Chapter VIII
8.1. Economy of the state of Assam

Assam is the easternmost state of the Indian Union and is located between the latitudes 24°08”N and 27°58”N and longitudes of 89°42”E and 96°01”E. The economy of the state is predominantly agricultural. The state has immense potentiality for increasing agricultural production with suitable climatic condition, rich and fertile soil and enough water resources.

Assam has been experiencing very high population growth since 1901. During the period from 1951 to 2001, population of Assam has increased from 80 lakh to 224 lakh. Due to low productivity and absence of diversification of agriculture in Assam, the high growth in population has created food problem in the state.

The land use pattern of Assam highlights that there is little scope for further physical expansion of arable land in the state. At
The present total area available for cultivation is 34.8 per cent of the total geographical area of the state. Forest covers 22 per cent of land area; the cropping intensity in the state is 149 per cent. During the period from 1951–52 to the end of the seventies, the net area sown in Assam has increased considerably by extending cultivation to new areas, but since 1981, net area sown in the state has remained more or less stagnant.

Assam produces both food crops and cash crops. But the cropping pattern of the state is dominated by food grains particularly paddy crops. Rice is a staple food of the people of Assam and it is grown everywhere by all sections of the society in the hills and the plains. But the productivity of rice as well as other food grains is low as compared to other states of the country due to various constraints. Increasing production of food grains at a rapid rate has become an urgent need in Assam in the face of unparallel population growth in the state. The fact is that the state has by and large fallen in a situation of "food-trap" in the post independence period, where growth in consumption demand of food grains persistently exceeds the production growth for a long period. The result is – once a
surplus state has become a net importer of rice from the early 1970s. Though there have been some achievements in the productivity during eighties and nineties, it is much lower as compared to agriculturally developed states like Punjab, Haryana etc. In these circumstances, the state must intervene by investing heavily on the strategic research on newer production frontier.

8.2. Cropping Pattern in Assam

The cropping pattern of Assam is characterized by predominance of food grains over non food grains. Nearly 80 per cent of the total cropped area of the state is occupied by the food grains. Rice is the main food grain crop of Assam, which occupies 90 per cent of the total food grain area. Thus, the trend of production of rice exerts a considerable weight on the overall growth rate of agriculture. During the last fifty years (1951 - 52 to 1999 - 2000) the cropping pattern of Assam does not show any significant change. Rice continued to dominate the cropping pattern. Among rice, winter rice occupies the major share (nearly 60 per cent). But in recent years, the share of this rice has shown a gradual decline while the share of summer rice has shown an increasing share in

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the total rice area. Pulses, an important food grain crop shows a constant share in the total cropped area during the last fifty years. The importance of wheat as cereal crop has increased in the state since 1980. The whole area under wheat has been brought under HYV seeds. Among other crops rape and mustard, sugarcane and potato have improved their position in the total cropped area while the share of jute, mesta and tobacco has registered a decline. No significant change has been observed in the crop combination and diversification in the districts of Assam. Nagaon, Goalpara, Darrang, Lakhimpur and N.C. Hill has become more diversified region while the position of Kamrup, Sibsagar and Karbi Anglong has remained static with regard to crop diversification. Only Dibrugarh district shows a decline in diversification.

8.3. Growth performance of food grain crop in Assam

The present work has looked into the growth performance of food grain crops in Assam across its districts, for a period of five decades (1951 – 52 to 1999 – 2000). The result of the growth analysis reveals that the increase in production of food grain crops during pre Green Revolution period is mainly due to significant
growth in area as yield remained stagnant in most of the districts of the state. During post Green Revolution period, area continued to grow at lower rate till the eighties while it remained stagnant during the nineties.

