

Study No. 130

POTENTIALITIES OF HORTICULTURAL CROPS AND
MARKET ACCESSIBILITIES IN ASSAM AND
MEGHALAYA WITH SPECIAL REFERENCE TO
TECHNOLOGY MISSION FOR INTEGRATED
DEVELOPMENT OF HORTICULTURE

Dr. Gautam Kakaty



Agro-Economic Research Centre For North East India
Assam Agricultural University
Jorhat-785013, Assam
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PREFACE

The present study on "Potentialities of Horticultural Crops and Market Accessibilities in Assam and Meghalaya with Special Reference to Technology Mission to Integrated Development of Horticulture" has been undertaken by the Centre at the Instance of the Directorate of Economics and Statics, Ministry of Agriculture, Government of India.

The agro-climatic condition of the N.E. Region is favourable for growing all types of tropical, sub-tropical and temperate fruits. The region is the highest producer of pineapple in the country. The objectives of the present study are to study the potentiality of horticultural crops and to identify the major constraints of the horticultural growers and to suggest policy implications. Considering the potentiality of horticulture in the North-Eastern States, the Government of India introduced Technology Mission for Integrated development of Horticulture (TM-IDH) in North-Eastern Region including Sikkim. An outlay of Rs.229.38 crores were approved for Ninth Five Year Plan and launched the programme in the year 2001-02. The impact of this comprehensive scheme in the State of Assam and Meghalaya is now gradually emerging in various fronts including products, productivity infrastructure development, per capita income, commercialization etc.

Market plays a pivotal role to accelerate the farm economy in an agrarian society. Various marketing institutions and its organization affect market power and are needed to be addressed. The study is a concerned effort to explore the potentialities of horticultural crops in this region through technology mission so as to bring integrated development in horticulture.

We are thankful to the Directorate of Horticulture, Government of Assam and Meghalaya for providing secondary level information related to the study. We are thankful to the District Horticulture officer of Kamrup and Nagaon, Government of Assam and District Horticulture officer of East Khasi Hills and Ri-Bhoi, Government of Meghalaya for their help and assistance in conducting field work

(ii)

I would like to express my gratefulness to the sample beneficiary households for their spontaneous help and cooperation to the research team by providing the field data.

The study is an outcome of a joint effort in the centre. Dr. Gautam Kakaty, Research Associate in Agro-Economic Research Centre for North-East India , Jorhat worked as leader of the team. The team spirit of the staff members was acknowledged. The report will provide the first hand in formation on horticultural development through technology mission launched in Assam and Meghalaya.

I hope the report would be useful to the Planners, Policy makers and others associated with the development programmes in the country.

February, 2009

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Chapter -I

Prologue:

India's varied agro-climatic conditions allow it to produce a wide variety of horticultural crops such as fruits, vegetables, potato, tropical and tuber crops, along with ornamental crops like coconut, cashew nut, cocoa etc. Commercial importance of fruits has been increasing all over the World as they contribute significantly to the country's economy besides their nutritional and social importance. After sixties, in recent times, India has put enough importance on development of horticultural sector in order to exploit the country's vast potential and to generate the much needed value addition. The country has been blessed with varied agro-ecological conditions with vast potential to produce wide variety of tropical, sub-tropical and temperate fruits.

According to Economic Survey 2007-08¹, the horticultural sector in India in 2005-06 contributed around 28 per cent of GDP in agriculture. Vegetables, fruits, plantation crops and spices contributed to 59.80 per cent, 30.90 per cent, 6.50 per cent and 2.10 per cent of total horticultural production, respectively in 2006-07. The production of horticultural crops registered an increase of 8.90 per cent in 2005-06.

Yadav et.al(2003)² viewed 'The Country is now in the third phase of agricultural development where it is paying more attention to agricultural diversification and productivity enhancement. To achieve the growth target of 8 per cent of GDP, the agriculture has to grow by 4 per cent and horticulture has to grow by more than 7 per cent in fragile areas in particular. With contribution of 18.80 per cent in total agriculture production and 52 per cent in total agricultural export, horticulture emerged as a prominent sector offering wide scope of diversification in agriculture. It has a vital scope in foreign exchange earning and employment generation'.

The Government of India has recognized horticulture crops as a means of diversification in agriculture in an eco friendly manner through efficient land use, optimum utilization of natural resources, besides, creating opportunities for

generating employment, particularly for unemployed youths and women folk. Investments in horticulture in the previous years have resulted in increased availability of horticultural produce in the rural and urban areas due to increased production. India has maintained leadership in the production of many commodities like mango, banana, acid lime, coconut, areca nut, cashew, ginger, turmeric and black pepper.

Considerable thrust has also been given to horticulture sector during the eighth-plan period. The emphasis given to horticulture in the eighth plan has proved that horticulture is the best source of diversification for land use, rewarding in terms of investment. Since growing of horticultural crop is economically rewarding, this sector is expected to grow and contribute to food and nutrition to the society. In view of great potential for rapid growth and economic return various new programmes have been undertaken for the development of horticulture sector in commercial lines. The National Horticulture Board has also launched certain broad-based development programmes to encourage, promote and to integrate the development of horticulture sector. The development strategy is mainly focussed on to (a) accelerate the volume of production (b) varietal improvement (c) reduction of post harvest losses (d) development of infrastructural facilities for processing, storage and marketing (e) setting up of food processing and training Centres (f) strengthening of linkages between the growers and the processors (g) marketing of processed items (h) research and development for varietal improvement and (I) establishment of quality control laboratories etc³. The horticulture development strategy also includes improving productivity of existing orchards through rejuvenation and adoption of commercially acceptable varieties of fruits.

The trend of development in the field of horticulture has not been focused with database on various aspects. The development in this area has been handicapped due to poor data base as well as extension support in respect of modernization of horticulture sector. It is only very recently that a reasonable database for horticultural products has started to take shape.

India is now second largest producer of fruit in the World next to Brazil. The country ranks first in the production of mango, banana, sapota and acid lime and

in recent years recorded the highest productivity in grapes. The area and production of some of the major horticultural crops in recent years in India is given in Table – 1.1.

Table-1.1

Area and Production of Major Horticultural Crops in India

Crop	2004-05		2005-06		2006-07	
	Area	Production	Area	Production	Area	Production
Fruits	5049	50867	5339	55397	5506	57727
Vegetable :						
Potato	1524	28788	1520	28697	1572	29647
Onion	614	7761	694	9228	656	8509
Total	6744	101246	7134	110106	7211	111776
Flower loose	118	659	146	686	154	886
Plantation Crops	3147	9835	3283	11263	3221	12083
Spices	2532	4068	2422	3923	2422	3923
Total Horticultural Crops	17827	167005	18713	181814	18980	186872

Source: Economic Survey 2007-08, Govt. of India, Ministry of Finance and Company Affairs, Economic Division, Table7.20, p.172.

In recent times, India has put enough stress on development of horticultural sector as a whole in order to exploit the country's vast potential and to generate the much needed value addition after sixties. Realizing the importance of horticultural crops, priorities have been accorded in development of this sector by providing due fiscal priorities. The Central as well concerned State Government has made sincere efforts to boost the horticultural crop production by increasing allocation of funds since six five year plan.

Horticulture in North-Eastern Region:

The North-Eastern region is characterized by hills and mountains with folded topography, plateaus and hills with near tropical to alpine climatic condition. Under these conditions the mixed farming system with horticultural crop cultivation in particular occupied the prime position because of its economic viability as compared to other field crops and vegetables. It is an established fact that a large variety of temperate, tropical and sub-tropical fruits in the N.E. region are well

endowed. The unique diversity in agro-climatic conditions coupled with fertile and well-drained soil makes this region suitable for growing a large number of horticultural crops like wide range of fruits, vegetables and plantation crops. Some of the selected and promising crops of temperate and tropical fruits are grown commercially by some of the farmers in some potential area. The tropical fruit crops of N.E. Region are citrus, pineapple, banana, mango, guava, papaya, jackfruit, litchi, coconut, areca nut and many other minor fruits grown in the hills and plains almost in an unplanned and unsystematic manner. The N.E. Region is the highest producer of pineapple in the country. Besides, pineapple some temperate fruits like apple, plum, peach, pears and guava are also grown by and large on commercial proposition by the farmers in the study area.

The region has rich diversity of different vegetable crops; both indigenous tropical vegetables and temperate vegetables are grown to a considerable extent. Among the flowering plants special mention may be made about the orchids, about 600 species are reported in the region. The commercial flowers of the region are marigold, tuberose, gladiolus and chrysanthemum. Tuber and rhizomatous crops grown in the region are tapioca (Cassava), sweet potato, dioscorea, colocasia, ginger and turmeric etc. while plantation crops like tea have considerable impact on the economy of Assam in particular. Later on, other plantation crops like rubber and coffee, medicinal and aromatic plants have been considered suitable for certain areas of the region.

The North-Eastern Council estimated (2002) that a total of about 10,74,890 hectares are covered by horticultural crops. Fruit crops occupied 2,78,600 hectares, vegetables covered 3,76,700 hectares, plantation crops like tea, rubber, hectares, coconut, areca nut, coffee etc., occupied 3,50,250 hectares, spices occupied 69,340 hectares. Of the total horticultural crops, 278.6 thousand hectares are under various other fruit crops. Of this about 63.1 thousand hectares are under banana, 47.6 thousand hectares are under pineapple, mandarin orange and other citrus covered 59.2 thousand hectares and the rest 89.7 hectares are under various other fruit crops like apple, pears, guava, papaya, mango, jackfruits and other miscellaneous temperate fruits.

Considering the site, situation and specific problems gentle hill slope even with shallow soil depths with sufficient soil moisture regime is considered suitable for horticultural crop cultivation. So, the North-East has enough potential for horticultural development, markets, proper storage, transport facilities and credit. Growers should be assisted right from planting to marketing and a co-ordinate effort of all concerned departments of the States.

Considering the potential of horticulture in the North-Eastern States, the Government of India introduced technology Mission for integrated Development of horticulture in North Eastern Region including Sikkim. An outlay of Rs. 229.38 crore was approved for Ninth Five Year Plan and launched the programme in the year 2001-2002.

Baruah (1986)³ in his research paper on horticultural crop cultivation in Assam pointed out that in the North-Eastern Region, there is vast scope for development of horticulture because of congenial climate, rainfall, soil variability, different topography and altitude also provides ample scope in horticulture sector. Proper and scientific development of horticultural crops will greatly help in increasing growth of the rural economy and will provide nutritious diet. There are some very good varieties of fruit crops, which have got export potential to the neighbouring countries. For this it is needed to stress more on research and development to get quality product. In order to achieve commercial potential of horticultural crops he emphasized that a strong growers' co-operation is needed for getting inputs, planting materials, is essential for solving some of the vexed problems.

