

SUSTAINABLE DEVELOPMENT OF AGRICULTURE IN NORTH EASTERN INDIA: A QUEST FOR MORE ECONOMICAL AND RESOURCES SUSTAINABLE ALTERNATIVES

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INTRODUCTION

North Eastern Region (NER) of India is located between 21.5 ° to 29.5 ° North latitude and 85.5 ° to 97.5 ° East longitudes. The North East (NE) of India constitutes the states of Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim and Tripura. Flanked by hills and with the mighty Brahmaputra river slashing a central path between its north and south, the North East is bounded by the states of Manipur, Meghalaya, Mizoram, Nagaland, Tripura with Assam comprising the heart. Arunachal Pradesh lies to its north and Sikkim a little away in the North West bordering China and Bhutan. Bangladesh and Myanmar lie to its southwest and east.

The western side of the NE is connected to the eastern part of the Indian subcontinent by a narrow land corridor; sometimes referred to as the Siliguri Neck or "Chicken's Neck". The hills of NE region contribute its major area with Assam and Sikkim states and Darjeeling on its periphery forming the North Eastern Himalayan zone in the Indian territory while Bhutan and Chittagong hills of Bangladesh lie outside the boundary of Indian republic. Hill states of India have a total geographical area of 5.63% of the country (approximately 183,813 km²) with a population of 1.13% to be supported on its natural resources.

The NE states are quite different and peculiar in nature due to their distinct topography, (highly rugged steep mountains and hills to rolling topography of plateau region) terrain comprising mountainous region, hills and plateaus interspersed with valley lands in the foot hills of the hills, extreme climatic characteristics that results in above 11000 mm of average annual rainfall in Cherrapunjee and Mowsynram Ranges. Inaccessibility and remoteness of the places, dense forest cover and poor and underdeveloped infrastructure system are characteristics of the NE region of India.

DEMOGRAPHY

The NE region of India is sparsely populated as compared to other parts of the country. The total population in 2001 was 10286.10 millions. The population density in the region varies from 55-60 persons per km² as compared to 275-290 persons per km² in plains. The population growth rate in the region during the last decade has been 21.54% and is expected to increase up to 25%. Nagaland is the state with highest population growth rate during last decade.

PHYSIOGRAPHY

The NER is characterized predominantly by hilly terrain, deep gorges and flat valleys. The average annual rainfall of the region varies from 2000 to 4000 mm. The climate varies from sub-tropical to extreme temperature and is bestowed with rich natural resources viz, water, petroleum, minerals, rare flora and fauna. The region is broadly divided into four major divisions. (i) Assam valleys (ii) Assam Himalayas (iii) Meghalaya hills and (iv) Eastern high lands. Assam valley is 80-129 km wide and 725 km long. The river Bhahmaputra passes through the middle of the valley. The Mishmi hills, Abor hills, Mikir hills, and Dafla hills are

in Assam Himalayas in Arunachal Pradesh. The Meghalaya hills (Shillong Plateau) is in south of Assam valley. The Garo, Khasi and Jaintia hills, Mikir hills and North Cachher hills are in Shillong plateau. The Eastern high lands include the Patkai, Naga hills, Barail hills, high lands of Manipur and Mizo hills. Manipur lies on the east of the Barail range, whereas Tripura lies in the western flank of Mizo hills. Nagaland is situated between Manipur and Arunachal Pradesh.

