1/20 weitht	1/20 body weight	0.100
29 - 42	-	1 body weight	1/10 body weight	0.500
43 - 56	-	1/2 weight	3.0 body weight	0.500
57 - 70	-	-	3.5 body weight	0.750
71 - 84	-	-	3.0 body weight	1.000

Feeding for calf – Is as per specification in Table 3.

Watering – Clean and fresh water should be provided after giving concentrate feed at 40 litres per cow/per day.

Hygienic Maintenance of Shed – Shed should be washed thoroughly with disinfectant. Cleaning and grooming of milch animal should also be done before milking to remove unwanted hairs and to avoid unnecessary contamination and spoilage of milk.

Drainage System – Proper drainage system should be made to avoid any stagnation of dung and urine, which may produce foul smell and aiding breeding of flies and germs.

Breeding – With the availability of the new technique of insemination artificially breeding of dairy animals becomes easier and cheaper, and maintaining of breeding bull can be avoided. Artificial Insemination is being carried out by trained technician/assistant readily at call

SIGN AND SYMPTOMS OF HEAT:

After delivery, a cow comes to heat again after 45 days and the Heifer (young female calf) is ready for service after the age of 18 months.

Symptoms of heat are divided into two parts: -

Part – I:

a. Restlessness and untimely mooing.
b. Refusing to eat.
c. Mounting of other nearby animals.
d. Frequent urination.
e. Alert for any movement searching for a sire.
f. A clean, clear mucous discharge is seen from the vagina.

The above signs and symptoms can be seen at the beginning and it will last for 8 hours.

Part – II:

a. The animal is now ready and receptive if any other animal is mounting on her.
b. The thick mucous discharge sticking the upper part of the tail is observed.

The signs and symptoms observed in Part – II, is the right time for insemination. This will last for only few hours.

It is to be noted that the gestation period (pregnancy) is 9 months and 9 days (+ - 10) when the animals in milk is pregnant, milking is continued up to 7 months only and should be discontinued (drying of pregnant cow) after this 7 months period or 60 days before delivery.

Drying of pregnancy cow is essential for the health of the animal and also to give rest to the organs of milk secretion and supply nutrient to the growing fetus instead of producing milk.

Pregnant cow should be taken proper care in feeding and should be guarded against any injury. At 9 months pregnancy, bedding should be also provided for prevention of any injury during delivery.

CARES OF A NEW BORN CALF:

After delivery, care should be taken to clean the mucous from the mouth and nose of the calf with a dry, clean proper breathing towel, cutting of naval cord after proper tying it with a sterilised thread 1 (one) inch below the stomach is needed. The newborn calf should be allowed to suck milk after 2-3 hours of its birth. This is necessary as colestrum (first milk) contains all the nutrients and antibodies provided by the mother cow to the calf. This colestrum helped the calf to resist against diseases.

The calf should be removed to a clean, well-lighted and well-ventilated dry pen.

Replacement Stock – Each and every farm should think about the future of expanding the farm with better replacement stock (or parent stock) to replace the old and aged one and to improve the production. Metriculous selection and care should be taken for raising young replacement stock.

KEEPING RECORD

It is impossible to run any kind of business profitable without maintaining a proper record. Apart from pedigree record, a dairy should also have a fairly accurate record of the amount of feed given to a particular animal, the amount of milk produced and butter fat contents.

Pedigree records are important to know the heredity trait of their ancestors,this will make selection of progenies

easier. Apart from the above, the date of birth, the age of maturity, the date of 1st location and number of progenies produced are also to be recorded.

Kinds of records to be maintained:

a. Milk record register.
b. Feed register.
c. Pedigree sheet and register included sexual maturity, date of service and birth etc.
d. Stock register.
e. Health record.
f. Financial register.

FODDER:

Apart from green fodder, dry grasses and hay may be fed to animals in dry season and winter to maintain their roughage requirement. Hay and dry grasses are not very appetising for the animal; therefore, straying of gur and salt can be done to entice the animal to eat.

Kind of fodder which can be propagated

There are some selected grasses and fodder, which can be grown and propagate, as they are nutritiously superior than the local available grasses. They can also be harvested earlier due to their faster growth; more number of harvest can also be made in one season. There are Guenie, Prasanti, Para grass, Napier (perennial), Maize, Oats, Tisenti, (seasonal). In winter where there is scarcity of green fodder, silage can be made and feed to the animals.

DISEASES AND PREVENTION:

(i) Bacterial Disease – These diseases are caused by bacteria. Some of the common bacterial diseases found in dairy animal are.

a. Mastitis,
b. Brucellosis,
c. Tuberculosis,
d. Anthrax.

(ii) Viral Diseases – Diseases caused by virus are:

a. Foot and mouth diseases,
b. Rinderpest,
c. Black quarter,
d. Harmorragic Septicemia etc.

(iii) Parasitic – Ecto-parasites like ticks, lices, flies etc. are common and endo-parasites like round worms, tape worms, liver fluke etc. can be treated at early age and regular interval to avoid spreading to other animals and shed.

(iv) Nutritional deficiencies Diseases – Like Milk fever and ketosis. These can be prevented be prevented by feeding nutritional balance diet at recommended rate.

(v) Prevention – Viral diseases can be prevented by vaccination. Almost all vaccines are available and produced in India. Therefore, it is admissible that vaccinations should be done regularly to the animal at an early age and as per instruction.

RAPPORTUERS REPORT
BUSINESS SESSION III
DAIRY AND ANIMAL HUSBANDRY

CHAIRMAN: *SHRI BALBINDER SINGH*
Principal Chief Conservator of Forest
Meghalaya

Rapporteurs: *Dr (Mrs.)J.Biswas &*
Mrs.I. S. Warjri

The first paper was presented by ***Dr. J.S.Jyrwa*** on the *Scope and Prospect of Livestock and Poultry development in Meghalaya.* Firstly, he talked about the social and economic condition of NER. He highlighted the recent picture and position of cattle, sheep, buffalo and poultry farming in different areas of NER from 1997 to 2001.Then he suggested some measures to develop the dairy and animal husbandry like protection from rabbies, improved breeding techniques, better reserved facilities, building adequate man-power and encouraging livestock industries. He also explained why Meghalaya is still lacking behind in comparison with other states in production of poultry and livestock since these have a great potential for development in the hill areas. He has suggested some strategies and also proposed some action for the improvement of poultry farming.

The next speaker, *Dr. B. Plain* has presented his paper in a lucid way about *Pig Farming* with special reference to Meghalaya. He has explained on how pigs should be kept in an area or in the house. Amongst domesticated animals pigs products such as porks, bacon, ham, sausages, etc. are increasing in demand both for local and consumption and for export. He then vividly explained about the swine husbandry and the housing of pigs. The first requirement for any livestock production programme is housing. The traditional pig breeders can be converted into a comfortable pig house by increasing the height, by providing windows and side effect. Cement concrete flooring has got to be provided. Then he explained about the structure and location and how much space should be required for the pigs to keep them nicely. Then, he suggested some measures like primary vaccination etc. in order to get healthy pigs.

The third and last speaker *Dr.W.Lato* gave a lecture on *rearing and management of dairy cattle (Dairy Farming).* He started his lecture with an introduction of what a dairy farming is. Then he has discussed about the types and breeds of dairy farming, then discussed about the exotic breed in India like the Jersy, Brown Swiss, Red Doves, etc. He also discussed the housing and equipments for dairy animals, eg. The location, feeding, watering, hygienic maintenance of shed, breeding, signs and symptoms of heat ,etc. He vividly discussed how to take care of a new-born calf. Then he has suggested some measurements for the prevention of diseases e.g. to get rid of viral diseases. The cow needs to take the primary vaccination. No questions were raised from the house in this session.

Then the session has ended up with a few good words from the chairman, Balbinder Singh. He encouraged the youth to go in for farming and poultry where they can do independent work and can show their potency instead of going in for goverment jobs. Then he spoke on how to start a farm and poultry and also some suggestions about cattle rearing.

BUSINESS SESSION – IV

HORTICULTURE AND PLANTATION CROPS

HORTICULTURE: A VIABLE ALTERNATIVE TO JHUM CULTIVATION IN MEGHALAYA.

Dr. (Mrs) E. Kharkongor
Department of Economics
Shillong College, Shillong

ABSTRACT:

The State of Meghalaya is endowed with tropical, semi-tropical and temperate climates, which is ideal for the cultivation of a wide variety of fruits, vegetables, spices and plantation crops. The State also abounds with rich flora of indigenous fruits growing naturally without very much human effort. Keeping in view the limitations of the state in terms of its topography which does not permit significant increase in terms of net area sown under foodgrains crops, the ultimate solution for the economic emancipation of the Jhummias lies in shifting the strategic thrust to horticulture. Further, the land which is not put under cultivation such as fallow lands, cultivable wastelands etc. can be gainfully exploited for growing horticultural crops which would ensure higher returns per unit area. Although Meghalaya has great potentiality for the development of horticultural crops, this sector still remains undeveloped due to poor infrastructural facilities in terms of transport, marketing, storage etc.

INTRODUCTION:

Meghalaya, one of the seven states in the North Eastern Region of India has an area of 22.49 lakh hectares constituting about 6 per cent of the total land area in the country. The State is basically agrarian in nature in which a major section of the population depends on agriculture for their livelihood. According to the provisional results of the census of India 2001, the total population of the state stood at 23,06,069 out of which the rural population constitutes 80 per cent of the total population. Further, a large percentage of the labour force comprising about 69.6 per cent of the total working force are engaged in agriculture and allied activities.

STATUS OF JHUM CULTIVATION IN MEGHALAYA:

The cultivation of land in the state is of two types – one, practiced on permanent and well-developed lands known as permanent or settled agriculture and the other on hill slopes known as shifting or *jhum* cultivation. Settled agriculture is mostly confined to plains and river valleys and to some extent foothills and terraced lands on gentle slopes. The total are under settled agriculture comprises about 6.6. per cent of the total geographical area of the State.

As against settled cultivation, *jhum* cultivation is practised by the hill tribals of the State. According to the State Forest Report 1997, the annual area brought under *jhum* cultivation amounts to 75,000 hectares which constitute 34.34 per cent of the net area sown and 3.34 per cent of the total geographical area of the State.

The adverse impact of *jhum* cultivation on the ecology and economy is an issue of great concern not only in Meghalaya but in the entire North-Eastern Region. *Jhumming* in Meghalaya is mostly undertaken on the hill slopes without resorting to any conservation measures. The 'slashing and burning' of forest and vegetation for jhum purposes and considering the fact that Meghalaya experiences high intensity rainfall, she has a high potential for soil erosion.

This has assumed serious proportion in Meghalaya and is in fact the crux of all chronic ills of agriculture.

Jhumming is also a wasteful method of cultivation since it involves leaving the land fallow for a number of years to enable the soil to regain its fertility. Fallow lands predominate in all the seven districts of the State. The vast area of fallow lands indicates a great wastage of land resources of the state.

Further, the rapid rate of increase in population in recent times and the limited ability to increase the quantum of land for cultivation purposes has led to a drastic decline of the *jhum* cycle from a more favourable 10-15 years period to a one to two years period at present. This has led to repeated *jhumming* on already denuded land greatly enhancing land degradation and drastically affecting the yield rate and economic returns of the farmers. Thus a vicious cycle of poverty and hardships marks the life of the majority of the farmers in the state.

But jhum cultivation is still practiced in the hill areas of Meghalaya. The persistence of this system of cultivation seems to suggest that the other viable alternatives to jhumming such as settled cultivation does not offer any advantage to the farmers in the State. Considering the topography of the land which does not permit a significant increase in net area sown, we would try to examine the viability of horticulture as an ultimate solution to jhum cultivation in Meghalaya.

SCOPE AND POTENTIAL OF HORTICULTURE IN MEGHALAYA:

Meghalaya, is endowed with a variety of agro-climatic conditions which is ideal for growing a wide variety of horticultural crops. As it is, the State abounds in a rich flora of indigeneous fruits and it will not be wrong to add that few other places in the world has a richer natural array of diverse forms of different types of fruits growing naturally without very much human effort.

Based on the physical features as well as the horticultural potentialities, the state can be classified into 3 distinct zones. They are:

1. **Central Plateau:** It is the highest region in the State and temperate fruits like pear, plum, peach, apricot and to some extent apples are grown. It has the largest area under grassland and unutilised land which can be put to good use under horticultural crops.

2. **Border Areas:** This region stretches downwards from where the Central Plateau ends towards the plains of Bangladesh in the south. It is a high rainfall area having Cherrapunjee and Mawsynram, the wettest place in the world within it. In this region, tropical and sub-tropical fruits like banana, pineapple, mandarin, betel leaf, areca nut are grown.

3. **Sub-Montane Areas:** Like the border area, this region is the continuation of the Central Plateau on the northern side and merges with the plains of Assam. The topography here is of more gentle slopes than the border area where the land is steeper. Horticultural crops like pineapple, banana, papaya, guava and mandarin grow well in this area.

The area of production and productivity of the major horticultural crops are given in the tables (next two pages)

Table 1.

Major Horticultural Crops in Meghalaya, 1998-99

Name	Area where grown	Area under cultivation (hactares)	Production (M.T.)	Yield (kg/hectare)
Citrus fruits (Mandarin, Orange)	Southern slopes of East West Khasi hills and Garo hills	7,523	35,205	4,680
Pineapple	Southern and Northern slopes of East, West, Khasi hills, Garo Hills and Ribhoi District	9,237	80,116	8,626
Banana	Northern part of East and West Khasi hills, northern and southern part of Garo Hills	5,194	62,888	12,108
Papaya	Northern Part of Khasi Hills and Garo Hills	495	3,997	8,075
Temperate fruits	Central plateau of East, West Khasi Hills and Jaintia Hills	703	3,462	4,925
Miscellaneous fruits		2,731	37,121	13,593
Total fruits		25,945	2,22,789	52,007

Source : Directorate of Economics and Statistics, Government of Meghalaya

It may be noted that the total area under fruit crops in Meghalaya is 25,945 hectares which constitutes just 1.15 per cent of the total geographical area and 11.3 per cent of the net sown area of the State. The total production of fruit crops in Meghalaya amount to 2,22,789 metric tonnes and the yield per hectare is at 52,007 kgs. in 1998-99. The largest production of fruit crops as shown in the Table-1 is that of pineapples and banana at 80,116 metric tonnes and 62,888 metric tonnes with a yield rate of 8626 kgs. and 12,108 kgs. in 1998-99, respectively.

The yield rate and the total production of fruit crops in Meghalaya far exceeded the total production and the yield per hectare of foodgrain crops. In 1998-99, the total production of foodgrain crops stood at 1,86,782 metric tonnes and a yield rate of 1404 kgs. per hectare. However, the area under foodgrain crops stood at 1,32,993 hectare comprising 6 per cent of the total geographical area and 61 per cent of the net area sown of the State is considerably higher than the area under fruit crops.

Considering the topography of land, climatic conditions and the availability of manpower which are naturally suited for horticulture the State direct its efforts to accelerate the expansion of horticultural crops. This involves the maximum utilisation of the potential areas available in the State such as fallow lands and cultivable wastelands for addition to the current area under horticultural crops. The area under fallow lands and cultivable wastelands in Meghalaya

for the year 1998-99 are presented in Table 2 (Next page)

Table 2.

Area under Fallow Lands and Cultivable Lands (1998-99).

District/State	Geographical	Net area sown	Fallow Lands	Cultivable Lands
East Khasi Hills	2,74,800	30.738 (11.81)	10.738 (3.90)	62.254 (22.65)
West Khasi Hills	5,24,700	22.108 (4.21)	67.490 (12.86)	1.20.388 (22.94)
Ri-Bhoi	2,44,800	21.325 (8.71)	14.964 (6.11)	59.780 (24.49)
East Garo Hills	2,60,300	28.900 (11.10)	26.785 (10.29)	43.457 (16.69)
West Garo Hills	3,71,400	63.964 (17.22)	57.720 (15.54)	35.260 (9.49)
South Garo Hills	1,85,000	18.303 (9.89)	24.143 (13.05)	24.587 (13.29)
Jaintia Hills	3,81,900	33.047 (8.65)	26.760 (7.00)	1.19.919 (31.40)
Meghalaya	22,42,900	2.18.385 (9.50)	2.28.600 (10.90)	4.65.645 (20.76)

Source: Directorate of Economics and statistics, Government of Meghalaya.

It may be noted from Table 2. that the net area sown and the area under fallow lands in Meghalaya constitute around 9.5 per cent and 10.9 per cent of the geographical area respectively in 1998-99. Fallow lands predominate in the State with the highest incidence at West Khasi Hills at 12.86 per cent where the net area sown is only 4.21 per cent of its geographical area.

Further, cultivable wastelands comprise 20.76 per cent of the state's geographical area, which far exceeded the net area sown in 1998-99. These cultivable wastelands predominate in all the seven districts of the State with the highest concentration in Jaintia Hills at 31.40 per cent while the net area sown is only 8.65 per cent of it geographical area.

The under fallow lands and cultivable wastelands together comprises nearly 32 per cent of the geographical area of the State. They represent the potential areas for expansion under horticultural crops in which the net returns per hectare tends to be higher than in field crops.

EXISTING INFRASTRUCTURE:

In order to meet the growing challenges of the State's economy, the Government has assigned a greater role for horticultural development in the Ninth- Five Year Plan period. A separate Directorate of Horticulture has been created which has started functioning. There are 13 horticultural nurseries and six experimental or research stations in the State.

There are two mini-fruit processing units in the State located at Shillong in the East Khasi hills and Daindubi in East Garo Hills District. These units also served as centers for training to the local growers. However, the processing

plants suffer from erratic and inadequate supply of packing material particularly containers even after paying high prices. There is a need to set up a **container manufacturing plant** in the Region.

In terms of marketing facilities, the Meghalaya State Co-operative Marketing and Consumers Federation (MECOFED) has been set up as an Apex Marketing body for procuring and marketing of surplus agricultural and horticultural products. The Meghalaya State Agriculture marketing Board has also been constituted with headquarters at Shillong. The Board will provide handling, grading. Storage, transport facilities etc. for agricultural and horticultural products. However, there are limited marketing facilities in the State for fresh fruits and finished products since the functioning links with Service Co-Operative Societies is yet to be established due to shortage of infrastructure, financial resources and trained human resources.

PROBLEMS OF HORTICULTURAL DEVELOPMENT:

In spite of the fact that Meghalaya has a high potential for horticultural crops, this sector is yet to attain the status of an industry in our State. The reason for the unsatisfactory performance in the field of horticulture may be briefly summarized below:

1. Lack of technologies, which are adaptable to the different regions of the State.
2. Shortage of trained human resources for piloting horticultural development projects.
3. Scarcity of basic inputs including planting material.
4. Limited or inadequate market facilities.
5. Inadequate storage facilities
6. Inadequate product- processing facilities.
7. Lengthy and ineffective procedure for obtaining institutional finance for establishing horticultural plantations.
8. Inadequate or limited research facilities.