Bora (1989)⁴ in his observation of the focus on the East Himalayan region viewed that there is sufficient development potential of horticulture in the hill regions of North-East India, particularly fruit production and processing enterprises in the regions where conditions are ideally suited for cultivation of pineapple, mandarin orange and other sub-tropical and temperate fruits. The region already produces some of the finest varieties of orange in the country. There are 24,000 hectares of land under pineapple producing about 2.82 lakh tonnes and 30,000 hectares under citrus fruits with an average annual production of 1.38 lakh tonnes. Considering its

potential, the development of fruit processing and preservation industry leaves much to be desired.

Sarkar (1992)⁵ in his paper on the "Processing and Marketing of Agri-Horticultural Produce in the N.E." examines the possibility of establishment of Regional Private Entrepreneurs in horticulture based industries. In this context he explains the creation of export-oriented processing facilities and boarder trading opportunities. He emphasizes that the current economic liberalisation policy of the Government provides opportunities for the private entrepreneurs to set up horticulture-based industries with proper incentive for production, marketing and export of produce for boosting up of national economy and also to provide gainful employment to a large section of people in the region.

Hussain (1993)⁶ while examining the 'Constraints in Development of settled Agriculture in the Mountain Eco-system of North-East India' viewed that "Agriculture is the traditional primary means of subsistence of the adivasi hill-dwellers of North-Eastern India. From time immemorial most of them have been practising jhuming with slash and burn technique using simple primitive implements like hoe, dibble and ado. In the given social, economical, cultural, technological, psychological and environmental conditions, shifting cultivation was the most practical and possible use of the tropical hill ecosystem endowed with abundant forest, faster rate of regeneration and fragile soil. Because of low-land man ratio, jhuming remained as viable alternative for centuries and ecological balance existed all along. But, with the increase of population beyond the carrying capacity of land under jhuming, it has become detrimental to environment leading to ecological imbalance in the mountain ecosystem". Therefore, there is a call to stop this destructive method of cultivation and to opt for settled cultivation specially terraced cultivation in the gentle hill slopes and horticultural crop cultivation in the middle reaches of hills and a forestation in the upper reaches to protect soil run-off.

Goswami, Sarma and Choudhury (1993)⁷ in their research paper opined that the potentialities for development of horticulture is very great in most of the hilly areas and this is more so in the North-Eastern hills where all kinds of horticultural crops can be grown as the region has been recognised as valuable gene pool for

horticultural crop improvement. They, however, emphasised for the qualitative improvement of variety of horticultural crops followed by adoption of post harvest technology, storage, transportation and marketing.

Agarwal (1993)⁸ while analyzing Agriculture Development in Arunachal Pradesh commented that "It is a well known fact that the shifting cultivation is widely practised in the hills of the State. Because of the primitive method of cultivation most of the farmers are below the threshold level of production providing little opportunity to efficient use of some of the resources with cost effectiveness". He, therefore, emphasized that the horticultural crop cultivation has been recognized as an important alternative in the hill economy. They have inherent advantage of providing higher productivity per unit of land, resulting in higher income and employment generation to the people living in the hills. The horticultural crops are also protecting the soil erosion and soil run-off. As such horticultural crop cultivation in the hills are remunerative and eco-friendly.

Patil (1994)⁹ Member of Planning Commission, while delivering the Assam Company lecture in Assam Agricultural University emphasised on the development of horticultural crops and plantation crops like tea having export potential. He stated that "India has been blessed with varied agro-ecological conditions with vast potential to produce a wide variety of agricultural and horticultural crops under tropical, sub-tropical and temperate climatic conditions. There are immense potentialities to harvest sun and rain water to our advantage. In order to make out planning more area specific, keeping in view the natural endowments like land, water and vegetation the research and developmental activities are now being directed accordingly. The Eastern Himalayan Region covers the States of Assam, Arunachal Pradesh, Manipur, Meghalaya, Nagaland, Tripura, Mizoram and also Sikkim and parts of West Bengal. The region is characterized by hills and mountains of folded topography, plateaus and hills with near tropical to alpine climatic conditions. This is a high rainfall area having large river basin. The forests occupy more lands, followed by barren land, leaving much smaller cultivable area. Transport and communication system is very weak, and a small portion of crops sown area is under irrigation. Shifting cultivation (Jhuming) is practised in nearly one-third

of cultivated area and mainly food crops are raised for subsistence. Under these given conditions, the thrust areas identified are soil and water conservation, water harvesting, control of shifting cultivation, a mixed farming system including horticulture, development and strengthening of roads and communication network”.

The Report of working group on Horticulture Development for the formulation of Ninth Five Year Plan(1996)¹⁰ viewed that as far as employment generation is concerned, the fruit crops generate as much as 860 Mandays per hectare per annum as against 143 Mandays by the cereal crops. Crops like pineapple, grapes and banana generate much larger employment ranging from 1000-25000 Mandays per hectare. The horticultural crops cultivation generate direct as well as indirect employment in the various stages – developing and maintaining nursery, land development, orchard management, harvesting, storage, transportation, distribution, processing and marketing which should also been taken note of. It may be stated that no animal is employed and no chemical fertilizers and irrigation are applied in jhum cultivation. The Neolithic evidences of various size and shapes proved that the earlier settlers in the present days Garos and the shifting cultivators and have been using similar implements”.

Singh and Singh (1997)¹¹ conducted a study to assess the country's production potential of tropical fruits and discussed the factors influencing the development of tropical fruits and its future challenges for agricultural diversification. During the last three decades (1961-91) the area and production of fruits crops in the country increased by 172 per cent and 320 per cent respectively. At the all-India level, area, production and productivity of fruit crops increased by 11.52, 15.10 and 3.21 per cent respectively between 1991-92 and 1992-93. The study highlighted the strategies for development in the different regions and suggests the need for giving impetus to fruit cultivation in India by effective utilisation of wastelands on which the fruit cultivation is more economical and favourable. The study suggests that on the basis of climate and economic background for high value of tropical fruit crops having export potential, commitment to competitive marketing a planned development effort with higher investment is necessary to complete with other Asian Countries.

Shadeque (1989)¹² viewed that the North-Eastern Region of India with a mixed terrain of hills and plains, intercepted by large number of small and big rivers, streams is nature's unique gift for production of number of horticultural crops, particularly fruits. The diverse agro-climatic conditions, varied soil type and abundance of rainfall offer immense scope for cultivation of different types and varieties of horticultural crops, including fruits, vegetables, flowers, plantation crops, tuber and rhizomatous crops and crops of medicinal and aromatic plants and other miscellaneous crops having economic values.

But, despite of potentiality no worth mentioning development in the field of horticulture has been achieved in the region due to a number of constraints like non-availability of quality planting materials of improved varieties, poor extension support and due to transport and marketing problems.

Therefore, in spite of vast potential, horticulture sector has remaining underdeveloped due to various constraints of technological, infrastructural and institutional factors.

Horticultural Crops in Assam:

Assam is endowed with unique agro-climatic condition, which permits growing of wide range of horticultural crops and as such it is traditionally horticultural state with plantations and gardens, which accommodate various fruits, vegetables, flowers, spices, medicinal and aromatic plants, nut crops, tuber crops and also plantation crops. The homestead gardens locally known as "Bari" is a unique feature of common Assamese farmers which has an inherent tendency to be self sufficient for meeting their day to day family requirements of seasonal major and minor fruits, vegetables, flowers, spices, condiments and medicinal plants. Largely organic in nature, these crops seldom see any chemical fertilizer or pesticides. Of late, bigger plantations with thrust crops on modern footing are gradually coming up and the need of commercialization has been felt even in remote and backward districts of the State. This is the virgin area of pomology, olericulture, floriculture, and processing, landscaping and aesthetic architecture in a single valley called Horticulture wherein job seekers may find an alluring atmosphere to go for self

employment, entrepreneurs can visualize new horizons and farmers can go for large scale diversification.

Table-1.2
Area, Production and Productivity of Fruits in Assam during 2006-07

Fruits	Area (Ha.)	Production(MT)	Productivity (Kg. /Ha.)
Banana	43250	598857	13846
Pine apple	12414	191894	15458
Orange	8037	88137	10966
Papaya	6826	104962	15377
Assam lemon	9897	67855	6856
Guava	4305	79577	18485
Litchi	4740	35256	7438
Jackfruit	21390	200189	9359
Mango	4450	48696	10943
Other fruits	3190	23054	7227
Total Fruits	118499	1438477	12139

Source: Directorate of Agriculture, Govt. of Assam

Table-1.2 shows the area, production and productivity of fruits in Assam. It shows that about 118499 hectares area is under various fruit crops in Assam. Out of this, about 43250 hectares are under banana, 12414 hectares under pineapple, 8037

Table-1.3
Area, Production & Productivity of Vegetables in Assam during 2006-07

Vegetables	Area (Ha.)	Production(MT)	Productivity (Kg. /Ha.)
Kharif vegetables	76305	1182956	15503
Rabi vegetables	159715	2704134	16931
Total vegetables	236020	3887090	16469

Source: Directorate of Agriculture, Govt. of Assam

hectares are under orange, 6826 hectares are under papaya, 9897 hectares are Assam lemon, 4305 hectares are under guava, 4740 hectares are under litchi, 21390 hectares are under jackfruit, 4450 hectares under mango and the rest 3190 hectares are under various other fruits. Table also denotes that among the fruit crops productivity is highest in guava. Table-1.3 shows the area, production and productivity of vegetable crops in Assam during 2006-07. Combining both kharif and rabi vegetables, the total

area, production and productivity of vegetables in Assam was 2,36,020 hectares, 3,88,790 M.T. and 16,469 kg/ha respectively.

