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Present Status, Potentials, Problems and Strategies for Agricultural Development in North Eastern States

Anuva Saikia*

Economic development of the North Eastern states depends primarily on achievements in the agricultural sector. The management of natural resources like land, water, forest resources for the economic development remains the major challenge for the region. The paper analyses the present status of agriculture in the North-Eastern Region, the potential for development and problems and strategies relating to crop sector. In the last three decades net sown area increased from 36.17 lakh ha to 38.39 lakh has while gross cropped area increased from 45.35 lakh ha to 53.49 lakh ha. The prominent changes in the cropping pattern were expansion of rice area in Mizoram, Meghalaya, Nagaland, Arunachal Pradesh, expansion of area under summer rice (Boro) in Assam, decline of wheat area, and rising importance of pulse, oilseed crops, vegetables and potato and maize in hills.

Growth of productivity was 44.24 per cent for foodgrains, 46.12 per cent for rice, 21.58 per cent for wheat, 39.62 per cent for maize, 27.30 per cent for pulses, 27 per cent for oilseeds and 103.93 per cent for potato. The average annual growth of productivity was lower during 1990-2000-01 as compared to earlier decades. There is scope for improving productivity of rice in Mizoram, Meghalaya, Nagaland, Arunachal Pradesh, summer rice (boro) and winter rice (Sali) in Assam, maize in hill districts, pulses, oilseeds and horticultural crops. The major problems of agricultural development are dominance of traditional production technology under rainfed condition, shifting cultivation, technology gaps, flood damage, low farm power, inputs, credit and marketing. Strategies for agricultural development should include development of short duration rice varieties for flood affected areas, high-yielding variety rice for hill areas, deepwater situations, disease/pest resistant high-yielding pulse varieties, cropping systems for double/multiple cropping, standardised agro techniques for horticultural crops, input supply, irrigation facilities and watershed management approach, improved models for shifting cultivation, support of agro processing services and marketing facilities.

* Professor and Head, Department of Agricultural Economics, Assam Agricultural University, Jorhat – 785 013 (Assam).

Post-Harvest Loss and Food Security – A Study on Fruits and Vegetables in Assam

C. Hazarika[†]

Horticultural crops occupy an unique role in developing countries both in economic and social spheres in respect of improving income and nutritional status particularly of rural masses. Assam produces a large number of fruits, vegetables and spices having high commercial value. This study attempts to estimate the post-harvest losses of the major perishable horticultural crops in Assam. Based on area coverage and total production, the major high valued perishable fruits and vegetables selected for this study were pineapple, orange, ginger and tomato. The maximum post-harvest loss was found to be 22.62 per cent for tomato followed by ginger, orange and pineapple. The study also reveals that the post-harvest loss was more during storage and transportation of the product. Except tomato, the loss was found to be more in the market level than the loss at the growers level. The post-harvest losses of these commodities were found to be very high and proper post-harvest management is the need of the hour to reduce these losses. This will help to increase the per capita availability of these crops at the existing level of production technology. Appropriate strategies like adoption of market-driven production system, appropriate post-harvest handling through proper loading/unloading of commodities and promotion of pack house concept including storage, processing and value addition, creation of adequate transportation infrastructure and organised marketing system are necessary to reduce the post-harvest losses.

Economic Analysis of Potato Production in Barpeta District of Assam

Arun Pandit*, N.K. Pandey*, Rajesh K. Rana*, N.R. Kumar
and K.P. Chandran***

Assam produces the highest quantity of potato and also has the highest potato acreage among all the northeastern states of India. However, it is one of the poor yielding states of India. A study was conducted during the year 2004-05 in Barpeta district of Assam to assess the economic aspects of cultivation. Barpeta was selected purposively since it contributes maximum towards potato production (18 per cent of the state) among all the districts of Assam. The study revealed that the estimated potato production cost was Rs. 255.36 per quintal and the benefit-cost ratio was 1.57. Further, farmers were not using quality seed of improved varieties and balanced

[†]Associate Professor, Department of Agricultural Economics, Assam Agricultural University, Jorhat – 785 013 (Assam).

*Central Potato Research Institute, Shimla – 171 001 (Himachal Pradesh) and **Central Potato Research Institute Campus, Modipuram, respectively.

doses of fertilisers. There was lack of irrigation and cold storage facilities in the area. Farmers also lacked the knowledge of scientific potato production practices. Labour, mulching, plant protection and micronutrients were the important factors affecting potato yield. Further, potato production in the study area was operating under increasing returns to scale. The Data Envelopment Analysis reveals that pure technical inefficiency has the greater contribution to the overall inefficiency. The study suggests the need to intensify efforts to educate the farmers regarding scientific potato production practices. The state Government should make available good quality seeds to the farmers and establish cold storage and proper irrigation facilities.