STRATEGY FOR HORTICULTURAL DEVELOPMENT:

The problems standing in the way of horticultural development in Meghalaya are not insurmountable. The Government should identify the problems and follow a concentrated and an integrated approach towards expansion and improving productivity in the horticultural sector. Some of the strategies towards an integrated development of horticulture in Meghalaya are presented as follows:

1. Augmentation and upgradation of state level Horticultural Research and Development Organization
2. A proper preliminary survey of the need of the farmers to identify need-based research programmes.
3. The evolution of cost-effective technology, which is within the farmers' reach.
4. Technological improvement of existing indigeneous methods for improving quality and productivity of

horticultural crops.

5. The evolution of technologies for locally growing medicinal and aromatic plant-based horticulture.

6. Provision of incentives for the establishment of nurseries with adequate capacity for generating quality planting material.

7. The adoption of horticulture-based Social Forestry or Afforestation programme which will popularized such horticultural species which retain a green cover throughout the year with emphasis on quality and productivity of crops.

8. The establishment of cold storage centers with proper grading facilities at selects locations.

9. The provision of training facilities on post harvest crop management.

10. The strengthening of the rural primary market network.

11. The establishment and strengthening of regional market with facilities of refrigerated transport services.

12. The provision of incentives for the establishment of Processing Plants for the processing and preservation of the existing marketable surplus of major crops of the State such as pineapple, banana, jack-fruit etc.

13. The opening and encouragement of the Indo-Bangla border trade in respect of horticultural crops including cash crops.

CONCLUSION:

It has clearly been established that there is immense opportunities for horticultural development in Meghalaya which will serve as a social and economic emancipation of the jhummias in the State. The opportunities lies in the climatic conditions and the naturally drained topography suitable for a wide range of horticultural crops. The availability of vast areas of land suitable for horticultural plantations and the natural inclination of the local people towards kitchen-yard horticulture indicates the potentiality of horticulture development in the State. Moreover, the low productivity of foodgrain crops and the socio-economic vulnerability of a major section of the jhummias pointed to the fact that it would be easy and feasible to wean them away to horticulture. Therefore, the vast opportunities available of horticultural development in Meghalaya needs to be optimally tapped and strengthened through a concerted effort so as to serve as the ultimate solution to the problem of jhum cultivation in Meghalaya.

PROSPECTS AND PROBLEMS OF PLANTATION AND HORTICULTURAL CROPS

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ABSTRACT:

This article takes into account the importance of horticulture as diversification of agriculture and as an innovative agriculture technology for the restoration of natural environment and maintenance of ecology, as a measure of soil and water conservation leading to increase in production and productivity of crops and sustainable development of the economy. It aptly says that horticulture industry based on fruits, vegetables, spices, ornamentals, floriculture, commercial plantation, aromatic and medicinal crops can play a pivotal role for providing food assortments, nutrition and potential to generate employment to a large number of skilled and semi-skilled workers on a sustainable basis. It also contributes for earning foreign exchange from fresh produce or processed products.

Horticultural development for its vast potential has not only gained importance in the global context but has been given emphasis and paid focused attention by the Government, Planning Commission and Ministry of Agriculture. Government's special priority to horticulture development is appropriately reflected in the phenomenal increase in the budget allocation during the Eighth Plan and beyond.

The North Eastern Region of the seven States of Arunachal Pradesh, Assam, Meghalaya, Manipur, Mizoram, Nagaland and Tripura, agro-climatically fall in the Eastern Himalayan Region (Zone-II) considered to be the most diverse and resourceful region of the country. It is endowed with congenial natural conditions to grow a wide variety of all types of fruits and vegetables throughout the year thereby confirming the vast potential for the growth and development of the horticulture industry. Statistics compiled by NEC has revealed that horticultural crops in North-East States are grown in an area of 6,558 lakh hectares producing 48.180 lakh tonnes of horticultural produce annually, which account for 5.5% area under horticultural crops of the country as a whole thereby contributing 4.82% of the national productivity.

After a thorough discussion on different horticultural crops grown in the NE like fruit crops, fruit nuts, vegetables and tuber crops, spices, plantation crops like tea, coffee and rubber, the potentialities of horticultural crops, economics of fruit crops in the hill, post-harvest management to minimise loss of horticultural produce and investment and manpower required for horticultural development is also discussed.

Associated problems affecting horticultural development in the NE Region has been stated as limited application of advanced 'on farm' agro-techniques, scarcity in availability of quality planting materials, serious bottlenecks in transport and communication network, lack of remunerative return due to lack of cold storage facilities and marketing potential, lack of technological support, extension support and credit support.

It is concluded that public awareness, self-discipline and Government support will go a long way in tackling the associated problems and stepping up the pace of development of horticulture in the North East Region.

Concerted efforts are required to be made for achieving a multifaceted development of horticulture in North East India in an integrated manner. Earnest efforts are sure to bring in the desired results and accelerate the development process.

INTRODUCTION:

The agriculture sector occupies a very important place in the economy. However, due to steady rise in the population rates and increasingly unfavorable land-man ratio, the production and productivity of agriculture has to be enhanced. Thus, the needs for diversification of agriculture through a viable alternate system like horticulture.

Even in the global context, horticulture has gained importance. It has evolved into a form of industry, which, apart from providing food and nutrition, also generates employment for million of people.

Horticulture industries based on fruits, vegetables, spices, ornamentals, floriculture, commercial plantation crops, aromatic and medicinal crops can play a pivotal role in diversifying agriculture in terms of production, productivity, providing food assortments, nutrition and has the potential to generate employment for a large number of skilled and relatively less skilled workers on a sustainable basis. It also contributes towards earning of foreign exchange either from fresh produce or processed products.

In recent years, horticulture and agro-forestry has been given great emphasis. They are now considered as innovative agricultural technology for restoration of the natural environment and maintenance of ecology, as a measure for soil and water conservation leading to production of crops and sustainable development of the rural economy. This could in turn bring about a revolutionary change in the rural economic scenario. At the national level, The National Horticultural Board and Agricultural Produce Export Development Authority have been established for the promotion of horticulture as an industry. NABARD also provides loan for the development of horticulture. For promotion horticulture development, the Government of India has also subsidised the cost of inputs like planting materials, fertilisers, pesticides, plant protection equipment etc. Thus, considerable thrust has been laid by the Government of India for ensuring the development of horticulture at a rapid pace during the Eighth Plan and beyond.

The North Eastern Region, comprising the seven states of Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland and Tripura, agro-climatically fall in the Eastern Himalayan Region (Zone II) which is considered to be the most diverse and resourceful region of the country and which is further sub-divided into Six Agro-climatic sub-zones. It lies between 21° 57 and 29° 28 North latitudes and 89° 40 and 97° 30 East longitudes. The region has a versatic agro-climatic pattern and represents a unique geographical area, which is characterised by high precipitation and humidity, undulating hilly topography with varying altitudes as low as 75 metre to more than 5,000 metre. The climate of the region also varies from tropical plains to temperate and Alpine in the hills. The area is endowed with an abundance of natural resources well distributed annual precipitation and deep alluvial loamy soil with ph balance between 4.5 and 6.5 and thus having endowed with the potential to grow a wide range of crops. The region is also blessed with congenial natural conditions to grow a wide variety of fruits and vegetables throughout the year in one or other parts of the region, thereby confirming the vast potential for the growth and development of the horticulture industry in the region.

Statistics complied by NEC reveals that horticultural crops in the North East are grown in the area of 6,558 lakh hectares, producing 48.180 lakh tones of horticultural output annually which accounts for 5.5 per cent area under horticultural crops for the country as a whole, thereby contributing 4.82 per cent of the national productivity. In view of the great potential for rapid growth and prospects of considerable economic returns from investment, various new programme have been initiated in the development of floriculture, tuber crops, mushroom, areca nut, betel vine, aromatic and medicinal plants and use of plastics in commercial horticulture. Thus, development of horticulture assumes great significance in the North Eastern Region and is a national priority.

The North East Region has great potentiality for sub-tropical and temperate fruits, vegetables, spices and plantation crops.

Fruit crops and fruit nuts: - The tropical fruits of North East Region are pineapple, orange, banana, mango, guava, papaya, jackfruits, litchi and many other minor fruits are grown both in the hills and plains. Citrus (like lime and lemon) and pineapple are commercially grown. Besides, some temperate fruits like apple, pears, peach and plum are also grown on commercial basis. However, local varieties of fruits of inferior quality also occupy larger areas. The main types of fruit nuts grown in the North East Region are coconut and areca nut. The total fruit crops and fruit nuts grown in the North East Region in the year 1996-97 and 1997-98 respectively is shown in Table 1 and 2.

Vegetable and tuber crops: - Among the vegetables and tuber crops grown in the North East Region are potato, cabbage, sweet potato, tapioca, brinjal, onion and cauliflower covering a total area of 189.4 hectares and total productivity of 1727.6 metric tones. The different type of vegetables and tuber crops grown in the North East Region in the year 1997-98 is shown in Table 2.

Government of Tripura with financial assistance from North Eastern Council has developed a Regional True Potato Seeds production centre at Agartala for producing sufficient and materials to cover 5 lakh hectares of cultivated area in North East Region.

Spices: - The main types of spices grown in the North East Region are ginger, turmeric, chillies, black pepper, garlic, coriander etc. which have commercial potentiality. But no systematic efforts have been made so far for commercial cultivation of these crops. The total area under spices in the North East Region in the year 1997-98 was 59.7 thousand hectares with a production of 149.2 thousand tones. The different types of spices grown in the North East Region in the year 1997-98 is shown in Table 4.

Plantation crops: - Among the plantation crops special attention has been given for the development of high value cash crops like tea, coffee and rubber and fruit nuts like areca nut and coconut. Because of agro-climatic suitability, large areas are brought under plantation of rubber, areca nut, betel vine and spices. Similarly, efforts are also made to expand area under tea cultivation in Assam, Arunachal Pradesh, Manipur, Nagaland and Tripura. The total number of tea estates present with the total area and production are shown in Table 5, 6 and 7. The figures in these tables indicate that the State of Assam leads in the production of rubber and the area under coffee is shown in Table 8 and 9 respectively. Bar diagram in figure 1, 2 and 3 shows area and production of tea and rubber.

POTENTIALITY OF HORTICULTURAL CROPS:

The Northeast Region can be considered to be the richest reservoir of a large number of horticultural and plantation crops. The region is also agro-climatically suitable for growing a wide variety of crops like fruits, fruit nuts, vegetables and tuber crops, spices, plantation crops like tea, coffee and rubber. However, despite the vast potential, the region has not developed into a major horticulture intensive zone due to several planning and development lags and inherent technological constraints. The dominant factors that have so far affected over-all growth and development of horticulture in the North East include:

1. Limited application of advanced 'on farm' agro-techniques;
2. Scarcity in the availability of quality planting materials like seeds, fertilizers and plant protection chemicals etc.;
3. Lack of knowledge and application of integrated nutrient supply, pest and disease control system;
4. Non-replacement of old and non-productive orchards;
5. Limited access to modern post harvest handling processing, packaging and marketing;
6. Lack of application of innovative and new technologies like bio-technology, plasticulture, vermiculture, apiculture etc. to enhance horticultural productivity;

7. Insufficient basic infrastructure for R & D work and shortage of skilled manpower;

8. Serious bottlenecks in transport and communication system and
9. Improper institutional arrangement and limited role played by financial institutions in setting up of agro-industrial and horticulture based industrial units.

Realising the vast potential for horticultural development, Government, Planning Commission and the Ministry of Agriculture during the Eighth Plan has paid focused attention to over-all "Ecosystem Development of Eastern Himalayan Region" to which "Integrated Horticulture Development" forms the central piece of development for the North Eastern Region. Governments special priority is appropriately reflected in phenomenal increase in the budget allocation for horticulture development of the North East Region during the Eighth Plan and beyond. Such a priority of integrated horticulture development will diversity the age-old practises of agriculture, minimise extensive damage caused by shifting cultivation, deforestation etc. It will help protect and conserve the fragile ecosystem, improve socio-economic status, help in generating marketable surplus and last but not the least creates ample job opportunities in the region.

ECONOMICS OF FRUIT CROPS IN THE HILLS:

Studies conducted in the recent past by the Agro Economic Research Centre for North East India shows that the return from horticultural crop cultivated in the hills are fairly higher than jhum cultivation. Table 10 indicates the comparative economics of jhum and horticultural crop cultivated in the hill areas of N.E. India.

Table 10.

Return per hectare of cropped area from Horticulture and Jhumming:

(Income in Rs./hectare)

State / Crop	Income from Horticulture crop	Income from Jhumming
Meghalaya :		3,400
1. Pineapple & other fruits	5,000	
2. Potato	8,420	
3. Cabbage & Cauliflower	6,694	
4. Turmeric.	11,828	
Arunachal Pradesh :		2,900
5. Apple	3,900	
Manipur :		3,200
6. Pineapple	4,300	
7. Orange.	4,000	

In Meghalaya, pineapple cultivation along with cultivation of guava, pear, plum, bay leaf etc. proved to be a viable proposition. On an average the net return per hectare from such plantation was estimated at Rs.5, 000 which is fairly higher than the return from jhum cultivation, which is Rs.3, 400.

Various studies conducted from time to time shows that income or return from horticultural cultivation is

more than income from jhumming. One study conducted in Meghalaya highlighted that potato growers cultivated rows of cabbage, cauliflower and other vegetables in between rows of potato under relay cropping method and it proved very beneficial and rewarding. The gross return per hectare was work out at Rs.8,420 for potato, Rs.6,694 for cabbage and cauliflower together and Rs.11,828 for turmeric in the year 1981, the return showed being substantially higher than jhum cultivation.

Another study in Kameng district of Arunachal Pradesh in the year 1977 highlighted that return from apple cultivation per hectare was Rs.3,900 when only 24 per cent of the plants were bearing fruits. A point to be noted here is that farmers paid more attention to the apple orchards and left jhumming partially.

Another study conducted in Manipur during the year 1979-80 showed per hectare return from pineapple and orange were 4,300 and 4,000 respectively. Thus, hill farmers paid more attention to fruit cultivation and left practising jhum cultivation partially.

It is however, also being observed that farmers are deprived from earning remunerative return due to lack of road communication and communication network, lack of cold storage facilities, lack of technological support and extension support system and lack of credit support, thereby affecting the development of horticulture industry in the North East.

POST HARVEST MANAGEMENT:

To reduce loss of perishable horticultural produce like fruits, vegetables and tuber crops, development of post-harvest management system is required. The post harvest loss of horticultural produce is due to inefficient post harvest handling, lack of efficient infrastructure and processing facilities. The estimated loss due to such spoilage is estimated at Rs.370 crores per annum in North East, which is Rs.3000 crores per annum in India.

INVESTMENT AND MANPOWER REQUIREMENTS:

In developing the hill slopes on a permanent basis for regular cultivation capital investment will be required for land development, procurement of plant nutrients, planting material as well as processing units for tea, coffee and rubber for the newly developed areas. Calculations done by N.E.C. for the same is shown in Table 11. The total cost shown would however rise progressively in future along with price rise.

Table 11.

Investment and Manpower required by 2000.

Crops / Programme	Area proposed (000 ha)	Area already develop ('000 ha)	Cost of development/ ha	Total cost (Rs.in crores)	Technical manpower required	Total
1. Tea	30.00	-	5000	15.00	1 for 8 ha	37.50
2. Coffee	44.00	2.00	5000	22.00	-	670
3. Rubber	105.00	4.20	5000	5.04	1 for 6 ha	17500
4. Horticulture						
a) Fruits	154.00	90.00	5000	32.00	1 for 100 ha	1540
b) Vegetables	126.00	96.00	4000	11.20	-do-	1260

Source: N.E.C. Secretariat, Shillong.

For an integrated approach to horticultural development in the North east, the following imperatives of development in a holistic manner requires due consideration:

1. Systematic local specific crop planning agro-climatically suitable, for the region.

2. Proper land use planning on model basis should be followed along with the due emphasis on optimum use of soil, water and plant resources.

3. To step up productivity, intensive horticulture development should be taken up in potential districts in a planned and systematic manner.

4. Application of scientific "on farm" technology package requires due emphasis to remove problems of the availability of planting materials, nutrient supplies and plant protection manners.

5. Access to scientific post harvest management techniques to ensure and minimize post harvest loss and receipt of remunerative price to farmers for their crop cultivation.

6. Creation of regional facilities for processing and value addition of horticultural produce.

7. Rapid expansion of infrastructure facilities for providing forward and backward linkage with due emphasis and priority on development of market, transport and communication network.

8. Strengthening and creation of regional facilities for research and development, promotion and publicity.

9. Due emphasis on export oriented production programme of various horticultural produce fresh and processed products.

Though the North East Region has great potential for the growth and development of horticultural crops, the need of the hour is to adopt the concept of sustainable development, being linked with economic growth in a manner that it is not only environment friendly but also globally accepted agricultural development strategy. As the World Commission on Environment and Development opines that sustainable development should be such that the present generation should access the basic necessities of life and maintain the natural resources intact for the future generation.

The present environment crisis which is the direct result of mass deforestation and lack of proper utilization of resources. Management of soil and water needs to be tackled. This can be done by public awareness, self-discipline and government efforts to preserve and maintain biological diversity and control jhumming for restoration of the natural environment.

A concerted effort for a multifaceted development of horticulture in an integrated manner is required for horticulture development in North East India. Earnest efforts are sure to accelerate the development process.

Table 1.

Fruit crops in the N.E.Region 1996-97

Area in Hectare
Production in M.T.

Fruit Crop		Assam	Arunachal Pradesh	Manipur	Meghalaya	Mizoram	Nagaland	Tripura	All India
1		2	3	4	5	6	7	8	9
Pineapple	A	13997	6633	9950	8793	1033	1805	5025	71300
	P	207838	29922	69650	77202	7154	44170	44470	1071200
Orange	A	5895	5566	830	-	7017	1265	4484	133900
	P	68527	11842	3320	-	28068	18031	21000	1161700
Other citrus (e.g. Lemon/Lime)	A	7367	2717	965	6961	964	-	2710	643100
	P	40639	3981	5888	32980	2787	-	3520	5597900
Banana	A	41337	2645	1410	5370	2814	1505	4927	433000
	P	595258	9495	10718	63967	14871	23360	33630	13095100
Mango	A	1360	76	160	-	478	168	5022	1283000
	P	7811	64	880	-	2555	455	41270	10811000
Guava	A	3084	683	700	-	339	455	-	7000
	P	40817	2607	2100	-	1324	3227	-	139000
Litchi	A	4063	181	-	-	79	55	5420	48600
	P	17563	251	-	-	270	171	2790	364600
Papaya	A	7482	457	1850	482	296	285	-	60900
	P	110389	1943	10175	3928	2426	2475	-	1329700
Jack-fruit	A	18369	124	260	-	216	225	8125	-
	P	160200	708	1040	-	1391	912	214580	-
Apple	A	-	2369	-	-	32	83	-	217100
	P	-	5405	-	-	31	451	-	1214700
Pears	A	-	579	-	-	93	750	-	-
	P	-	1668	-	-	444	2455	-	-
Plum & peach	A	-	730	610	-	184	930	-	-
	P	-	1896	3965	-	517	3425	-	-

Source : CMIE & NEDFI

NB: Fruit Crops in respect of Tripura and All India Pertaining to 1995-96.

Table. 2.

Fruit Nuts in the N.E. Region 1997-98.

Area in Hectare
Production in M.T.