Table-1.4
Area, Production & Productivity of Spices
in Assam during 2006-07

Spices	Area (Ha.)	Production(MT)	Productivity (Kg./Ha.)
Chilies	15453	9975	646
Turmeric	11741	8538	727
Onion	6870	16775	2442
Ginger	18855	128817	6832
Coriander	20565	19248	936
Garlic	7095	23505	3313
Black pepper	3210	4866	1516
Other spices	2467	1874	760
Total Spices	86256	213598	2476

Source: Directorate of Agriculture, Govt. of Assam

Table-1.4 shows the area, production and productivity of spices in Assam during 2006-07. Table shows that the area, production and productivity of spices are

Table-1.5
Area, Production & Productivity of Tuber Crops
in Assam during 2006-07

Spices	Area (Ha.)	Production(MT)	Productivity (Kg./Ha.)
Potato	77712	504557	6493
Sweet potato	8112	28443	3506
Tapioca	2665	12602	4729
Total Tuber Crops	88489	545602	6166

Source: Directorate of Agriculture, Govt. of Assam

86256 hectares, 213598 M.T. and 2476 kg/ha respectively. Table-1.5 shows area, production and productivity of tuber crops in Assam during 2006-07. It was found that the area, production and productivity of the total tuber crops were 88489 ha, 545602 MT and 6166 kg/ha respectively. Among the tuber crops, potato occupies the highest rank in respect of area, production and productivity.

Horticultural Crops in Meghalaya:

The State has immense potential for the development of horticulture. The variation of altitude, soil and climatic conditions and temperature regime of the State provide ample scope for growing of different types of horticultural crops including fruits, vegetables, spices, plantation crops, medicinal and aromatic plants of high economic values.

Table-1.6 shows the area, production and productivity of fruits in Meghalaya.

Table-1.6
Area, Production and Productivity of Fruits
in Meghalaya during 2004-05

Fruit	Area (Ha.)	Production (MT)	Productivity(Kg./Ha)
Pine apple	9565	92038	9622
Citrus Fruits	9808	38989	3975
Banana	6276	67838	10809
Papaya	582	4484	7704
Total Fruits	26231	203349	7752

Source: Report on Area, Production and Yield of Horticultural Crops, Directorate of Horticulture, Govt. of Meghalaya

Table shows that the total area, production and productivity under different fruit crops in Meghalaya are 26231 hectares, 203349 tonnes and 7752kg/ha respectively.

Citrus:

Among the citrus fruits the most dominant economic crop of the State is mandarin orange. Khasi mandarin is adjudged as an important variety in the North-East region and outside having good acceptance among the consumers. Citrus fruit is mainly grown in the sub-mountainous tract along the Indo-Bangladesh border regions of the State. The total area, production and productivity under citrus fruit crops in Meghalaya are 9808 hectares, 38988 tonnes and 3975 kg/ha respectively.

Pineapple:

It is one of the most important fruit crops of Meghalaya besides mandarin orange and banana. Pineapple is grown in the hill slopes as well as in valleys having proper drainage. The State Agriculture Department implemented several State

schemes for the development of pineapple and the "Horticultural Development Programme" for improvement of quality. Considering the feasibility of commercial cultivation of pineapple in Meghalaya a number of centrally sponsored schemes were implemented for varietal improvement which boosted of the production of pineapple as well as other fruit crops. Pineapple varieties like giant kew, queen and local indigenous varieties are commercially grown in the State and in Ri-Bhoi district as the district has suitable physiological conditions for growing of fruit crops in general and pineapple in particular. The district has also additional advantage of marketing of pineapple as one of the major consuming Centres Guwahati City of Assam is adjacent to Ri-Bhoi district. Moreover, wholesalers are also operating from Guwahati city, transacting fruit business within the region and outside the region also. The Pineapple in Meghalaya is grown well in Northern part of East and West Khasi Hills as well as the Northern and Southern part of the Garo Hills. The total area, production and productivity under different fruit crops in Meghalaya are 9565 hectares, 92038 tonnes and 9622 kg/ha respectively.

Banana:

Varieties like 'jahaji', 'chenichampa', 'malbhog' and several other indigenous varieties are commonly grown in the State. Recently, banana saplings developed through tissue culture are doing well in the region. Banana commands a considerable economic importance and is grown in the gentle hill slopes and plain valley areas of the State. The total area, production and productivity under different fruit crops in Meghalaya are 6276 hectares, 67838 tonnes and 10809 kg/ha respectively.

Temperate Fruits:

Temperate fruits like plum, peach, pears, apricot are found in the central plateau of East and West Khasi Hills and Jaintia Hills.

Other fruits now grown with limited stress and acreage but having great potentiality are guava, mango, litchi, lime/lemon, orange, papaya etc. Besides these, there is potentiality of growing highly nutritious fruit crops such as jackfruit, berries, custard apple, sapota etc.



Vegetables:

Meghalaya is also famous for its vegetables in the North-East. Cabbage, cauliflower, radish, tomato, carrot, squash etc. are the major vegetable crops grown in Meghalaya. The area, production and productivity of vegetables in Meghalaya are 11947 hectares, 144180 tonnes and 12068 kg/ha respectively. The most important aspect in the vegetable sector is that it gives rise in productivity in most vegetable crops. Recently, tomato cultivation has been introduced in the high altitude region of East Khasi Hills, which has been boosting up the production.

The department of agriculture is taking steps to accelerate the growth of the vegetable sector by encouraging the farmers to grow vegetable sector in polyhouses by providing subsidy on the cost of cultivation by adopting new devices.

Tuber Crops:

Among the various tuber crops grown in the State, the following three species, viz. potato, sweet potato and tapioca are commonly cultivated. Potato is extensively grown in the East and West Khasi Hills District. Tapioca is found in Ri-Bhoi and Garo Hills District while sweet potato is cultivated throughout the State.

Table-1.7 shows the area, production and productivity of Tuber Crops in

Table-1.7
Area, Production and Productivity of Tuber Crops
in Meghalaya during 2006-07

Tuber Crops	Area (Ha.)	Production (MT)	Productivity(Kg./Ha)
Potato	17287	141622	8192
Sweet potato	4974	16172	3251
Tapioca	3975	20644	5193
Total Tuber Crops	26236	178438	6801

Source: Report on Area, Production and Yield of Horticultural Crops,
Directorate of Horticulture, Govt. of Meghalaya

Meghalaya. The areas of potato, sweet potato, tapioca in 2004-05 were 172807 hectares, 4374 hectares, 3975 hectares and productions were 1,41,622 metric tonnes, 16,172 metric tonnes, 20642 metric tonnes respectively. The productivity of these three root crops are 8192 kg/ha., 3251 kg/ha., 5193 kg/ha. respectively.

Plantation Crops:

Areca nut, tea and cashew nut are the important plantation crops in India. Since time immemorial areca nut has been grown in Meghalaya and considered as an important commercial plantation crop. Table-1.8 shows the area, production and productivity of Plantation Crops in Meghalaya. In the recent past this crop has been

Table-1.8
Area, Production & Productivity of Plantation Crops
in Meghalaya during 2004-05

Plantation Crops	Area (Ha)	Production(MT)	Productivity(Kg./Ha)
Tea	1199	3747	3128
Areca nut	14169	14169	1261
Cashew nut	5765	8846	1308
Total Plantation Crops	21133	26762	1266

Source: Report on Area, Production and Yield of Horticultural Crops,
Directorate of Horticulture, Govt. of Meghalaya

introduced in the northern slopes of Khasi Hills in the Ri-Bhoi district. The scope for introduction of commercially important plantation crop like tea, coffee and rubber in the region has now been getting explored in collaboration with Tea, Coffee and Rubber Boards. A number of programmes have been sponsored in potential areas by the State government and the North Eastern Council.

Cashew nut is extensively grown in Garo Hills. However the bulk of the produce is sold outside the State as raw product for processing. The processing factories of cashew nut at Mancashar of Goal Para district receive raw cashew nut from Garo hills

Floriculture:

Meghalaya has a very high potential for commercial cultivation of ornamental crops due to the favourable climatic condition. Varieties of high valued, long self life and off-season flowers such as orchids, bulbous plants, bird of paradise, chrysanthemum gerbera, gladiolus, marigold, carnations etc. can be cultivated at low cost.

Spices:

Meghalaya has the natural advantages of growing variety of spices of which the prominent ones are turmeric, ginger, chili, black pepper and bay leaf. Table-1.9 shows the area, production and productivity of spices in Meghalaya. The

Table-1.9
Area, Production & Productivity of Spices Crops
in Meghalaya during 2004-05

Spices Crops	Area (Ha)	Production(MT)	Productivity(Kg./Ha)
Ginger	9222	47138	5111
Turmeric	1682	9316	5539
Chilies	1844	1303	707
Total	12784	57757	4517

Source: Report on Area, Production and Yield of Horticultural Crops, Directorate of Horticulture, Govt. of Meghalaya

cultivation of turmeric is concentrated in the Nongbals - Shangpung belt of Jaintia Hill district while bay leaf is concentrated on the southern slopes adjoining Bangladesh. Chili is grown all over the State while ginger cultivation is concentrated in East and West Garo Hills and East Khasi Hills Districts.

Medicinal and Aromatic Plants:

Meghalaya as a treasure craves of medicinal plants has a long history in the traditional system of medicinal as well as folk prescription. Nature in its generous abundance has bestowed Meghalaya a unique array of vegetation rich in medicinal properties. More than 800 medicinal and aromatic plants species have already been listed while many remain untapped due to lack of initiative of the State Government.

Geographical Features and Topography of the North-Eastern Region :

The North-Eastern Region of India comprises of seven States viz. Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland and Tripura. Sikkim is also now considered as one of the States of the North-Eastern region. The region lies in between 21.57⁰ and 28.30⁰ North Latitudes and 89.46⁰ and 97.30⁰ East

Longitudes. The total geographical area of the region is 2.55 lakh sq.km. which is about 8 per cent of the country's total area. The region is connected with the rest of the country through West Bengal by a narrow corridor of 56 km., which runs below the foothills of Bhutan and Sikkim. It has 1350 km. long border with China in the North, 900 km. long boundary with Bangladesh in the South West and 1350 km. long border with Burma in the East. The boundary with rest of India is only 38 km., which is the width of narrow corridor connecting the region with the country through West Bengal.

Except the plains of Assam the vast area of hills interspersed with fertile valley which represents agro-climatic of diversity ranging from extreme humid tropical, falling within altitude ranges from 0 to 5000 meters. Basically the State of Meghalaya is full of undulating hills physiographically and administratively as well, the central and eastern parts grouped together under the same Khasi Hills and Jaintia Hills i.e. the western part. The Garo Hills, which is, lower in elevation and rise more gently from the southern plains. The highest peak in the State is 1600 m altitude above MSL.

Physical Features of the N.E. Region:

The physiography of the region is divided into three divisions, namely Meghalaya Plateau, the North-Eastern Hills and Basin and the Brahmaputra Valley. The North-Eastern Hills and Basin alone account for 65 per cent of the total land area while the Brahmaputra Valley and the Meghalaya plateau cover 22 per cent and 13 per cent of the area respectively.