Sustainable Development of Agriculture in North Eastern India: A Quest for More Economical and Resources Sustainable Alternatives

J.P. Misra and A.K. Mishra[†]

The North Eastern Region of India in general and north-eastern hilly region in particular are highly exclusive in nature due to their peculiarities of location, terrain characteristics, climatic patterns and ecological biodiversity. This paper aims at critically evaluating some of these concerns and suggesting the corrective measures for realising the goals of economic well being to the farmers and artisans of the region. Agriculture development in the region till date can be referred to as primitive in nature being practiced for sustenance of its poor, illiterate tribal populace despite ample resource potential and development opportunities for better, highly favourable economical resources sustainable alternatives. The region falls short of foodgrains of the order of 1.6 million tonnes/year mainly due to poor productivity of various commodities due to scores of limiting factors for the development of modern agriculture. It has been visualised that even if these shortcomings are overcome, the region cannot compete with other states as far as the productivity of various crops are concerned vis-a-vis natural resources sustainability. The cost of production, post-harvest, material handling, packaging, storage and transport will make agriculture a less profitable option as compared to the other highly economic opportunities utilising the same resource base with more sustainability. The exploitation of mineral resources, quarrying and mining activities are already rampant with their ill effects but landowners prefer those activities to agriculture due to its overall low profitability, uncertainty and drudgery. Research experiences with resources conservation and watershed management have also confirmed the fact that farmers are on the look out for other economical options than agriculture. Looking to the

[†]Professor and Head, Department of Agricultural Economics, Narendra Dev University of Agriculture and Technology, Narendranagar, Kumarganj, Faizabad - 224 229 (Uttar Pradesh) and Sr. Scientist (Soil and Water Conservation Engineering), Water Technology Centre, Indian Agricultural Research Institute, New Delhi – 110 012, respectively.

problems through an economical perspective as well as from the point of view of the sustainability of natural resources for realising the desired levels of productivity to abridge the existing gap in supply and demand, the promotion of intensive agriculture does not seem to be the most profitable alternative. This warrants serious attention from the planners and policy makers to shift their attention towards more sustainable and profitable alternatives. The farmers can be weaned away from not only the practice of jhuming but also be persuaded to adopt such profitable ventures which will provide them the much needed financial security, food security and long term resource sustainability.

Agricultural Technology Adoption and Constraints of Development of Char Areas of Sonitpur District, Assam

R.N. Barman and R. Das*

An attempt has been made in this study to analyse the problems and constraints being faced by Char area farmers of Sonitpur district of Assam. Char areas are characterised by riverine and flood prone plain areas with sandy and silty loam soil condition lying in the vicinity of rivers. Gaps in technology adoption and constraints were identified for the Char areas of two development blocks of the district lying in the command area of the river Brahmaputra. Four Char villages of the two development blocks were brought under the purview of the study. The data collected pertained to the year 2004-05. Adoption gaps were computed based on selected technology components. Less progressive (with adoption gap 25 per cent or more) and progressive (with adoption gap of 25 per cent or less) farmers were categorised after studying the technology adoption gaps. Only 12 to 16 per cent of the sampled farmers were found to be progressive. The Char area farmers mainly prefer growing those crops which can escape the damage of flood. The Char area soil condition suits crops like oilseeds and vegetables better. Along with the oilseed crops and vegetable crops the farmers also grow *ahu* rice and in some cases *bao* rice as cereal crops. In terms of technology components adoption gaps were found to be the highest in respect of irrigation (more than 60 per cent) followed by manure and fertilisers and use of plant protection chemicals in descending order for *ahu* rice and rapeseed and mustard in all the Char villages under less progressive category. For progressive farmers also the results are more or less similar though the percentage of adoption gaps were below 25. For vegetable crops other than irrigation the adoption gaps were less than 30 per cent for various technology components even in less progressive categories. The study indicated that the Char farmers lacked even the bare minimum

*Associate Professor, Department of Agricultural Economics and Farm Management, B.N. College of Agriculture, Sonitpur-784 176 (Assam).

of infrastructures in the form of road and communication network, irrigation facilities, storage structures, input distribution network and sale markets. Forced sale is the common feature among the Char farmers because of their poor (about 50 per cent of the families below poverty line) economic condition. Prioritisation of constraints indicated risk due to flood as the major constraints followed by soil condition and irrigation facilities which forced the farmers to make adjustment with the cropping pattern. There is enough scope to tap the potential of the Char areas which can very well be targeted as non-traditional oilseed and vegetable growing areas. The Government, non-governmental organisations, field management committees and financial institutions need to play a major role towards the all round development of Char areas. Strengthening of government machinery through establishment of proper infrastructure of the agricultural development offices, storage structures, input distribution centres, schools, primary health centres, village market centres and construction of irrigation canals are very much the need of the hour.

Agricultural Development in the North-Eastern States: Constraints and Potentialities

Kanak Kanti Bagchi[†]

Agriculture is a dominant activity in the North-Eastern States of India till today both in terms of output and employment. But the existing data and literature suggest that in spite of certain favourable conditions prevailing in the region for a prosperous agriculture, productivity of major crops has remained at a low level in most of the states of the region. Moreover, there is a huge potential for development of some allied activities to agriculture like horticulture, fishery, animal husbandry, sectors, etc. Based on these allied activities agro-processing industries including food-processing units can be profitably set up in some states of the region. The present paper attempts to portray the current scenario in the agricultural sector in these states in terms of growth of the use of agricultural inputs and productivity growth. For purpose of comparison, data on all-India level and on West Bengal have also been incorporated. Moreover, an attempt has been made in this paper to identify the constraints as well as the potentialities of agricultural development of the region. Finally, the paper has suggested some policy prescriptions to make the agriculture and allied sectors more viable and prosperous so that they can play an appropriate role in the economic development of the region.

