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Problem, Prospect and Role of Agriculture in Rural Development in North-East India

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ABSTRACT

NE Indian agriculture is overwhelmed by several problems; some of them are natural and some others are manmade, which are multi-sectoral and multidimensional. In this connection, some of the major issues directly relating to the agricultural sector are- small and fragmented land-holdings, lack of quality seed and planting materials, imbalance or no use of fertilizers, natural factors/ disasters, limited irrigation facility, lack of mechanization, disease and pest problems etc. Besides, a significant quantity of products harvested in NE region perishes due to lack of adequate storage and processing facility as well as due to absence of sound marketing facilities. Social factors such as low literacy levels, lack of awareness about the benefits of modern high-value agriculture, inadequate training programmes for farmers etc. also contributes to the challenges for agricultural development in north-eastern part of India. However, despite of these challenges, the North-east region is endowed with a varied topography and agro-climactic conditions which offer vast potential for agriculture, horticulture and forestry. All the eight states of NE India have different developmental prospects and resources to support their efforts in contributing to the regional as well as national economy. In order to improve the contribution of the agricultural sector to the overall development of the North-east, there is a need to devise some appropriate, regionally differentiated strategy. Crop intensification and diversification with multiple cropping such as- intercropping, mixed cropping, multi-storeyed cropping system, agroforestry etc. are the need of hours to meet the challenges of natural hazardous and climate change effect. Terrace cropping, contour bunding, SALT, cover crops etc. are the practical options for increasing the agricultural production in hilly areas in one way and for sustaining the natural resources, in other. However, sustainable development is the only way to promote rational utilization of resources and environmental protection without hampering economic growth. "Integrated Farming Systems" hold special position as in this system nothing is wasted, the by product of one system becomes the input for other, as it refers to agricultural systems that integrate livestock and crop production. Moreover, the system help poor small farmers, who have very small land holding for crop production and a few heads of livestock to diversify farm production, increase cash income, improve quality and quantity of food produced and exploitation of unutilized resources. Considering the importance, the present study is an attempt to collate information on problems associated with agricultural development (based on statistical data and other secondary sources) and also to focus on the prospects of agricultural development in the north-eastern region of India more particularly in Assam. Thus, the detail regarding the issues relating to problems and prospects of agriculture in rural development and the strategies required to address them for a hunger free north-east in a sustainable manner are described in the paper.

Key Words : Agricultural scenario, Challenges, Developmental strategies, NE India

INTRODUCTION

The North-Eastern (NE) Region of India, comprising the states of Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim and Tripura, lies between 21.5°N to 29.5°N latitude and 85.5°E to 97.5°E longitude. The NE region has long international borders with Bangladesh, Bhutan, China and Myanmar and is close to Nepal and Indo-China. Occupying 8% of India's geographical spread, the NE states are home to only 4%

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of the country's population. It has a total cropped area of 5.3 million hectares and a population of around 39 million. The region falls under high rainfall zone and the climate ranges from subtropical to alpine. The region is characterised by difficult terrain, wide variations in slopes, altitude, land tenure systems and diverse cultivation practices.

Traditionally, agriculture has been the mainstay of people of this region. Despite major impact of green revolution in the irrigated areas of the country, modernisation of agriculture has escaped this region as evidenced by poor adoption of modern technologies, low consumption of fertilisers and other indicators of growth. Increasing the yield of crop in a complex system and in an environmentally positive manner is a challenge in a place like NE region of India. It is dominated by the tribal population and the development of agriculture and production of food grains in the region is highly depending upon the custom, culture and the food habit of the tribal people. At the same time, due care should be taken for the protection of the environment of the region and hence sustainable development in agriculture is highly welcomed in the north east.

Objective of the study:

Agricultural development is considered to hold the key to economic development for most of the countries in the world including India. The NE region of India is characterized by high dependence on agriculture. Despite its high potential for development, the region has been confronted with various challenges, both natural and man-made.

The primary objective of agricultural development is to satisfy the essential materials needs of the society, but the same cannot be achieved at the cost of local environment and the culture of the people. Socio-economic way of life has at all times put its impact on the agricultural development of any region of a country. Therefore, some of the social indicators plays important role in indicating the agricultural status of a locality.