Productivity increased significantly during the post Green Revolution period in the state as well as most of the districts except Karbi Anglong. As a result of combined effect of area and productivity, production increased significantly with 0.97 per cent in the state. Among the districts, the highest growth in production is registered by Nagaon in the post Green Revolution period, as against Karbi Anglong in pre Green Revolution period. The productivity growth rate is found to be significant only during eighties and nineties. Among the districts, Nagaon, Goalpara, Kamrup and Darrang registered higher growth in productivity than other districts. For the over all period the compound growth of area, production and productivity is found to be 0.56 per cent, 0.88 per cent and 0.32 per cent respectively. Decade-wise growth in production indicate that as against 0.39 per cent growth in Period I (1951 – 52 – 1966 – 67), the growth increased to 1.03 per cent in
sub Period II (1967 – 68 – 1977 – 78). As compared to sub Period II, growth in production is found to be lower with 0.97 per cent in sub Period III and 0.70 per cent in sub Period IV. This declining rate of production growth is mainly due to non-availability of further expansion of cultivable land.

8.4. Instability in Assam Food Grain Sector

Instability analysis is divided into two sections. In the first section, variability in area, production and yield is measured over the periods by coefficient of variation. In the second section production variance is decomposed into different components to judge their importance by using Hazell’s decomposition model.

The result of the first section indicates that during the period under study (1951 – 52 – 1999 – 2000), there is a general increase in variations in area, yield and production for all the food crops in all districts of the state. Such fluctuation is found to be much higher during the post Green Revolution period as compared to pre Green Revolution period. For the entire period, the highest variations is recorded by Karbi Anglong district and the lowest fluctuations by
Darrang district. Both area and productivity variation contributed to the variation in production in the state. However, area variation is slightly higher than productivity variation during Period I for all crop groups except pulses; while in Period II, yield has shown much higher fluctuation than the area. This might be due to technological changes, which have brought about some changes in the yield of cereal crops, while area has remained stagnant due to scarcity of cultivable land. The analysis also reveals that pulses register higher degree of fluctuations for both area and production in most of the districts of Assam as compared to cereal crops. Results of variance decomposition analysis indicates that for rice and total cereals, area variance accounts for highest share of production variance in Period I followed by productivity variance and area productivity covariance. The major source of production variance in most of the districts including Goalpara, Kamrup, Darrang, Nagaon, Lakhimpur, Dibrugarh, Cachar and N.C. Hills is found to be area variance, while productivity variance contribute largest share to production variance in Sibsagar and Karbi Anglong district. In Period II, area variance has continued to be the major source of production variance in Goalpara, Kamrup, Nagaon,
Sibsagar, Dibrugarh, Cachar, Karbi Anglong and N.C. Hill districts, while in Darrang and Lakhimpur districts, productivity variance contributes the largest share. For the entire period also area variance contributes the largest share to production variance followed by productivity variance. The area productivity covariance had a negative effect in this period.

For the crop group of pulses, area variance contributed the largest share in Period I, while in Period II, the major contributing source was productivity variance. But in the whole study period, contribution of both area variance and productivity variance was in the similar pattern.

8.5. Factors affecting Growth and Instability

It has been mentioned in the preceding section that growth scenario of Assam's food grain sector is not satisfactory. Despite the immense potentialities, Assam has failed to accelerate the production and productivity of food grains during the period under study. Abundant natural resources are yet to be exploited properly and upto capacity for the agricultural development of the state.
Area under crops has been extended without any significant improvement in the form of technology. Lack of assured water, low level of fertilizer consumption, inadequate use of pesticides, slow progress in adoption of HYV seeds, inadequate supply of agricultural credit, poor economic condition of farmers, social barrier, increase of marginal lands, fragmentation of holdings, insufficient marketing facilities, non availability of storage facilities, inadequate extension services, non-implementation of tenancy reforms and the recurring flood hazards are some of the reasons, which impede the production and productivity of crops in the state.