Assam is situated in the far, North-East corner of India. The State is bounded by two foreign countries Bhutan in the North and Bangladesh in the West. Assam is lying between $24^{\circ}08'$ N and $27^{\circ}09'$ N latitude and $89^{\circ}42'$ E and $96^{\circ}10'$ E longitudes. It has been divided into three physiographic divisions- the Brahmaputra Valley, the Barak Valley and the Hill region. The State has 27 numbers of districts. Of these there are 22 districts fall under Brahmaputra valley, 3 districts under Borak Valley and 2 districts under Hill region. The Brahmaputra valley covers 72 percent, the Barak valley covers 9 percent and the Hill region accounts for 19 per cent of the total geographical area 78,438 sq. km. in the State.

The Brahmaputra, the fifth largest river in the world and the Barak are the two international rivers flowing through Assam. The length of Brahmaputra within Assam is about 720 km while the length of the Barak River is 192 km in Cachar. The Brahmaputra River divides Assam into two parts the North Bank and the South Bank. There are about 40 major tributaries in North Bank and 20 on its South Bank.

The Meghalaya plateau, though now a part of the North-Eastern Region, is really an east ward extension of the massive block of peninsular India lying to the east of the great gap in the Archnehn terrain, subsequently filled up with alluvium deposited jointly by the Ganga and the Brahmaputra. The organic movement was so slow and free bulking that the sedimentary beds retained their horizontal character and gave rise to structural platforms, well developed in the Cherrapunji area. From the Surma Valley in the South, the Central and Eastern parts of Meghalaya appear as an imposing table-land bordered by a great scarp and sloping steeply towards the plains. Waterfall rush down very rapidly and carved out deep valleys through which swift flowing of rivers descend to the plains. It is the ascending monsoon clouds over the frontal slopes and the valleys that have made Mawsynram world famous as the meteorological station that records the highest rainfall and they account for the regional name Meghalaya (megh-cloud, alaya-abode). Physiographically and administratively as well, the central and eastern parts can be grouped together under the name Khasi hills and Jaintia hills and the western part, the Garo hills which is lower in elevation and rise more gently from the southern plains.

Soil Characteristics of N.E. States:

The soils of the N.E. hills are derived from genesis complex parent materials; they are dark brown to dark reddish-brown in colour, varying in depth from 50 to 200 cm. The texture of the soils varied from loamy to fine loamy. The soils of the alluvial plains adjacent to the northwest and southern plateau are very deep, dark brown to reddish-brown in colour and sandy-loam to silty-clay in texture.

In a research report of Agro-Economic Research Centre for N.E. India, authored by N. Saha (1973)¹³ opined that N.E. Region contains several soil zones. Hill soils have high humus and nitrogen content. These are acidic in reaction. The areas affected by shifting cultivation, the fertile hill slopes are cleared up by cutting

and burning the natural vegetations. After using the same plot for two or three years the land is kept fallow in barren condition, exposed to heavy showers to erode the top soil down to the valleys. Thus, there is depletion of top soil due to jhuming carried out indiscriminately by the hill farmer. The fertility of land deteriorates and higher vegetation gives way to lower vegetation. The valley soils are clay loam and fertile due to the silting of soil humus from the hill slopes.

Soils of Assam are broadly classified into 4 categories-

New alluvial soil found near river bank

- (i) Old mountaineer alluvial soil found in flood free plain area and acidic in nature
- (ii) non- laterised red soil and
- (iii) laterised soil both found in the hill regions of Assam.

Meghalaya soils are rich in organic carbon, which is a measure of nitrogen supplying potential of the soil, deficient in available phosphorous and medium to low in available potassium. The reaction of the soil varies from acidic, the soil PH of which varied from 5.0 to 6.0. Most of the soils occurring on higher altitudes under high rainfall belt are strongly acidic due to intense leaching. Base saturation of these soils is less than 35 per cent. There is not much difference in fertility classes of soils in the State. Four soils fertility classes, High Low Medium (HLM), High Medium Medium (HMM), Medium Medium Low (MML) and Medium Low Medium (MLM) have been established from the soil test analysis so far compiled in the soil testing laboratories in the State.

Rainfall:

The North-Eastern Region is the highest rainfall zone in the country. These factors have created diverse climatic conditions except in the high mountain ranges. The climate is generally hot and humid. Cropping pattern, agricultural practices, agricultural productivity and floods are governed by the single greatest factor i.e. rainfall. The rains are of long duration and occur mostly between March and October. During March and April the rainfall is sporadic, but it is steady, heavy or very heavy during May to October. Mawsynram, a village 16 km. west of Cherrapunjee in

Meghalaya, boasts of the heaviest rainfall area in the World (annual average 11,406 mm and the highest recorded at even more than 24,000 mm).

Annual rainfall in north-eastern portion of Arunachal Pradesh, North-West of Dihang and North-East of Bomdila, is above 4000-mm. but gets reduced in South-Western direction. The rainfall increases in Khasi Jaintia and Garo Hills (above 10,000 mm.) but drops down in the north of the Brahmaputra Valley (about 2000 mm.). The central parts of Meghalaya experienced phenomenally high rainfall; the average annual rainfall is about 7000 mm. The northern and adjoining central area is in the rain shadow region, the average rainfall varied from 4000 mm to 2000 mm. The Imphal – Luminging region that partly lies in the rain shadow of the Mikir hill range recorded lowest rainfall.

A great deal of variation in rainfall is also observed in the state of Assam for which the state has the experiences of both floods and drought at different point of time in some districts.

The entire N.E. Region has an annual rainfall of above 2000-mm (going up to more than 11,000 mm) except for a small area in which the rainfall ranges between 1000 mm to 2000 mm. The number of rainy days in a year in the region is more than 100 days.

Climatic Conditions:

The wide latitudinal differences along the varied physiography contribute to great climatic variation in the entire region. Climatically, the North-Eastern region has mainly two seasons – the rainy season and the winter season. In the region, the monsoons usually start in June and last until the end of October. Rainfall in north-eastern region is usually heavy due to its peculiar geographical position.

Assam is situated in the sub-tropical zone characterized by hot and humid summer and mild to moderately cold in winter. The average annual maximum temperature (July-August) is recorded at 30⁰ C to 35⁰ C, while minimum temperature (December-January) lies between 6⁰ C and 12⁰ C. The percentage of Humidity is very high recorded at 85.0 to 90.0 percent in the most of the districts. The state average annual rainfall is recorded at 25845 mm (normal) and 2262.9 mm (actual) from December 2004 to November, 2005. The state average normal annual rainfall is

recorded at 66.20 mm in winter season (Dec, 2004 to Feb.2005) 648.90 mm in summer season (March 2005 to May 2005), 1702.00 mm in Monsoon season (June 2005 to Nov, 2005).

From the very beginning the annual rainfall ranges from 70 mm in the plains to 250 mm or more in the North-Eastern hills and Cherrapunji in Meghalaya was known for receiving the highest rainfall in the World. Later on the highest density of rainfall has been recorded in the Mawsynram area. The Kopili valley, lying between the Khasi – Jaintia Hills and Mikir Hills, in the Nagaon district of Assam, is the only area where the average rainfall is 43 mm which is the rain-shadow area of this region. The rainfall rapidly diminishes after October is usually the dry period of the year which continued upto March throughout the region.

Recent survey report on the ecological condition of the region revealed that the climate in the North-Eastern region has undergone a major change. Cherrapunji known for receiving highest rainfall in the World sometimes remain dry even in the month of June – July in the year 1992 leading to a serious water scarcity in that area. Climate in the Kohima, Ukhrul and Senapati districts of Nagaland has become unprecedently hot needing even air cooling arrangements in recent years. Same climatic change has also been reported even in other north-eastern states like Manipur, Mizoram, Arunachal Pradesh, Assam and Tripura. Large-scale deforestation and burning of bushes due to shifting cultivation in the hill areas of the region are said to be mainly responsible for this climatic set back.

Earlier, the great earthquake of 1950 created extensive landslides in the North-Eastern mountains and had up-set the river regimes and topography of the plain district. After the 1950 earthquake, floods have become more pronounced. Even after the monsoon a major part of the plain areas remain water – logged for varying periods, depending upon the depth of the depressions. Moreover, soil erosion in the hill areas have been resulting constant siltation of lakes leading to fall in its reservoir capacity which is threatening the region's hydel projects severely.

Importance of Horticultural Crop Cultivation in the Sample States:

Horticultural crops have potential to generate gainful employment, promote trade and earning of foreign exchange. Horticultural crops are generally high value

crops. They help not only fighting malnutrition but also earning more foreign exchange as they have good export potential. Certain special varieties of horticultural crops can be grown in marginal and degraded soils by identifying the species/root stocks suitable to the situation. In the present context of changing socio economic environment, horticultural crops are quite relevant in India.

Reddy (2002)¹⁴ while assessing the importance of fruit crops for maintenance of soil property and in providing the nutritional security to people described that India has a good natural resource base and has an adequate research and development back up which resulted in increased production of several fruits. India is the second largest producer of fruits next only to China and their production has tripled over the last 50 years. The Indian topography and agro-climatic conditions are well-suited for fruit crops was an ideal method to achieve sustainability of small holdings, increase employment, improve environment, provide an enormous export potential and above all helps to achieve nutritional security. Export of fresh as well as processed fruits has been increasing. The demand for fruits is on the rise due to changing food habits, realization of high nutritional value and creates emphasis on value addition and export.

Pandey(1993)¹⁵ viewed 'Horticultural crops have greater relevance to the new socio-economic environments, viz – reduced availability of per capita land for cultivation and farm labour, increased per capita income and consumption of processed fruits and vegetables. The new economic policies which include liberalisation of imports, export promotion, encouragement of foreign investment and phasing out subsidies on agricultural inputs have created congenial environment to undertake export oriented horticultural crop in the hill areas'.

G.L. Kaul (1997) ¹⁶ analysed the role of horticultural crops in crop diversification, human nutrition and industrial growth and in generating income and employment under Indian situation. His analysis is more valid today when Indian agriculture is getting more and more commercialized and competitive. These crops have been identified as most remunerative crops for replacing subsistence farming in the rain fed dry land, hills, arid and coastal agro-ecosystems. Crop diversification in favour of horticultural crops is driven by hard economic factors. These crops are

characterized by high productivity per unit area, much higher than the field crops. Their role in improving environment is an added advantage. The biomass available particularly from the tree crops is phenomenal which either gets recycled into the soil to add to its fertility, or is amenable to industrial use for value addition, thus further enhancing their economic viability.