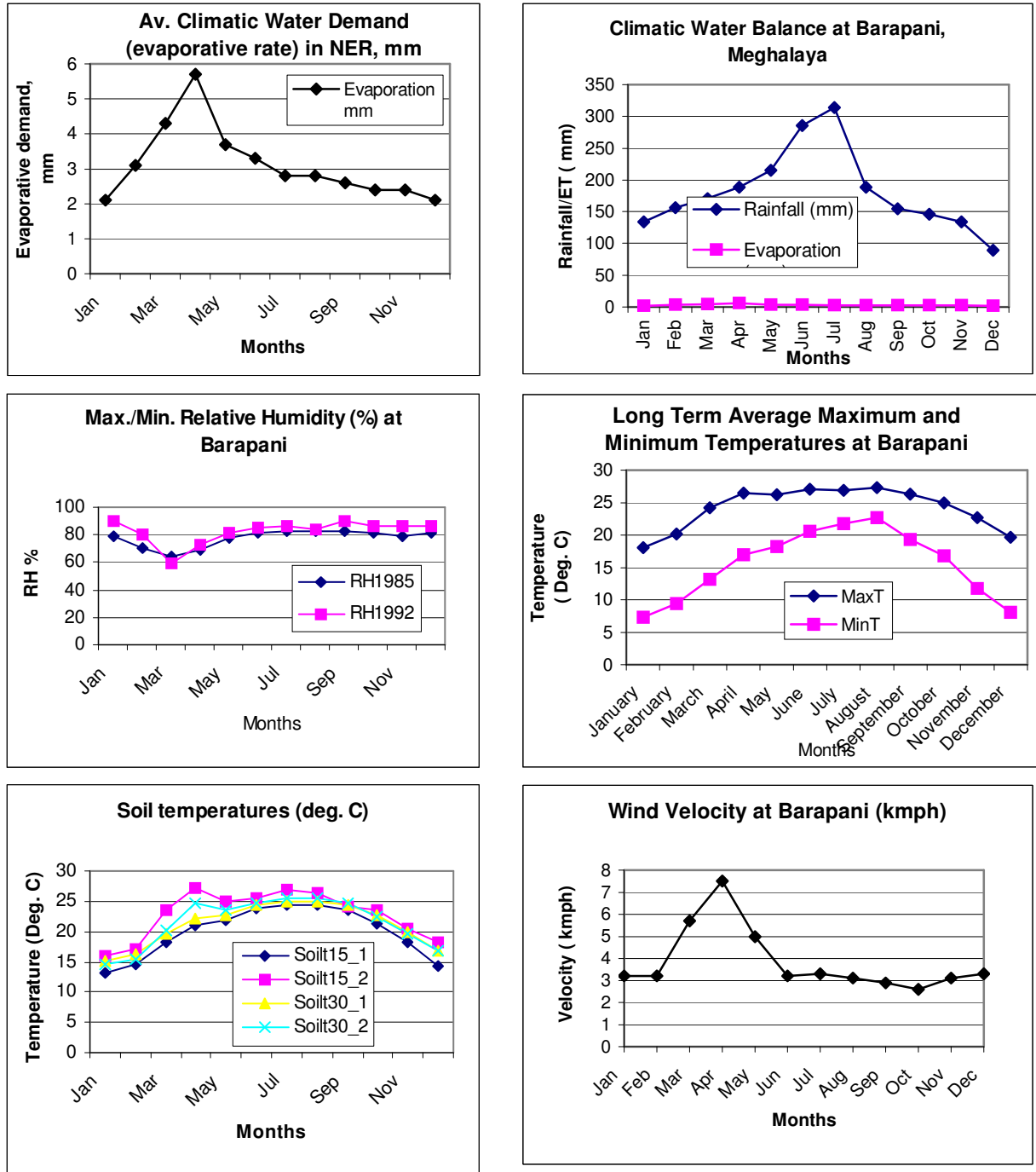


Figure 1. Representative agro-climatology of Barapani, Meghalaya in North Eastern Region of India

CLIMATIC RESOURCE AND AGRO-CLIMATIC SUB-DIVISION

The altitudinal differences coupled with varied physiography contributes to climatic variations in the NE region of India. The climate in the region varies from sub-tropical to alpine. Despite diverse physiographic characteristics of the region, sub-regional variations in the average seasonal temperature are not striking. Bulk of the annual rainfall in the region

(64%) is received during June – September period. The North Eastern states of the region, through have 7.75% of the geographical area of the country receives about 12.7% of the total precipitation in the country. The area can be divided in to three climatic region viz . (i) the cold humid monsoon climate of the frontier hilly region (above 200 m); (ii) wet sub-tropical monsoon climate and (iii) humid mesothermal monsoon climate with heavy monsoon showers. Average annual rainfall in the region is about 2490 mm with highest rainfall of 12,500 mm in the world in the Cherrapunji Mawsynram state. The region, due to heavy rainfall, has very high humidity varying from 62% to 91% in rainy season and 42% to 65% in other seasons. The climatologic parameters are depicted in Figure 1. Accordingly the NE India has been divided in the agro-climatic zones as; Alpine zone, Temperate sub-Alpine zone, Sub-tropical hill zones, Sub- tropical plain zone (valley areas) and Mild tropical hill zone.