[†] Professor, Department of Economics, North Bengal University, District Darjeeling – 734 013 (West Bengal).

Dynamics and Prospects of Agriculture in Tripura: An Economic Analysis

**Moloy Kanti Roy, Debdutt Behura, Dibakar Naik and
Durga Charan Pradhan***

Tripura, a land locked hilly state situated in the North-Eastern part of India is endowed with vast green forests and abundant natural resources. Due to its geographical isolation and inadequate infrastructural development, its economic progress has been slow. The economy of the state is primarily agrarian. Shifting cultivation (practice of Jhum) is rampant and is one of the main source of livelihood. Agriculture continues to be the main occupation in the state and also forms the basis for growth of allied activities like fishing, animal husbandry, poultry as well as industries including trade and transport. An attempt has been made in this paper to analyse the change in cropping pattern in the state over the years in terms of growth rates of area, production and productivity of major crops in the state, variability in yield of major crops, dynamics of agricultural production over the years and its prospects. The major crops grown in this state are paddy, pulses, oilseeds, fibres, vegetables, spices and condiments, fruits, tea, coffee and rubber. There has been a significant change in the cropping pattern of Tripura during 1985-88 to 2004-05. The area under paddy which was 2.68 lakh hectares during the triennium 1985-88 has declined by 12.5 thousand hectares during 2004-05. The area under oilseeds, fibres and sugarcane also has declined during the period under study. These areas have been covered by vegetables, fruits, spices, tea, rubber and other plantation crops. The area under these crops was 27.13 per cent of the gross cropped area during 1985-88 triennium and has increased to a considerable extent to 42.80 per cent during 2004-05. Thus the farmers of Tripura have shown a clear signal of crop diversification towards fruits, vegetables, spices and plantation crops and hence the state needs infrastructural facilities like storage and processing of fruits and vegetables which will tend to encourage the farmers to export and increase crop diversification towards high value crops and will raise the farm income in the state. Since Tripura is the second rubber capital of India and has conducive environment for rubber crop, farmers have shown their interest to expand area under this crop and so processing and export facilities for rubber should be created in the state. Productivity of major crops like paddy, wheat and total foodgrains have increased considerably during the study period. Since the co-efficient of variation in yield of major crops has declined considerably during the last decade, the farm productivity may be stabilised by intervening in the technological adoption through major key inputs like quality of

*Assistant Director of Agriculture, Government of Tripura, Dharmanagar, North Tripura and PGRF, Directorate of Planning, Monitoring and Evaluation, Dean of Research and Associate Professor, Department of Agricultural Economics, respectively, Orissa University of Agriculture and Technology, Bhubaneswar-751 003 (Orissa).

high-yielding variety (HYV) seeds, application of balanced fertiliser and expanding irrigation facilities and introducing contract farming. The farmers have already started diverting poor paddy lands to high value crops. If this trend continues yield of major crops will not only increase but its variability will be reduced further and total farm income would increase due to more addition of high value crops in the cropping pattern. More than 70 per cent of the people still depend upon agriculture and there is less scope for increasing the non-farm income in the rural areas. So steps are to be taken to effectively integrate dairy, poultry, fishery and goat and sheep rearing in the farming system. The income through primary sector which was about 56 per cent of the net state domestic product (NSDP) during 1980-81 has declined considerably to 34.18 per cent during 2000-01. Though the contribution of agriculture to the primary sector has increased from 84.59 per cent to 91.53 per cent during 1980-81 to 2000-01, its share to the NSDP has declined from 47.13 per cent to 31.29 per cent during the period, indicating a dissimilar growth in rural and urban income. The share of tertiary sector to the NSDP has increased considerably from 36.51 per cent to 51.80 per cent during the last 20 years. Thus it has given a clear signal to increase rural income by creating facilities for processing of rural produce and its export so that it will reduce the disparity in rural and urban income.

Status and Prospects of Coffee Development Programmes in North Eastern States of India – An Economic Analysis

K.B. Umesh*, **B.M. Shashidhara***, **N.R. Gangadharappa***, **S.M. Srinivasan****
and **B.N. Venu****

Coffee development programme in the North Eastern States (NES) was undertaken primarily to wean away the local inhabitants from the hazardous practice of Jhum/shifting cultivation and to provide permanent source of income to the tribals. Against this backdrop, the study was taken up to assess the current status of coffee development in NES and its performance particularly during the Tenth Plan period. The coffee development programmes have created a marginal impact on the income, employment and livelihood among the tribal households. The impact on socio-economic development of tribals is slow as coffee is taken up as one of the components in different cropping systems. The promotional programmes may take some more time to alter the mindset among the tribal coffee growers with respect to discontinuation of Jhum cultivation. Coffee has vast socio-economic as well as ecological benefits. The coffee plantation is one of the measures for afforestation which can help to provide a green cover to the denuded hillocks and thereby

*Associate Professors of Agricultural Economics, Agricultural Marketing and Cooperation and Agricultural Extension, respectively and **Research Fellows (Agricultural Economics), College of Agriculture, University of Agricultural Sciences, GKVK, Bangalore - 560 065.

improving the entire ecosystem. This crop holds out the promise to accelerate the rural development by opening up vast avenues for the generation of employment and income. In view of this, serious efforts are very much desirable for expansion/consolidation of coffee in these states. The north-eastern region is probably the most suitable area in India for organic farming as the region is by and large, organic by default. Transforming the region into an organic coffee producing zone and connecting it with the domestic as well as international markets would lead to a better welfare among the tribals of the region.