8.6. Policy Measures

In the context of foregoing discussion, it is felt that there is urgent need of improving the present agricultural situation in Assam by raising the crop intensity through multiple or relay cropping and substantially raising the productivity of crops per unit of area. For this purpose the following policy measures have been suggested:
8.6.1. Land Reform measures

It is very unfortunate that the various land reform measures undertaken in Assam have not been implemented properly to assist the farmers in their endeavours to raise agricultural production. Therefore, steps should be taken to implement these measures properly and if necessary by changing the existing policies. For this purpose, a drastic land distribution policy should be taken, which will break the monopoly of big farmers and help equal distribution of rural income. The agricultural land distribution policy of the Government should be such that each farmer gets sufficient land for remunerative production. State should also make laws to prohibit subdivision of land into uneconomic sizes. For this purpose, if necessary the ‘law of inheritance’ should be amended. Besides new laws should be enacted to debar the non-cultivating members of a family employed in other occupation from inheriting the agricultural land and purchasing such lands from the peasants. Adoption of improved technology is not possible unless the farm size is raised to an economically feasible unit. But in Assam the average size of land holdings is very small (1.27 hectares according to agricultural census 1990 – 91). Besides, there are
marginal farmers with skill and vigour with or without little holdings of land. In such cases, the co-operative farming systems will be the best policy. But in Assam, the progress of co-operative farming is not encouraging. But it is necessary for small neighbouring farmers to form such co-operatives for more production. For this purpose proper guidance and help should be given to these co-operatives to achieve the purposes by the Agricultural Department of the Government.

In order to reduce the pressure of population on agricultural land, Government should undertake programmes for the development of rural based industry and other projects such as transport, irrigation projects, rural electrification etc. Such programmes will absorb a large labour force and thus will release the excess surplus labour force from agriculture.

8.6.2. Development of agricultural research, education, training and extension services

For the development of agriculture, the research and extension services of Assam will have to be strengthened to provide
solutions of problems faced by the farmers. For this purpose, agricultural research institution should be revitalized. The various research conducted by the Agricultural University should be based on local level problems and production oriented so that it can suit the specific needs of the state. The agro-climatic and other situations of Assam are different from other parts of the country. Assam has fertile soil for different crop cultivation, but the soil of certain area need special treatment to raise the yield of crops. Therefore, agricultural research work in the state should be directed to evolve such seeds and technology, that will be most suitable for the different types of soils and climatic conditions of the state and farming technology appropriate for small and marginal farmers. Further, there must be wide publicity about the seeds and technology developed by such research work among the farmers through establishment of experimental farm and by holding field demonstrations.

The Indian Council of Agricultural Research (ICAR) has innovated programmes to impart training and education to the farmers to spread knowledge of technology among the farmers.
The state should avail all these facilities imparted by ICAR for agricultural development of the states. Further, the training programmes for the farmers should be need-based. Therefore, while preparing the course contents for training programmes, necessary advice should be taken from the local agricultural officers as they are more aware of the local needs of the farmers.

The illiterate farmers may not be enthusiastic to adopt the new seeds and technology until they see the changes very vividly. So the Department of extension services should make practical demonstration of new seeds and technology to the farmers. When they are satisfied that the new methods give much more yield, this demonstration can be held in some individual farmers. Gradually the neighbouring farmers will adopt these new seeds and technology and gradually this will spread to cover the whole state.

The role of Agricultural extension officers will be very crucial for the success in adoption and extension of the new technology and improved seeds; they will have to hold block level training programmes to some literate and selected farmers of the block;
then such training programmes to be extended to the village level; this will require greater number of field officers if the programme is held simultaneously all over the state; as, so many officers may not be available, the change can be done gradually by first starting with one district and then to another and so on. This will take up some time of a year or two or more; but when the whole of the state is covered, the result will be very satisfactory both to the state and to the farmers. Farmers will find their production of crops as increased manifolds.

The success of this programme mostly depends on the sincerity and devotion of the agricultural extension officers. If they sincerely work for this purpose, they can bring about the change. For this purpose, the service of the Gram Sevak can also be utilized; if the block level extension officers give training to the Gram Sevak about the new technology, they in turn will give training to the farmers falling under his area under the supervision of the extension officer. Thus the whole of the state can be covered within a year or two. What is required is the sincerity and devotion of the field officers, both the block level and village level.
8.6.3 Use of Improved Seeds

Seed is the basic, vital and central input in agriculture and all farming system. It is the timely availability of quality seeds of right variety in adequate quantity that decides the strength and health of an agricultural economy.