At present, India is moving towards the Golden Revolution in which commercialization of horticulture through better post harvest management, primary processing and particularly marketing assume greater significance in the modern era of globalization.

The programme of development of horticulture in N.E. States provides abundant scope for development and preservation of fragile ecological balance in the hills. The development strategy is also supported by techno-economic feasibility study, establishment of nurseries, progeny orchards, training of farmers through demonstration, creation of post harvest infrastructure and marketing system.

According to Indian Council of Medical Research (ICMR), the minimum per capita consumption of fruits and vegetables must be 90 gms. and 280 gms. respectively. The per capita consumption of fruits and vegetables was 43 gms and 37 gms only in the beginning of the first five year plan which has increased to 46 gms and 93 gms of vegetables in the eighties against the minimum dietary requirements of about 90 gms. of fruits and 280 gms. of vegetables. From the point of nutrition, these crops were considered very important as they contribute other micro-nutrients to the population and help to prevent several diseases.

The horticulture crops are favoured more in the rural economy as they generate more gainful employment. The average labour required for growing horticultural crops is about 450-2,500 Mandays as compared to only 150 – 200 Mandays for field crops in a year.¹⁷ In the hill areas horticultural crops is considered to be a viable alternative to destructive jhuming. The research studies conducted in the region proved that returns from horticultural crops are found to be quite encouraging as compared to jhuming and are also helpful in soil management, restoration of environment and ecological balance of the region. So, the potentiality to develop

horticulture for economy and ecology of the region has to be supported by sound marketing net work and needed infrastructure.

At present horticultural sector has established its credibility in improving land use, promoting crop diversification, generating employment and above all providing nutritional security to the people besides supplementing to their income. Apart from these, the horticultural crop helps in maintaining ecological balance and produces increased biomes per unit of area as well as increases the aesthetic value.

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Chapter-II

Scope, Objectives and Methodology of the Study

In this chapter an attempt has been made to present a brief idea on the scope, objectives, methodology, limitations of the study for arriving at the final conclusion of the study.

Scope of the Study:

Horticulture is considered as the main axis of economic development in the hills and plains of the North Eastern States. Horticulture sector can play a pivotal role in diversifying the agriculture in terms of increasing production, productivity, providing food assortments, nutrition, income and employment. Integrated effort to horticulture development may form the main component of 'Model Land Use Planning' with emphasis on scientific use of soil and water considering the potential, resource base and bio-diversity of the region.

The term 'Horticulture' is derived from the Latin root 'Hortus' means garden and 'culture' means cultivation. Modern horticulture is defined as a major branch of agricultural science, which deals with the production, technology utilization for improvements of quality of fruits, vegetables, spices and ornamentals, aromatic and medicinal crops. Horticultural research and development in India was at very low ebb till the Third Five-Year Plan and received meager attention even thereafter. However, the plan investment in horticultural research and development increased significantly since the Seventh Five-Year Plan. Chadha (2001) viewed that 'The Government of India has laid considerable thrust in development of horticulture at a rapid pace during the seventh plan and beyond. There was a big boost in the plan allocation for horticultural development programmes in India. Starting with a small allocation of Rs. 2.05 crores in Fourth Plan, it rose to 7.62 crores in Fifth, Rs. 14.64 crores in Sixth, Rs. 25.00 crores in Seventh, Rs. 1000.00 crores in the Eighth and Rs. 1,374.00 crores in Ninth Plan'¹. The North Eastern Region consists of seven States

¹ K.L. Chadha (ed.): "**Handbook of Horticulture**", Indian Council of Agricultural Research, Directorate of Information and Publications of Agriculture, Pusa, New Delhi, 2001, p.1-2.

with a geographical area of 2.55 lakh sq.km. and with population of 38.44 million which is 3.74 per cent of the country's total population (2001). It is endowed with very fertile land for horticulture and other agricultural crops. Majority of the population of the region live in the rural areas and they are primarily dependent on agriculture. This part of the country is broadly divided into two regions –the plains and the hills. The north-eastern hill region occupies a wide range of topography, agro-climatic condition which varies from tropical to sub-tropical to temperate type and offers a favourable set of soil for cultivation of different types of horticultural crops like fruits, plantation, tuber and rhizomatous crops, vegetables, flowers etc., besides field crops like paddy, maize, millet etc. are grown as staple food crops. The major fruits are pineapple, banana, papaya, orange, litchi, guava, pears, peach, plum etc. Out of total vegetables, potato, cabbage, cauliflower, radish, beans, squash, chilies, tomato, sweet potato etc. are very common. Horticulture may play a vital role in determination of economic development of north-eastern hill region. It is needless to mention that fruits and vegetables are highly perishable and requires appropriate transport and storage facilities which are lacking in the North-Eastern hill region. The farmers usually harvest these crops in installments and sale in the market immediately after harvest. Due to lack of regional facilities of processing for value addition, marketing has been remained as the major problems of production of horticultural crops in the region.

The potentialities of horticultural crops in generating higher returns per unit of area and ensuring of employment to the rural population are immense. But no accelerating development in the field of horticulture has taken place mainly due to lack of marketing facilities and other needed infrastructural support scientific research for exploitation of the genetic wealth of horticultural crops.

Considering the pivotal role played by the horticulture sector in respect of production and productivity, a considerable thrust has been given on increasing production and productivity of horticultural crops. In view of great potential and

2. Talukdar, K.C. and B.C. Bhowmick: "*Marketing of Perishable Agricultural Products*" in K.C. Talukdar and B.C. Bhowmick (Ed.) "*Marketing of Perishable Products*" B.R. Publishing Corporation, 1993, p.1.

prospect of considerable economic return from investment, various new programmes have been initiated for the development of horticulture, floriculture, plantation crops, medicinal and aromatic plants. The National Horticulture Board also promotes and supports to the horticulture sector in India. The Board has also established computer network of market survey and market database throughout the Country to facilitate the marketing of perishable horticultural produce through market information service. The NABARD provides loan for horticulture development and the Government of India also provides subsidies on inputs like fertilizers, drip irrigation and for plant protection.

The production and productivity of various fruit crops grown commercially have direct bearings on the agricultural economy in general and the economy of orchardists in particular. In spite of favorable soil and climatic condition, the productivity of most of the crops is far below the all-India average mainly because of unscientific cultivation and poor management of the orchards. The agricultural scientists, however, view that the productivity of fruits can be increased by adoption of improved agronomic management practices. For this, the farmers must be optimistic to get remunerative prices which depend to a great extent on marketing and other infrastructural facilities.

It may be mentioned that although productivity of fruit crops is comparatively lower, yet, there is high marketable surplus of major fruit crops in the region. Talukdar and Bhowmick (1993) opined that perishable products need special attention for orderly marketing. Timely harvesting and procurement, quick transportation, modern storage and processing, advance packing and maintenance of a cool chain in their marketing process are some of the factors for immediate attention.² Due to short harvesting period of fruits, immediate disposal of produce through organized marketing network, is considered to be prime pre-requisite. But, due to lack of organized market infrastructure very poor returns are accrued to the orchardists. Besides due to poor road conditions and undeveloped transport infrastructure from farm to the nearest marketing or assembling centre, the farmers are forced to sell their produce to the middlemen at very low prices. The functions of existing marketing system of fruit crops such as assembling; storage, transportation, grading, financing,

market intelligence etc. are quite un-organized and un-regulated. Presence, these bottlenecks commercialization of horticulture in this region has been hindered to a great extent despite immense potentiality. In the context of changing perspectives of hill area development for economy and ecology the proposed study has great significance. The horticultural crops have potential to generate gainful employment, promote trade at national and international levels to earn foreign exchange. As a result, the Government of India is encouraging the cultivation and processing of horticultural crops by adopting scientific technology. The horticultural research has developed new technologies, hybrid-planting materials for qualitative improvement of fruits and also post harvest management like handling and processing technologies. To cope with the New Economic Environment and to promote export of horticultural produce the Govt. of India established the 'Agricultural Produce Export Development Authority' (APEDA). The Government also liberalized the imports of inputs in horticulture components. Horticulture sector has a good scope to fit into the hill agriculture to increase employment and income of the hill people on the one hand and for protection of soil from run-off, conservation of natural environment and ecological balance of the region.

In the present day context this study is considered very important and relevant. No worth mentioning intensive study has been made so far as to assess the prevailing constraints and problems faced by the commercial growers of horticulture crops in marketing their produces. So, an intensive study on the potentialities of horticulture crops and market accessibilities in Assam and Meghalaya with special reference to Technology Mission for Integrated Development of Horticulture (TMIDH) is considered to be very useful for the planners, policy makers and the State Governments for taking policy decisions.

Objectives:

The study is proposed with the following main objectives.

- (i) To study the potentialities of horticultural crops under the study area.
- (ii) To study the programmes under technology Mission in the sample States.
- (iii) To study the market accessibility of horticultural crops under the study area.
- (iv) To study the problems of horticultural crop cultivation.

(v) To suggest policy implications.

Sources of Data:

Data were collected from two sources – primary and secondary. Primary level data were collected from the sample area and secondary level data were collected from the published and unpublished official sources available with the Directorate of Agriculture, Horticulture and the Directorate of Economics and Statistics, Government of Assam and Government of Meghalaya respectively for the study.

Tools of Enquiry:

In order to collect the required information a set of schedules and questionnaires were prepared keeping in mind the objectives of the study. The data for the study were collected by personal interview method. All the selected respondents were interviewed by the structured schedules and questionnaires. Due care were taken to collect reliable, dependable and authentic information for the study. The information supplied by the sample households were verified by cross-questioning the village headman, enlightened farmers and head of the family and also from other reliable sources. During the field study personal and additional observation were also recorded according to the needs of the study. Amongst the seven North-Eastern States, Assam and Meghalaya was considered to be the most potential area to undertake the proposed study. It may be mentioned here that two separate project proposals were sent to our centre, one by the Department of Horticulture, Assam Agricultural University and another from the Directorate of Agriculture, Government of Assam. But in the officer in charge meeting held at Bangalore on 13th and 14th April, 2007 under the chairmanship of Secretary, Ministry of Agriculture, Government of India, it suggested to combine both the project proposals to one, keeping parity with the objectives framed by the two organizations. Further it was advised to take up study with reference to the ongoing Technology Mission for Integrated Development of Horticulture in North-East India.

Keeping in view the objectives of the study for collection of empirical data, it has been decided to concentrate the study in two States of North-East Region.