Agricultural Growth and the Cropping Pattern Changes in Assam During 1951-52 to 1999-2000

Pravat Kumar Kuri[†]

The paper seeks analyse the growth performance of agriculture and the nature of changes in cropping pattern in the state of Assam over a period of 49 years commencing from 1951-52. For the purpose of study, the estimates of area, production and yield of principal crops in Assam were collected from the Directorate of Economics and Statistics, Government of Assam. The time series data on area, production and yield of major crops of the state have been compiled for the period 1951-52 to 1999-2000. The overall performance of agriculture in the state does not show any significant trend of prosperity. The increase in yield rates has been very low and even negative for many crops. In the absence of any appreciable change in the relative yield growth rates between crops, the farmers in the state did not make any significant changes in their cropping pattern. Instead, there seems to be a gradual shift of cropping pattern from diversification towards unification favouring foodgrain crops. The major changes in cropping pattern that have occurred during the period are the relative growth of area under foodgrain crops and the relative decline in area under some minor crops, viz., gram, jute and tobacco. The expansion of gross cropped area has led mostly to the expansion of area under foodgrain crops. In effect, the expansion effect of gross cropped area could explain 97 per cent of the total changes in area allocation under crops during the last five decades since 1951-52. A conscious effort involving agricultural scientists, extension and development agencies is required to unveil the untapped potential of agriculture in the State to obtain the targeted growth in yield of crops.

[†]Reader and Head, Department of Economics, University of Burdwan, Burdwan - 713 104 (West Bengal).

Agricultural Development in the North-East India: Status, Assessment and Prospects

S.S. Kalamkar*

An attempt has been made in this paper to study the agricultural development in north eastern states of India. Agriculture is the main economic activity in the region and despite the 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. The agricultural production system in the region is predominantly rainfed, mono-cropped at subsistence level. The north-eastern (NE) region continues to be a net importer of foodgrains even for its own consumption. The NE region has about 52 per cent area under forest cover though there is large variation among the states. The average size of operational holdings is found to be lower in NE region as compared to the same at the all-India level. The cropping pattern in the region (except Sikkim) is characterised by predominance of rice as the lead crop, however, maize is the dominant crop in Sikkim. Foodgrains account for more than 66 per cent of the gross cropped area, which is suggestive of prevalence of subsistence agriculture and lack of crop diversification. The net irrigated area of the region does not constitute a significant proportion of net area sown due to which irrigation coverage under crops is very low. The productivity of all the crops was lower than that of national level. The wide range of disparities among the states, the lack of location-specific and system-based technologies, limited availability of cultivable and farming techniques are the major reasons behind the slow agricultural development of the region. Therefore, adequate attention is necessary to increase use of fertiliser, high-yielding variety seed, availability of credit and storage facilities. The development of location-specific seeds and planting material is required to increase productivity and government needs to regulate output and input markets in an effective manner so as to increase the farmers' income level. Efforts need to be made for location-specific research with increased emphasis on agricultural extension services. Watershed approach of soil and water conservation and development of land-based production programme in participatory mode need to be propagated. Also the development of different types of farming systems to irrigated and rainfed situation coupled with efficient management of soil and water should be worked out.

*Lecturer, Gokhale Institute of Politics and Economics (Deemed to be a University), Pune - 411 004 (Maharashtra).

Institutional Finance for Development of North-Eastern Region: Retrospect and Prospects

G. Gopakumaran Nair[†]

The paper analyses the relative backwardness of the north eastern region (NER) terms of access to institutional credit for agriculture and offer plausible solutions to mitigate the situation. The area has been faced with various challenges, both natural and manmade, pulling back the developmental initiatives of the region. One of the major reasons for the poor status of agricultural development is the low level of access to institutional credit and its small size in the region – warranting immediate remedial measures. Various factors such as share of irrigated area, status of agricultural development, banking infrastructure, extent of repayment of loan, non-performing assets of the banks, status of land reforms, law and order situation, etc. have influenced the credit flow in the region. There is an imperative need for planned efforts from various fronts to meet these challenges being faced by the region. The region deserves attention for the development of agriculture through adequate provision of credit since 51 per cent to 89 per cent of the total population in the region stay in the rural areas and depend mainly on agriculture for their livelihood. The issue of improving the credit flow needs to be addressed by generating adequate demand by modernising/diversifying agriculture, strengthening agriculture extension and encouraging contract farming. Implementation of land reforms, use of governmental agencies and community organisations as banking agents will also facilitate flow of credit. Promotion of self-help groups, joint liability groups, farm management group, strengthening of NGO network, etc., can improve the access of credit by the rural poor in this region.