LAND RESOURCES

Out of the total geographical area (255,090 km²) in NE, 54.4% is under forest cover and about 14.5% is under cultivation in the region. Arunachal Pradesh, having 83,749 km² area is the largest state while Tripura with 10,490 km² area is smallest state of the region. Assam has the maximum net sown area 27,060 km² and Mizoram has the minimum 650 km² net sown area. About 31.15% of the total geographical area has been classified as waste land. The overall terrain of the region is predominantly hilly characterized by diverse agro-climatic and geophysical situations. The region can broadly be divided into three physiographic zones viz. (i) Hills and mountains of folded topography (ii) Peninsular plateau and (iii) The plains.

Shifting cultivation, the predominantly form of agriculture prevalent in the region is practiced in about 3,869 km² of area annually, affecting 14,660 km² area at one time or the other. The system is uneconomical and has caused resource depletion and land and environmental degradation (NRSA, 1995).

AGRICULTURE DEVELOPMENT IN THE NORTH EASTERN REGION OF INDIA

The tribal population of the NE India is dependent on agriculture and related activities connected to land. Agriculture is practiced for sustenance and not for commercial activities except for some location specific commercial activities such as tea growing and arecanut planting. Shifting cultivation is the major form of agricultural practiced in the region. The pattern of agricultural growth has however remained uneven across regions and crops. The north-eastern region (NER) continues to be a net importer of food grains even for its own consumption. The NE region produces only 1.5% of the country's total food grain production, provides livelihood support to 70% of the population. The food grain production and productivity of some crops are given in the Table 1. A comparison of the crop productivity of the North Eastern Region with the country showed that almost all the crops show a very poor performance as compared to the country level productivity. This is indicator of the production gap that may be abridged by adopting modern and scientific practices of commercial farming is the common understanding of the planners, policy makers, educationists and agricultural scientists. However, associated factors related to sustainability of the resources as well as economics need to be examined critically (Table 2).

Table 1. Area, production and productivity of various crops in NER (1993-94)

Crops	NER			All India		
	A	P	Pr.	A	P	Pr.
Rice	3351.9	4680.0	1396.0	42033.6	78972.4	1879.0
Maize	109.4	192.2	1793.0	5989.4	9479.5	1583.0
Wheat	92.8	125.6	1353.0	24914.5	59139.3	2373.0
Small millets	46.1	38.4	833.0	192.9	933.3	475.0
Total pulse	146.8	92.1	627.0	22440.2	13099.6	584.0
Total grains						
Total food grains	3747.0	5068.9	1351.0	2557.7	20277.4	793.0
Total Oil seeds	391.8	215.6	550.0	11075.2	16387.9	15242.0
Potato	96.5	688.9	7139.0	58.0	189.4	3262.0
Ginger	11.6	63.4	5473.0	128.6	397.4	3090.0
Turmeric	11.5	12.0	1043.0	226.9	5021.9	22152.0
Tapioca	7.0	40.9	5843.0	139.7	1185.2	8484.0
Sweet Potato	16.5	65.9	3994.0	-	-	-

Source: Basic Statistics of North Eastern States, NEC, 2000.