The supply of quality seed is very minimum in Assam. Therefore, farmers in the state are compelled to use the farm saved seeds which do not have any quality standard. Many times non descript varieties are also used as seeds by the resource poor farmers which result in low productivity. Therefore, there is an urgent need to increase the supply of seeds in order to meet the growing demand for seeds.

Production and supply of hybrid seeds of the crops require highly technical know how, trained personnel and resources. The following suggestions are given in order to increase the production and supply of seeds in the state:

(a) Government should encourage seed production in the private sector along with public sector.
(b) Proper co-ordination must be maintained between various seed producing organizations so that they can meet the seed demand of the state.

(c) Necessary financial support should be given to the seed producers. For this purpose, a good budgetary provision must be committed for development of new varieties, hybrid and seed research.

(d) To maintain the purity of seed, necessary programmes must be organized to train the seed producers. The number of seed testing laboratories must be increased in the state.

(e) Steps should be taken to disseminate the technical know-how among the seed producing organization to increase their productivity.

(f) Steps should also be taken to supply the seeds to the farmers in proper time and at reasonable price.
Extensive publicity should be given among the farmers about the beneficial effects of hybrid seeds by farmers’ training programme and field demonstration.

8.6.4 Pest Management

As the HYV seeds are easily susceptible to pests and diseases, necessary steps should be taken to protect the crop from the ravages of pest by adopting appropriate pest management practices. During the early years of Green Revolution, use of chemical pesticides was popular as a plant protection measure. But it is observed that over use of chemical pesticides led to poisoning people and animals and as well as polluting the environment. The other problems associated with over use of pesticides is the contamination of soil and water resources including the aquatic system. Continued use of harmful pesticides pose greater danger to the soil fauna and flora. Chemical pesticides and their residues have often been detected in food grains, vegetables, fruits, oils etc. in most part of the country. Due to harmful effects of these chemical pesticides the use of non-chemical methods of pest management have become popular in different parts of the country.
Such pest management methods include botanical and biological pest control tactics.

In Assam also 'Bio basis' method of pest management becomes popular in the recent years. In order to develop and popularize this method of pest management in every corner of the state, the following suggestions are made:

1. Farmers of Assam should be given necessary training under the FFS (Farmers Field School) approach of integrated pest management programme in order to let them know about the eco-friendly crop production programme. Such programme should be extended to each corner of the state so that each farmer gains knowledge as how to grow healthy crops and manage crops.

2. The presently available biological control agents and botanical pesticides should be made available to the farmers of Assam and all the needed infrastructure should be developed with a view to enable the farmers to adopt these
non-chemical methods of IPM (Integrated Pest Management).

3. Great attention should be given for conservation and augmentation of natural enemies and developing better methods of mass culturing, storage, transport and field release.

4. Research work should be encouraged to innovate new pest management method suitable for the state of Assam under the IPM-eco-friendly approach in agricultural production activities.

It can be expected that proper use of eco-friendly approach in agriculture in the state will protect the crops from the ravages of pest and raise crop productivity and production of quality crops.

8.6.5 Use of Fertilizer

Fertilizer is one of the key inputs in our endeavour to increase agricultural production to feed our increasing population. Though,
fertilizer consumption has been rising over the years, per hectare consumption is still very low, even when compared to our neighbouring states. Therefore, there is need to undertake some measures by the Government to increase the supply of fertilizer within the state. Fertilizers should be made available to the farmers at the time of need through well-organized distributive agencies at reasonable rate. Periodical soil testing based on fertilizer application for specific crops should be made. The State Government's extension agencies, fertilizer companies and NGOs can provide these services. Optimum productivity level can be attained if fertilizers are applied according to the recommendations of these agencies. Organic materials of plants and animals has a unique role to play in soil fertility. Therefore, farmers of Assam should be encouraged to use the organic materials derived from plant residue and agricultural waste.