Economic Upliftment through Watershed Development in North-Eastern Regions of India

R.P. Singh, Ranjit Kumar and N.P. Singh*

The economy of the North-Eastern Region (NER) is primarily agrarian. Its contribution to the state domestic product ranges between 24 per cent in Meghalaya to nearly 40 per cent in Assam and Tripura. *Jhum* cultivation is practiced in the hilly tract of the region and the prevalence of this practice of cultivation amounts to colossal loss of various organic and inorganic constituents by way of soil erosion,

[†]Assistant General Manager, Department of Economic Analysis and Research, National Bank for Agriculture and Rural Development, Mumbai - 400 051.

*Division of Agricultural Economics, Indian Agricultural Research Institute, New Delhi - 110 012.

adversely affecting the crop productivity. The region has tremendous irrigation potential, but due to lack of proper harnessing, the sizeable cropped area is still un-irrigated even in the plains of the region. The problem gets accentuated with the prevalent land use systems practiced in the NEH region. In order to check the environmental and ecological imbalance in the region due to soil erosion, fertility loss, etc., there is a need to develop watersheds in the region on a mass scale. The irrigation potential thus generated will pave a smoother way for the various farming systems, involving agri-horti-pastoral and forestry. The present paper has empirically demonstrated the impact on income and employment generated from experimental watersheds under various farming systems. These watersheds will also arrest the run-offs and soil loss of different farming systems. Moreover, the barren and uncultivable land to the tune of 16 per cent in the region will be brought under cultivation by enhanced irrigation potential. This will give enough boost to the economic upliftment and thereby development of the region as a whole. In a nutshell, watershed in the north eastern region promises a win-win solution by complementing the natural resource conservation and agricultural productivity, thereby alleviating the poverty in a big way.

Growth and Diversification of Agriculture in the North East India

K.C. Borah and D.K. Chakraborty[†]

In this paper an attempt has been made to study the pattern of growth of some important crops and changes in cropping pattern in the North Eastern Region (NER). The study is based on secondary data collected from various sources. The pattern of land holding systems in the NER are not the same in all the states. The study has indicated that rice productivity has recorded an increase of 1.02 per cent per annum in the region, whereas in the case of maize, wheat and rapeseed and mustard the annual compound growth rates in productivity are 1.03, 1.02 and 1.02 respectively. Among the four crops considered, maize recorded the highest growth in productivity followed by rice. The same is the case with the area under production and total production. The area under crops increased marginally from 3,729 thousand hectares in 1990-91 to 3,756 hectares in 1997-98. During the same period area under sugarcane declined from 44 thousand hectares to 36 thousand hectares. The area under vegetables and tuber crops registered a decline from 260.03 thousand hectares to 189.40 thousand hectares. The highest yield variability is found in pulse crop, which can be attributed to the climatic conditions. The extent of crop diversification is examined using the Entropy Index (EI). The EI for the NER for 1990-91 and 1997-

[†]Professor and Lecturer, respectively, Department of Economics, Dibrugarh University, Dibrugarh - 786 004 (Assam).

98 is estimated as 1.172 and 1.083, respectively. The fall in the EI indicates concentration of agriculture in the region during 1990-91 to 1997-98. This downward trend diversification has serious consequences on the sustenance of the rural economy. Besides a number of risks and uncertainties are faced by agriculture, which adversely affect the investment and production decisions. Efforts are needed for enhancing productivity of the crops by modernising marketing infrastructure and through provision of institutional credit. Agricultural policies must take a holistic view in the above directions to enable the economy of the NER to realise its potential.

Economic Analysis of Maklang Watershed Development Project, Manipur

S. B. Singh*, K.K. Datta and S.V. Ngachan***

The paper attempts to study the impact of Maklang watershed project on the changes in land use pattern, income, employment and equity of the households in the watershed and also identify the factors that hinders successful implementation of the project. The project was implemented by the Department of Horticulture and Soil Conservation, Government of Manipur under the centrally sponsored National Watershed Development Project for Rainfed Areas (NWDPR) during the years 1992-93 to 1997-98. All the five villages covered under the project was purposively selected due to the significant difference in the socio-cultural status of the farm households. Using proportionate random sampling technique 65 farm households were selected and the primary data were collected before and after the project during the year 2000-01. The study indicated that the watershed project altered the land use system favourably to horticultural crops, mostly fruits with little attention to the development of field crops and livestock including fisheries. The project could increase the income and employment opportunities of the households in the watershed but it showed income disparity among the sample households. The study necessitates proper attention to the landless, marginal and small farmers while planning for watershed development projects. Self-employment schemes such as village level small-scale industries, post-harvest technologies, marketing and livestock and poultry etc., need to be developed. People's participation in watershed development and management in general is poor due to lack of empowerment to local people and village institutions. Inappropriate technology intervention is observed in most cases due to non-prioritising areas for watershed development and lack of on farm research and a multi-disciplinary perception of issues by research and development agencies. Institutional support such as credit, extension and technical

*ICAR Research Complex for NEH Region, Manipur Centre, Lamphelpat - 795 004 and ** ICAR Research Complex for the NEH Region, Umiam – 793 103 (Meghalaya).

support, etc., is missing in most of the cases. Lack of flexibility in the watershed guidelines, the social issues such as traditional land institutions and tension between communities and poorest, law and order problems and finally little or no attention on post-watershed period constraints the efficient management of the project. Empowerment of local people and village institutions, site-specific research and a multi-disciplinary perception of issues by research and development agencies, institutional support such as extension and credit, enactment of suitable land reforms, joint operational partnership, flexibility in watershed guidance and attention on post-watershed period are some of the policy options for successful implementation of watershed schemes. Watershed programmes are also most likely to succeed in villages with homogenous communities and where difference in the socio-economic status are small.