The slow growth in agricultural sector in NE India results the slow growth of north east economy. The most important problem which creates hindrance on the way of agricultural development is the problem of population explosion in the region. As a result, the agricultural production could not cope with the growing population and socio economic changes of the region for which the food grain production is short by 2 million tonnes of demand in this region.

The present study is an attempt to collate information on problems associated with agricultural development (based on statistical data and other secondary sources) and also to focus on the prospects of agricultural development in the north-eastern region of India more particularly in Assam. Thus, the present paper describes the issues relating to problems and prospects of agriculture in rural development and the strategies required to address them in the NE region of India so that a hunger free north-east can be achieved in a sustainable manner.

Agricultural Scenario of North East India:

Indian economy is predominantly agrarian and North-East India is no exception to it. Agriculture has a vital role to play in the economic development of NER which is a key factor in the economic growth. Its share in State Domestic Product (SDP) ranging from 19 per cent to 37 per cent in different states of the region.

The total population of the region is about 38.5 million representing about 3.75 per cent of India's total population in 2001. The region's growth rate of population is much higher than the national average. It is increasing at a faster rate, 25.29 per cent during 1991–2001, against the national average of 21.54 per cent. The population explosion caused chiefly by immigration poses serious threat on the natural resources of the region and the availability of cultivable lands for the people of NE region. Thus, population pressure limits the horizontal expansion of cultivable land. The percentage of cultivated area to total geographical area ranges from 2.2 per cent (in hilly states like Arunachal Pradesh) to 35.4 per cent (Assam), as compared to 43.3 per cent at all-India level.

North-east India accounts for 3.4 per cent of the agricultural land of the country; it contributes only 2.8 per cent to total agricultural production, underscoring the low productivity of the region's agricultural sector (RBI, 2005). More than 70 per cent of total geographical area of the region is covered by hills and about 3 million hectare is estimated to be under soil erosion hazard as a result of practice of *Jhum* cultivation. In Assam alone, 83.2 per cent of area are suffered from erosion of slight (35.30%), moderate (37.70%), severe (10.00%) and very severe (0.30%) intensity. Many factors like natural calamities, large number of smallholders, low availability of agri-inputs etc. are threatening the livelihood-sustainability in the region.

Challenges in NE Indian Agriculture:

North-east Indian agriculture is overwhelmed by several problems; some of them are natural and some others are manmade. Thus, the problems confronting the North-East India are multi-sectoral and multidimensional.

The visible agricultural backwardness of the region in the context of present day India has been associated with some specific problems. Identification of these development constraints in the agricultural sector is necessary to unlock the factors inhibiting performance of the sector. In this connection, some of the major issues directly relating to the agricultural sector are discussed below.

Small and fragmented land-holdings:

Fragmentation of the holdings is one of the main causes of our low agricultural productivity and backward state of our agriculture. A lot of time and labour is wasted in moving seeds, manure, implements and cattle from one piece of land to another. Irrigation becomes difficult on such small and fragmented fields. Further, a lot of fertile agricultural land is wasted in providing boundaries. Under such circumstances, the farmer cannot concentrate on improvement.

The region contributes only 2.8 per cent to the total food grain production of the nation, pointing to its low level of productivity. Small and marginal farmers dominate the landholding pattern in the north-eastern region of India. More than 59 per cent of the farmers hold below 1 ha of land, and 80 per cent of them hold below 2 ha. Small size of operational holdings ranging from 0.60 ha in Tripura to 1.33 ha in Meghalaya as compared to 1.42 ha at all-India level.

Lack of quality seed and planting materials:

Seed is a critical and basic input for attaining higher crop yields and sustained growth in agricultural production. Distribution of assured quality seed is as critical as the production of such seeds. Unfortunately, good quality seeds are out of reach of the majority of farmers, especially small and marginal farmers mainly because of exorbitant prices of better seeds.

Imbalance or no use of fertilizers:

Indian soils have been used for growing crops over thousands of years without caring much for replenishing. This has led to depletion and exhaustion of soils resulting in their low productivity. The average yields of almost all the crops are among the lowest in the world. This is a serious problem which can be solved by using more manures and fertilizers.It has been estimated that about 70 per cent of growth in agricultural production can be attributed to increased fertilizer application.

The use of fertilizers in the NE region is low compared to the rest of the country. Fertilizer used per hectare during 2004–05 was negligible in the region, especially in Nagaland (1.5 kg), Sikkim (2.8 kg) and Arunachal Pradesh (2.9 kg). Fertilizer consumption was 18 kg in Meghalaya, 60 kg in Manipur and 63 kg/ha in Tripura compared to the national average of 104.5 kg per hectare.