8.6.6 Development of irrigation and water management

Agricultural development depends a great deal on the availability of adequate and assured irrigation facilities. Assured irrigation especially during winter months is an imperative need for the
optimum utilization of chemical fertilizers and HYV seeds. Irrigation also enables diversification of cropping pattern from the traditional mono cropping to multiple cropping vis a vis increase in productivity. Unfortunately, development of irrigation is extremely tardy in the state. A good proportion of agricultural lands have been out of use on account of water-logging and salinization caused by seepage from unlined canals and distributaries. So, required steps should be taken in time to develop the irrigation facilities and water management system in the state. For this purpose the following measures have been suggested:

i. Detail soil surveys are required to be carried out in areas where irrigation facilities are available to find out the optimum requirements, wastage by seepage and over application of water. Water should be considered as an economic good. Incentives should be given to those farmers who save water and the motto for the farmers should be ‘more crop per drop of water’.
ii. The State Government should identify areas suitable for setting up lift irrigation schemes. Adequate funds should be allotted for completion of canals.

iii. New tanks can be constructed or old ones can be renovated by the State Government.

iv. The fields should be leveled and shaped in such a way so that it may be possible to apply water to field in a uniform manner without waste. There should be provision for drainage facilities to prevent water logging and salinity.

v. To avoid frequent breakdown or defects of the machines, pump sets, proper repairing services should be arranged. Field channel should be constructed properly. Defects of deep tube wells should be found out in time and proper repairing services should be provided.

vi. The micro irrigation system such as drip irrigation not only save each drop of water most efficiently, but also save the
soil from getting water logged or salined. Such methods can save 30-60 per cent of water, which about 30-50 per cent increased yield. Steps should be taken to adopt and develop such schemes in Assam.

vii. As water management requires substantial skills, which depend upon the technical knowledge of the persons involved in irrigation, the extension worker and farmer should be given training in the utilization of irrigation water.

viii. High priority should be given on rural electrification.

ix. In Assam there is a wide gap between irrigation potential created and utilized. Government should take major steps to reduce the gap.

x. There should be proper coordination between the agriculture and irrigation departments and the between farmers and the departments for getting maximum benefit.
It should be noted that the irrigation scenario in the state after 2000 might show a different picture because of large scale installation of shallow tube wells in the state under the major irrigation project launched in the state through NABARD funding. Nevertheless, the impact of this world be available only from the year 2001 – 2002 onwards.

8.6.7 Mechanisation

Mechanisation of agriculture is also important to increase the total production of food grains for inducing and sustaining the tempo of agricultural growth in the state. Mechanisation reduces the cost of cultivation and helps in reclaiming barren lands. Use of fertilizer and pesticides also require suitable machinery.

In Assam, huge manpower in rural areas and fragmented holding mostly prevent mechanization. Hence, there is little scope for full mechanization of agriculture in Assam. The cost of mechanization is very high and most of the farmers cannot think of buying all the necessary machine and tools themselves. So, it will be convenient for the state to mechanise agriculture only partially.
Iron plough should be made available to the farmers at reasonable price. Tractors can be installed by co-operative farms in a co-operative basis.

Vital agricultural implements should be manufactured within the state and these should be provided to the farmers at a lowest possible price and on hire basis through the co-operatives or through the agents of Assam Industrial Development Corporations.

8.6.8 Marketing

Agricultural marketing in the state is yet to be developed as agriculture in Assam has been at a subsistence level with a very small surplus for sale. The growth and diversification of agriculture mostly depends upon an efficient marketing system. So, the following necessary steps have been suggested for the improvement of present marketing system in the state.

1. All the markets of the state should be brought under the purview of the Agricultural Produce Market Act and regulated according to the time bound programme. Till
now, 24 markets in Assam are under regulated market but none of the markets has shown the expected result.

2. In order to increase the longevity, retention of freshness, texture and reduction of post harvest losses of different types of food grains, horticultural crops and other perishables including seeds, new and modified storage and cold storage facilities must be made available in the rural areas.

3. Available market information can be used to plan as to which crop and varieties to grow, when to grow and harvest and in what quantities. Support in the form of information and marketing extension services to the farmers is therefore very vital. Therefore, the existing marketing information in the state has to be improved by linking all the important markets with computer and networking facilities.

4. A necessary pre-condition for an efficient marketing system is developed transport system. But the existing transport
system in the rural areas of Assam are in very poor condition. Therefore, Government should take urgent step to develop existing the transport and communication system of the state.