Fruits / Nuts		Assam	Arunachal Pradesh	Manipur	Meghalaya	Mizoram	Nagaland	Tripura	Total
1		2	3	4	5	6	7	8	9
Coconut	A	19.7	-	-	-	-	-	9.1	
	*P	126.9	-	-	-	-	-	6.1	
Areca nut	A	74.1	-	-	9.5	0.7	-	1.8	
	P	64.0	-	-	12.1	0.1	-	3.5	
Cashew nut	A	-	-	-	-	-	-	-	
	P	-	-	-	-	-	-	-	
Walnut	A	-	-	-	-	-	-	-	
	P	-	-	-	-	-	-	-	

Source: Directorate of Cashew nut Development, Ministry of Agriculture, GOI, Cochin Director of Economics & Statistics, Ministry of Agriculture, GOI.

* Million Nuts
Area- '000 ha
Production '000 tns.

Table. 3.

Vegetables & Tuber Crops in the N.E. Region 1997-98.

Area in Hectare
Production in M.T.

Vegetables/ Tuber Crops		Arunachal Pradesh	Assam	Manipur	Meghalaya	Mizoram	Nagaland	Tripura	All India
1		2	3	4	5	6	7	8	9
Potato	A	4.5	75.3	3.2	20.8	0.7	3.8	4.9	1208.9
	P	33.3	671.9	16.9	200.0	3.7	30.7	91.3	17652.3
Cabbage	A	-	18.5	-	5.2	-	-	-	218.4
(1995-96)	P	-	227.5	-	17.0	-	-	-	3861.7
Sweet	A	-	9.4	0.0	4.0	0.6	0.7	1.1	128.8
Potato	P	-	32.6	0.1	21.1	3.2	7.8	9.7	1171
Tapioca	A	-	2.5	-	-	0.5	0.8	-	264.3
	P	-	11.7	-	-	7.0	15.8	-	6681.9
Brinjal	A	-	12.5	-	-	-		-	434.2
	P	-	187.7	-	-	-		-	6443.1
Onion	A	-	7.8	-	-	-		0.1	338.5
	P	-	17.9	-	-	-		0.2	3142.8
Cauliflower	A	-	12.5	-		-		-	220
		-	120.0	-		-		-	2474

Source : CMIE Pvt. Ltd. Mumbai.

Table.4.

Spices in the N.E.Region 1997-98.

A- Area in Thousand hectares
P-Production in thousand in tones.

Fruit Crops		Arunachal Pradesh	Assam	Manipur	Meghalaya	Mizoram	Nagaland	Tripura
1		2	3	4	5	6	7	8
Ginger	A	NA	4.2	0.7	7.4	2.6	0.5	1.0
	P	NA	32.1	1.2	45.3	20.4	4.0	1.9
Turmeric	A	10.1	0.3	NA	1.4	0.4	NA	1.4
	P	7.0	1.0	NA	6.4	3.6	NA	2.8
Chilies	A	14.3	1.3	7.2	1.8	2.8	0.4	1.9
	P	9.5	1.6	4.3	1.1	3.3	2.7	1.0

Source: Horticultural Statistics, 1997-98

Table. 5.

Tea statistics in NER

Number of Tea Estate.

State	1971	1985	1989	1991	1997
1	2	3	4	5	6
Arunachal Pradesh	-	3	6	6	22
Assam	750	844	848	848	860
Manipur	-	2	2	2	6
Meghalaya	-	-	-	-	0
Mizoram	-	-	-	-	2
Nagaland	-	1	1	1	6
Tripura	-	55	58	58	51
All India	-	13.537	13.856	13.873	-

Source: National Co-operative Development Corporation, New Delhi.

Table. 6.

Area under Tea.

(In hectare)

State	1986	1987	1994	1995	1996	1997
1	2	3	4	5	6	7
Arunachal Pradesh	5	5	1151	1256	1360	1395
Assam	222618	225783	227120	226280	227290	228260
Manipur	104	104	343	452	470	485
Nagaland	8	8	237	256	257	280
Tripura	6453	6481	5938	5952	5980	6010
All India	407647	411335	425966	4270065	429677	432297

Source: Area under Tea – Tea Digest – 1997 * Provisional & NEDFI.

Table. 7.

Production of Tea.

(in Hectares)

State	1986	1987	1994	1995	1996	1997
1	2	3	4	5	6	7
Arunachal Pradesh	-	-	569	707	650	800
Assam	3354	363739	400732	402617	424864	425430
Manipur	-	-	60	74	68	80
Nagaland	-	-	12	17	17	18
Tripura	3427	3780	5827	5679	6657	6548
All India	-	665251	752895	756016	780034	810613

Source : *Tea Board 1997.*

Table. 8.

Area and Production of Rubber.

State	Area (Hectares) 1991-92	Production (Tonnes) 1991-92	Area (Hectares) 1992-93	Production (Tonnes) 1992-93	Area (Hectares) 1997-98	Production (Tonnes) 1997-98
1	2	3	4	5	6	7
Arunachal Pradesh	50	12	50	19	128	43
Assam	9,740	148	9,885	196	10060	1623
Manipur	1,215	12	1,215	14	1308	69
Meghalaya	4,058	45	4,350	93	1757	287
Mizoram	960	5	960	3	628	7
Nagaland	1370	-	1370	1	1287	120
Total	17,860	1,600	18,250	1,740	22582	7631
Tripura	35,254	1,822	36,080	2,067	39750	9780
All India	488,500	366745	499,000	393,490	544534	583830

Source: Rubber Board.

Table. 9.

Area Statistics of Coffee in the NE.Region. (1998-99)
(Planted area, bearing area etc. of Coffee)

State	Arunachal Pradesh	Nagaland	Meghalaya	Assam	Mizoram	Tripura	Manipur
1	2	3	4	5	6	7	8
Area under	In Ha.	In Ha.	In Ha.	In Ha.	In Ha.	In Ha.	In Ha.
Aravica	210.80	2260.00	635.50	1073.85	427.75	36.5	275.00
Robusta	377.10	390.00	904.50	718.50	0.50	891.15	100.00
Total	587.90	2650.00	1540.00	1792.35	428.25	927.70	375.00
Area under	In Ha.	In Ha.	In Ha.	In Ha.	In Ha.	In Ha.	In Ha.
Aravica	107.50	2218.20	425.50	966.50	297.50	36.55	N.A.
Robusta	290.00	369.00	494.50	688.40	0.50	817.05	N.A.
Total	2587.20	920.00	1540.00	1654.90	298.00	853.60	
Area under	In Ha.	In Ha.	In Ha.	In Ha.	In Ha.	In Ha.	In Ha.
Aravica	103.30	41.80	200.0	107.35	130.25	-	N.A.
Robusta	87.10	21.00	400.0	39.00	-	74.10	N.A.
Total	190.40	62.80	600.0	146.35	130.25	74.10	

Source: Jt. Director (Extn), NER, Coffe Board Shillong-14.

Figure I

AREA UNDER TEA (IN HECTARES)

1997

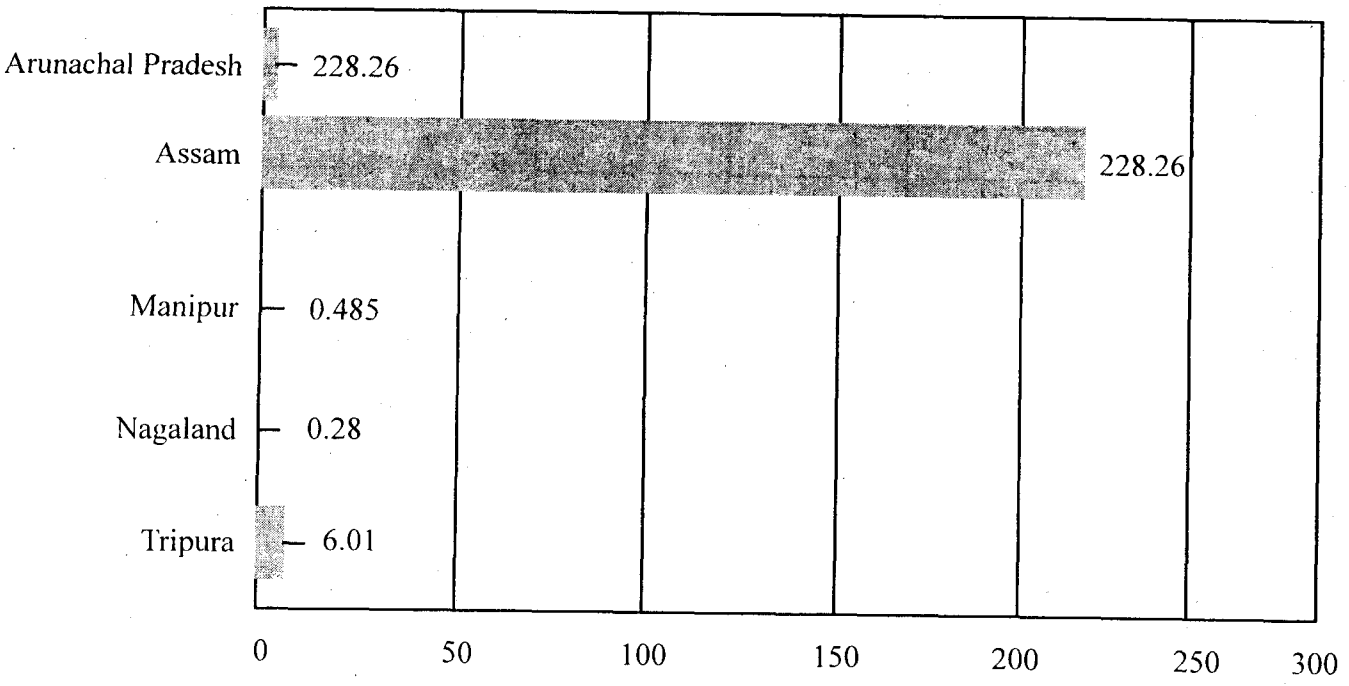


Figure II

PRODUCTION OF TEA (IN HECTARES)

1997

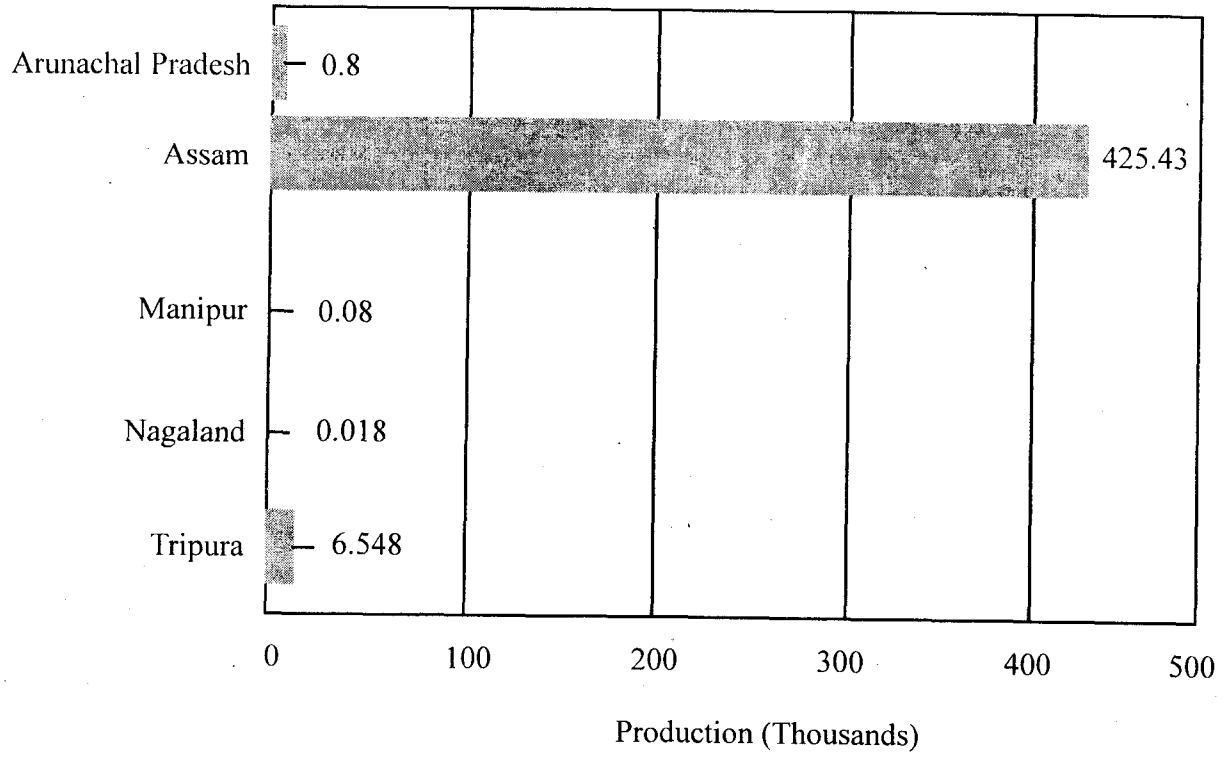
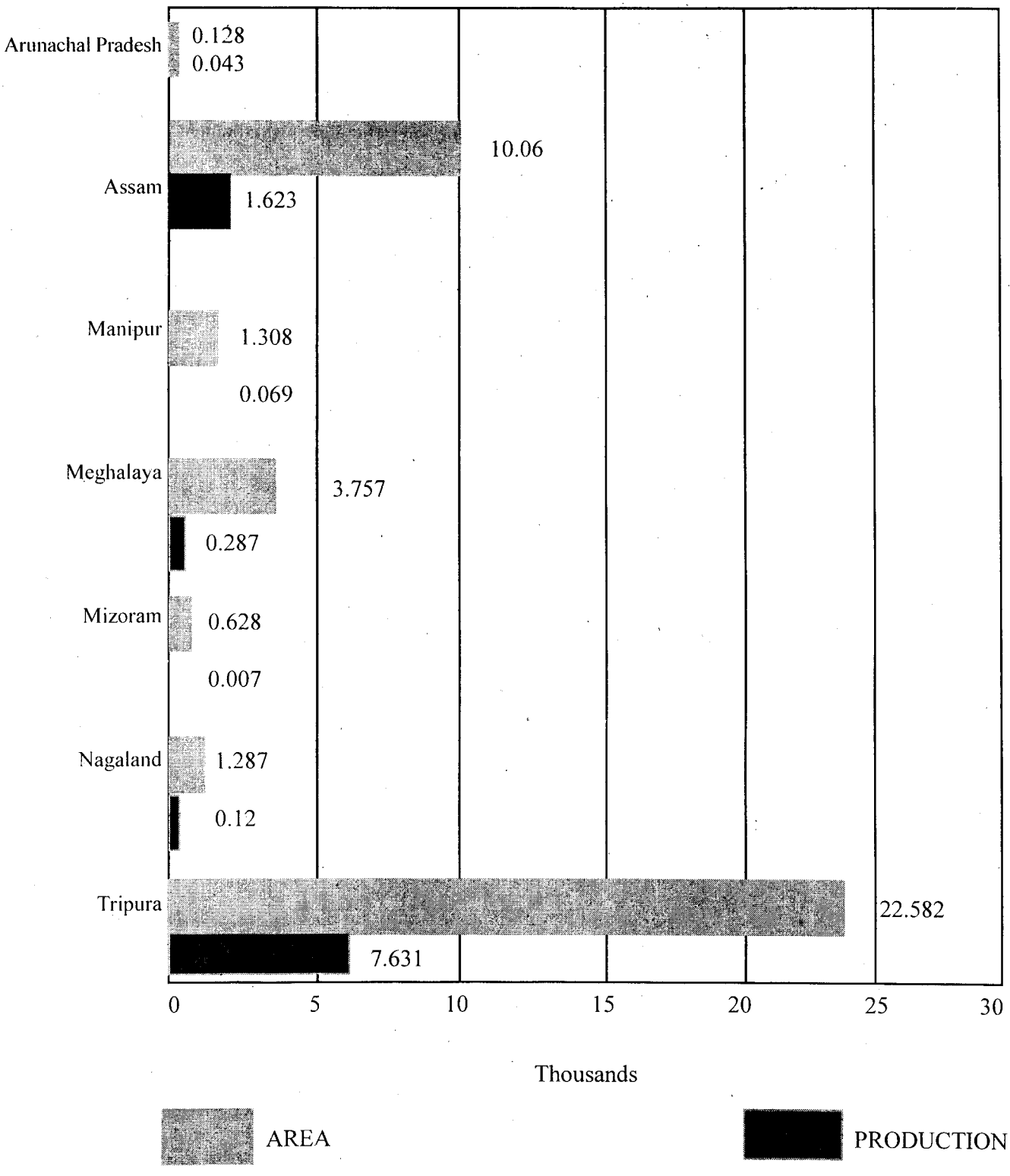


Figure III

AREA AND PRODUCTION OF RUBBER



REFFERENCE:

1. A.K. Agarwal, Economic Problems and Planning in North East India, Storling Publishers private Ltd, 1987.

2. R.K. Lekhi, R.K. Chaudhury, Economy of India including Assam and North East, Kalyani Publishers, 1993.

3. Sarkar A.N. Horticulture Development Scenario of India in Horticulture Development in India, M.D. Publications, New Delhi, 1993.

4. Basic Statistics of North Eastern Region 1995 and 2000, North Eastern Council, Shillong.

5. Dr. A.N. Sarkar. Advances in Horticulture in North East India, Focus on North East Journal of North Eastern Council Volume 15 No. 2 & 3, 1995

6. Dr. T.N. Saikia. Prospect of Horticulture in North East India, Journal of North Eastern Council Volume 15 No. 2 & 3, 1995

PROSPECTS OF HORTICULTURE IN HILL TERRAIN

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ABSTRACT:

Horticulture is a subject of new origin, which needs attention. N.E.F.A., which even remained as "Forgotten frontier" had prospects to grow fruits and vegetables. As gift of nature, pineapple and banana began to grow in this region. Verrier Elwin encouraged efforts of the Government to nourish this approach in the past. This paper probes the prospects of horticulture in the context of climate in hill terrain and directions of development with the assistance of agricultural department. Expanding programmes in production of fruits and spices by horticulture department under Five Year Plans is myriad of development which is treated as myrite in this region.

Approach of the onlooking schemes under 9th Plan is also analysed, with an intricate and inhospitable biophysical environment. The dimension and development involve the inter play of multitude of economic, social and cultural elements. It is also shown as suggestions for struggles in this paper with fruitful attempt.

INTRODUCTION:

Arunachal Pradesh means mountains for raising sun. It is a land of high hills spreading over an approximate area of 83743 sq.km. It accounts for 2.5% of the total area of the country. The biophysical environment is not promising to provide a land of plenty in progress. Absence of wide flat plain, thin soil coverage, vagaries of monsoon make this territory a tough terrain for human comforts. Arunachal Pradesh has an intricate and inhospitable surface. It is essentially a State with mountains with minimum plain space.

The sub-topical and temperate climate condition provides a vast scope to produce a wide range of varieties of fruits.

Specialised cultivation of vegetables, fruits and flowers is called horticulture. In U.S.A. it is called "truck farming" as the vegetables and fruits grown far away from the urban and industrial centres are supplied to the markets through the trucks and transport carriers.