Natural disasters:

Poor soil condition, short sunshine hours, excessive humidity and frequent floods & draught problems are the natural constraints in these states. The undulating nature of the terrain surrounding the foothills and the high density of rainfall require proper water management and the prevention of soil erosion.

The primitive form of food production system, locally known as "*Jhuming*", involves selection of hill slopes, cutting, drying and burning of vegetation followed by sowing of assorted seeds. In India, about 2 million tribal people practising the *Jhum* cultivation in approximately 11 million hectare of forest land, of which north-east India accounts 7.76% of total *Jhuming* area of the country. The system of shifting cultivation (*jhum*) is widely practised in hilly regions, accounting for roughly 30 per cent of the total area under settled agriculture. This, slash and burn cultivation practices are not economical due to loss of soil fertility and loss of micro- organisms from the soil. Such unscientific form of farming system thus leads to resource degradation as well as low productivity of soil in long run.

Limited irrigation facility:

Irrigation is the most important agricultural input in a tropical monsoon country like India where rainfall is uncertain, unreliable and erratic. Over-dependence on monsoonal rains with poor irrigation infrastructure is one of the main factors of low productivity of agricultural crops in North-east.

The NE region is characterized by a low proportion of irrigated area. Gross irrigated area (to the gross cropped area) under all crops ranges between 5.50% in Assam to 30.20% in Meghalaya is well below than the

national average of 41.50% (Dutta and Bezbaruah, 2005). However, irrigated area in Manipur is 46%.

Lack of mechanization:

In spite of the large scale mechanisation of agriculture in some parts of the country, most of the agricultural operations in larger parts are carried on by human hand using simple and conventional tools and implements like wooden plough, sickle, etc.

Little or no use of machines is made in ploughing, sowing, irrigating, thinning and pruning, weeding, harvesting threshing and transporting the crops. This is specially the case with small and marginal farmers. It results in huge wastage of human labour and in low yields per capita labour force.

Lack of adequate storage and processing facility:

Food must be consumed on a daily basis where as production has a different specific time profile. Even if the total production of food seems adequate at the aggregate level, it will not lead to significant improvement in food security unless the food is available for consumption at the right time and in the right form. Consequently, storage and processing are critical in ensuring that the commodities produced at a particular period are available for consumption whenever and wherever they are required. The lack of adequate storage and processing facilities accounts for divergence between national food security and household food security.

A significant quantity of products harvested in NE region of India perishes due to lack of storage and processing facilities. Simple, efficient, and cost effective technologies for perishables, such as roots, tubers, fruits and vegetables, are not as highly developed in the country compared to the storage technologies for cereal grains and legumes. Consequently, post-harvest food storage losses are very high.

Storage facilities in the rural areas are either totally absent or grossly inadequate. Traditional storage facilities have certain deficiencies, including a low elevated base giving easy access to rodents, wooden floors that termites could attack, weak supporting structures that are not moisture-proof and inadequate loading and unloading facilities. Thus, heavy post harvest losses occur due to inadequate storage facilities, especially in times of bumper harvests. Under such conditions, the farmers are compelled to sell their produce immediately after the harvest at the prevailing market prices which are bound to be low. Such distress sale deprives the farmers of their legitimate income.

The Parse Committee estimated the post-harvest losses at 9.3 per cent of which nearly 6.6 per cent occurred due to poor storage conditions alone. Scientific storage is, therefore, very essential to avoid losses and to benefit the farmers and the consumers alike.

Unorganized market:

Agricultural marketing still continues to be in a bad shape in rural India. On the other hand, another main handicap with north-east Indian agriculture is the lack of cheap and efficient means of transportation. Most roads in the rural areas become useless in the rainy season.

Under these circumstances, the farmers cannot carry their produce to the main market. In most cases, these farmers are forced, under socio-economic conditions, to carry on distress sale of their produce. In the absence of sound marketing facilities, the farmers have to depend upon local traders and middlemen for the disposal of their farm produce which is sold at throw-away price. In most of small villages, the farmers sell their produce to the money lender from whom they usually borrow money.

Linking each village by metalled road is a gigantic task and it needs huge sums of money to complete this task.