8.6.9 Provision of credit

As the small and marginal farmers do not have money to make investment on agriculture, therefore, the major thrust of the existing credit policy should be to provide farmers through institutional agencies.

As the repayment capacity of the small and marginal farmers is relatively lower as compared to rich farmers, banks and other financial institutions should provide adequate repayment period so that loan repayment does not become difficult for the farmers. The micro finance (MF) through SHGs (self Help Groups) should be implemented properly in Assam so that small farmers operating on a micro scale get benefit from such scheme.
8.6.10 Problem of Flood

Flood in Assam is a regular feature and it causes much damage to crops every year in all the localities of the state; as a result, control of flood is the urgent necessity for increasing production. But it has been seen that the state authority has not been able to control flood in spite of erecting great number of dams and taking other such measures. As it seems that it is not easy to control floods, the Government can take some measures and programmes so that the agriculturists can grow the crops during the time of the years when there is no chance of flood. Early varieties of paddy and short duration crops can be cultivated before the probable flood period. There are some flood resistant paddy and other crops, which can also be cultivated during the flood period. Proper selection of crop rotation also help the flood affected farmers to a great extent. For all these, research is essential and Government should install such research center under the guidance of reputed scholars in the line. The main emphasis should be that agriculturists can grow the crops before the flood season and also can grow after the floods recede.
In the flood prone areas crops like mustard, wheat and rabi pulses can be cultivated very profitably. Most agriculturists do this; but for lack of irrigation, proper fertilizer and improved varieties of seeds, the agriculturists do not get the expected volume of crops. Government can also help by giving these facilities to the agriculturists by easy loan and supplying fertilizers at subsidized rates and making irrigation water available. For this also a devoted agricultural department of government and some devoted officers will be required who will sincerely work to get bigger production of crops. But what Government needs is the permanent solution of the flood problem. Once the districts of Lakhimpur, Kamrup, Darrang were growers of crops like paddy; but from years back, all the crops are washed away by floods and the agriculturists people of these area, which form the bulk of the population have become much poor. Actually, the flood problem of Assam, which is caused by the mighty river Brahmaputra and its tributaries is so big and costly that it is not possible to tackle it by the State Government alone. It is therefore to be taken as a national problem; and the Government of India and the State Government should act together using money and talented persons for its permanent solution. It is
heard that the Government of India has agreed to treat the flood problem of Assam as a national one and we hope there will be a permanent solution soon.

8.6.11 Liberalisation and Market economy

The world scenario in recent time has been rapidly changing because of liberalization through economic reforms and also due to globalization on account of the creation of W.T.O. Market economy is now going to play a large role in various economic activities including agriculture.

With increasing globalization of world agriculture, India has an opportunity to participate in the world agriculture market through increasing its competitiveness of various crops. In order to fully benefit from trade liberalization and globalization of agriculture, India should continue to carry out domestic reform through streamlining its domestic markets, institutions and infrastructure policies that reduce high transaction costs and make agricultural commodities competitive in international market. Being a part of India and having high potentiality of increasing agricultural
productivity with suitable soil and climatic conditions for agriculture, Assam should also introduce all the necessary reforms to increase its competitiveness in the production of various food grains and other crops particularly the horticultural crops and vegetables.

8.7 Conclusion

In the context of the rapid growth of population and meagre growth of extension of cultivation to new areas, the future strategy for agricultural development in Assam should be concentrated on increasing cropping intensity and greater emphasis on increase per hectare yield of crops like rice, wheat, pulses, mustard, potato etc. This will lessen dependence of the state on outside sources. There is also need to improve research on crop husbandry to evolve technology suitable to our soil and climatic conditions. In executing such a programme, farmers must be properly trained and motivated through improvement in extension service. For increasing cropping intensity there must be adequate and assured irrigation. So, required steps should be taken in time to develop irrigation facilities and water management systems in the state. In
all such efforts, State Government and Assam Agricultural University will have to co-operate with one another in order to assist the farmers in their endeavours to increase agricultural production.