[A : Area in ('000 ha), P : Production ('000 t), Pr: Productivity (kg/ha)]

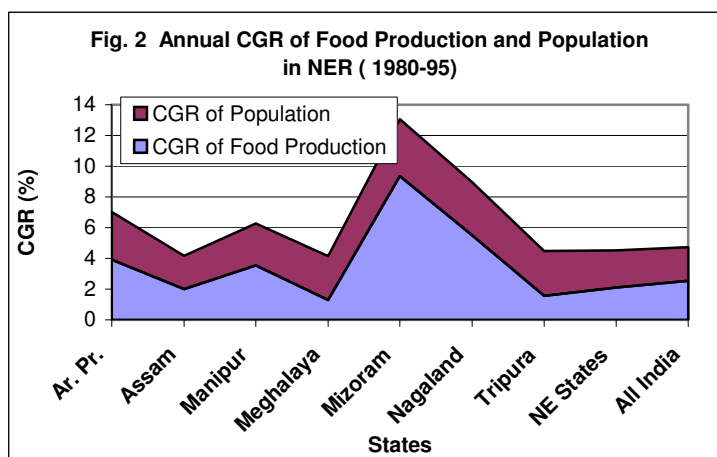
Table 2. Trends in rice production and productivity in NER

Year	Area ('000ha)	Production (' 000 t)	Productivity (Kg/ha)
1990-91	103.36	119.8	115
1991-92	104.5	121.1	1146
1992-93	104.2	114.0	1094
1993-94	104.2	111.5	1094
1994-95	103.2	118.8	1080
1995-96	104.0	141.1	1075
1996-97	104.8	151.1	1346
1997-98	157.9	225.3	1427

Source: Basic Statistics of North Eastern States, NEC, 2000.

PRODUCTION AND PRODUCTIVITY OF IMPORTANT FOOD GRAINS IN NE REGION

Rice is the major crop of the region accounting for about 89% of the area and 92% of the total food grains production. The other major crops are maize, wheat, millets, oilseeds and pulses. The region is deficient in food grains and the gap between demand and supply was widening further. During the years 1980-95, the annual Compound Growth Rate (CGR) of food grains production was a meager 2.11% as against 2.41% increase in the population. (Fig.2). The production in Meghalaya and Assam has lower annual; CGR than population. Sustainable Yield Index (SYI), which gives an idea of the overall yield sustainability of major crops, is shown in Table 3. The average productivity in the region is very poor. The annual CGR of productivity indicates that productivity of various food crops is declining in Meghalaya, while it is very poor in Assam and Nagaland states. This could be



attributed to low use of fertilizer nutrients, traditional agricultural practices, mostly rainfed agriculture, lack of availability of good seed, suitable cropping patterns etc (Sharma, 1995).

The annual removal of major nutrients by various crops in the region is 294.08, 83.98 and 187.14 thousand tonnes of N, P₂O₅ and K₂O whereas, replenishment is only 36.42 (12.3%), 10.92 (13.0%) and 7.91 (4.2%) thousand tonnes. This is a cause of concern as we are mining the soil at a faster rate that would affect the sustainability of food production system. The overall fertilizer nutrient response potential (FNRP) achieved in the region is only 16%, with highest (34.4%) in Manipur and lowest (6.3%) in Arunachal Pradesh (Table 4). There still exists a lot of scope for enhancing the productivity of food crops in the region with optimum use of nutrients (Sharma'1992).

Table 3. Sustainable Yield Index (SYI) of various crops in NE region (1980-1990 -91)

State	Rice	Maize	Wheat	Pulses	Total
Arunachal Pradesh	0.895	0.898	0.308	-	0.573
Assam	0.779	0.947	0.943	0.887	0.782
Manipur	0.7171	0.584	-	-	0.713
Meghalaya	0.727	0.735	0.88	0.716	0.850
Mizoram	0.658	0.584	-	0.408	0.648
Nagaland	0.647	0.564	-	0.426	0.647
Tripura	0.709	-	-	0.709	0.731
NE State	0.793	0.774	0.679	0.439	0.797

Source: Sharma' 1996

Table 4. Contribution of various inputs (%) in increasing food grain production in NE states (1974-93)

State	Irrigation	Fertilizer Nutrient	Area	HYV & improved practices etc
Arunachal Pradesh	6.4	17.4	65.9	10.3
Assam	2.0	44.4	33.0	20.6
Manipur	3.7	63.0	0.0	32.3
Meghalaya	3.1	38.0	26.6	32.3
Mizoram	1.2	48.0	14.0	36.4
Nagaland	6.2	39.9	30.7	23.2
Tripura	5.2	60.9	0.0	33.9
NE States	2.9	48.9	26.8	21.5

Source: Sharma, 1997.