Disease and pest problems:

Disease and pests also a major factor contributing to the crop losses in the NE region of India.

Inadequate service delivery system:

In north-east India, there seem to be a communication gaps between farmers (end-users of research efforts) and the researchers. The existence of unified agricultural extension system notwithstanding, there is still poor coordination between researchers, extension agents and farmers. This situation is worsened by the low extension-farmer ratio. Thus, farmers are unable to take up new innovations aimed at boosting their productivity and, by extension, their output.

Technology shy farmers:

Social factors such as low literacy levels, lack of awareness about the benefits of modern high-value agriculture, inadequate training programmes for farmers *etc.* also contributes to the challenges for agricultural

development in north-eastern part of India. Most of the cases, farmers are also not come-forwarding type and therefore, they are still remaining adherence to traditional agricultural practices. This has adversely affected the developmental activities of the North-East.

Prospects of Agriculture in North-east India:

North-east India is one considered as one of the twelve mega-biodiversity hot-spot of the world. The region is endured with rich bio-diversity of germplasm of flora and fauna that include countless resources of medicinal and aromatic plants. Assam alone is the home of more than 5000 germplasm of crops, 240 different fish species, 30% of the country's bamboo resources, 43 citrus germplasm, 23 indigenous fruits etc. The region is endowed with a varied topography and agro-climactic conditions which offer vast potential for agriculture, horticulture and forestry.

The mighty river The Brahmaputra and its tributaries contributed to the water resources of the region. Ground water tapping and use could be a potent source for increasing irrigation in the region. Based on the diverse climatic condition, the region is divided in to several agro-climatic zones specific for farming systems is having tremendous potential for different crops. Here, bio-resource (including soil, plant, animal and microbes) can be use in addressing various stresses. It is thought that-there is scope for increasing the production by 3 – 4 folds through input maximization.

The NE region is congenial for growing high-value crops. Full advantage must be taken of the relative strengths of the region in fruit production, plantation horticulture and floriculture, cultivation of medicinal and aromatic plants, forest-based products, etc., without impacting sustainability. The growth engine of the region can be high-value agriculture, fish farming and tourism, especially farm/eco-tourism.

The soil of the north-eastern part of India is untouched by chemo-centric agriculture unlike in green revolution belts, offers scope for evergreen revolution. There is a big opportunity in NE India for being world leader in organic farming. In addition, state-specific strengths should be given priority. Orchid cultivation in Arunachal Pradesh where more than half of the 1,000 Indian varieties are found in Arunachal Pradesh, mushroom cultivation in Manipur, spices in Nagaland, off-seasons vegetables in ML & AP need to be fully valued.

Thus, all the eight states of NE India have different developmental prospects and resources to support their efforts in contributing to the regional as well as national economy. In addition, there is no lack of trained human resource to take the agriculture sector forwarded in NE India. "Look East Policy" of the government should be taken as the opportunity through developmental activities in agriculture centric employment generation in the region.

Strategies for the North-east Indian Agriculture:

In order to improve the contribution of the agricultural sector to the overall development of the North-East, there is a need to devise an appropriate, regionally differentiated strategy. Some of the major strategies and scientific techniques suitable for NE region of India are discussed below.

Promoting intensification and diversification of crops:

The NE region has high potential for agricultural intensification and diversification, particularly towards high-value crops. In case of rice, mono cropping has allowed the field to remain under fallow for a considerable period of time, where more than one crop is possible to grow (i.e. double or triple cropping) in a year. As the climate is favourable, farmers can go for *Rabi* crops such as toria, vegetable crops (chilli, capsicum, cabbage, cauliflower, knolkhol, potato etc.), fodder crops (oat) etc. On the other hand, inclusion of summer leguminous crops (such as greengram, blackgram etc.) can improve and sustain the fertility and productivity status of soil.

Diversification with different crops in the same piece of land can also be a promising option under dryland, rainfed situation of NE India. Depending on the land situation, multiple cropping options such as inter-cropping, relay cropping, cultivation of crops through raised & sunken bed techniques etc. can play an important role in augmenting agricultural production in NE region of India.

Multi-storied cropping system:

Population pressure limits the horizontal expansion of cultivable land. Thus, vertical expansion through multi-storied cropping system can play imperative role for harnessing the solar energy efficiently from per unit area. Agroforestry, in this context, holds great promise in augmenting wood production in our country in one way and increasing agricultural production in other, without much adverse effect on land and environment.