Agricultural Growth, Diversification and Convergence – A Case Study of North East Region in India

Jayabati Gangopadhyay and Ratan Kumar Ghosal[†]

The paper tries to examine the nature of growth of agricultural output and its diversification across the states in the northeast region of India. It also estimates the relative contribution of different components to the growth of crop output in terms of a simple growth decomposition model and tests the hypothesis of convergence of productivity of crops by using cross state regression analysis. The study does not find any uniform pattern of growth of agricultural output both across the states and the two phases of our analysis. A pessimistic performance with even negative growth rate of foodgrains production is noted for four states in this region. In growth decomposition of rice, the yield effect has been found to be stronger in almost all the states except Arunachal Pradesh over the period of our study and also for some states during the second phase. However, one does not find any uniform pattern of contribution of area and yield to the growth of output both across the two phases of the study and also across the states. The cross state regression results on the convergence of productivity of major crops reveal a tendency of divergence over the period. The region-specific agrarian reform through widespread application of new high-yielding variety seed-fertiliser technology depending on region-specific agro-ecologies and the diversification of cropping pattern conditioned by the region-specific agro-ecology seems to be the necessary condition and the effective public action programme - the sufficient condition for the agricultural growth in this region.

[†]Guest Lecturer in Economics, Hooghly Women's College, Hooghly (West Bengal) and Reader in Economics, Department of Commerce, University of Calcutta, Kolkata, respectively.

Strategies for Agricultural Planning of North East India

N. Ram Singh*

The study provides a historical overview of the economy of the eight states of North-East region and offers suggestions for the successful regional planning in the agricultural sector of the region. A study on agricultural land use planning for economic development and related statistical data of the north east region reveals that there is need for appropriate regional planning for sustainable agricultural development with co-operation among different states of the region. The main findings of the study are: the forest area of Assam valley may be used for intensive farming with major irrigation project. The total area under shifting cultivation for rice in the hills of the region may be used for economic forest and for preservation of the Himalayan ecology. Encouragement of contract farming with incentives in Assam valley for the farmers of the hills of the region under mutual understanding and co-operation among the states.

Agricultural Development and Structural Changes in the Net State Domestic Product of Meghalaya

S.V. Hariharan and M. Anandan[†]

The paper analyses the growth of agricultural sector in Meghalaya and compares it with the growth of other sectors based on the available data. Further, the position of Meghalaya in the Indian economy in terms of net state domestic product (NSDP) and the growth of NSDP (in current and constant prices) of Meghalaya are also analysed. Finally, the study compares the performance of the agricultural sector of Meghalaya State with other North-Eastern States through a few indicators. The share of Meghalaya in the national income of India is increasing and has exceeded 2 per cent since 2000-01. In 1993-94, Meghalaya stood in 25th rank in terms of its absolute value of NSDP among the 32 states of the Indian economy and it has come up to 22nd place in 2003-2004. In terms of per capita NSDP, Meghalaya was in the 19th place in 1993-94 and it has elevated to 15th place in 2003-04. For a long time Meghalaya remains below the national average in terms of per capita NSDP. The NSDP at current price was Rs. 767 crores in 1990-91 and it has increased to Rs. 4,349 crores in 2003-04. In terms of constant prices (1993-94 prices), the NSDP has

*Professor and Head, Department of Agricultural Economics, College of Agriculture, Central Agricultural University, Iroisemba, Imphal - 795 004.

[†]Professor, School of Economics, Madurai Kamaraj University, Madurai-625 021 (Tamil Nadu) and Research Scholar, Department of Economics, B.D. University, Trichy – 620 024 (Tamil Nadu).

increased from Rs. 1,014 crores to Rs. 2,403 crores during the same period. The compound growth rate of NSDP of Meghalaya in current prices works out to 14.68 per cent and in constant prices, it grows by 7.28 per cent. The contribution of agricultural sector in current prices showed an increasing trend from Rs. 203 crores in 1990-91 to Rs. 425 crores in 1996-97. In terms of constant prices, it has come down marginally from Rs. 268 crores to Rs. 259 crores. The share of agricultural sector has declined slowly from 26.46 per cent in 1990-91 to 24.13 per cent in 1996-97. Hence, the available data point out the fact that agricultural sector is contributing approximately one-fourth of NSDP. The structure of NSDP of Meghalaya does not show any remarkable change. In most of the cases there are marginal changes. Only for the service and banking sectors the share has increased. In the remaining sectors, the share remains more or less constant or declines marginally. On the whole, the overall structure of NSDP of Meghalaya has not changed very much and agricultural sector seems to be a significant source of NSDP of Meghalaya.