PROSPECTS FOR HORTICULTURE DEVELOPMENT:

1. The topography of this land suits cultivation of horticultural crops.
2. Climate features favours production of fruits and commercial crops on the hill slopes and middle regions of the state.
3. Horticulture can be adopted as strategy for rural development.
4. It is an alternative job for slash and burn system of cultivation.
5. It generates income to the growers

Many fruits are grown in this state as gift of nature in the early stages of development. By seeking the nature and prospects, potential schemes are drawn by government to make it a viable one.

Sl. No.	Name of the fruits	Places where the fruits are grown
1.	Apple	Bomdila, Tawang, parts of Kameng district, Ziro, area of Subansiri district. At present it is grown in many districts
2.	Orange, Lemon, Pineapple, Gauva, Walnut, Mango, Jack fruits and Banana.	These fruits are grown in all the districts
3.	Litchi	Seppa, Ziro, Papum Pare, Dist. Along, Daporijo, Pasighat, Tezu, Khonsa, Changlang and Anini.

"The NEFA the then administration is attempting – a far-reaching agricultural reform – but from within. It does not forbid Jhumming or speak of it as an "Evil". But it is teaching improved techniques within traditional framework. At the same time, it is introducing new methods of terracing and irrigation, it is encouraging vegetable gardens and growing of fruit trees, it is distributing labour- saving implements and better seed". Vierrier Elwin.

The Department of Agriculture began the agricultural programme under Five Year Plans to maximise output which promise self-sufficiency on food and fruits front. The revolutionary response began in Seventh Plan due to funds and proper administrative machinery. Specific stress is stretched to fruit crops like apple, orange, banana, pineapple and in spices ginger and chillies. Activities related to horticulture were attempted by Agricultural Department until 1989. A new department with wide spectrum of specific schemes was born in October 1989. Horticulture development has exhibited positive response in progress with leads, lags and lapses until date. The cardinal components of horticulture development adopted under plans are given below: -

THE POLICY OF THE GOVERNMENT: Directions and Development.

1. Identification of suitable location for development of horticulture gardens.
2. Distribution of fruit plants, vegetable seeds and planting materials on subsidy.
3. Establishment of people horticulture garden one-acre unit.
4. Nursery programme, for raising of tropical, sub-tropical and temperate fruit plant nurseries.
5. Distribution of garden tools and equipments on subsidy to progressive growers.
6. Extension of existing Government Horticulture and Agriculture farms to meet the increasing demand for planting materials.
7. Utilization of abandoned land.
8. Increasing border area development programmes.
9. More emphasis on income generation crops like spices and mushroom.

Accordingly, the Directorate of Horticulture has taken up various schemes to uplift the rural poor. Important schemes under progress are given below: -

1. Peoples Horticulture garden,
2. Compact Area plantation,
3. Plant protection,
4. Mushroom Development Programme,
5. Spices development
6. Floriculture,
7. Training and Education.

The Peoples Horticultural Garden Scheme is taken up in small holding up to 1 hectare where large and compact area is not easily available. Farmers are provided inputs and technical guidance to set up horticultural garden.

The compact area plantation scheme aimed at commercialisation of horticulture through establishment of garden in compact area of 2 hectares with individual of joint holding under this scheme. The beneficiaries bear the cost of land development, digging up of pits plantation, erection of fencing etc. in the shape of labour. Besides, to improve the rural economy of the common masses diversification of horticulture with the introduction of Floriculture, cultivation of spices, cardamom and black pepper etc. has been introduced. The production trend of cardamom and black pepper is shown in Table: (page No.)

Two varieties of mushroom are grown in the State. They are –

1. European or White button
2. Tropical Oyster or Dhingri. Keeping in view of the nutritive value in diet, the department is trying to popularize this crop (mushroom) by taking demonstration units in different districts of the State. This will generate 10 times more income to growers.

The policy of agricultural extension under the 9th Plan is also marching: -

1. Training to fruit growers for women, youth in farm techniques for production of different crops including storage facilities.
2. Training to extension workers.
3. Refresher course for middle and high officials in and outside of the state.
4. Information and Public Services.
5. Rs.40 lakhs is kept for Floriculture, fair and exhibition under 9th Plan.
6. Publication of pamphlet / book etc.

FRUIT PRESERVATION:

This is an attempt to minimise the post harvest losses which occur due to lack of harvesting technology. Training methods to make juices/ jam and jelly are in the agenda of the 9th Plan, which help the growers. Funds for fruit preservation centre is also under consideration in the 9th Plan.

Existing good quality of fruit growing trees are to be rejuvenated. So it is suggested under the 9th Plan to revitalise the productivity of old orchards.

Pilot project on high value and low volume like amla, kiwi, spices, have been advocated with an allocation of Rs.50.00 lakhs in 9th Plan frame work. Centrally sponsored schemes receive due share in the 9th Plan proposal which are growth oriented schemes.

1. Integrated programme for development of spices.
2. Mushroom cultivation.
3. Commercial floriculture programme.
4. Preparation of package material.
5. Development of betel vine.
6. Rs.363 lakhs go to Centrally Sponsored Schemes.

PROGRESS OF HORTICULTURE: From 1971-1999.

Positive progress of fruits production met set back in 1974-75, 1975-76 and 1977-78 due to many factors with diminishing rate of production with coverage of area. After 1978-79, gradual gain found in area and output till 1998-99. Area under fruit production was 973 hectares in 1970-71, whereas it has gone up to 34817 hectares in 1998-99 with an increase in percentage term 3478%. Similarly, position faster production trend is noticed in those years.

Target proposed under 9th Plan in respect of important fruit, crops and spices.

Sl.No.	Name of the crop	Area in 1997-2002 Area in hectares	Production in M.T.
1.	Apple	8168 Hectare	20300 (MT)
2.	Citrus	11258 Hectare	25900 (MT)
3.	Pine apple	8143 Hectare	39200 (MT)
4.	Banana	3698 Hectare	14700 (MT)
5.	Walnut	3039 Hectare	
6.	Other fruit crops	6034 Hectare	17500 (MT)
7.	Cardamom	1912 Hectare	600 (MT)
8.	Black pepper	579 Hectare	300 (MT)
9.	Other	100 Hectare	10 (MT)

9th plan report (page: 50)

FRUIT CROP AND SPICES UNDER 9TH PLAN:

Highest product progress target is fixed to pineapple, citrus and apple. Due to remoteness of fruit growing areas of the State from market and also due to inadequate communication facilities, emphasis is given for production of spices like cardamom, ginger, turmeric, chilly, black pepper and garlic. Cardamom and black pepper are the new crops given due attention in the 8th and 9th Plan. Horticultural activities in the State help to cover wasteland and to reduce shifting cultivation.

SUGGESTIONS FOR STRUGGLE:

While casting a glance at progress there is tremendous future to make horticulture from transition stage to export-oriented stage.

1. An intensive approach to examine farm structure, availability of irrigation, rainfall soil structure, capital inputs, level of technology are to be clearly quantified. It is lacking in this State. A co- ordinate policy and programme for various departments such as Agricultural Department, Irrigation and Flood Control, Horticulture

Department, Industrial Department and Employment and Training Department.

2. The transportation system in this State comprises few modes such as road way and scope way. There is high-marginal cost in movement of people and commodities. The inadequacy of investment in road and transport create problems to dispose the perishable fruits in times of over production growers will be deprived from gain.

3. Communication technology is most important to spread the message about the contents of horticulture, in this State. This State has to use extensively and intensively the media such as newspaper, radio and T.V. The role of Non-Government Organisation is in a budding stage. Proper focus perhaps, may give way for further progress.

4. 52% of the rural people in the state live below poverty line. Therefore, it is necessary to extent fruit growing schemes to the poor villagers through poverty eradication schemes. Emphasis to women will be a welcoming one for better economic and social change.

   Industrial development is still in the stage of struggle. A proper scope through various inputs and incentives is necessary to make diversified food processing industries in this State.

5. The progress of various financial institutions have set back in the first 5 to 6 years. For instance the total number of commercial banks in the State, continue to show the same number as 98 banks for many years. To finance the fruit growers, cooperative institutions are another road. It needs trained persons to mobilise men and materials at village level by imparting principles of co-operation, organization and management through self-help. It is a best measure to bring more area under horticulture.

6. Fruits of progress can be possible through social change. We have seen many kinds of dualism. There exist attitudinal dualism were some sections of the people seem still tight with the old ones and values, ready to oppose any effort towards change on one hand and few section of people are unable to learn new technology (N. Sharma & S.P.Shukla- page.116). Dualism in the use of tools, technology and system of cultivation continue to dominate in the economy. So real progress is possible through acts of accommodation of people and physical environment in the context of changing development and technology.

Area and Production of Cardamom and Black Pepper from 1992 – 93 to 1998 – 99 in Arunachal Pradesh.

Year	Cardamon		Black Pepper	
	Areas in Hectares	Production in (MT)	Areas in Hectares	Production in (MT)
1992 - 93	223	8	42	9
1993 - 94	600	200	120	50
1994 - 95	600	50	120	20
1995 - 96	898	322	315	125
1996 - 97	1312	445	363	215
1997 - 98	1494	450	663	215
1998 - 99	1891	472	505	226

Source: Data are collected from
Economic Review of
Arunachal Pradesh 1994 – 95.
1997 and 1999.

Trend of coverage in area and production of Horticulture from 1970 – 71 to 1998 – 99 in Arunachal Pradesh.

Year	Area under horticulture in hectare	Production in MT	Year	Area brought under horticulture in hectare	Production in MT
1970 - 71	973	2787	1986 - 87	10045	23529
1971 - 72	1220	3041	1987 - 88	40593	25162
1972 - 73	1334	2887	1988 - 89	12165	29025
1973 - 74	3106	5949	1990 - 91	18438	41395
1974 - 75	1680	4212	1991 - 92	21262	47430
1975 - 76	2042	4290	1992 - 93	22340	49257
1976 - 77	1797	5103	1993 - 94	24445	50550
1997 - 78	2613	6006	1994 - 95	28563	58864
1978 - 79	3870	5161	1995 - 96	30701	67617
1979 - 80	3436	8821	1996 - 97	32032	85260
1980 - 81	5013	4199	1997 - 98	33460	89813
1981 - 82	6094	6033	1998 - 99	34817	93582
1982 - 83	6985	10236			
1983 - 84	7544	11377			
1984 - 85	9620	14703			
1985 - 86		22335			

Source: Data are collected from Statistical tables. From Directorate of Economics & Statistical, Govt. of A.P.

Progress of People Horticulture Garden from 1973 – 74 to 1993 – 94 in Arunachal Pradesh.

Year	No. Of Horticulture garden
1973 - 74	168
1979 - 80	689
1980 - 85	1010
1985 - 90	10990
1991 - 92	12000
1992 - 93	12000
1993 - 94	12400

N.B. The Progress of people horticulture garden was slow from 1973 – 74, to 1985 face of progress is seen only after 1985.

(Data are collected from Statistical Table of Government of Arunachal Pradesh)

REFERENCE:

1. Systematic Agricultural Geography, Majit Hussain, Rana publishing House, New Delhi.

2. A Philosophy for NEFA (Page 88), Verrier Elwin, Directorate of Research, Govt. of Arunachal Pradesh.

3. Economic Development of Arunachal Pradesh since Independence (Page 80 and 81), R.Arumugam, Narayani Printers, Chennai.

4. Annual Plan 96 – 97 Government of Arunachal Pradesh (Page – 36), Planning and Development Department, Govt. of Arunachal Pradesh.

5. Ninth five year Plan 1997 – 2002 and Annual Plan 1997 – 98 (Page 42 to 44), Planning and Development Department, Govt. of Arunachal Pradesh.

6. Geography and Development of Hill Areas (Page 116), N.Sharma, S.P.Shukla, Mettap Publication, New Delhi.

7. Statistical Abstracts of old years in collection of Data, Directorate of Economics and Statistics, Govt. of Arunachal Pradesh.

RUBBER PLANTATION IN GOALPARA DISTRICT OF ASSAM

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Natural Rubber is perhaps the most versatile industrial raw material of plant origin. It has revolutioned the man' life to such an extent that now we cannot think of the world without rubber. From simple eraser to aircraft tyre, the basic raw material of over 35,000 product is rubber.

Heave brasiliensis, a forest tree that is indigenous to the tropical rain forest of Central and South America, is the only major commercial source of Natural Rubber (NR). The trees evolved in this environment have developed a preference for warm, humid weather (*Pothamus*, 1962; Opeke, 1982). It is one of the most recently domesticated crop species in the world. The modern age of NR actually started during the 1870s when the British successfully transported Heave seeds from Brazil for planting in the then British India (Thomas and Panikkar, 2000). Before that rubber became popular in Europe in the 16th century. *Christopher Columbus*, reportedly had taken a few rubber ball on his return from West Indies to illustrate one of the 'wonders' of the' New World' (Schurer, 1956). By the mid 1830, there was a flourishing rubber manufacturing industry in Britain and North America, but all the products ranging from domestic and sport articles to surgical, mechanical and engineering goods were made of unvulcanised rubber. Charles Goodyear developed the process of vulcanisation in early 1840s by heating rubber with sulphur at high temperature. Vulcanisation of rubber removed most of its susceptibilities to climatic conditions and its limitations as a raw material for mechanical applications.

During the 1850s, most of the rubber for the world rubber industry came from the wild forest of Central and South America, India, Africa, Madagascar etc. However, later with the rapid growth of demand, the colonial powers initiated a scheme for introducing rubber as a wonderful plantation agricultural crop in the South East Asia. At present South East Asian countries dominate the world NR production. *Thailand, Indonesia, Malaysia, India and China are the top five NR producer countries of the world.* Today India is the fourth highest producer of rubber in the world having 554000 ha.under rubber with a total production of 605045 tonnes. Smallholdings comprise 87 p.c. of total area under rubber whereas large estates comprise the rest. In terms of productivity, 1999 *national average of 1563 kg per ha. per year is the highest among major rubber producing countries*. During the Second World War, due to shortage of NR supply, many varieties of Synthetic Rubber (SR) were developed. Since the global production of SR has been increasing and at present the ratio between SR and NR production is 60:40. The greatest advantage of SR is that SR of different specification can be produced from a factory. But India is lagging behind in its production and in1997, SR production in India was just 10 p.c, of the total.

The growth of the Indian rubber plantation industry has been mainly through the expansion of rubber cultivation in Kerela. The geographical and agro-climatic suitability proved congenial for rubber cultivation in Kerela (Thomas and Panikkar, 2000). With the beginning of commercial planting during 1870s, the Indian rubber plantation industry did not look back. Though many new areas were brought into plantation, the development of the industry mostly confined to the present Kerela state. In1946, total area under rubber was about 64,090 hectares. After independence, rubber plantation industry in India showed dynamic growth due to many favourable factors. The most notable was the Government support initiated through the Rubber Board in the form of incentives, research and institutional support for cultivation, processing and marketing (Thomas and Panikkar, 2000). In the post-independence India, the demand for Natural Rubber increased substantially. However, the scope of area expansion in the traditional region was limited. Therefore, Rubber Board after extensive exploratory surveys introduced rubber in many non- traditional areas. The crop is now successfully cultivated in Tripura, Assam, Mizoram, Meghalaya and Arunachal Pradesh in the North Eastern Region; Maharashtra and Goa in Western region; West Bengal, Orissa, Madhya Pradesh and Andhra Pradesh in the Eastern region. One important point to be noted is that *long before this introduction, indigenous rubber yielding*

trees known as 'Assam Rubber' were tapped on a commercial scale in Assam. The recorded average annual production from Assam rubber during 1882 to 1887 was 207 tonnes (Schurer, 1956).

At present Assam ranks second in the North East in terms of area and production of rubber. The following table *will highlight the statistics* relating to NR farming in the North East India.

Rubber plantation in North East India
(1998-99)

State	Area under rubber (ha.)	Production (tones)
Tripura	24120	8588
Assam	10805	1785
Meghalaya	3958	1424
Nagaland	1416	167
Manipur	1401	136
Mizoram	671	59
Arunachal Pradesh	161	24
Total	**42532**	**12183**

Source: Rubber and its cultivation, Rubber Board, 2000

Goalpara district of Assam is located in the western part adjacent to the Garo Hills of the State of Meghalaya. The district consists of both hilly areas and plains. Garo and Rabha tribals mostly lived in the hillocks of the district. They are engaged in shifting cultivation along with other traditional forms of cultivation. Rubber plantation, which was first started in the district in 1986, is quickly gaining ground there. The present paper is based on an explanatory investigation of the status of rubber plantation in the district.

OBJECTIVES OF THE STUDY:

The study was undertaken keeping the following objectives in mind.

1. Find out the number of holdings in the district and the total area under its cultivation.
2. Find out the number of skilled and unskilled workers engaged in Rubber plantation in the Goalpara district.
3. Collecting informations about ownership of holdings.
4. Finding informations about types of land used in the Rubber Plantation.
5. Studying the role and activities of Government agencies in promoting rubber plantation.
6. Knowing the productivity (per hectare) of the holdings in the districts.
7. Studying pricing and marketing channels of the rubber sheets produced in the district.
8. Studying the role of Rubber Board is promotion of this plantation industry in the district.
9. Studying the prospects of using rubber plantation as an afforestation drive.
10. Find the used of rubber wood.

DESCRIPTION OF THE FINDINGS OF THE STUDY:

The hillocks of the district are inhabited by the tribals. Earlier as the population was low the pressure on the hill areas due to shifting cultivation was not such felt. But as the demand for food increased with the increased in population and also due to large scale cutting of trees for timber in recent times has resulted tremendous deforestation both in the plains and foothills of the district. Shifting cultivation and selling of woods were the two main source of livelihood of the hill people until recently. Since1986, when rubber plantation was first started in the district at the initiative of the Rubber Board the people are becoming increasingly interested in taking up this plantation crop as an alternative source of earning revenue. Gradually its plantation spread over to the plains as well as it was found during survey that 25 percent of the holdings in the districts are situated in the plains. At present there are about 3000 holdings of rubber plantation in the Goalpara district. Till the year 2000, about 1200 hectares of land were brought under this plantation crop. Out of these tapping or extracting latex has started in about 6000 hectares of plantation. The ownership of the holdings are mostly private, though some holdings are also owned by the co-operative societies. There is one slightly bigger holdings in the district at Darangirri, which is owned by the Rubber Board. The holdings in the district are mostly small. Average size of the holdings is 0.38 hectare.

Rubber plantation in the district is done mostly on the deforested land, which are either previously engaged in shifting cultivation or cleared for its timber. Some fallow and private lands were also used in this plantation. During the survey, it was revealed that 400-500 trees are planted in an area of one hectare. The survival rate of the trees is very high. It was found that more than 90 percent of the trees survive. It takes 5 to 6 years for a rubber tree to become mature. The Rubber Board provides the trees at a highly subsidised rate. Rubber Board owns a nursery at Darangirri in the district. *Clonal trees are provided because they are considered more productive than the seedling trees.* The Rubber Board also provide subsidy at Rs. 16,000/- per hectare in six installments during the first six years of plantation. The extraction of rubber start from the six year. According to the Rubber Board's statistics the average productivity of natural rubber produced in Goalpara district is higher than the All India average. In the year 1998-99, against the All India average of 1563 kg per hectare, the average yield in three of their sample holdings in Goalpara district was found to be 1800 kg per hectare. This fact may be considered very significant as far as promotional drive of this plantation is concerned.