Following Multi Stage Stratified Random Sampling Technique two districts dominated by horticultural crops from Assam undergoing the progress of Technological Mission for Integrated Development of Horticulture were selected in consultation with the Directorate of Horticulture, Assam. Thus, Kamrup and Nagaon districts were selected at the first stage. In the next stage two orange growing blocks viz. Boko and Bangaon were selected from Kamrup district in consultation with the District Agriculture Officer. In the third stage, 5 villages were selected and from each village eight beneficiary households were selected randomly. Similarly, two banana growing blocks viz. Bajiya and Laokhowa were selected in consultation with the district Agriculture Officer, Nagaon. From each block 5 villages were selected. From each village eight beneficiary households were selected at random. The beneficiary households were selected at random from different five size groups. Thus, a total of 80 beneficiaries were selected from the two districts of Assam.

In the State of Meghalaya too, following Multi Stage Stratified Random Sampling Technique two districts dominated by horticultural crops and undergoing the progress of Technological Mission for Integrated Development of Horticulture were selected in consultation with the Directorate of Horticulture, Meghalaya. Thus, East Khasi Hills and Ri-Bhoi districts were selected at the first stage. In the next stage, two orange growing blocks viz. Myllem and Mawphlang were selected in consultation with the District Agriculture Officer East Khasi Hills. In the third stage, 5 villages were selected and eight beneficiary households were selected at random from each village. Similarly, two pineapple growing blocks viz. Umling and Umsning were selected in consultation with the district Agriculture Officer, Ri-Bhoi. From each block 5 villages were selected. From each village eight beneficiary households were selected at random. The beneficiary households were selected at random from different five size groups. Thus, a total of 80 beneficiaries were selected from the two districts of Meghalaya.

Selection of the Market:

The important orange and banana market centre of the two selected districts of Assam were identified in consultation with the concerned officials of the Department of Horticulture. The marketing centres falling outside the sample district

but marketed the produce of the sample districts were also selected for the study. The relevant information on market arrival, prices at different times, marketing institutions involved in channels and market costs and margin were collected. Besides, the marketing channels, the different levels of market functionaries were identified in consultation with the orange and banana growers, State Agriculture Department and other agencies having fair information on marketing of orange and banana. The Study covered 4 important orange and banana marketing centre. From each marketing centre, 1(one) wholesaler, 4(four) commission agents/sub-traders and 4(four) retailer's operating in the area were interviewed as per requisite information for the study.

The market having higher volume of transactions of trade on orange and pineapple market centre of the selected district of Meghalaya were identified in consultation with the concerned Departments of the State. The marketing centres falling outside the sample district but marketed the produce of the sample districts were also selected for the study. The relevant information on market arrival, market accessibility, prices at different times, marketing channels, and price spread were collected. Besides, studying the marketing channels, the different levels of market functionaries were identified in consultation with the orange and pineapple growers, State Agriculture Department and other agencies having fair information on marketing of orange and banana. The Study covered 4 important orange, pineapples, banana marketing centre's. From each marketing centre, 1 wholesaler, 4 commission agent/sub-traders and 4 retailer's operating in the area were selected for the study. Appropriate set of schedules and questionnaires were prepared to collect relevant data from different level of market functionaries.

Limitations of the Study:

The important limitation of this study is that it relates to the data collected during the agricultural year 2007-08. The data collected depends upon the farmers response to different quarries based on recall memory of the beneficiaries. The findings of the present study are expected to be true as all the precautions were taken to minimize the error in collecting the required information at different levels.

Chapter –III

Implementation of Technology Mission for Integrated Development of Horticulture in North Eastern Region

In this chapter an attempt has been made to analyse the implementation of Technology Mission in the two North-Eastern States, which is a new concept in horticulture sector. North-Eastern Region, with its mixed terrain to the plains and the hills with numerous rivers, is nature's unique gift for production of large number of commercial horticultural crops. It has the potentiality for growing wide range of fruits and vegetables due to the rich soil and agro-climatic conditions. The prime need of horticultural sector in North-Eastern Region is transition from its traditional or subsistence status to commercial status. Every branch of horticulture viz., fruits, vegetables, spices, medicinal & aromatics, floriculture etc. needs market oriented touch and in order to achieve qualitative and quantitative improvement, there was serious demand for a comprehensive approach in the horticulture sector starting from research to production, marketing and value addition with convergence amongst each sector. It is at this juncture, considering the potential of horticulture in the North-Eastern States, the Government of India introduced Technology Mission for Integrated Development of Horticulture (TMIDH) in North Eastern Region including Sikkim. An outlay of Rs. 229.38 crore was approved for Ninth Five Year Plan and the programme was launched in the year 2001-2002.

The commercial horticultural crop cultivation implemented through TMIDH is expected to play a significant role in increasing employment potential and income as well as changing the life style of the people in the North-Eastern States. Horticulture sector has crucial role to play in providing food and nutritional security to the people. The North-Eastern States are characterized by diverse mountain system with small land holdings in undulating terrains, prevalence of shifting cultivation, rain fed agriculture, sparse population, poor means of transport and communication system, migration of male workers in search of wage employment elsewhere, poor and fragile eco-system, low risk bearing capacity of farmers yet rich in plant and

animal diversity. In spite of all these constraints they have sustained their endeavor to horticultural crop cultivation in difficult conditions which is sensitive one.

The TMIDH is a centrally sponsored scheme being implemented in the North-Eastern States since 2001 -02 in horticulture sector. The objectives of the Mission are:-

- (i) To establish convergence and synergy among numerous ongoing Governmental programmes in the field of horticulture development to achieve horizontal and vertical integration of these programmes.
- (ii) To ensure adequate, appropriate, timely and concurrent attention to all the links in the production, post harvest and consumption chain.
- (iii) To maximize economic, ecological and social benefits from the existing investment and infrastructure created for horticulture.
- (iv) To promote ecologically sustainable intensification, economically desirable diversification and skilled employment.
- (v) To generate value addition, promote the development and dissemination of eco- technologies based on the blending of the traditional wisdom and technology with frontiers knowledge such as bio-technology, information technology and space technology; and to provide the mission links in ongoing horticulture development projects.

Implementation of TMIDH: TMIDH is being implemented through four Mini Missions. These four components are:-

1. **Mini Mission Model -I:** Research is coordinated and implemented by the Indian Council of Agricultural Research (ICAR), N.E. Region/Assam Agricultural University.
2. **Mini Mission Mode-II:** Production Covering and productivity improvement activities are coordinated by the Department of Agriculture & Co-operation and implemented by the Agriculture/Horticulture Department of the States.
3. **Mini Mission Mode-III:** Post harvest management, marketing and export are coordinated by National Horticulture Board.
4. **Mini Mission Mode-IV:** Processing is coordinated and implemented by the Ministry of Food Processing Industries.

Table: 3.1
Physical Target and Achievement of Total Area Expansion of Horticultural Crops Under TMIDH in Assam During the Periods of 2001 - 02 to 2007 - 08

Components : (In Hectare)	2001 - 02		2002 -03		2003 -04		2004 -05		2005 -06		2006 -07		2007 -08		Total		P.C.
	T	A	T	A	T	A	T	A	T	A	T	A	T	A	T	A	
Banana	200	200	661	661	450	450	800	800	800	800	1250	1250	2500	2500	6661	6660	(99.99)
Orange	50	50	230	230	100	100	300	182	400	400	900	900	2200	2160	4180	4022	(96.21)
Cashew nut	100	100	650	650	200	200	400	260	500	500	500	500	755	755	3105	2965	(95.49)
Pineapple	-	-	50	50	100	100	300	259	500	500	670	670	1500	1500	3120	3079	(98.69)
Assam Lemon	-	-	-	-	-	-	300	183	400	400	900	900	1000	1000	2600	2483	(95.50)
Black Pepper	150	147	330	330	200	200	500	250	200	200	500	500	500	490	2380	2118	(88.98)
Ginger	50	50	50	50	150	150	300	298	480	480	600	600	1250	1250	2880	2878	(99.94)
Flower	80	80	28.40	28	40	40	100	62	176	176	192	192	800	800	1,417	1379	(97.35)
Guava	-	-	30	30	-	-	-	-	-	-	-	-	-	-	30	30	(100.00)
Litch	-	-	60	60	50	50	-	-	-	-	-	-	-	-	110	110	(100.00)
Mango	-	-	30	30	-	-	-	-	-	-	-	-	-	-	30	30	(100.00)
Other Fruits	-	-	250	250	-	-	500	431	-	-	-	-	-	-	750	681	(90.80)
Regoinal Fruits	-	-	-	-	200	200	-	-	-	-	-	-	-	-	200	200	(100.00)
Papaya	-	-	100	100	-	-	-	-	-	-	-	-	-	-	100	100	(100.00)
Vegetables RTC	250	250	100	100	250	250	1000	444.40	700	700	500	500	650	650	3450	2894	(83.90)
Orange(Rejuvenation)	-	-	-	-	-	-	-	-	200	200	250	250	900	900	1350	1350	(100.00)
Cashew (Rejuvenation)	-	-	-	-	-	-	-	-	-	-	-	-	600	600	600	600	(100.00)
Water Melon	-	-	-	-	-	-	-	-	300	300	-	-	-	-	300	300	(100.00)
Turmeric	50	50	50	50	150	150	300	120	-	-	250	250	-	-	800	620	(77.50)
Areacanut	200	194.9	-	-	-	-	-	-	-	-	-	-	-	-	200	195	(97.45)
Other Spices	-	-	50	50	150	150	245	245	-	-	-	-	-	-	445	445	(100.00)
Medicinal Plants	40	40	10	10	50	50	75	75	-	-	-	-	500	500	675	600	(88.89)
Aromatic Plants	20	20	10	10	50	50	75	75	-	-	86	86	500	500	741	741	(100.00)
Garlic	-	-	-	-	-	-	100	44	-	-	-	-	-	-	100	44	(44.00)
Total	1190	1182.30	2689	2689	2140	2140	5295	3654	4656	4656	6598	6598	13655	13605	36223	34525	(95.31)

Source: Directorate of Horticulture, Government of Assam

P.C.:= Percentage of Achievement

T ---> Target

A ---> Achievement

Table:3.2
Target and Achievement of Total Area Expansion of Horticultural Crops under
TMIDH in Meghalaya During the Periods of 2001 -02 to 2006 -07