About 80% of the people of north-east India lives in the rural areas and almost all of them are directly or

indirectly concerned with agriculture. Farmers, in this region, are generally small holders and an attempt with agroforestry practices can result an increase in their earnings without endangering the fragile ecosystem. So far as geographical location and socio-cultural behaviour of the people are concerned, the following systems has edge over other systems of agroforestry in NE region of India-

i) Agri-Silviculture: (crops + trees)
ii) Agri-Horticulture: (crops + fruit trees)
iii) Silvi-Pasture: (trees + fodder crops)
iv) Horti- Pasture: (fruit trees + fodder crops)
v) Agri-Horti-Silviculture: (crops+fruit trees + trees)
vi) Homested Agroforestry

Thus, agroforestry in north- east India holds a great potential to make a positive and significant contribution to agricultural output.

Rice cultivation under flood prone situation:

In north-east region of India, flood during rainy season has been a major problem since long back which damages the crops. On an average, 0.5 million ha of rice lands are annually damaged by flood.

Under such a situation, farmers may go for the rice cultivars which are suitable for flood prone areas of north-east region of India. Assam Agricultural University, Jorhat have development many rice varieties which can tolerate and escape flood problems. Rice cultivars for flood prone areas of NE India, more particularly for Assam are as under noted-

i. Under pre-flood situation: Luit, Kapillee, Disang, Lachit, Kalong etc. rice cultivars are short durational, having very good productive potential can be grown during February to April months of the year.
ii. Rice cultivars for post-flood situation: Same varieties those are suitable for pre-flood situation can also be grown during August to November when flood water recedes.
iii. Rice cultivars suitable under delayed planting situation: Cultivars like Gitesh and Prafulla can be sown in the month of June and transplanting (with 60 days old seedlings) can be done during August. Thus, under delayed planting situation, these cultivars can be harvested during November. Manohar Sali is also good under such a situation.
iv. Submergence tolerance rice cultivars: Jalashree, Jal Kunwari, Plaban etc. can withstand flash flood situation remaining up to 15 days under submerged conditions.
v. Under prolong flood situation: Bao rice varieties, having kneeing ability are suitable prolong flood prone areas of NE India. Such varieties include Panindra, Padmanath etc. which can grow up to 1 meter water. Besides, there have some traditional cultivars which can even grow beyond 1 meter water depth.

Besides, System of Rice Intensification (SRI) technique has been gaining popularity which increases the production of rice in one way and conserves the resource base, in other.

Thrust to high-value agriculture/ Organic farming:

Fruits (like- banana, pineapple, orange, passion fruit and papaya), spices (like- ginger, garlic, black pepper, cardamom, chilli), plantations crops (like- tea, rubber and bamboo) and sericulture are capable of generating high returns per unit of land and provide good avenues for investment.

Given the NER's agro-climatic suitability for high-value agriculture, and the minimal use of chemical fertilizers (as indicated earlier) in the region, measures should be taken to develop and protect the North-East as an *organic farming zone*. Through the use of contract farming and the active involvement of multinational corporations, a strong thrust can be given to export-oriented agriculture.

As the climate of NE India is favourable to horticultural crops, effort should be made to improve their cultivation, specifically the *off-season* vegetables.

Rain-water harvesting:

NE India cannot achieve sustained progress in agriculture unless and until more and more cropped area is brought under assured irrigation. Utilization of ground water for agricultural purposes may create problem under long run. So, priority should be given for harvesting the rainwater and efficient utilization of surface water.

The NE region is endowed with high rainfall, but rain-water is neither conserved nor harvested to increase crop yields and intensify agriculture. Appropriate watershed programmes with people's participation need to be encouraged to harness the untapped benefits.

Hill agriculture:

There is a scope to push the production of shifting cultivated area by restoring the water and fertility status of soil. Intercropping with closely planted suitable species in single or double rows, across the slope of the hill, in *Jhum* cultivated areas is highly effective to maintain the productivity of soil.

The top most area of the hill along the vegetation is allowed to grow without disturbance. The middle portion of the hill is converted to bench terracing that consists of series of bench like structure or platforms, by digging the soil from upper part of the terrace and filling the lower part. The shoulder like bunds is prepared at the end of the each terrace, on which bamboos can be planted to arrest the loss of soil and water. Such bamboo belt (single or double rows) after each bench terrace ensures a uniform distribution of moisture and nutrients through out the terrace. The foot hill area can be utilized for cultivation of crops such as- pineapple, ginger, turmeric, vegetables etc.