Rubber plantation is creating opportunities for engaging rural youths of this *employment starved district.* Rubber Board is actively encouraging the rural educated youths to start rubber plantation. According to the norms of the Rubber Board, one skilled labour and two unskilled labourers are needed in a holding of one hectare. However, as the holdings in the district are mostly of smaller size, the number of people engaged is more than what is required according to official norms. Out of these, about 1000 are skilled, 500 semi skilled and about 3000 are unskilled. The labourers do the work of extracting the latex from the trees, cleaning, processing and making of sheets. With many newly started rubber plantations and many more prospective planters in the district, it is likely to be one of the most employment provider in the near future.

Latex from the trees is collected during the tapping season from April to Dec/Jan. After collecting latex, rubber sheets are made in the processing houses. For catering to 20 hectares of rubber plantation, one standard processing house of size 10' x 14' is required. Rubber sheets are the materials used by the industries to produce various commodities. There are five main varieties of rubber sheets RSS (Ribbed Skewed Sheets)-1,2,3,4 and ungraded. RSS-4 is the best quality of rubber sheets. However, this gradation system is yet to be introduced in the Goalpara district. Therefore, the growers of the district have to sell all their produced as ungraded, which attracts the lowest price. Selling of the rubber sheets is done through dealers. There are a few registered dealers in the district. They collect the sheets from the growers and sell them to the traders either to Guwahati or send them outside the State. The price of rubber sheets is fixed internationally. During 1995 and 1996, the price of RSS-4 variety peaked to about Rs. 50/- per kg in India. At that time price of RSS-3 variety was almost same at London and Kualalumpur. In India the price variation between the varieties is usually Rs 1/- to 1.50/-The rubber sheets produces in Goalpara district, which are sold as ungraded, attracted the peak price of Rs. 46/- per kg in 1996. Thereafter, the price steadily declined all over the world and the present price of the ungraded variety is about Rs. 32/- per kg. Though there is not much variation between prices prevailing in the Kottayam market in Assam, the difference between market price and what the dealers

pay to the growers is about Rs.1.50/- per kg.

Rubber plantation is making a steady progress in the district over the years. Besides providing gainful employment to many, it is also checking environmental degradation. As has been earlier, there are large tracts of deforested land in the district due to *timber cutting and shifting cultivation*. NR farming is as good as afforestation drive as it is effective in checking shifting cultivation. What is needed more is further co-operation between Forest and Soil Conservation Departments of State. The deforested lands that are still under forest department can be given on long lease to the prospective planters to grow rubber trees. Though rubber is mostly grown as monoculture, as the holdings in the district are small, it does not lack biodiversity. In the State of Kerela, it is common for the small-scale planters to maintain a limited number of coconut, areca nut, jackfruits etc. in the rubber plantation. In the Goalpara district this practice is not yet started. Natural Rubber enjoys excellent environmental image and rubber plantation is unique in many respects. Low intensity agriculture practised in rubber plantation has helped to sustain long-term productivity of the soil and maintain an economically viable source of income for the planters in the rubber growing countries [James Jacob, 2000]. Latex from the rubber tree can be cut and chemical treatment costing very little can convert them into hard wood. Such rubber wood can be used for all purposes.

REFERENCES:

Jacob, James, 2000 - Rubber tree, man and environment. In: -Natural Rubber, Agro management and Crop Processing RRII, Eds: -P.J. George and C. Kuruvilla Jacob, pp-599-608.

Narayanan, Nair, P.N., 2000 - Rubber and its Cultivation, The Rubber Board.

Opeke, L. (1982) - Tropical Tree Crops, John Wiley and Sons, New York, pp-215- 241.

Polhamus, L.G. (1962) - Rubber- Botony, Production and Utilization, Interscience Publisher. Inc., New York, 449 p.

Schurer, H. (1956) - The discovery of the rubber tree: Achievements of the 18th Century exploration in America, Africa and Asia. Rubber Journal, 130.

Thomas, K.K. and A.O.N., 2000 - Indian Rubber Plantation Industry: Genesis and Development. Panikkar, In: Natural Rubber, Agro management and crop processing,

RRII. Eds. - P.J. George and C. Kuruvilla Jacob, pp-1-17

HORTICULTURAL AND PLANTATION CROPS IN MEGHALAYA

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ABSTRACT:

Agriculture constitutes the core sector where 80. 37 percent of the population resides in the rural areas. The provisional census figure 2001 shows that out of the total population of 22. 91 lakh, agriculture occupied 22. 30 percent, agricultural labour 5. 04 percent, marginal workers 2. 35 percent, other workers 12. 82 percent and non-workers 57. 33 percent. The contribution of the work force to the State gross domestic product has shown a considerable decline even against the character of its rich diverse state of agriculture which suits with the characters of both tropical and temperate climates. The rural sector provides a predominant and variegated base of food production and production of other essential commodities which are vital to our existence. The state has to go ahead in combating food shortages and developing other suitable agro-base industries which should yield increasing returns.

The State's total production of foodgrains and other essential items do not look to be proportionate with the increasing rate of population. Moreover, nothing has ben done towards installing modern food processing industries although the State posseses the necessary requisites towards that direction. The State still depends heavily on imports in respect of foodstuffs and other essential commodities. Hence, the work force has to be enhanced in agriculture and allied undertakings to raise the level of production.

Constraints to an enhanced crop production have been caused by the restricted trade with Bangladesh, absence of communications with the accessible part of terrain, absence of irrigation facilities at dry places, extent of rural indebtedness, high transport charges, unstable prices offered to farmers etc. With the setting up of The Mawiong Wholesale Regulated Market in 1998, it is hoped that it will lead towards accelerating the rate of productivity of crops, provide a better means of regulating trade transactions, offer scope for developing suitable grades of food processing and fruit preservation units and provide effective protection to crops under cultivation against assaults of insects and several rigours caused by uncertain climatic conditions.

The rural population in view of its large numbers has to be provided with resources sufficiently to promote agriculture linked up activities and extension of a variegated pattern of farming in which improvement of efficiency of small and large farm management is extremely necessary.Of course, in respect of individual holdings, fragmentations in the sizes of land are unavoidable as affected by the issue of succession and inheritance. Lands held jointly may also pose problems to improving the standard of maintenance and operation.

The continuous mining operations in the state have brought about deforestation on a large scale, soil erosion and loss of organic fertility. Therefore, the process of land reclamation for the purpose of a settled agriculture and procuring the proportionate output of the soil's produce should continue over a period of time. Havocs caused by floods and disruptions of communication which have taken place seasonally, have further affected partially the raising of a minimal level of output causing such farmers at places to remain impoverished continually.

Here we seek to inculcate that agriculture in its overall domain extends also to pasturage, sericulture, pisciculture and craftsmanship. Waste of pasturages and livestock generally domesticated, yield the highest grades of natural manure which help considerably to increase the yields of the soil. Natural manure used separately or side by side with chemicals are resorted to, to fertilise the soil. Natural manures help to quicken the increased yields of the soil, agriculture integrated with pasturage has urged upon us to intensify the use of livestock, partially to provide manure, and partially to cater to the increasing demand of meats at markets and to lay down a necessary infrastructure for boosting dairying. Our State falls short and can hardly yield even half of the size of daily requirements of meat, milk, eggs and their by-products.

The local sericultural farms have also been coping with production cocoons graded as tassar, muga, eri and silk but hardly with a highly adequate weaving and textile infrastructure. Soil conservation under the heading of jhum control and watershed development programmes have secured innovations conducted scientifically in linking up agriculture with vital sectors therby, reducing constraints to soil erosions. Water conservation, irrigation management and development of cash/horticultural crops have yielded more concrete results in increasing the number of crops undertaken recently based on soils suited to germination and growth.

Farming as much as its condensed meaning bears, implies a highly conventional or organized system of cultivation or pasturage possessing the necessary assets in the shape of equipments, expertise and other things in a regularly acquired tract of land held either in perpetual possession or a lease system. Farming has its more comprehensive significance because it includes a host of activities in pasturage, sericulture, pisiculture and weaving. Agriculture, basically and intrinsically, is allied with the similar system of farming. Horticulture means the application of the highly developed arts and techniques of agriculture and seems to infer a specialized pattern to carry out the more sensitive kinds of operation for improvement in the field of agriculture.

Because of the obvious reasons, I believe that this conference has been organized with the view to assess some of the conspicuous drawbacks and at the same time offer some remedial measures towards – a) accelerating the rate of productivity of major and minor crops in the variegated field of agriculture, b) to find out better means of regulating trade transactions and motivate the farmers to increase the margins of profits, especially those placed at remote places constrained with several rigours and sometimes the uncertain weather and inferior soil conditions and against the difficult means of communications to afford them, therefore, all the possible protection against undue exploitations and harassments, c) to explore or otherwise offer scope to develop the more suitable pattern of agro-based factories viz. food processing and fruit preservation, dairying, craft items, handloom weaving, textile works, canning and other allied activities and ensuring proportionate and viable returns in these items, d) to ensure the more scientific preservation of easily perishable items and preventing farmers from disposing them at thrown-away or very insecure prices, which are suicidal to the constant labours and exertions, put by the farmers into the soil and e) provide effective protection to the crops under cultivation against the assaults of pests and insects and several rigours caused by the uneven character of climate and soil conditions, disruption of communications and other adverse effects.

According to the provisional census report 2001, the total population of the state is 23, 06, 069 in the proportion of 18,53,457 and 4,52,612 comprising the rural and urban sectors respectively. The sex ratio stands at 972 in the rural areas as against 975 in the general list. The number of towns has increase from 12 to16 in 2001.

The State is passing through a heavy process of transition in which a few vital points furnished below are so essential for us to bear:

1. The growth of townships other than the earliest district headquarters, viz. Tura and Jowai besides the State headquarter has not been sustained proportionately. This is because indications are faint on any conspicuous growth of commercial centers properly upgraded and availing the modern facilities in a right perspective: a few towns have served as the viable roadside stations.

2. Agriculture is still the principal and pre-dominant sector. Agriculture has still its distinct place in comparing with other activities conducted in villages which may consist of quarrying and mining, cattle rearing, carpentry, craftsmanship, construction and other trades. There are other activities of a minor tertiary character which have arisen.

3. Urbanization recently has worked out to 62 per cent in the State, but the heaviest concentration has shifted to Shillong, the State headquarter, and in smaller proportions to other district headquarters and centers, which may or may not have sufficient scope to intensify the variegated activities, unless a sufficient infrastructure is created for carrying out the further fresh and feasible projects.

4. In spite of the heavy rate of urbanization, it is a paradox that agricultural production during the period 1995-96 to 2000-2001 has shown gradually increasing trends in terms of several items of produce- both traditional and modern.

The 2001 provisional Census figure, showed the proportion of the following grades of population against the total population numbering 23.06,069 lakh persons –

a) Cultivators	.....	22.30 per cent
b) Agricultural labourers	.....	5.04 per cent
c) Household industry	.....	0.16 per cent
d) Other workers	.....	12.82 per cent
e) Marginal workers	.....	2.35 per cent
f) Non-workers	.....	57.33 per cent

5. The provisional Census figure of 2001 gives a break up of the polulation in the ratio of 80.37 rural and 19.63 urban provides the following indications –

a) that the rural sector should provide resources to promote agriculture linked up activities and extension of a variegated pattern of farming, b) that more community mindedness be boosted among the backward villagers especially in inculcating the principles of self-reliance c) that intensive farming is unavoidable in view of the frequent fragmentations of land caused by the law of succession and inheritance in respect of tiny land holdings.

Non-workers in whatever census return appear to have occupied a largest proportion of total population. Household industry looks also to be merge while the number of marginal workers form an almost insignificant segment of population. Non-workers at many instances seems to include house keepers, students and children and have the least or nothing to contribute to productivity.

A review on the traditional pattern of agriculture is indispensable in which the proper nomenclatures have been briefly provided below –

Rep sung and Rep hali – which infer a wet-rice cultivation concentrated in extensive valleys, narrow basins and short terraced grounds being confined also on bases of shorter hills and stretching out into flat level lands near about: Rep Pynthor – this refer to wet-rice cultivation confined in lower grounds distinct from larger valleys: Thang-ram or Shyrti Khlaw – is a heavy shift-and-burn system of cultivation or jhum pattern: Rep Syllai – provides a system of extraction of light herbage for procuring a kind of manure: Rep Lyngkha – this is a more crude form of cultivation which is applied regularly or irregularly: Rep Bri – this is a cultivation, regular in character which distinctly applied to orchards and spice cultivation of various kinds confined to the southern border: Rep Kper – is a homestead gardening: Rep Rnem – this is a pattern which usually involves a heavy system of digging and hoeing.

In a historical perspective, the Garos mostly practise shifting cultivation till the attainment of statehood in 1972. Jhum cycle normally intervened between six and nine years, depending on local soil conditions. As among the Khasis and Jaintias jhum is more confined to ridges: it is a rotative system of cultivation in which the soil accommodates operations for two to three years only. It involves a heavy jungle felling which causes top-soil erosions easily and extinction of some organic power of the soil including its other most valued ingredients. Yet, although experts suggest that it is highly disadvantageous since it exhausts quickly the fertility of the soil, the local farmers admit that it is the only applicable system in the undulating terrain, and they have no other to sustain their way of living although they are more impoverished. Among the Garos, paddy, maize and millet are the main crops although admixed with tapioca, gourds, arum plant, dioscorea, onion, leaf mustard, garlic, brinjals, sweet potato etc. Cotton plantation intervenes at the latter months. Harvests, therefore, intervene between July and February. The first broadcast of seed is done more out rightly after the jhum are fired. Second broadcast is done more neatly in dibbling the seeds into apertures prepared.

The earlier report indicates that the little valley between the hills are very carefully cultivated and yield the richest crops of planted rice, the hill tracts when cleared are cropped with cotton, rice, chillies and yams which give the most abundant returns. A.J. Mills reported further that " the Garos are an energetic, industrious people, the forest producing timber of all kinds many of them valuable and supplying bamboos, grass and fuel to the districts round" (Report on the Province of Assam, reprint 1980). Playfair reported that " cotton is sold at every twenty markets" situated all along the border, and at Tura. During the cold winter months, it is sold unginned, but in March and April " the cleaned article is brought to market." (Monograph, the Garos first printed in 1909). Playfair was thinking that the annual outturn was 60,000 maunds in which unginned cotton was sold at Rs. 7 per maund minimum and that of ginned cotton as high as Rs. 27 per maunds. " The greatest part of the crop is exported to Germany." Again, the 'sale of lac is also a source of considerable profit' to the Garos, in which total output of lac exported in 1904-05, was estimated roughly at 6,986 maunds.

Garo markets in the hills and along the border held weekly, performed the transactions in which cotton, ginger, chilies etc. were bartered with cows, fowl, rice and dried fish. In 1942 Jobang D. Marak legislator in the Assam Legistative Assembly pointed out that thousands of maunds of cotton collected at Tura, Baghmara, Garobadha, Dainadubi, Romenagar, Bajengdoba had required the services of the ginning machineries to facilitate better returns of profits and also to avert exploitation upon the local farmers by Malwaris. He also pinpointed the potentialities existing in Garo Hills for muga and endi rearing; he pressed further upon availing better means of communications for the transport of bamboos lying unmoved in a huge magnitude. He implored upon withdrawing the restrictions usually imposed by Akhings or Nokmas against the extension of paddy cultivation in the valleys by enterprising farmers in which these constraints had affected the economy to a large extent. Benjamin Chandra Momin M.L.A. insisted on the completion of road constructions such as part of Bajengdoba road, Garobadha-Halli-Laleyganj and Mukhdnagra-Rajabala roads and also building two bridges along the Tura-Mankachar road and renovations of Tura-Phulbari, Tura-Damra roads.Garo Hills appeared even in 1970 to offer bright prospects for the development of plantation crops, fruits and vegetables.

Agriculture in the rest of the State is marked by its variety, 'Rep Shyrti" and 'Rep bun' in fact accommodate the admixed cultivation of varied crops grown mostly in rotation and which pertain to the different seasons in a crop calendar. The different soil and climatic conditions have made shift-and-burn systems still more varied. In fact some crops have two or three seasons in a year. Homestead gardens should be treated of separately because they provide the regular feature of a small-scale cultivation. Jhum mostly implies a suitable single crop grown in a field replaced in the next year by another crop or a combination of a few akin crops in both cases. Rep bun constitutes a shifting system although in its more modified mode. 'Rep syllai' is a dry system of potato and sometimes maize cultivation. 'Bun system' in general accommodates a host of items, viz. potato, ginger, maize, soya beans, cucumber, melon, chillies, radish, turnips, cabbage, cauliflower, sesamun, gourds and others. Buns normally hold cultivation for three years, and the bun cycle thereafter works to eight or even ten years.

The system widely differs between temperate and sub-tropical zones marking a difference in altitudes. Buns offer a marked contrast because somewhere, spring time paddy thrives in them, whereas elsewhere winter paddy stays mostly. With regard to shyrti or thang ram , on the north they plant the paddy at the first year replaced by kachu at the following year, and in the next year they replaced it by errandi seeds. Potato is the main produce during the summer although phan tlang or winter potato is known to prevail. Rice, a basic cereal, represents a hill variety which grain pertains both to swamp and dry rice cultivation which thrive at the central plateau and extending to the foothills adjoining the plain. Imported seed, besides the indigenous, have been adopted more widely.

Tapioca species are represented by phan khlaw, phan shynreh, phan mluh and phan dieng. Yam and kachu appear to contain a large portion of starch and herbaceous ingredients. A tuber soh phlang and soh liang appear to represent a gymnospermous specie. Job's tears is a kind of coix-lachrymai. Finger millet, fox tail and Italian millet till the last century was more abundant. Typical beans are rymbai ktung and rymbai ja which looks like soya beans.

Output of turmeric from Jaintia Hills is also considerable. Ginger has two grades- ing makhir and ing bah. Long pepper and bay leaf (tez pata) are the important sub-tropical products. Onion and garlic are mostly confined to homestead gardens. Vegetables of market value, apart from those mentioned, are squash, khol-khol, egg-plant, tomato, freash beans, flat beans, lettuce, lady's finger, carrot, beats, kerela, capsicum and others, besides a host of wild herbages.

Limes and lemons is a variety composed of myngngor (pommel), soh jew, myndong, niang riand, soh khyllung, soh bah, soh long and soh mad

. Citrus mainly are soh brab (perhaps passion fruit), pears, papaya, pyrus khasiana, pyrus begeta (soh shur), litchi, local cherries and berries, guava and others. Output of jack fruit seems to be quite considerable.

Temperate fruits are sohphoh klong, grapes, peaches, plums, apricot etc. which thrive well in and around Shillong. Garo Hills are known for banana plantation. There are grapes of plantain which include dwarf cabandish, cheni champa (kait syiem, Jo-ji, kait jrong) and others. They are also important items of produce. Plantation crops that are of considerable importance are areca-nut and betel-vine. It has been extremely difficult to compress all the details for want of time and space.