NATURAL RESOURCES DEGRADATION IN SHIFTING CULTIVATION VIS-A-VIS MODERN AGRICULTURAL METHODS

The soil and runoff from *Jhuming* has been estimated to be very high (Table 5) in the shifting cultivation practice and hence ICAR has set up its research complex to study, understand, suggest alternatives to Shifting cultivation for its complete replacement with modern methods of agriculture (Jackson, 2001). The million dollar question is whether the above form of shifting cultivation that has been reported to have most degenerative effect on resources sustainability in the region and that resulted in to such high levels of resources degradation needing the immediate attention leading to creation of a full fledged Research Institution (ICAR-NEH) to replace Jhuming 25 years back has been able to achieve its goals? It is the time for introspection that whether after 25 years with all the expenditure in the form of human resource and money what we have been able to achieve is worth? To understand the intricacies of shifting cultivation practice in much better manner; one has to explore the Indigenous method of shifting cultivation and its intricacies, which took ages to evolve with the ingenuity of the farmers who have inhabited the area since long more scientifically. Their cultivation practices have evolved as a solution to the problems to a raw mind. The arguments

can be put forth in favour of Jhuming over modern agriculture looking from the angle of resources sustainability. The modern agriculture is certainly not friendly to resources as a huge soil loss takes place as soon as the land is put under the modern tools and implements of primary and secondary tillage superimposed with high intensities and duration of continuous rainfall. Augmenting these vows are terrain characteristics. What is more daunting is the fact that as soon as the soil particles are detached and transported with water they are lost forever. As the silt laden water leaves the boundary of Indian territories these resources become the property of neighbouring countries which are never retrievable. The author has watched this phenomenon helplessly on the southern boundary of Meghalaya state. This has warranted the quest for new resources sustainable alternatives that are more remunerative.

Shall we allow such type of resources wastage in the name of developing modern agriculture or shall the scientific community feel concerned to preserve and protect the resources. The valid argument can be put forth in favour of other non-degenerative alternatives, which may provide economical security to the people of the region who can obtain food grains from other regions or countries if they have either money or material to exchange with. This concept has led to look for more economical vis-à-vis resources sustainable alternative for the region.

PER CAPITA INCOME

The Net Domestic Product of NER has increased from Rs 46,162 crores in 2000-01 to Rs 50,520 crores in 2001-02. In terms of per capita income NER as a whole is placed amongst the poorest regions in the country. The per capita income at Rs. 12,407 is less than the national average of Rs. 17,978/- (2001-02). There is a dire need to take provisions so that the per capita income of the region gets a boost. A vigorous policy of the government is therefore, inevitable which can not only boos the economic conditions of the poor tribals as well as ensure resources sustainability.

Table 5. Table Runoff and soil loss from Jhum cultivation fields and fallow in Meghalaya in North East India

Particulars of Land Use	Runoff (% of Rainfall)	Soil Loss (t/ha/year)	Source
Freshly burnt field under cropping (Steep slope, rainfall 2200 mm)			Tokey and Ramakrishna (1981)
30 years cycle	21	22.5	
10 years cycle	24	23.0	
5 years cycle	26	30.0	
Fallows (regeneration)			
5 th Year	19	1.1	
10 th years	13	0.8	
Freshly burnt field under cropping (Rainfall 1785 mm on 40% slope)			Mishra and Ramakrishna (1983)
10 years cycle	30	50.0	
5 years cycle	33	55.0	
Fallows (regeneration)			
1 st year	25	7.1	
2 nd year	21	3.5	
10 th year	13	2.0	

Source: Jackson, 2001.