Again, Sloping Agricultural Land Technology (SALT), terrace cropping, contour bunding etc. are scientific, alternate methods of cultivation in hilly areas, recognized as environmentally safe, economically profitable and socially acceptable methods for the *Jhumies*, especially in *Jhum* prone north eastern region of India.

Thus, the hilly terrains and slopes of these states may be used for plantation crops (such as fruits, rubber and forestry), flower and livestock to supplement food production and income generation. Such strategy for the hilly terrains can promote production of staples (rice, maize and pulses) and high-value crops along with livestock and sericulture in NE India.

Integrated Farming Systems:

With rising population, declining land-man ratio and increasing mechanization in farm operations, agriculture alone is not able to provide adequate income and employment to households in India. Besides, in recent years, food security, livelihood security, water security as well as natural resources conservation and environment protection have emerged as major issues worldwide. Here, within the broad concept of sustainable agriculture, "Integrated Farming Systems" hold special position as in this system nothing is wasted, the byproduct of one system becomes the input for other.

Integrated farming is an integrated approach to farming as compared to existing monoculture approaches. It refers to agricultural systems that integrate livestock and crop production. Moreover, the system help poor small farmers, who have very small land holding for crop production and a few heads of livestock to diversify farm production, increase cash income, improve quality and quantity of food produced and exploitation of unutilized resources. Population growth, urbanization and income growth are fuelling a substantial increase in the demand for food of animal origin, while also aggravating the competition between crops and livestock (increasing cropping areas and reducing rangelands).

Such combination of food crops with livestock, fishery, piggery, forestry and horticulture can also be suggested for the states of Arunachal Pradesh and Mizoram, where the cultivable land is less than 10 per cent of the total geographical area.

However, following measures should also treated on priority to improve agricultural productivity in NE region of India-

i. Popularizing high-yielding variety (HYV) seeds, encouraging the use of appropriate inputs, and developing climate-/location-specific and pest resistant varieties of seeds.
ii. Training, farmer's fare and mela etc. awareness programmes should be arranged as much as possible to make the farmers aware about the problems of conventional agricultural production technologies and also to guide them about the scientific methods of agricultural production.
iii. There is urgent need to mechanise the agricultural operations so that wastage of labour force is avoided and farming is made convenient and efficient. Agricultural implements and machinery are a crucial input for efficient and timely agricultural operations, facilitating multiple cropping and thereby increasing production.
Strategies and programmes should directed towards replacement of traditional and inefficient implements by improved ones, enabling the farmer to own tractors, power tillers, harvesters and other machines.
Strenuous efforts are being made to encourage the farmers to adopt technically advanced agricultural equipments in order to carry farm operations timely and precisely and to economise the agricultural production process.
iv. A well formulated plan to develop rural

infrastructure, focusing on agriculture, trade and tourism, will yield huge returns and contribute enormously to the overall development of the region.

v. *Post-harvest management:* In order to improve the profitability of farming operations, emphasis must also be placed on post-harvest management and marketing linkages. Since most states in the North-East produce tropical and subtropical fruits, spices and flowers, the marketing infrastructure for the value addition of such produce needs to be put in place. Developing cold storage facilities, establishing processing centres, applying quality control, using advanced packaging techniques and modern transportation methods, setting up ancillary units, attracting private corporations, encouraging contract farming etc. all these measures are capable of minimizing economic losses. While such investments require adequate institutional financial support, they will fetch good returns for the farming community in the region.

Conclusion:

Agriculture depends on natural environment. Therefore, in the present context of rapid degradation of natural environment, efforts should be directed for meeting the needs of the present generation without compromising the needs of future generations. A well-focused plan focusing on local strengths must be formulated and implemented to improve farm productivity, promote high-value agriculture, encourage contract farming and strengthen rural infrastructure such as roads, irrigation structures and communication networks. The strategies describe in this article are found to be practical feasible options for agricultural development as these options are recognized as environmentally safe, economically profitable and socially acceptable methods. However, farmers, Agricultural Universities and Department of Agriculture should work hand-in glove for overall agricultural development in north-eastern part of India.

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