Groups of agricultural commodities pertaining to summer and autumn seasons are shown in a table below which have been serialized by the Department concerned, this is for fixing prices of such commodities in market –

a) Vegetables – tomato, carrot, cabbage, cauliflower, turnip, radish, fresh beans, beet, root, capsicum, brinjal, pumpkin, cucumber, bottle gourd and squash.
b) Spices and condiments – ginger, garlic, turmeric, chillies – green and powder, black pepper and onion.
c) Oil seeds, sesamun and soya beans.
d) Roots and tuber crops, potato – special, large and small.
e) Pulses – peas, grams, rajma.
f) Fruits – temperate – lagoon, Himalaya cherry, peaches, plums, cabandish, napsti (pear); tropical lemon, pineapple, jack fruit, guava, cabandish, chini champa, pine-apple.
g) Plantation crops – areca-nut and betel-vine.

Bulk of the above except rajma form the parcel of the local produce at Shillong. We cannot confine ourselves to traditional crops only. We have to take note of non-traditional items which are of considerable importance.

The variegated crop production does not look to be proportionate with an increasing rate of population. The State still depends heavily on imports from outside in respect of essential commodities such as salt, sugar, vanaspati etc. some of which are transacted through public distribution system and others through several private concerns. The State export a host of items like fruits, vegetables, spices, fibres, and plantation crops, yet, cross trade on double traffic lines seem still to be unavoidable.

In public distribution, over 483 thousand tonnes of foodgrains were indented by the Union Government in 1992-93 along with an excess off take of 495 thousand tonnes on subsidy burden by the State amounting to Rs. 24.75 crores for 978 tonnes of that commodity.

In 1998-99, total quantum of rice produced by the State is 1.50 lakh tonnes. Total quantum of foodgrains was 1.87, maize 0.25, cotton 0.5, ginger 0.46, rapeseed and mustard 0.4, potato 2.01 and citrus fruits 0.7 lakh tonnes.

Total output for the year 1997-98 were meesta 21,558, sweet potato 16,978, maize 24,854, tapioca 2,10,78, wheat 6,894, total oil-seeds 5,167, banana 6,30,11, dry chillies 1,108, total cereals 18,40,86, papaya 3,980, sesamun 686, areca-nut 12,071, total pulses 2,467, jute 34,683, other cereals 2,237, turm 6,367, soya beans 804, pineapple 80,404, sugarcane 225, castor 16 and tobacco 505 tonnes. Total cropped area has then exceeded to 2.15 lakh hectares: net sown area and area sown more than once were shown at 0.44 and 2.59 lakh hectares respectively (W.L.Lyngdoh,

Pocket Statistical Handbook, Economics and Statistics, 1998).

The following few points are of obvious importance –

Advanced treatment of mushrooms should be scientifically processed into spawns with button and oyster grades therby raising its quality in market transactions.

Turmeric if it possesses six per cent of rich curcumin can have considerable scope for circulation.

Potato produced in the State if it accounts for the highest yield per hectare in India should have scope for more formidable entries into trade transaction and in which potato preservation should have its large role to engage a large number of persons.

As regards maize, apart from the indigenous grade, a project if implemented for the development of citrus fruits including papaya and pine-apple in particular and root crops such as sweet potato and tapioca can considerably help to solve the unemployment problem to a certain extend. This would require a more effective attention of the experts and in the long run can sustain the principles of self-reliance to a greater extent.

Some selected Garo soils are known to yield some high grade of wheat, paddy and some horticultural crops. We may also include other items such as meesta, rapeseeds, oil seeds, jute, broomsticks and others.

MECOFED for the last few years, has supplied some items of minor forest and agricultural produce which mainly include meesta, jute, cotton, agro-products and other minor products. But during recent years, it has to depend heavily on the subsidized assistance of the Government which means that it has not succeeded constantly to deliver the goods with confidence.

Mawiong wholesale regulated market which has started in 1998, possesses 22 traders' stores and 20 retail outlets are expected to be added.Besides, a more scientific system of preservation through cold storage. have been proposed for installation.

Crops allotted to the Commercial Crops' Development Board appear to include cotton, rubber, black pepper, coffee, tea, turmeric, betel leaf and areca nuts. We have come to know that cashew-nut plantations have shown very encouraging results.

Soil Conservation Schemes have been carried out stage by stage under three headings – Jhum Control, Watershed Development Programme and Soil Conservation Schemes in general. Under each category again are included terracing to reclamation, afforestation, water conservation and distribution works, cash/horticultural crops' development, and erosion control works are also conducted under Soil Conservation Schemes and Watershed Development Programme.

Till 1999 there are three experimental centers viz. Thebronggiri, Riangdo and Umsning which facilitated supply of green tea. The only tea factory which was started more recently is Nalari located at Mawsyntai.

Cultivation (in view of 80 per cent of population residing at villages) should have scope for further expansion on more active scale with regard to both traditional and scientific farming. The variegated system has considerably become linked up with similar programme conducted by soil conservation and similar sister establishments in which the on-going forest plantations and afforestation schemes are conducted. Agricultural activities have their wide range. In a seminar held by Bri Hynniew Trep movement on June 28,1997, I have pointed out that enhancement of agricultural activities leads to the enhancement of traditional blacksmithy products (mohkhiew, side, wait) used as traditional implements and several baskets, tray etc. (kriah, shang, polo etc.) as recipients and storages of crops produced. The seminar opines that agricultural produce in terms of scientific management and preservation including sauces, spices

– powder etc. remains still to be considerably focused. Increased production of cabbage, tomato, mushrooms, arums and others should give an increased weightage to farming in a variety in such soil in which they thrives best, and in the development of tea pat, spices, horticultural plants (areca nut and betel vine) and sub-tropical variety, besides which farming (in whatever respect – rotatory , intensive, extensive) needs constant treatment to enhance the quantum of output and effectively protect the plants against pests. Rubber and cashew-nut plantations should also receive further impetus. The allied system of sericulture, pisiculture, cattle, poultry and piggery farming, craftsmanship, flori-culture and bamboo plantations are intimately connected with agriculture. Some of these by virtue of natural inclination are connected with the processes of aromatic, pharmaceutical and a host of other manufactures, although agriculture in its overall domain is still traditionally oriented.

The Meghalaya Parliamentary Forum in September, 1999 among other things, have opined to aim at food self-sufficiency through an increased agricultural, horticultural, piscicultural, animal husbandry and plantation crop production and are bent upon promoting large scale production through an intensified sericulture. In June last year a consensus of opinion was framed, which among other things, evoked new aspirations to utilize the maximum resources for implementation of development programmes: to streamline the Public Distribution System and enhance agricultural production, to enrich the traditional sector of weaving under the coverage of sericulture, to provide potable drinking water and protect the environment under a joint forest management. I have also opined that economic upliftment programmes can be taken at hand with the issue of environmental preservation.

A thorough review indicates the following points which are of revalence to the Conference –

Lands held on kinship or community basis pose obstacles to the system of individual ownership which is crucial in context of a changing scenario. In other parts of the State, dwindling sizes of land holdings are frequently occurring affected by succession and inheritance issues. Fragmentation of lands, generation to generation, however, cannot be avoided. Land fragmentation therefore,poses a problem to cater to growing population. Rural sector is the dominant production base and the main stay of agriculture, food production and other jobs or grades of activity. Hence, "to tackle the problem is to improve the efficiency of small farm management." (W. Laso published in "Khasi Cultural Society Souvenir & Conspectus 1988" Journal 3rd series).

Some of the retrogressive factors which have mainly led to the disappearance of agricultural tracts are intrusions caused by heavy quarrying and mining of limestone and coal. Heavy soil erosions and deforestation have stayed after the effect of heavy mining and practices of shifting cultivation which have occurred and recurred through the ages.

Owing to the cloud of social ignorance and non-acceptance of improved variety and techniques diminishing returns from the land has constantly prevail. Rich outturns of the soil have been sabotaged, in spite of the fact that National Watershed Development project has been implemented over eight micro-sheds spread out over 4,000 hectares of land. The deleterious factors have been affected, since the period of jhum cycle has greatly been reduced from 3 to 5 years in western and 1 to 3 years in eastern Meghalaya respectively. Flaws in inheritance and land tenure have constrained the running of a few prospective agro-based factories. Facilities for extending irrigation into the drier catchment areas are very poor. Occurrences of floods and other severe natural ravages have also led to the stagnation of farming for some time and have brought about heavy reverses upon the continuous productive pattern.

A lot of educational propaganda is constantly required in respect of saturated seed treatment, soil testing laboratory, integrated pest eradication management, grading of manures such as green and organic types, rock phosphate etc. which are mostly encompassed within the policy of the Directorate concerned. Assets for availing the services of fruit and agricultural research stations more effectively still remains to be created.

The types of irrigation which should be suitable are conveyance of water through flow irrigation, drips and sprinkle which require services of pump-sets and showers and digging deep tube wells. I have opined that the matter

of using fertilizers and chemicals in lieu of natural manure should be properly assessed, so that this process should not lead to destruction flora and fauna and acquatic life. The matter of procuring any suitable distribution of natural manure is linked up with developing the form of cattle wealth and rearing of livestock. Use of admixed natural manure and of chemicals purely cannot be totally avoided. However, due safeguards have to be taken to assess their deteriorating effects upon the soils.

It is , therefore, essential to suggest the following measures for implementation –

1) to review the existing system of land management for small and joint holding and recommend for its daily efficiency drive in the system of horticultural and allied operation,

2) introduction of more effective measures for procuring more cattle waste for natural manure soas to increase the yields of the soil and to supplement daily requirements of our meat markets (as we depend heavily for meat shortages on imports). It would also greatly assist to process further dairying activities to a considerable measure. Pisiculture and rearing of livestock practices have their intimate linkages with enhancing agricultural wealth in its variegated system. Horticultural items, viz. muga, silk, errandi as also jute and cotton, broomsticks, lac, bay leaf, rape seeds and others have their natural inclination to be counted with agriculture,

3) to create effective measure to provide irrigation facilities at dry soils, to relieve the concerned Department of fund constraints and to ensure proper implementation of planned schemes

4) it is admitted at the Shillong Trade Fair 2000, that "fruit juice squashes marketed by the Agricultural Department of the State are second to none. In fact, these are freshly packed and carbonated, and besides, the locally produced fruit juices are available at much cheaper rates than those sold by multi-national companies." Because of the above reasons, effective advertisements and publicity coverages are greatly essential in view of the heavy competitions caused by trade upsurges from outside. Publicity is needed not only for agro-based produce but also for a host of horticultural and spice items which offer high grades of quality at national and international markets,

5) Proper incentives have to be disseminated especially to our youths to take up co-operatives and entrepreneurial activities both in the agro-based as well as poultry, cattle, piggery farming as also in horticultural and pisiculture programmes,

6) Site and resource selections should be made fully viable which should not fail to yield increasing returns because recurrences of deficit budgets mean not only wastages of time, labour and money but offer very bleak prospects for raising the per capita and gross produce of the State.

HORTICULTURE AND PLANTATION IN THE N.E.RGION.

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The North Eastern Region of the country can bid for a good position in the country in respect of agriculture. The economy of the region is mostly agrarian. But presently in respect of agricultural productivity, the region lags far behind the other parts of the country, though it has all the potential for development of agricultural and allied activities. As per statistics of the country as a whole during the past two years, the agriculture recorded a declining trend in production. However, in 2001-02 it is expected that this sector would grow by 9.1%. The production of foodgrains is expected to increase by 8.2% and that the non-food products by 10.3%.

The Horticultural production is estimated to go up in 2001-02 by 8.4% as against 4.4% in 2000-01. Jammu and Kashmir a major food producing State, has witnessed an additional area of 1957 hectares of orchards in 2000, while in 2001 another 5000 hectares are being planted with saplings of various varieties of fruit trees. My contention is that if the trouble torn J&K can try to increase production from Horticulture, why not North Eastern Region at present a trouble torn and under developed region can turn it into an island of peace and prosperity by properly using the potential resources of the region.

The Shifting Cultivation which cannot be entirely done away with, leads to degradation of natural resources like forest, soil and water thus destabilising the ecology. Since a large number of crops could be grown in the jhum lands the jhummias are practising mixed cropping and mixed farming. But for a sustainable development of agriculture in North Eastern Region modern land use system with inter cropping pattern and sequences should be adopted. The modern land use system prevents soil loss, increase the soil fertility and conserves the moisture. As for example, cashmere is planted on half moon terraces on hill slopes at 7-8 metres distance both ways or it accommodates more number of plants with optimum growth and bearing. In between two rows of cashmere broom or lemon grass or pineapple at young stage may be grown. It fetches income with a minimum labour management within a year under utilising the wasteland. Cashmere can also be grown in abandoned jhum land or in hill slope. Garo Hills has a great potentiality with many natural resources. Three cashmere-processing units are set up in Garo Hills where a large number of female workers get employment. In recent times more pockets are being converted into plantation of cashmere but not in scientific lines. The same could be made highly productive and beneficial with little more care and alertness at initial stage of lines. Bamboos are planted along the fencing to serve not only as wind break but also to fetch some amount of income. Garo Hills is very often affected by cyclonic winds resulting in the devastation of orchards where fruits like cashmere, banana. Orange etc. are grown.

Since a complete switch over from the shifting cultivation is neither possible nor advisable in view of the terrain, fear of changes in tribal dietary habits and any other adverse effects, development of horticulture and floriculture should be taken up by scientific land use pattern. The North Eastern Region has the total geographical area of 255090 sq. km. out of which 136785 sq. km. is under forest cover. About 37220 sq. km. or 14.5% of the total area is under cultivation in the region. Assam has the maximum net sown area of 27066 sq.km. and Mizoram has the minimum net sown area.

The total estimated wasteland in the region is 29008 sq. km. About 31.1% of the total geographical area has been classified as wasteland in Tripura followed by Manipur 25.3%. The wasteland can also be brought under fruit cultivation with very little efforts. In North Eastern Region several fruits like pineapple, orange, lemon, banana, mango, guava, litchi, papaya, jackfruit, apple, pears, plum and peach are grown. But the area under production and productive level are much below the All India level. As for example in Assam the area under pineapple production is 13997 hectares only and the productivity is 207838 M tones whereas the All India figures are 71300 and 1071200 respectively. Coconut is grown in Assam and Tripura only. The production of sweet potato had ceased in Arunachal Pradesh since 1990. But in other six states, sweet potatoes are grown and in 1997-98, the total area under it is 17%.

Besides Horticulture, attention should also be given to the cultivation of plantation crops. The major plantation crop is tea, which was started by the initiative of the then British rulers. The first tea garden of North Eastern Region was in Jaipur in Lakhimpur District. At present the tea statistics of the North Eastern Region are as follows :-

In Arunachal Pradesh there are 22 tea estates. In Manipur 6, Nagaland 6, Mizoram 2, Assam 860 and there is not a single tea estate in Meghalaya. Possibilities should be explored for establishing small tea gardens in Meghalaya also. In Assam, besides large and medium sized tea estates, there are a number of small tea gardens. In respect of rubber production, Tripura is at the top producing 7631 tones in 1997-98, Mizoram comes next producing only 7 tones in the same year.

In respect of coffee, the planted area is 587.90 meters in Arunachal Pradesh, 2650 in Nagaland, 1540 in Meghalaya, 1792.35 in Assam, 428.25 in Mizoram, 927.70 in Tripura and 375 in Manipur. So there is a need for establishing coffee processing units in all the States of North East Region. Unfortunately, the coffee processing unit established by the N.E.Council is lying defunct in Guwahati. In respect of cotton as against the All India figure, the productivity in N.E.Region is too meager. The All India figure in 1997-98 was 8904.1 tones whereas in Assam it was 1.7, Manipur 0.1, Meghalaya 7.6, Mizoram 1.0, Nagaland 0.2, Tripura 1.1.The total production in the region being only 11.7 tones. Cotton is generally grown in highland. So there is immense possibility of growing cotton in N.E.Region.

In case of jute, the area under cultivation is 94.5 hectares in Arunachal Pradesh, 4.2 in Meghalaya and 36.7 in Assam. The raw jute is sent mostly to Calcutta for want of any industry for producing of jute products in the region. The N.E.Council may initiate proposal on this.

In conclusion, it may be said that a variety of crops can be grown in the region. The productivity of each crop is very low as compared to the national average. However, the topographic and agroclimatic settings of the N.E.Region provide a unique opportunity for wide-spread cultivation of commercial crops such as flowers, fruits, fruit nuts, vegetables, spices plantations, forestry, energy plantations, medicinal and aromatic plants. Owing to difficult terrain, development of Micro Irrigation System (Drip + Sprinklers) in the region have to be adopted. The medicinal herbs are abundantly found in Arunachal Pradesh. But after inking and cleaning at Tezpur they are sent to other places of the country for processing. The N.E.Council could take steps to establish medicine-making units in the region out of the medicinal resources locally available. The NEC is at present making efforts to boost agriculture/ horticultural production by providing facility like trucks/tractors, cold storage godowns and market sheds through registered co-operative Societies/NGOs. The role of the NEC should be expanded and made more effective so that the proposal packages of the Union Government may be effectively implemented.

HORTICULTURAL DEVELOPMENT IN MIZORAM: STATUS, POLICY AND PROSPECTS

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ABSTRACT:

The paper examines horticultural situation in Mizoram. Horticulture includes a wide variety of crops such as fruits, vegetables, spices, plantation crops, floriculture, medicinal and aromatic plants, cashew nuts and mushrooms. During the Eighth Plan (1992-97), efforts were made at the national level to diversify agriculture in favour of horticultural crops which has resulted to significant expansion of area and production of these crops. Mizoram is agro-climatically suitable for cultivation of a good variety of horticultural crops. The major horticultural crops include fruits like pineapple, citrus fruits like orange, lemon, hatkora etc., passion fruits and banana, vegetables such as brinjal, tomato, french bean, iskut (chow chow), potato, tapioca and sweet potato and spices like ginger and chillies. Floriculture is now emerging in urban areas especially in areas around Aizawl city. Plantation crops like areca-nut, coconut and betel-vine are also introduced. Recently, tung plantation which can be grown all over Mizoram has also been introduced. Other plantation crops having vast potential in Mizoram are rubber, coffee and tea.

Productivity of fruits and vegetables in Mizoram is quite low compared to All-India level and also with North-Eastern Region as a whole. Meanwhile, the productivity of spices like ginger, chillies etc. is higher compared to All-India average.

The State Government has taken several steps and programmes especially after 1980s and 1990s to give a boost in the production of fruits, vegetables and plantation crops like areca-nut, coffee, rubber, tea and coconut. The important institutions involved in the development of these crops are State Government Departments like Horticulture, Agriculture, Soil and Water Conservation, Industry and other agencies like Mizoram Food and Allied Industries Corporation Ltd (MIFCO), Mizoram Agriculture Marketing Corporation Ltd (MAMCO) and Mizoram State Cooperative Fruits and Vegetable Federation (MAFF). The Coffee Board under Ministry of Commerce and Industry has also taken up schemes for rejuvenation and new plantations with packaged subsidies, demonstration farm and other marketing supports.

The infrastructural facilities for horticultural development in Mizoram are far from adequate. The major constraints limiting production in the horticultural sector are inadequacy of disease-free planting material for improved varieties of different crops, deficiencies in post harvest management, absence of organised market for fruits, vegetables and other crops like ginger, chillies etc., inadequacy of efficient processing units for fruits and vegetables and unreliable statistical data-base for area and production of different crops. Removal of these constraints shall be the top priority for the planners and policy-makers. Himachal Pradesh's model of horticultural development may be followed which provides everything from 'plant breeding and tissue culture propagation, demonstration, training of manpower including barefoot extension agents, post harvest technology, marketing, cold storage, processing and pricing.' Finally various commodities board's presence in the State is also urgently needed to provide support in management, marketing, planning and coordinating the development of horticultural sector in the State.