Trends and Growth Analysis of Sugarcane Cultivation and Processing in North East Region of India

Ashwani Kumar Sharma and D.V. Yadav*

The study has analysed the growth and variability/instability of sugarcane area, production and productivity for the whole north eastern region (NER) as well as its constituent states for four different periods to highlight any change in the post-WTO era. The sugarcane processing scenario was studied for Assam and Nagaland states where sugar factories existed. Sugarcane cultivation saw a spurt in acreage upto mid-eighties particularly in Assam, Nagaland and Manipur as the area under sugarcane increased at an annual compound growth rate of 3.06 per cent for the whole NER. However, it decreased thereafter. The study highlights that the performance of the sugarcane crop was better in Nagaland followed by Tripura for its positive growth, high mean productivity and low instability indices whereas it was not the case in major sugarcane growing states of Assam. The sugarcane processing and sugar production scenario had also not remained favourable in the North East compared to the rest of India. The average duration of the sugarcane crushing season declined to mere 36 days in Assam leading to ultimate closure of the sugar factories. The co-operative sugar factories were more efficient compared to public owned enterprises in the region. The growth rates in area under cane, its yield rate and total production had declined at a much faster rate than in terms of the cane crushing capacity, quantity of cane crushed and sugar production highlighting a deleterious and a multiplier effect on sugarcane cultivation which have been initiated due to lack of proper management

*Sr. Scientist (Ag. Econ.), RCM and Pr. Scientist and i/c RCM, respectively, Indian Institute of Sugarcane Research, Lucknow – 226 002 (Uttar Pradesh).

at the factory level resulting in low mill operational efficiency as well as due to inordinate delays in the payment of cane prices to the sugarcane growers. The sugar factories could crush only 3 to 6 per cent of the total cane produced in the season.

With the closure of the sugar factories, the sugarcane cultivation was carried out at a much smaller scale to meet the demands of gur and khandsari manufacturing units. Sugar was also being produced from khandsari units even after the closure of the large sugar factories. Khandsari units have helped the industry in catering to the emerging needs of the local markets. However, khandsari industry could not grow satisfactorily even in the absence of competing sugar factories in the region. Nor it provided adequate incentives to the farmers despite the fact that about 84-86 per cent of cane was at their disposal. This may be due to their limited capacity or a lack of supportive cane development programme or both. If the sugar industry is to be revived in the region, districts/small pockets of sugarcane growing 100 ha to 300 ha in NER may be the ideal sites for khandsari units to begin with, provided a conducive policy environment is provided to them. Assam is still having 26 thousand ha under sugarcane and therefore more than one sugar factory could be run satisfactorily and viably. The demand for industry-driven technology will always remain the need and research and development system need to be redrawn for meeting the new challenges of the industry such as cogeneration and ethanol production in the sugar factories. The problem of insecurity which has resulted into lack of private investment (private sugar factory) in the region also needs to be tackled on priority basis to generate adequate business investment.

Agricultural Growth, Crop Diversification and Technology Assessment for Crops with Special Reference to Rice in the Flood Plains of Assam

K.C. Talukdar, A.K. Das and J.P. Hazarika[†]

An attempt is made in the paper to examine agricultural growth, extent of crop diversification and technological effects on rice cultivation in Nagaon district of Assam. Secondary data were collected from various published sources of Government of Assam pertaining to the years 1951-98 and primary data were collected from 200 marginal and 200 small farmers in Nagaon district of Assam during 2000-01 for micro level analysis. It was found that several districts of Assam are in the flood prone zones affecting two lakh hectares annually and the farmers sustain their livelihood adjusting their cropping pattern before and after flood. Cropping pattern in the state is pre-dominated by cereals whose proportionate area is declining in the recent years and the state has witnessed a moderate growth of

[†]Professor and Associate Professors, respectively, Department of Agricultural Economics, Assam Agricultural University, Jorhat - 785 013 (Assam).

diversification. In cereals, summer rice emerged as a rescue crop in the flood affected areas. Area growth of some commercial cash crops like sesamum, jute, onion, potato emerged in the flood affected areas against flood risk. The state has witnessed a declining growth of cropping intensity and crop diversification in all crop groups in the recent years. Case studies indicated that upland and medium land were more intensively used with higher magnitude of diversification under irrigated and unirrigated conditions. Special emphasis may be put for land based crop planning to increase cropping intensity and diversification indices. The marginal and small farmers could generate higher return and employment increasing cropping intensity and realising higher prices by cultivating high valued crops. Medium land was highly productive with a good base of food security while up land was good for income source through cultivation of high valued crops. The return and profitability were higher for *boro* rice with full technology, pulses and oilseed crops due to higher market prices, and vegetables adjusted in early seasons could fetch higher prices generating higher return and higher profit. Most of the spices and condiments were found to be highly remunerative. The level of technology used was below the recommended level in rice and it was higher in *boro* and early *ahu* rice. Application of fertiliser was higher in winter crops. There exists wide gap between the average productivity of rice and best farmer productivity of rice in the state due to the low level of technology used. The farm strategies may be formulated for commercial cultivation of vegetables, pulses, oilseed crops, spices and condiments for farm income generation and to bridge the demand supply gap of pulses, oilseeds and spices. This will also strengthen the state exchequer. There is scope to increase productivity of rice with proper use of technology and crop planning. The important constraints to diversification like strengthening of input and output markets, irrigation, roads and communication, mechanisation, credit and storage facilities and agro services should be minimised. Extension for commercialisation of crop cultivation will be highly imperative for generating income and employment in the farm sector.