SUSTAINABLE ECONOMIC ALTERNATIVES TO AGRICULTURE IN NORTH EASTERN REGION OF INDIA

In the North Eastern Region of India due to high rainfall of the order of 2000-4000 mm per annum that is intense and for short duration having high erosive energy water erosion is the major form of land degradation (Table 5). This problem gets aggravated with the cultural practices being done in the agricultural fields to realize economic production. All

cares should be taken and the resources degradation should be checked by all means so that not only the soil but also the most important nutrients should be preserved. Since, agriculture and related activities are highly desired and cant be checked overnight, we may allow it to be practiced; but keep on looking for more remunerative alternatives as soon as possible with the help and support of the government agencies. Agro-based small-scale industries, semi permanent farming with perennial plants, animal based farming systems, aquaculture etc.; are some other alternatives that should be practiced in order to improve the socio-economic status of farming community with a wider national goal of preserving the national treasurer of soil and nutrients.

Few workable suggestions are made for adoption of other economically remunerative ventures for large-scale adoption in the NE region to ensure resources sustainability vis-à-vis economic well-being. Some alternatives have been studied in detail (but not exhaustive) and recommended for wider adoption in the region in the light of above discussion.

1. Tea Plantation and Tea Industry:

The NE region of India is one of the major tea growing areas of the country (Table 6). The tea industry of NER is the world's largest tea growing region having 16 % share, and is the largest producer and exporter of tea in India (share 55%). Tea plants being perennial in nature that can withstand high intensity rainfall and provide the cover to the exposed land surface in turn helping to check the soil erosion o a large extent. Tea growing is being expanded to non traditional areas in other North Eastern states. Tea growing areas need a boost in the region for resources sustainability and profitability. Brazil having deforested its large tracts of rainforest has planted tea on the hills, which is providing both benefits of resources conservation with economic benefits.

Table 6: Tea Industry of the NER (in million kg)

	2000	2001	2002	2003	2004
Production	846	854	826	857	830
Imports	14	17	22	7	25
Exports	207	183	201	173	190
Consumption	653	673	685	697	710

Source: Report of the Meeting of the Committee on Financial Sector Plan for NER, March 2006 .

2. Other Plantation Crops

Agro-climatologically and edaphically, conditions of NER are highly favourable for development of plantation crops. On lower elevations of the plains, arecanut, banana and rubber have got very high potential. Rubber board is already experimenting with the rubber plantation in Guwahati. Suitable areas could be earmarked to expand the rubber plantation areas in non traditional areas. Areca nut is another economical plantation crop that can be propagated in this region big way looking to its huge market potential. In lower Brahmaputra valley region Banana plantation which has a highly diversified germplasm in the region can be commercialized.

3. Spices Crops

This region offers great potentials for larger scale cultivation of Pepper, Bell pepper, Cinchona, Large and Small Cardamom. These crops require partial shade and moist ambient climatic conditions. Therefore, these spices can be commercially cultivated in mixed farming conditions in the region.

4. Coffee and Cocoa Cultivation

The agro climatic conditions of the region are quite favourable for cultivation of Coffee and Cocoa, which has got very high export potential. The government has to develop infrastructure for processing the coffee beans before taking up to popularize the coffee plantation.

5. Cashewnut, Walnuts and other nuts

In some areas of the region Cashewnut and Walnuts are having scope for commercial cultivation. In Garo hills region of Meghalaya farmers have already started growing cashew nut. Strategies should be formed for large scale cultivation if the conditions are favourable.

6. Tropical and Temperate Horticulture

High hills and plains of the region offer excellent conditions for development of Tropical and Temperate Horticulture is in unorganized primitive state of development as far as the area, production and post harvest processing is concerned. Area under commercial horticulture need to be enhanced. This will ease out the burden from the land for resources depletion. The NE States produce varieties of tropical and sub-tropical fruits starting from Jackfruit, Pineapple to Orange, Pears, Peaches and Plums. From the data of productivity made available by National Horticulture Board, it appears that although this region produce good quality of fruits, their productivity per Hectare is far below in comparison to other states of India. Amongst many reasons, non-availability of quality planting material is one of the major causes. Conventional methods of propagation from uncertain Clonal mothers have become obsolete. The modern technology of Micropropagation through Tissue culture is gradually eliminating the conventional system of propagation. But conventional methods are still being practiced and till date infrastructure for making available high quality planting materials has not been created so far. If this bottleneck is overcome then the spread of horticulture to non conventional areas can be ascertained. Value addition to the horticultural produce could help on getting better prices.