INTRODUCTION:

Horticulture includes a wide variety of crops sueh as fruits, vegetables, spices, plantation crops, floriculture, medicinal and aromatic plants, cashew nuts and mushroom. Recently, beekeeping is becoming an important activities under horticulture sector. Since the Eighth Plan (1992-97), horticulture has been regarded as a critical sector for potential diversification in agriculture. Horticultural crops have several economic advantages over field crops, such

as, improved productivity of land and high returns per unit of area, higher potential for employment opportunities, vast export potential and environmental friendliness. Besides, horticultural development provides nutritional security and helps reduce poverty in hills and tribal areas.

The annual growth in area and production of horticultural crops in the country have improved considerably during the last decade. The area under horticultural crops increased from 12 lakhs hectares in 1991-92 to 150 lakhs hectares in 1996-97 and production also rose from 961 lakh tonnes to 1410 lakh tonnes during the period. Diversification of agriculture in favour of horticultural crops has been sweeping across the country. The share of horticultural crops in the total net (NCA) and gross cultivated area (GCA) increased remarkably during the last two decades. In some Indian states like Kerela, Karnataka, Punjab, Maharashtra and Andhra Pradesh, the area under field crops such as rice, sugarcane, wheat etc. have steadily gone down while the area under horticultural crops like fruits, vegetable, spices etc. rose rapidly.

Today India is the largest producer of fruits in the world. The country had the highest production of mango and banana in 1998-99 and also occupied fourth and fifth place respectively among the countries of the world in the production of pineapple and oranges. India is the second larger producer of vegetable in the world, next only to China. Despite the large production of fruits and vegetables in India, the per capita availability is much below the recommended levels i.e., 120 grams of fruits and 280 grams of vegetables per day. India is the larger producer and consumer of spices in the world. Production and productivity of coconut has also increased and India has now emerged as the largest producer of coconut in the world. Productivity is also the highest with 4863 nuts per hectare. Commercial production of floriculture and mushroom have also emerged as an important segment of the growing horticultural sector in the country.

Realizing the country's vast unexplored potentials in the horticultural sector, the Ninth Five Year Plan (1997-2002) continues the efforts made by the Eight Plan with the following thrust areas, viz.

1. Increase availability of seed planting material of high-yielding varieties,
2. Expansion of area under different horticulturtal crops,
3. Improved the productivity of existing orchards and plantations,
4. Transfer technology through training and demonstration and
5. Facilitate post harvest management of horticultural crops.

The Ninth Plan's programmes includes development of tropical temperate and arid fruits, development of cashew nuts and cocoa, use of plastics in agriculture, development of medicinal and aromatic plants, promotion of beekeeping, development of commercial floriculture, development of mushroom cultivation, development of spices and of vegetables including root and tuber crops. Coconut Development Board and National Horticultural Board have also been strengthened. New initiatives like development of horticulture in hills and backward areas, human resource development for horticulture and Technology Mission for Integrated Development of Horticulture in N.E.Region have also been taken up.

The North Eastern Region is also suitable for a wide variety of horticultural crops and plantations for its favourable agro-climatic conditions. The major horticultural crops include fruits like pineapple, orange, lemon, banana, mango, guava, papaya etc.; vegetables like potato, sweet pototo and tapioca and spices like ginger, turmeric and chillies. Among the plantation crops, tea is well established especially in Assam while upland teas are also coming up in Meghalaya, Arunachal Pradesh and other hilly region. Rubber plantation is very successful in Tripura and it now ranks second to Kerela in Production.

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The present paper is a modest attempt to analyse the status of the development of horticultural crops in Mizoram. It examines briefly the area and production of horticultural crops in the State along with the development policy and programmes undertaken in recent years by the State Government and other Organisations.

HORTICULTURE SITUATION IN MIZORAM:

Agriculture is the mainstay of Mizoram economy. About 66 per cent of the workers were engaged in agriculture and other allied activities, contributing nearly 40 per cent of State Domestic Product (SDP) in 1991-92.Though agro-climatic condition and abundant rainfall favours the cultivation of different crops, Mizoram is at present deficit in foodgrains production and other crops like fruits, vegetables etc. Rice is the principal crop of the State but its productivity is quite low. Moreover, the potential area available for rice cultivation is extremely limited. The state remains virtually dependent on other States for supply of food and other essential items. This situation calls for a diversified agriculture favouring horticultural crops in the State. Horticultural development is expected to bring about rapid socio-economic development of the State along with food and nutritional security to the people. It is therefore necessary that a viable horticultural development strategy for the State is prepared to fully exploit the State's vast potential in horticultural crops.

The total area available for horticulture in Mizoram is around 6,31,000 hectare, which is about 30 per cent of the geographical area of the State. The total area under horticulture crops in 2000-01 is 32,187 hectares, indicating about 5 per cent utilisation of land available for horticulture. The performance of the horticultural sector in the Sate is given in Table 1.The value of production is estimated at Rs. 128.38 crores with the largest contribution being made by vegetables (41.5%), followed by spices (31%) and fruits (21%). Floriculture is emerging as an important activities in urban area especially in Aizawl. Other important horticultural crops of the State are areca nut, coconut and betel vine. Recently, tung cultivation has been introduced which can be grown all over Mizoram. Other plantation crops having vast potential in Mizoram are rubber, coffee and tea. The area under rubber and coffee were 40 hectare and 152 hectare respectively in 1998-99.

Table 1.

Area and Production of Horticultural crops in Mizoram (2000-01)

Name	Area (in ha)	Production (in metric tonnes)	Value (in Rs.lakh)
1. Fruits	12998	40702	2729
2. Vegetable	8124	55301	5335
3. Spices	8452	34392	3989
4. Floriculture	71	N.A	N.A
5. Areca nut	900	560	672
6. Betel vine	290	244	73
7. Coconut	240	22	6
8. Tung plantation	1112	339	34
TOTAL	**32187**	**131560**	**12838**

Source: Statistical Handbook, Mizoram 2000

The major fruits grown in the state are pineapple, citrus fruits like oranges, Assam lemon, hatkora etc., passion fruits and banana. Vegetables such as brinjal, tomato, French bean, iskut (chow chow), potato, tapioca and sweet potato are also extensively grown under settled cultivation. Among the spices, ginger and chillies are grown all over Mizoram. The area, production and productivity of these crops presented in Table 2. clearly reveals that the overall productivity of horticultural crops, especially fruits and vegetables, are quite low compared not only to all-India level , but also with North Eastern Region as a whole.

Table 2.

Area, Production and Productivity of some Major horticultural crops in Mizoram.

Items	Mizoram		Productivity per hectare (tonnes/ha)		
	Area (000ha)	Production (000MT)	Mizoram	NE Region	All India
A. FRUITS (1996-97)					
1. Pineapple	1.03	7.15	6.92	10.17	
2. Orange & other citrus	8.0	30.8	3.87	5.14	
3. Banana	208	14.8	5.28	12.53	
4. Passion fruits	1.0	4.0	4.98	NA	
B. VETETABLES (1997-98)					
5. Potato	0.7	3.7	5.28	14.60	
6. Sweet Potato	0.6	3.2	5.33	9.09	
C. SPECES (1997-98)					
7. Ginger	2.2	20.4	7.84	3.78	
8. Turmeric	0.4	3.6	9.00	3.91	
9. Chillies	2.8	3.3	1.18	0.99	

Note: NA= Not available

Source: NEC, Basic Statistics for North Eastern Region, 2000
TECS, Perspective/ Visionary Plan for the State of Mizoram, 1998.

DEVELOPMENT POLICY FRAMEWORKS:

Several infrastructure facilities are needed to ensure and sustain production of horticultural crops and also for quick disposal of marketable surplus which used to be very high in horticultural sector. These facilities may be classified as production facilities, disposal facilities and institutional facilities. Production facilities include supply of inputs for plants, insecticides and fertiliser while disposal facilities consist of grading, packing, transportation, storage etc and institutional facilities are credit, market, co-operative societies etc..The state government has undertaken various measures to augment these facilities over the years. Various state government departments and agencies are distributing seeds, planting materials, insecticides/pesticides and fertilisers at a subsidised rate to the farmers. So far disposal facilities are totally absent excepting a few co-operative godowns constructed on some village. The important specialised institutions involved in the development of horticultural sectors are Mizoram Food and Allied Industries Corporation Ltd(MIFCO), Mizoram Agriculture Marketing Corporation Ltd (MAMCO) and Mizoram State Cooperative Fruits and Vegetable Federation (MAFF).

MIFCO provides processing facilities for food, vegetable and fruit in the state. In the horticultural sector, the

corporation has two working plants, viz., Fruit Processing Plant at Sairang and Chhingchhip. The other two working plants, viz., Ginger oil and Oleoresin plants at Sairang and Maize Milling Plant at Khawzawl had been discontinued due to their non-feasibility in techno-economic spheres. Presently, two more plants viz., Fruit Juice Concentration Plant with capacity of 1400 metric tones per annum and Mushroom Cultivation and Processing Plant with capacity of 24 metric tonnes annually, both at Chhingcchip village, are to be completed during the Ninth Plan. The performance of MIFCO since its incorporation in 1989 remains unsatisfactory and dismal. It suffers from low capacity utilisation, low product quality and huge financial loss due to mismanagement, inadequate working capital and obsolete technology. MIFFO also conducts training courses in food preservation and food processing at the Food Processing and Training Centres at Sairang, Vairente, Khawzawl and Chhingcchip for the benefit of private entrepreneurs both in the rural and urban areas.

MAMCO Limited, incorporated in 1983 under the Company's Act 1956, involves in the marketing of ginger, chillies, cotton, sesame and procurement and marketing of tung oil. The corporation also provides financial assistance and temporary loan to NGOs and individuals. MAFF is presently selling fertilisers to fruit and vegetable growers.

The horticulture department, established in 1993 after bifurcation of Agriculture Department, is now responsible for horticultural development of the state. The department has a total outlay of Rs.21.41 crores for the Ninth Plan. The following schemes have been taken up during the Ninth Plan.

1. **Fruit development:** The scheme for fruit development includes expansion of areas under fruit crops like passion fruits, hatkora, oranges, banana etc., distribution of planting materials of improved varieties at 50% subsidized rate and construction of link roads to connect the orchards with the villages. A sum of Rs.470 lakhs is proposed under this scheme for the Ninth Plan.

2. **Vegetable development:** Seeds, seedlings, bulbs, tubers, etc., are distributed at 50% subsidised rates. The area under potato, sweet potato etc. will be expanded. The proposed outlay for this scheme during the Ninth Plan is Rs.255 lakhs.

3. **Spices development:** Improved varieties of spice crops like ginger, turmeric, chillies, pepper, garlic etc., are distributed free of cost. Demonstration plots are maintained to popularise uncommon but high value spices.

4. **Commercial floriculture:** Distribution of seeds, bulbs and other planting materials at subsidised rate have been undertaken and expansion programme for rose and anthurium are also initiated. An outlay of Rs.90 lakhs is proposed for this scheme.

5. **Mushroom development:** Rs.20.00 lakh is proposed under this programme. Mushroom growers are provided spawns at the nominal rate and training of interested persons also will be conducted.

6. **Plantation crops:** Improved varieties of seeds and planting materials for coconut, areca-nut, tung (aleurites)etc. are provided at subsidised rate. A sum of Rs.170 lakhs is proposed for the Ninth Plan. Expansion programme for coffee, rubber and tea plantations are also proposed under Soil and Water Conservation Department and Industries Department respectively. Soil and Water Conservation Department proposed to cover 1500 ha. under coffee, rubber, tea and other commercial plantation. A total Outlay of Rs.150 lakhs has been provided for the scheme during the Ninth Plan. The Industry Department also undertakes schemes for development of tea industry, medicinal herbs and plants and citronella grass cultivation and processing for oil extraction for which a sum of Rs.902 lakhs has been proposed in the Ninth Plan.

Other important schemes under Horticulture development during the Ninth Plan are:

a. Development of infrastructure at the Horticulture Research Centre at Kolasib with an outlay of Rs.22lakhs.

b. Strengthening of direction and administration for which a sum of Rs.361 lakhs was proposed.

c. Establishment of departmental farms for production of seed/ seeding and planting materials of improved varieties. A sum of Rs.140 lakhs has been proposed for this programme.

d. Rs.65 lakhs has been proposed for extension programme which include audio-visual aids, farmers tours and training, distribution of printer materials etc..

e. Distribution of improved tools, implements and machineries including fencing materials, trailing supports, polythene pipes, U.V. films, components of green houses, sprinkler irrigation etc at a subsidized rate for which a sum of Rs.125 has been proposed, and

f. For horticulture research and education especially for providing graduate, post graduate and Ph.D studies in Horticultural sciences, a sum of Rs.5 lakhs has been proposed for the Ninth Plan.

Coffee Board and Mizoram:

Coffee Board started coffee development programme in the North Eastern Region in 1960s and 1970s. However, the programme have not been very successful so far in establishing coffee as a commercial crop in N.E.Region. the Annual Report (1999-2000), Department of Commerce points out the following reasons:

a. Frequent changes at the managerial level dislocating proper management of coffee farms:
b. Lack of skilled manpower;
c. Inadequate fund position;
d. Lack of adequate financial support;
e. Negligible credit inflow from financial institutions due to peculiar land tenure system;
f. Non-availability of inputs for timely application of fertilizer etc.;
g. lack of proper marketing network;
h. Very high transportation cost;
i. Poor accessibility and communication network;
j. Unstable law and order situation.

Coffee Board presently implemented its scheme "Consolidation and Expansion of Coffee Areas in the North-East for the period 1997-2002". The scheme covers Mizoram and other North Eastern States. The objectives of the scheme, among others include rejuvenation/consolidation of existing tribal coffee holdings in N.E.States through financial support providing financial incentives including subsidy component of 50% and other support for installation of estate processing plant and providing services through demonstration farms. The goals of the scheme include promotion of coffee as a commercial and eco-friendly activity, increase productivity from 70 kg/ha which is the North Eastern average to 350 kg/ha by 2002 and also total production from 259 tonnes (total N.E.) to 5000 tonnes by 2002 Coffee Board proposes to spend Rs.43.18 crores in the North East during the period 1997-2002 and Rs.30 crores shall be used for expansion of areas under coffee cultivation. The assistance programme includes a subsidy of Rs.25,000 per hectare for rejuvenation and fresh plantation for categories below 10 ha. for tribal and non-tribal growers, a subsidy of Rs.10,000 for other agencies and government for purchase of poly-bags, seeds, plant protection chemicals and other incentive for marketing and installation facilities such as pulpers,etc.

For Mizoram, Coffee Board has given its focus to plantation below "10 hectares" categories in which 1600 hectares will be taken for rejuvenation. Under large/Govt/other categories, another hectares for rejuvenation and 1000 hectares new area will be taken up. Around Rs. 8.1 crores would be spent for Mizoram. Towards infrastructural development, the Board has plans for 15 warehouses and 15 drying yards in Mizoram by 2002 out of 100 such

facilities planned for the whole North East and 3 to 4 huller units of 2 to 3 tonnes per day capacity are also planned for Mizoram out of a total of 28 planned for the North East.

A coffee demonstration farm is established at Bualpui in an area of 14.26 hectares, out of which plantation represent 5 hectares. The demonstration farm recorded 241 kg/ha of coffee yield as against 16 to 17 kg/ha by tribals. This achievement has been made without any transfer of technology. It may be noted that though Mizoram is agro-climatically ideal for growing coffee, the average per hectare yield recorded is only 17 kg/ha as against All India average of 860 kg/ha for professionally managed estates in the South

STRATEGY FOR FUTURE DEVELOPMENT:

Presently, horticultural sector in the state has been confronting several constraints such as inadequacy of disease-free planting material of improved varieties of different crops, deficiencies in post harvest management, absence of organized market for fruits, vegetables and other crops like ginger, chillies etc., inadequacy of efficient processing units for fruits and vegetables and unreliable statistical data-base for area and production of different crops. The horticultural sector which has a vast potential in Mizoram, must be strengthening by taking appropriate steps systematically to remove these constraints. The state government must make efforts to provide disposal facilities such as grading, transportation, storage etc., improved seeds and planting materials, more transparent subsidy schemes to benefit growers rather than supplier of inputs, improved capacity utilization of existing processing units and special development scheme for orange and hatkora which has a ready market in the neighbouring areas like Cachar, Tripura and Bangladesh. Horticultural statistical data have to be made more accurate and reliable, and comprehensive cost studies of different crops are also essential to design horticultural price policy. As Shukla Commission (1997) suggested, the state may well emulate Himachal model of horticultural development which provides everything from 'plant breeding and tissue culture propagation, demonstration, training of manpower including barefoot extension agents, post harvest technology, marketing, cold storage, processing and pricing'. Finally, commodity boards like Coffee Board, Rubber Board, Spices Board, etc. must be established or strengthened the existing ones, if any, with well-manned offices not only in the state capital but also in each of the district headquarters.

Reference:

1. Dahiya, P.S and Rnveer Sigh (1997) Horticultural Development in Himachal Pradesh: Profitability, Policy and Prospects. Indian Journal of Agricultural Economics, Vol.52, No 3, July-Sept.
2. Government of Mizoram (1997) Draft 9th Five Year Plan 1997-2002 and Annual Plan (1997-98) Planning and Programme Implementation Department. Aizawl
3. Government of Mizoram (2000) Statistical handbook Mizoram, Department of Economics and Statistics, Aizawl.
4. Government of India (1997) Transforming the North East (Tackling Backlogs in Basic Minimum Services and Infrastructural Needs-High Level commission Report to the Prime Minister (Shukla Commission). Planning Commission, New Delhi.
5. Government of India (1999) Background Notes for Economic Editors Conference 1999, Department of Agriculture and Cooperation, Ministry of Agriculture, New Delhi.
6. Government of India (1999) Annual Reports 1999-2000, Department of Commerce, Ministry of Commerce and Industry New Delhi.
7. Kaul, G.L. (1997) Horticulture in India-Production, Marketing and Processing, Indian Journal of Agricultural Economics, Vol 52, No3, July-Sept, pp 561-583.
8. M.S. Swaminthan Research Foundation (1998) Agenda-21 For Mizoram (A Blue Print for Sustainable Agricultural and Rural Development, Chennai.
9. Tata Economic Consultancy Services (1998) Perspective/Visionay Plan for the State of Mizoram, Bombay.

Rapporteurs Report
BUSINESS SESSION –IV
HORTICULTURE AND PLANTATION CROPS

Chairman:
Dr. N. M. Singh
Professor of Economics
Manipur University

Rapporteurs :
1.Mrs. R. P. Laitphlang
2.Dr. G. Purkayastha

This session was chaired by ***Prof. Mohendra Singh***, Professor of Economics, Manipur University. Altogether six papers were presented by the resource persons belonging to different disciplines and states. The first paper was presented by ***Dr. (Mrs.).E. Kharkongor***. The title of her paper is "*Horticulture : A viable alternative to jhum cultivation in* Meghalaya". The speaker highlighted the impact of jhum cultivation on ecology and economy in the entire North Eastern Region. She concentrated on the scope and potential of horticulture in Meghalaya based on physical features and its horticultural potentialities She classified the state into three district zones .She emphasised on the area specified strategy for encouraging horticultural practice. The paper included a detailed record of production and yield of different traditional and horticultural crops in the states of Meghalaya. Several questions were raised on the paper related to food security of the jhummias and long-gestation period in alternative land use pattern.