Components : (In Hectare)	2001 - 02		2002 -03		2003 -04		2004 -05		2005 -06		2006 -07		Total		P.C.
	T	A	T	A	T	A	T	A	T	A	T	A	T	A	
Banana	-	-	170	170	100	100	700	700	150	150	200	200	1320	1320	(100.00)
Orange	-	-	100	100	160	160	225	225	200	200	400	400	1085	1085	(100.00)
Pineapple	-	-	100	100	100	100	142	142	570	570	290	290	1202	1202	(100.00)
Plum/Peach	-	-	50	50	-	-	-	-	185	185	120	120	355	355	(100.00)
Strawberry	-	-	-	-	-	-	-	-	35	35	60	60	95	95	(100.00)
Guava	-	-	100	100	-	-	-	-	-	-	-	-	100	100	(100.00)
Litch	-	-	100	100	-	-	-	-	-	-	-	-	100	100	(100.00)
Mango	-	-	100	100	-	-	-	-	-	-	-	-	100	100	(100.00)
Passion Fruit	-	-	50	50	-	-	75	75	-	-	50	50	175	175	(100.00)
Indigenous Fruits	-	-	70	70	-	-	185	185	75	75	-	-	330	330	(100.00)
Stone Fruits	-	-	100	100	65	65	150	150	-	-	-	-	315	315	(100.00)
Kiwi Fruits	-	-	-	-	-	-	-	-	-	-	60	60	60	60	(100.00)
Papaya	-	-	100	100	-	-	-	-	-	-	-	-	100	100	(100.00)
Sub Total	950	950	1040	1040	425	425	1477	1477	1215	1215	1180	1180	6287	6287	(100.00)
Vegetables RTC	300	300	308	308	240	240	345	345	969	969	2060	2060	4222	4222	(100.00)
Orange(Rejuvenation)	-	-	-	-	-	-	-	-	-	-	300	300	300	300	(100.00)
Cashew (Rejuvenation)	-	-	-	-	-	-	-	-	-	-	-	-	0	0	(100.00)
Plantation Crops	150	150	400	400	100	100	155	155	300	300	400	400	1505	1505	(100.00)
Other Spices	-	-	400	400	350	350	535	535	580	580	300	300	2165	2165	(100.00)
Medicinal Plants	50	50	100	100	15	15	75	75	-	-	-	-	240	240	(100.00)
Aromatic Plants	20	20	25	25	-	-	88	88	-	-	-	-	133	133	(100.00)
Total	1470	1470	2273	2273	1130	1130	2675	2675	3064	3064	4240	4240	14852	14852	(100.00)

Source: Directorate of Horticulture, Government of Meghalaya

P.C.:= Percentage of Achievement

T ----> Target A ----> Achievement

**Table: 3.3
Physical Target and Achievement of Transfer of Technology Under TMIDH in Assam**

Components:	2001-02		2002-03		2003-04		2004-05		2005-06		2006-07		2007-08		Total	
	T	A	T	A	T	A	T	A	T	A	T	A	T	A	T	A
Seven Days Farmers Training (Nos.)	1380	1380	3100	3100	3000	3000	2960	-	2420	2420	2000	2000	4670	4670	19530	16570 (84.84)
Farmers Training Outside the State(Nos)	-	-	1200	1200	1000	1000	1000	-	675	675	1000	1000	-	-	4875	3875 (79.49)
Trainers Training (Nos.)	69	69	20	20	20	20	20	-	17	17	20	20	-	-	166	146 (87.95)
Supervisors Training Centre (Nos.)	-	-	3	3	3	3	8	8	2	2	-	-	-	-	16	16 (100.00)
Gardeners Training Centre (Nos.)	-	-	1	1	2	2	10	10	2	2	-	-	-	-	15	15 (100.00)
Organic Farming (Nos.)	50	-	-	-	-	-	-	-	-	-	-	-	-	-	50	0 0.00
Incentive for Organic Farming (Ha)	-	-	-	-	-	-	-	-	-	-	800	800	-	-	800	800 (100.00)
Earthworth Unit (Nos.)	4	4	132	132	100	100	100	100	284	284	100	100	350	350	1070	1070 (100.00)
Certification (Groups)	-	-	-	-	-	-	-	-	-	-	7	7	-	-	7	7 (100.00)

Source: Directorate of Horticulture, Government of Assam

T ----> Target A ----> Achievement

Note: Figures in parentheses indicate percentage to total Achievement.

The Small Farmer's Agribusiness Consortium (SFAC) is involved in co-ordinating the scheme. Meanwhile, State level SFACs have also been constituted in most of the implementing States for monitoring and implementing the programme at the grass root level. Under Technology Mission, funds to the states are made available on the basis of yearly action plans/proposals, which are approved by the State Level Steering Committee under the chief secretary of the concerned States.

The impact of this comprehensive scheme in the State of Assam and Meghalaya is now gradually emerging in various fronts including products, productivity infrastructure development, per capita income, commercialization etc. The area expansion programmes, the physical target and achievement of total area expansion of horticultural crops under TMIDH in Assam are shown in Table- 3.1. Table shows that since the inception year 2001-02 up to 2007-08, 34,525 hectares of area expansion programme of thrust crops of commercial importance has been taken up in Assam against the target of 36,223 hectares which shows 95.31 per cent achievement. In case of Guava, Litchi, Mango, Regional Fruits, Papaya, Orange, Cashew, Water Melon, Other Spices and Aerometric Plants 100 per cent achievement was noticed while in case of other horticultural crops achievement was below the target.

Similarly in Meghalaya, the physical target and achievement of total area expansion of horticultural crops under TMIDH are shown in Table -3.2. It is observed from the table that total area expansion target under TMIDH was 14,852 hectares and its achievement was 100 per cent for all the crops.

Various vital infrastructures like supervisors training centre, gardeners training centre, earthworm unit are already developed in Assam and Meghalaya under TMIDH. Under the TMIDH thousands of farmers were trained either inside or outside the State in premier horticultural institutes on latest frontier technologies. Table- 3.3 shows the physical target and achievement of transfer of technology under TMIDH in Assam. Table shows that under the seven days farmer training head 16,750 numbers of farmers were trained against the target of 19,530 numbers in the state 3,875 numbers of farmers imparted training from the outside of the State. Total achievement during the period was 100 per cent in case of Supervisors Training Centre, Gardeners

Table: 3.4
Physical Target and Achievement of Transfer of Technology Under TMIDH in Meghalaya.

Components:	2001 -02		2002 -03		2003 -04		2004 -05		2005 -06		2006 -07		Total		
	T	A	T	A	T	A	T	A	T	A	T	A	T	A	
Seven Days Farmers Training (Nos.)	530	530	275	275	577	577	500	500	410	410	800	800	3092	3092	
Farmers Training Outside the State(Nos.)	300	300	175	175	640	640	280	280	120	120	300	300	1815	1815	
Trainers Training (Nos.)	32	32	12	12	20	20	20	20	10	10	10	10	104	94	
Supervisors Training Centre (Nos.)	-	-	-	-	-	-	-	-	-	-	-	-	-	(90.38)	-
Gardeners Training Centre (Nos.)	2	2	-	-	-	-	-	-	-	-	-	-	2	2	
Organic Farming (Nos.)	-	-	-	-	-	-	-	-	-	-	-	-	-	(100.00)	-
Incentive for Organic Farming (Nos.)	200	200	500	500	-	-	299	299	-	-	100	100	1099	999	
Earthworth Unit (Nos.)	4	4	31	31	135	135	83	83	805	805	500	347	1558	1405	
Certification (Groups)	-	-	1	-	1	-	2	-	-	-	5	-	9	-	
															0.00

Source: Directorate of Horticulture, Government of Meghalaya

Note: Figures in parentheses indicate percentage to total Achievement.

T ---> Target A ---> Achievement

Table: 3.5
Physical Target and Achievement of Production of Planting Materials Under TMIDH in Assam

Components: (Nos.)	2001 -02		2002 -03		2003 -04		2004 -05		2005 -06		2006 -07		2007 -08		Total	
	T	A	T	A	T	A	T	A	T	A	T	A	T	A	T	A
Big Nursery (Public)	-	-	2	2	-	-	-	-	-	-	1	1	-	-	3	3 (100.00)
Big Nursery (Private)	-	-	5	5	3	3	10	2	-	-	-	-	-	-	18	10 (55.56)
Small Nursery (Private)	1	1	14	14	25	25	24	18	8	8	4	4	-	-	76	70 (92.11)
Herbal Garden(Public)	-	-	1	1	-	-	-	-	-	-	-	-	-	-	1	1 (100.00)
Herbal Garden(Private)	-	-	-	-	15	15	-	-	4	4	-	-	-	-	19	19 (100.00)
Tissue Culture Laboratory	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	0
Total	1	1	20	22	43	43	34	20	12	12	5	5	0	0	117	103 (88.03)

Source: Directorate of Horticulture, Government of Assam

T ---> Target A ---> Achievement

Note: Figures in parentheses indicate percentage to total Achievement.

Table: 3.6
Target and Achievement of Production of Planting Materials Under Horticulture Technology Mission in Meghalaya

Components (In Nos.)	2001 -02		2002 -03		2003 -04		2004 -05		2005 -06		2006 -07		Total	
	T	A	T	A	T	A	T	A	T	A	T	A	T	A
Big Nursery (Public)	3	3	2	2	10	10	2	2	2	2	5	-	24	19 (79.17)
Big Nursery (Private)	-	-	-	-	5	5	1	1	2	2	-	-	8	8 (100.00)
Small Nursery (Private)	-	-	2	2	-	-	10	10	5	5	10	-	27	17 (62.96)
Small Nursery (Public)	4	4	2	2	-	-	5	5	3	3	7	-	21	14 (66.67)
Herbal Garden(Public)	2	2	-	-	-	-	-	-	-	-	-	-	2	2 (100.00)
Herbal Garden(Private)	-	-	-	-	-	-	2	2	-	-	-	-	2	2 (100.00)
Tissue Culture Laboratory	1	1	-	-	-	-	-	-	-	-	1	-	2	1 (50.00)
Total	10	10	6	6	15	15	20	20	12	12	23	-	86	63 (73.26)

Source: Directorate of Horticulture, Government of Meghalaya

Note: Figures in parentheses indicate percentage to total Achievement.

T ---> Target A ---> Achievement

Table: 3.7
Physical Target and Achievement of Integrated Pest Management Under TMIDH in Assam

Components:	2001 -02		2002 -03		2003 -04		2004 -05		2005 -06		2006 -07		2007 -08		Total	
	T	A	T	A	T	A	T	A	T	A	T	A	T	A	T	A
Adoption of IPM (Ha.)	1000	960	200	200	500	1000	-	-	-	-	600	600	-	-	3300	2260 (68.48)
Leaf Analysis Laboratory (Nos.)	-	-	-	-	-	-	-	-	1	1	-	-	-	-	1	1
Plant Health Clinic (Nos.)	1	1	-	-	-	-	-	-	1	1	-	-	-	-	2	(100.00)
Bio -Control Laboratory (Nos.)	-	-	-	-	1	1	-	-	-	-	-	-	-	-	1	(100.00)

Source: Directorate of Horticulture, Government of Assam

Note: Figures in parentheses indicate percentage to total Achievement.