7. Ornamental Fish Culture and Composite fish culture

There is a great potential in the fishery sector. Due to various reasons currently there is low fish production in the NER however, the majority of the population being non-vegetarian the demand is very high. At present the NER imports about 90,000 tonnes of fish from outside the region. This gap can be easily abridged by popularization of fish culture in the region. Due to very high rainfall and undulating topography the region offers best potential for cultivation of fish for ornamental purposes for exports to foreign markets and composite culture for table purposes. Production of fishlings and hatcheries of inland fisheries is another suitable alternative. Innumerable number of rivulets can be converted into cesspools for fish rearing by artificial creation of dykes and bunds in these channels at regular intervals so that water can be retained round the year. The total fish production in the year 2003-2004 was expected to be 233.46 tonnes.

8. Dairy Farming

Dairying is practiced in the region on a minor scale especially by the migrated labourers from the neighboring states. This is a highly remunerative venture associated with the agriculture. Sheep and goats are also seen but due to high humidity probably they are not able to withstand the climatic pressures. The region due to its high rainfall offers great potentials for fodder production round the year for dairy cattle.

9. Rabbit farming

Due to the predominantly non-vegetarian nature of the tribals of the region this species has found acceptance among farmers and locals for self consumption. Table size rabbit of the age of 3-4 months has been liked by the people and is in great demand. Rabbit farming also fetches wool and fur required for warm clothing essential for harsh winters.

10. Pig farming

Pig meat (pork) is liked by almost every body in the region. Back yard piggery needs a boost in form of large scale industry. Industrial houses can be invited to set up modern piggery farms and the meat processing units in the region. Possible bottlenecks such as high costs of feed can be overcome by promoting the trans border trade between neighboring countries and plains of Assam and Bangladesh.

11. Rearing Cattle for meat for self consumption and export to foreign countries

Almost all the North Eastern states are dependent for their meat supplies from the plains of Assam, Bihar, Uttar Pradesh and West Bengal. The domestic demand for meat products as well as favourable climatic conditions for production of fodder and grasses provide very highly suitable atmosphere for commercial development of cattle farming for meat purposes. Yak and Mithun farming is already prevalent in Arunachal Pradesh and Manipur. The localized practice of this type can be popularized elsewhere in the region.

12. Poultry and Duckery

Poultry and Duckery are two promising ventures that have vast potential in the region. Tripura, Assam and plains region of Manipur and Meghalaya can be converted to the poultry production hubs in the North East. Duck can also be promoted for egg and meat purposes. Scientific studies are needed to adopt duckery and poultry, which has great liking of the native people of the area. The efforts for developing commercial farms not only for self-consumption and domestic markets but also an eye on export markets should be initiated.

13. Cultivation of Medicinal and Aromatic Plants

This region is the mega biodiversity zone and the house of innumerable number of plant species having medicinal and aromatic properties. Opportunities can be explored to start the cultivation of such plant species which are perennial in nature and do not require disturbing of the land beneath due to weeding.

14. Floriculture/Ornamental Horticulture and Orchids Production for Export

Agroclimatology of the region is much suitable for commercial floriculture and Ornamental horticulture. The region has great potential to become one such hub of commercial floriculture that can be comparable to Holland due to its climate. The need for providing artificial cooling can be done away with due to its mild climate round the year. The international airport is the vital link required for the same. Orchid is one group of ornamental plants, which has large, export markets in Europe, America and Middle east. Almost all the hilly states of the region have favourable climatic condition for commercialization of orchid cultivation and this fact needs to be explored more than any other thing. North Eastern State especially Meghalaya has 124 species of Orchids and amongst them there are high value species which can be grown for commercial flower production as well as commercial supply of planting material by micropropagation through Tissue culture technique. Commercial Orchids are complex hybrid which can not be propagated by seed and micropropagation through Tissue Culture is the only answer. Green house culture and production of commercial flower seedling in off season through tissue culture and supply at the onset of season is the widely practised method of commercial flower production, which can also be adopted in North Eastern States.