The second paper was presented by ***Dr. Farida Shaheen Rasul*** on the *problems and prospects of horticulture and plantation crops*. Enhancement of productivity received prime importance in this paper. She also stressed on horticulture diversification and innovative agricultural technology for restoration of environmental technology for restoration of environmental balance. Horticulture can create ample job opportunities and reduced soil erosion associated with jhum.

She stressed on the potentialities of NER in the spheres of temperate and sub-tropical fruits. She also stressed on plantation crops because of the agro-climatic sustainability of the region. She stated some of the basic infrastructural problems of the region and suggested remedial measures in the line of extension of post- harvest loss, controlling technology and well-knit marketing system, and integrated approach to research and development in horticulture and development.

The third paper was presented by ***Shri. R. Arumugam*** on "*Prospects of horticulture In Hill Terrain.*". According to him, although horticulture crops have long gestation period, its yield rate is high. He had a long brief on the ongoing government. Schemes related to boasting horticulture in Arunachal Pradesh. He highlighted the problem faced by the area to bring about the social changes in the region.. He also stressed on the role of the women and youth in horticulture development and agro- based industries.

Mr. Dharmendra Nath presented a paper on "*Rubber plantation in Goalpara district of Assam*". He talked about the history of rubber plantation in the region. This movement is new in the region, which started only after independence at the initiative of the Rubber Board. This plantation generates more employment and the productivity is higher in the sample district. It helps in uplifting the environmental image and an alternative source of wood. The main objective of the study was to explore the pros and cons of rubber plantation and how far this plantation is going to benefit the small farmers.

The fifth paper was presented by ***Dr. Hamlet Bareh*** on "*Horticulture and Plantation crops in Meghalaya*". His presentation was also on the basic characteristics of jhum cultivation in Meghalaya. He expressed his deep concern about the fact that the people of Meghalaya is still marketing their products like vegetables and fruits in a primitive manner and selling their products at throw- away prices.

He spoke about tea plantation as a growing industry in Meghalaya and stressed on the fact that craftsmanship and agriculture go side by side. Agricultural products as well as crafts can go beyond the territorial boundaries.

SUMMARY OF THE FINDINGS AND RECOMMENDATIONS

In this part of the proceeedings we shall summarise the findings of the conference and note down the recommendations of the seminar. The part is divided into two sections - **Section 'A'** gives the summary of the Findings while **Section 'B'** records the recommendations of the conference.

Section 'A'
SUMMARY OF THE FINDINGS.

In the first Bussiness Session where the **Status of Jhum Cultivation** in the North East Region was discussed and where seven papers were presented, it was agreed hands that Jhumming is a wasteful and a ruinous method of cultivation. Most speakers reiterated the evil effects of Jhumming like soil erosion, siltation of rivers, loss of fertility of the soil, destruction of forests and serious environmental hazards. Speaking on the present status of Jhum cultivation, different views were expressed .While some were of the opinion that Jhumming has ceased to be the sole occupation of the Jhummias, others pointed out that it is still commonly practised.

There were those who lamented that in spite of the many programmes undertaken by the various state governments in the Region during the last 50 years, the practise of Jhumming has still remained widespread in the hill areas with progressive shortening of jhum cycle, declining productivity trend and increasing land and environmental degradation. There were participants who expressed sympathy with the Jhummias and pointed out that Jhumming is a way of life of the people. And, if the people are to abandon Jhumming they must be fully compensated and suitably rehabilitated. On the contrary,some others argued that the Jhummias are averse to settle cultivation and that more and more lands have been put under Jhum cultivation for the fact that Jhumming population keeps on increasing rapidly leading to a reduction of Jhum cycle or the period of fallow which is not long enough as it was 30 to 40 years in the past when the population was low. With the increase in population the cycle has been reduced to 4 years in most states. This short interval is not sufficient for the regeneration of the soil and the Jhummias have to jhum larger areas at a time resulting into reduction of the cycle. Hence some resource persons had even discovered that agricultural production from jhum areas had increased because of the increase in the area under jhum cultivation rather than in productivity.

The consensus opinion was obviously expressed about the diseconomies of the jhum system and its numerous evil effects. It was unanimously agreed that awareness level of the Jhummias would have to be raised regarding the hazards of the system where there is also no scope for increasing the yield. It was further agreed that measures should be taken to wean away the Jhummias like introduction of alternative occupations as well as developing of horticulture, floriculture, forest plantations, livestock and poultry rearing and wage employment.

II

The second Bussiness Session on the Sub-Theme **New Trends in Cropping Pattern** continued to echo the evils of Jhumming in order to bolster the need for a change in the cropping pattern in the hill areas of the North East Region. Five Papers were discussed in this Session. The discussion was near unanimity on Jhumming system and mono-cropping pattern as being the major causes of low productivity of agriculture in the hill areas of the Region. The Session called for a sustainable development of agriculture by complete abandonment of the Jhum system through adoption of multiple cropping pattern along with the introduction of technological improvement in agriculture taking into account the ecological balance. For this to happen, it was argued that incentives have to be provided to the Jhummias.

It was also brought to light that despite the fact that the Jhummias in certain hill region of the Regions have adopted new technologies, Jhumming still persists. Reference was made to the Jhum Area Development *Programmed* for the Region being sponsored by the ***International Fund for Agricultural Development (IFAD)*** which should be welcomed and taken advantage of.

The need for adequate investment on land development and agricultural infrastructure particularly irrigation facilities, was mainly stressed so as to enable the hill areas of the Region to catch up with the development in other parts of the country where Green Revolution had taken place. In this regard the land tenure system in the hill areas has to be re-examined for necessary reform to take place. The general consensus was that the change in the cropping pattern in the hill areas will have to take place where commercial crops, vegetables and fruit trees could be profitably grown and develop for the economic well-being of the Jhummias who can always depend for foodgrains being supplied from the plain areas. Favourable trends towards this kind of development could be discovered in many parts of the hill areas of the Region.

III

The discussion on other alternative occupations to Jhumming was carried on in the third session where 3 Papers were read on theSub-Theme : **Dairy and Animal Husbandry**. Most speakers spoke on the great potentials for the development of Dairy Farming and Animal Husbandry in all the hill areas of the Region. At the same time, many expressed their surprise about the hill people being averse to these alternative occupations even now when the Nepalis coming from a foreign country have been thriving on these bussiness at the expense of the indigineous hill tribes. All agreed that some serious thinking on this issue is urgently called for so that the Region will not remain dependent on the supply of dairy and animal products from outside the Region.

The three resourse persons have made serious attempts to explain clearly how to initiate and develop dairy farming and animal husbandry in the hill areas where great potentials exist even for export of dairy and domesticated animal products. They also deals with the measure for easy prevention of diseases to poultry and animal and spoke on how to encourage the establishment of livestock industries among the Jhummias.

IV

The fourth and last session further took up other alternative occupations that can replace Jhum cultivation. Six Papers were presented in this session dealing with **Horticulture and Plantation Crops.** The session confirmed the expert belief that horticulture and plantation can provide a very viable alternative to Jhum cultivation in the hill areas of the Region. The consensus was that horticulture can do away with almost all the evils associated with Jhum system of cultivation. Horticulture can also create ample job opportunities while it can be diversified with innovative technology for restoration of environmental balance. It was realised that the Region has great potentialities for both temperate and tropical fruit trees.

The Region has also the agro-climatic sustainability in respect of plantation crops. But it was argued that basic infrastructural provisions in terms of transport and communication, marketing, application of modern technology and research should preceed the development of horticulture and plantation crops. Of all these infrastructural facilities, marketing got the most attention. The Technology Mission for Integrated Development of Horticulture in the North East Region as mooted by the Union Government was already referred to during the Inuagaral Session of the Conference. The importance of a social change was also spoken about and the support and co-operation of women and youth were solicited in horticultural development along with the development of agro-based industries.

Of the plantation crops, rubber and tea were thought to be very suitable in the hill areas of the Region. It was contended that the hill areas in the Region are better placed than Jammu and Kashmir which has been very successful in horticultural development. But it was also argued that in respectof tree plantation, the indigenous species like pine, sal, teak and other local trees would do better than rubber.

Section 'B'

RECOMMENDATIONS

A. The Conference was fully convinced that the issue of Jhum system cannot be isolated from the general problems of economic under-development. Its solution too cannot be isolated from the programme of integrated development of the economy and the people. Hence policy decisions will have to be suitably formulated by all the states in the region on both short term and long term basis. As a part of a short term strategy, it is necesarry to take up measures to boost the productivity of jhum cultivation. Such measures may include, inter alia, introduction of better yielding varieties of seeds and other productivity raising inputs like fertilisers and making the jhummias aware of the need for enhancing productivity. In the long run, however, there is no option but to switch over to alternative forms of cultivation or occupations. This can be done by evolving a system of conferring entitlement and ownership rights of land and other productive assets to the real farmers thereby serving as an incentive to switch over to settled cultivation. Moreover, improving their education, imparting new skills and providing them with capital, marketing and other infrastructural facilities is essential so as to enable them to effectively diversify their economy and sustain themselves on other alternative sources of living. The provision for improved varieties of inputs, irrigation facilities, undertaking of programmes for watershed management, better agronomic practises, appropriate land use system and effective extension services could certainly be part of effective policy instruments. The Conference was further convinced that the system is crumbling in many parts of the hill areas of the Region as Jhumming has ceased to be the sole occupation of the Jhummias. The respective State Governments could completely wean away the Jhummias within a reasonable period of time from now, if the awareness level of the latter is forcefully raised through various methods of publicity campaigns about the destructive evils of the system. The other measures include payment of reasonable compensation and provision of rehabilitation schemes.

B. The fact that jhumming is still being widely practised indicates that the various jhum control schemes implemented so far has not had sufficient impact. A thorough impact and evaluation study of these programmes besides closer monitoring of the implementation process is necesarry. In particular it is imperative to ascertain to what extend factors such as physiography, existing land tenure system, non-avialability of alternative and appropriate technology, credit support, scarcity of skill and general reluctance of the jhummias to surrender the right to jhumming are responsible for holding up the transition from shifting cultivation to settled agriculture in the hill areas of the region. The Conference arrived at a consensus that Jhumming and mono-cropping pattern have been the major causes of low productivity of agriculture in the hill areas of the Region. Hence the Conference called for a sustainable development of agriculture by complete abandonment of the Jhum system through adoption of multiple cropping pattern along with the introduction of technological improvement in agriculture. The necessary incentives will have to be provided to the jhummias to enable them to go in for the production of cash and commercial crops. There should not be any fear of the hill areas of the Region being deficit in foodgrain production as the economy of the Region should not be considered in isolation of the national economy including Assam in so far as food supply is concerned.

C. The hill areas of the region have great potential for the development of Dairy Farming and Animal Husbandry which can serve as viable alternative to jhumming. In view of the huge and ever increasing demand for meat and poultry products in the region, the conference was of the view that livestock and poultry farming should be organised on co-operative lines following the 'Amul' pattern. In every block there should be at least one livestock farm to be brought under the administrative control of the District piggery and poultry farmers union and under the overall supervision of the state level piggery and poultry farmers co-operative federation. The department of Veterinary and animal Husbandary should take initiative to encouraged entreprenuership development programmes for setting up of commercially viable piggery and poultry farms. Besides the department should also strengthened its health care unit.

For proper development of the livestock and poultry sector, in the region, the following action should be initiated:

i. Introduction of germ-plasm at the village level by supplying quality livestock and poultry.
ii. Increase in the supply of vaccine, de-wormer medicines and prompt attention to disease control.
iii. Dressing units and slaughter –cum- processing plants should be established.
iv. Training facilities at various levels should be provided and a network of marketing infrastructure should be developed.
v. Fodder and fodder seeds production should be increase and facilities for conservation and preservation should be improved.
vi. Research work on performance and adaptability of improved breed under village condition and performance of such breeds fed with locally available feed is necessary.
vii. Proper incentives should be given for taking up co-operative and entrepreneurship programmes in poultry, cattle, piggery farming as well as in pisiculture and dairying activities.

D. There are still more viable alternatives to Jhum system according to expert opinion. These include horticulture and plantation crops.Since the topography, climate and soil conditions of the hill areas favours the development of horticulture and plantation crops and the real solution to the problem of controlling jhum cultivation is actually the question of providing real alternative means of earnings to the jhummias, intensified horticultural and plantation programmes like establishment of coffee and tea gardens, plantation of rubber, growing of spices and agro-forestry programmes should be launch. An effective substitute for jhumming can also be found through area-specific crop planning with the hills specializing in horticulture and plantations and the valleys in food crops.

Since the hill areas is still lacking in terms of basic infrastructure, developing of horticultural and plantation crops necessitates increasing provision of these basic facilities particularly transport and marketing facilities. In this regard, the role of the government is important in building up the transport and communication systems connecting not only the states within the region but also all the districts for easy movement of goods and services. **The North Eastern Regional Marketing Corporation** should be properly co-ordinate so as to procure the goods at reasonable price from the farmers. The involvement of NGOs' and private entrepreneurs in agro-based industries will be a welcome step.

In developing horticultural and plantation crops, it is highly important to adopt the strategy of sustainable development so as to ensure that the growth process is environmental friendly and globally acceptable. The present environmental crisis is the direct result of mass deforestation and lack of proper management of soil and water resources. However, this can be tackled through various programmes of public awareness, self discipline and government efforts in preserving and maintaining biological diversity. Besides, concerted efforts for a multifacet development of this sector in an integrated manner is also required. This should cover the following areas:

i. Setting up of new research and development institutions and upgrading of existing ones
ii. Develop cost effective technology within the reach of the farmers

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i. Setting up of new research and development institutions and upgrading of existing ones
ii. Develop cost effective technology within the reach of the farmers
iii Adopt horticulture based social forestry programmes
iv. Setting up of cold storage centers
v. Proper incentives should be given particularly to the youth for taking up co-operative and entrepreneurial programmes in horticulture including setting up of processing units.
vi. Encourage border trade in respect of horticulture and plantation crops.
vii. Setting up of training institutions for post harvest crop management .
viii. Better organization of local markets for fruits, vegetables and other crops such as ginger, chillies etc.
ix. Effective advertisements and publicity coverages are essential in view of the heavy competitions and tradeusurges from multinational firms.

The Union Government has recently mooted a **Technology Mission for Integrated Development of Horticulture** in the North Eastern Region. The respective state goverments should take full advantage of this beautiful programme right from the start. It was strongly recommended that the Mission Programmes should be successfully implemented at every stage of the four mini-missions. The success of this Technology Mission would certainly be able to convert the Region into a national granary of horticultural produce with the potential to export these produce to other states in the country and abroad.

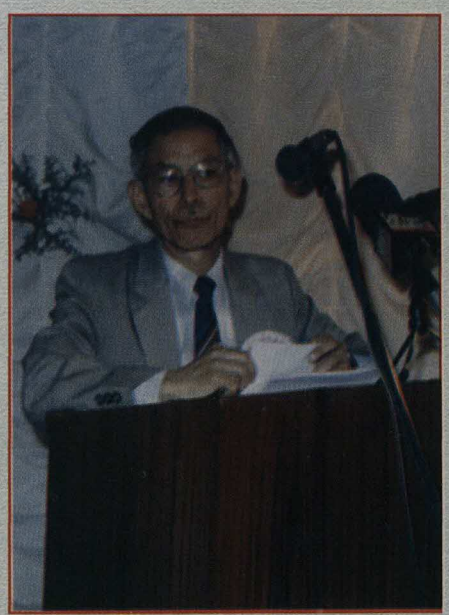
Similarly, the Union Government has recently created a Corpus Fund known as the **Rural Infrastructure Development Fund (RIDF)** with an initial amount of Rs. 2000 crores which has now grown to a massive Rs. 23,000 crores. The respective states in the Region should be made to fully utilise the Fund so that the capability of the Region could be strongly built in terms of roads and communications, bridges, irrigation, drinking water supply, flood control, health and education.

The Conference consider that rubber and tea plantations that have already been initiated in various hill areas should be futher expanded and supported. The indigenous plantationsa like Pines, teak, sal and other local species should be preferably extended to all hill areas which are favourable for their growth.

INAUGURAL FUNCTION

Chief Guest Mr. E.K. Mawlong, Hon'ble Chief Minister, Govt. of Meghalaya

Guests, Invitees and Participants



Prof. P.M. Passah, Vice-President North Eastern Economic Association

Dr. (Mrs.) M.P.R. Lyngdoh, Conference Chairperson delivering the welcome address

Release of the Souvenir by the Chief Guest Mr. E.K. Mawlong, Hon'ble Chief Minister, Govt. of Meghalaya

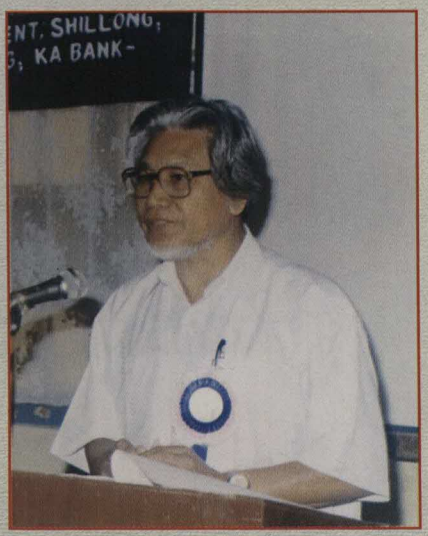
Dr. (Mrs.) M. P. R. Lyngdoh, Conference Chairperson delivering the welcome address

Welcome song by the students of Shillong College

BUSINESS SESSIONS

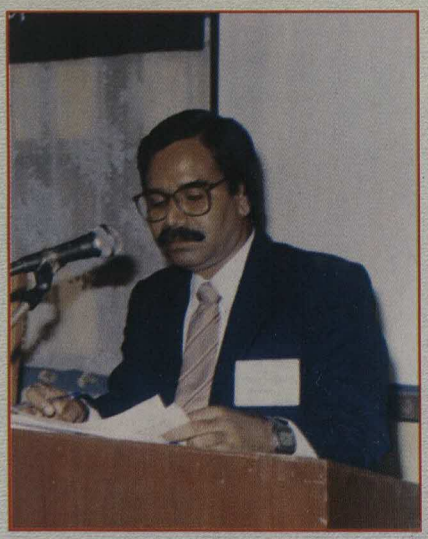
Dr. (Mrs.) Malabika Das Gupta

Dr. (Mrs.) S. Islam



Prof. N. M. Singh

Mrs. T. B. M. Lynser



Dr. P. K. Dhar

Dr. J. S. Jyrwa

Dr. D. Nath

VALEDICTORY FUNCTION

Chief Guest Mr. A. H. Scott Lyngdoh, Hon'ble Finance Minister, Govt. of Meghalaya

Mr. P. J. Bazely, IAS Principal Secretary, Govt. of Meghalaya

Mr. B. Syiem, Conference Organising Secretary

Mr. B. Roy, Conference Joint Convener