Arunachal Pradesh - Initiating Agro Processing in the Fledgling Horticulture State

S.S. Sangwan[†]

The paper discusses the status and scope of horticultural and spice crops in the state of Arunachal Pradesh. An attempt is made to identify the constraints in sustaining this tempo of horticulture growth and thereby suggests an approach for developing marketing infrastructure and agroprocessing facilities. The study relies

[†]Deputy General Manager, National Bank for Agriculture and Rural Development, Pune - 411 001.

on data collected from the published sources as well as the author's personal visits made during the years 2002-04 all over the state and through interactions with the relevant officials and farmers. Fruit crops like pineapple, orange, guava, etc., have been planted since 1980s while apple, kiwi have emerged as important fruits crops in recent years. As per the latest available data, the area under fruits was 56,132 ha during 2003-04 with total production of 103594 MT. The setting up of Spices Board in Itanagar has renewed focus on spices too. The main spice crops grown are ginger, large cardamom, black pepper, etc., occupying 14564 ha of area with 41137 MT of production during 2003-04. Some aromatic crops like citronella (*cymbopogon winterianus*), geranium (*pelargonium graveolens*), patchouli (*pogostemon cablin benth*) mentha (*menthe arvensis*), etc., are also coming up due to their comparative advantage in marketing from this distant location. The New Agricultural Policy of the state has projected area to be brought under fruits and spices as 83,402 ha by 2010. As against this scope, the challenges are the development of markets, cold storage and processing units from almost non-existent base. Provision of credit in the absence of land records is also a serious constraint. The announcement of New Agricultural and the Industrial policies have not made any headway especially in the agro-processing units. It indicates some other latent reasons that do not allow the normal economic laws to attract investors.

The state can take up setting up of markets, cold storage and processing units in a few strategically identified areas on its own. These investments will have the income multiplier effect on the economy. This will mitigate the risk of capital investment and loan requirement of an individual investor. As regards the state, loans for this purpose can be availed of from Rural Infrastructure Fund of National Bank for Agriculture and Rural Development. Besides, subsidies are available for all these investments under the ongoing Central Government schemes. However, the state government shall have to take an irrevocable decision to lease out these units to experienced private entrepreneurs on competitive basis at the conception stage of the project to avoid delay and loss to the government. If a well thought out detailed plan is worked out by professionals then most of the repayment may come from the lease amount itself. Moreover, the generation of higher state domestic product in this process will provide additional tax revenues to the state government.

Agricultural Development Status in North Eastern States: Assessment and Priorities

Subhasis Mandal[†], Suchitra Mohanty[‡], M.R. Verma[†] and A. K. Tripathi[†]

The paper attempts to analyse the various issues related to sectoral transformation and agricultural development status in north eastern states of India covering the following aspects of agricultural development in north eastern states:

[†]Division of Agricultural Economics and Statistics, ICAR Research Complex for NEH Region, Umroi Road, Umiam, Meghalaya, [‡]Commission for Agricultural Costs and Prices, Ministry of Agriculture, New Delhi.

first; changes and growth of various sectors *second*; the status and progress of agricultural development, *third*; highlighting the potential areas to be explored to augment the farm income and *finally*, the study suggests broad policy implications for the region. The agricultural sector in north eastern states is experiencing the transition phase, slowly shifting out from traditionally low-income agriculture, but is yet to reach the stage of pre-conditions for take-off into self-sustaining growth. Under this stage of economic transition, various sub-sectors particularly under agriculture and allied activities showed high growth prospects, when stimulated through policy initiatives. But the real challenge remains to sustain this growth rate in the long run. Under this traditional economy, it is difficult but extremely important to prioritise the sub-sectors which have short-run as well as long-run growth prospects. Sometimes, some of the sub-sectors may even show misleading growth rate pretending to have the high or low potential but actually it is not, particularly due to the non-availability of reliable data-base, emphasising the need for credible database for various sectors. Capacity building and empowering with technical knowledge might be given top priority for the human resource development in this region. The traditional family farmers resist change towards modern technologies and it is necessary to analyse whether their behaviour is stubborn and irrational (e.g., low adoption rate for high-yielding variety seeds for rice cultivation) or they are acting rationally within the context of their particular economic environment, and the agro-technologies should be appropriated accordingly to increase the adoption level of these innovations. The focus should be to increase the efficiency of production along with the volume of production; therefore, returns to investment should be the criteria for investment in various economic activities. Enhancing the productivity of women labour engaged in agricultural activities needs to be looked into more positively. Strict monitoring and evaluation should be followed for implementation of agricultural developmental projects. The output growth performance for various sub-sectors under agriculture such as crop, fruits, vegetables, spice, fishery, livestock, etc. indicated that a combination of these activities will facilitate to augment the farm income rather relying on any single activity, which is true even at the farm household level, thereby suggesting promotion of integrated farming system approach at massive scale in this region. Expansion of market through horizontal integration among the primary producers' to increase the volume of marketable surplus and then, vertical integration for value addition of these products is extremely important to realise the potential of this region. The promising areas like expansion of meat production, increasing fish output, growing off-season vegetables, fruits, spices and condiments and promoting organic products should be given priority. The volume of marketed surplus from agricultural production must be increased and value addition should be done at least at primary level to make the product price competitive at domestic as well as international markets. The process of economic growth and development for the north eastern states is primarily dependent on agricultural sector and thereby, development planning should continue to follow agriculture-led-growth.