15. Ramie and jute fibre

Ramie and jute fibers are in great demand in the industrial sectors and this opportunity can be encashed by propagating their cultivation in suitable areas. The ramie is the strongest known vegetative fibre and is popularly known as "Reha" in Assam. The importance of ramie fibre is increasingly felt in the textile industry because of its excellent quality compared to other fibres. The fibre of ramie is obtained from the bark of the plant which is composed of high cellulose percent. This fibre is used in the textile industry for manufacturing of various type of superior quality of clothing material and it can also be mixed with rayon, terelyne, polyester, wool, cotton, jute and silk etc. The ramie fibre is in great demand for marine purposes.

16. Bamboo

Bamboo is another commercial multipurpose tree specie that has tremendous potential of production in the region. Bamboo based industries and usage of bamboo products are innumerable. It is also very highly economic species if the cost of cultivation on pr ha basis is estimated. The problem with bamboo cultivation is that it is not done on large scale commercial basis. In recent past the bamboo has caught the attention of the authorities and efforts are being made to strengthen the bamboo cultivation in the region. The same need to be spread in almost whole of the North eastern Region of our Country. A bamboo grove of 10 sq. meter can fetch approximately Rs, 2000/- on maturity of approximately 100 bamboos @ Rs. 20/- local prices. This species alone can be more remunerative if cultivated as an industry. This means that the bamboo cultivation can fetch approximately 20 lakhs over a period of five years from a well organized and maintain bamboo area of one hectare.

17. Agro forestry

Agro forestry is already being practiced in the region at a limited scale. Several plantation companies have already established their forest plantations in many parts of the region. Agro forestry provides the poor farmers the much needed cash and the food items at a much lower input and labour. Various alternatives in agro forestry are already been tried and recommended. Novel alternatives and combinations of species can be experimented and tried so tat the farmers get the maximum benefits.

DEVELOPMENT OF AGRO-BASED INDUSTRY

Industrially, the NER continues to be the most backward region in the country, and the states in the region hardly have any industrial base, except perhaps Assam, because of its traditional tea, oil and wood based industries .To some extent Meghalaya has made some headway in setting up of small and medium industries. There are a number of factors contributing to the lack of industrial growth in the region like poor infrastructure, inadequate supply of electricity, violence and extortion etc. The growth of industries, large, medium and small has been uneven. The number of functioning large and medium industries in the NER has been negligible. The status of industries in the NER is as follows.

SUMMARY AND CONCLUSIONS

North Eastern region is endowed with rich natural resources of soil, water and vegetation. Management of resources of the region needs scientific interventions in the form of judicious rain water harvesting, ground water extraction, creation of surface storages of water, *in-situ* water harvesting tanks, improving irrigation efficiency, and reduction in evaporation loss. Since most of the area is hilly, development of agriculture based on micro-watershed approach will be more useful.

Though there may be many other highly remunerative and economically viable options yet they might not have been sighted here yet it confirms the fact that there are ample numbers of other activities that can replace the need for cultivating the steep slopes permanently. Thus, from the above discussion it is evident that while the North Eastern region has excellent scope for development of many economic alternatives to agriculture and farming they need to be provided with much needed help support and infrastructure facilities

before establishing the larger scale projects. Also, the inherent built in nature of social-fabric of a large number of tribals of mutual cooperation can be utilized for establishing such ventures in which the farmers may be owners on a collective basis which will avoid confrontations. All the solutions may not be applicable for all regions but a suitable group of activities can be picked up and spread in the most favourable region so that farmers can learn to be independent financially and socially and the sustainability of the natural resources are not in jeopardy. The planners and policy makers should be aware that the highly degrading nature of activities in long run are going to create problems and more problems unforeseen so far of great dimensions until the corrective measures are taken well in advance with farsightedness and zeal.

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