T ---> Target

A ---> Achievement

Table:3.8
Physical Target and Achievement of Integrated Pest Management Under TMIDH in Meghalaya

Components:	2001 -02		2002 -03		2003 -04		2004 -05		2005 -06		2006 -07		Total	
	T	A	T	A	T	A	T	A	T	A	T	A	T	A
Adoption of IPM (Ha.)	1761	1761	3000	3000	-	-	907	907	-	-	-	-	5668	5668 (100.00)
Leaf Analysis Laboratory(Nos)	1	1	-	-	-	-	-	-	-	-	-	-	1	1 (100.00)
Plant Health Clinic (Nos)	1	1	-	-	-	-	-	-	-	-	-	-	1	1 (100.00)
Bio Control Laboratory(Nos)	-	-	1	-	-	-	-	-	-	-	-	-	1	- 0.00
Intregated Pest Management (Nos)	-	-	-	-	625	625	-	-	-	-	1140	1140	1765	1765 (100.00)
Disease Forecasting Units (Nos)	1	1	2	-	-	-	-	-	-	-	-	-	3	1 (33.33)

Source: Directorate of Horticulture, Government of Meghalaya

Note: Figures in parentheses indicate percentage to total Achievement.

T ----> Target
 A ----> Achievement

Training Centre, Incentive for organic farming, Earth worm Unit and Certification groups. But in case of Seven Days Training , Farmers Training outside the State and Trainers Training , achievement was quite below the target level. In case of Organic farming achievement was nil against the target of 50 numbers.

Table-3.4 shows the physical target and achievement of transfer of technology under TMIDM in Meghalaya. During this period (from 2001-02 to 2006-07), seven days farmers training was imparted to 3092 numbers of farmers. Department of horticulture sent 1815 numbers of farmers for higher training on horticulture to the outside the State. Table shows that total achievement was cent percent in case of Seven Days Farmers Training , Farmers Training outside the State ,Gardeners Training Centre. In case of other heads achievement was slightly below the target level.

Table -3.5 shows the physical target and achievement of production of planting materials under TMIDH in Assam. Under this head, 3 big nurseries (public), 10 big nurseries (private), 70 numbers of small nurseries (private), 1 herbal garden (public) and 19 herbal gardens (private) were established. During this period the total target was 117 numbers and achievement was 103 numbers. The percentage of achievement was 88.03 shown in the Table.

Table- 3.6 shows the physical target and achievement of production of planting materials under TMIDH in Meghalaya, since inception till 2006-07; 29 big nurseries (public), 8 big nurseries (private), 17 small nurseries (private) 14 small nurseries (public), 2 herbal garden (public), 2 herbal gardens (private) and 1 tissue culture laboratory were established all over the State under TMIDH to meet demand of planting material. The total achievement was shown 73.26 per cent .

Table-3.7 shows the physical target and achievement of Integrated Pest Management under TMIDH in Assam. Out of the targeted 3,300 hectares of adoption IPM was extended to 2,260 hectares of land. 100 per cent achievement was shown except the adoption of IPM. Table-3.8 shows the physical target and achievement of integrated pest management under TMIDH in Meghalaya. Table indicates that during the Mission period adoption of Integrated Pest Management was extended to 5,668 hectares. It shown 100 per cent achievement in all the heads of target.

Table: 3.10
Physical Target and Achievement of Creation of Water Sources Under TMIDH in Meghalaya

Components:	2001 -02		2002 -03		2003 -04		2004 -05		2005 -06		2006 -07		Total	
	T	A	T	A	T	A	T	A	T	A	T	A	T	A
Community Tanks (Nos)	28	28	30	30	186	186	61	61	14	14	100	67	419	386 (92.12)
Tube wells (Nos.)	35	35	-	-	127	127	58	58	52	52	200	-	472	272 (57.63)
Drip Irrigation (Nos.)	28	28	-	-	115	115	58	58	40	40	280	280	521	521 (100.00)
On Farm Handling Units	-	-	47	47	55	55	54	54	-	-	54	-	210	156 (74.29)
Sprinkler Irrigation (Nos)	-	-	-	-	296	296	62	62	-	-	160	-	518	358 (69.11)

Source: Directorate of Horticulture, Government of Meghalaya

Note: Figures in parentheses indicate percentage to total Achievement.

T ---> Target A ---> Achievement

Table: 3.11
Physical Target and Achievement of Agricultural Equipments Under TMIDH in Assam

Components: (Nos.)	2001 -02		2002 -03		2003 -04		2004 -05		2005 - 06		2006 -07		2007 -08		Total	
	T	A	T	A	T	A	T	A	T	A	T	A	T	A	T	A
Manual Equipments	600	569	488	488	2500	2500	-	-	469	469	200	200	850	850	5107	5076 (99.39)
Diesel Engine	100	100	100	100	210	210	50	50	218	218	150	150	330	330	1108	1108 (100.00)
Power Tiller	121	120	562	562	180	180	50	48	100	100	110	110	-	-	1342	1120 (83.46)
Training on Equipments Use	1000	710	-	-	-	-	-	-	-	-	-	-	-	-	1000	710 (71.00)
Power operated Equipments	-	-	375	375	400	400	50	23	-	-	-	-	-	-	825	798 (96.73)
Total	1821	1499	1525	1525	3290	3290	150	121	787	787	460	460	1180	1180	9382	8812 (93.92)

Source: Directorate of Horticulture, Government of Assam

Note: Figures in parentheses indicate percentage to total Achievement.

T ---> Target A ---> Achievement

Table: 3.12
Physical Target and Achievement of Agricultural Equipments Under TMIDH in Meghalaya

Components: (Nos.)	2001 -02		2002 -03		2003 -04		2004 -05		2005 - 06		2006 -07		Total	
	T	A	T	A	T	A	T	A	T	A	T	A	T	A
Manual Equipments	31	31	670	670	403	403	-	-	-	-	500	-	1604	1104 (68.83)
Diesal Engine	3	3	5	5	100	100	65	65	75	75	140	-	388	248 (63.92)
Power Tiller	3	3	46	46	50	50	200	200	60	60	75	-	434	359 (82.72)
Power operated Equipments	-	-	50	50	481	481	-	-	-	-	150	-	681	531 (77.97)
Electric Pumpsets	-	-	-	-	-	-	40	40	-	-	400	-	440	40 (9.09)
Grinder Drier	-	-	-	-	-	-	2	2	-	-	-	-	2	2 (100.00)
Total	37	37	771	771	1034	1034	310	310	135	135	1265	0	3552	2287 (64.39)

Source: Directorate of Horticulture, Government of Meghalaya

Note: Figures in parentheses indicate percentage to total Achievement.

T ---> Target A ---> Achievement

Table: 3.13
Physical Target and Achievement of Women Development Under TMIDH in Assam

Components	2001 -02		2002 -03		2003 -04		2004 -05		2005 -06		2006 -07		2007 -08		Total	
	T	A	T	A	T	A	T	A	T	A	T	A	T	A	T	A
Women SHG	-	-	140	140	250	250	400	-	333	333	200	200	250	240	1573	1163 (73.94)
Training of Women (Nos.)	920	920	2150	2150	1500	1500	2000	-	2220	2220	2000	2000	5000	4800	15790	13590 (86.07)
Intregated Mushroom Unit	-	-	-	-	1	1	-	-	-	-	-	-	-	-	1	1 (100.00)
Total	920	920	2290	2290	1751	1751	2400	-	2553	2553	2200	2200	5250	5040	17364	14754 (84.97)

Source: Directorate of Horticulture, Government of Assam

T ---> Target A ---> Achievement

Note: Figures in parentheses indicate percentage to total Achievement.

Table: 3.14
Physical Target and Achievement of Women Development Under TMIDH in Meghalaya

Components (Nos.)	2001 -02		2002 -03		2003 -04		2004 -05		2005 -06		2006 -07		Total	
	T	A	T	A	T	A	T	A	T	A	T	A	T	A
Women SHG	-	-	500	500	425	425	330	330	300	300	130	-	1685	1555 (92.28)
Training of Women	-	-	71	71	-	-	-	-	-	-	-	-	71	71 (100.00)
Intregated Mushroom Unit	1	-	-	-	-	-	-	-	-	-	-	-	1	0 0.00
Total	1	-	571	571	425	425	330	330	300	300	130	-	1757	1626 (92.54)

Source: Directorate of Horticulture, Government of Meghalaya

Note: Figures in parentheses indicate percentage to total Achievement.

T ---> Target A ---> Achievement

Table -3.9 shows the physical target and achievement of creation of water sources under TMIDH in Assam. Under this head, 440 community tanks, 1,545 tube wells and 10 farm handling units were provided to the farmers. In addition to this, drip/sprinkler irrigations were extended up to 384 hectares during this period. The over all achievement was 100 per cent during the period of 7 years.

Table -3.10 shows the physical target and achievement of creation of water sources under TMIDH in Meghalaya. Under this head, 386 community tanks, 272 tube wells, 521 drip irrigation, 156 farms handling unit and 358 sprinkler irrigation were provided to the farmers. The percentage of achievement was cent percent in case of Drip irrigation while it was only 57.63 per cent in Tube well irrigation.

Table -3.11 and 3.12 shows the physical target and achievement of agriculture equipments under TMIDH in Assam and Meghalaya respectively. Under the agricultural equipments head in Assam, 5,076 sets of manual equipments, 1,108 diesel engine, 1,120 power tillers and 798 power operated equipments were provided to the beneficiary of TMIDH in Assam (Table 3.11). In addition to this, 710 growers undertook training on equipments use. Total achievement was only 93.92 per cent as shown in the Table.

In Meghalaya, during the Mission period, 1104 sets of manual equipments, 248 diesel engines, 359 power tillers, 531 power operated equipments, 40 electric pump sets and 2 ginger drier were provided to the beneficiary of TMIDH in Meghalaya which is shown in Table-12. Total achievement was only 64.39 per cent as shown in the Table.

Tables-3.13 and 3.14 show the physical target and achievement of women development under TMIDH in Assam and Meghalaya respectively. Under the women development programmes in Assam, 1,163 numbers of Women Self Help Groups were formed and 13590 women received training. One Integrated Mushroom Unit was also established during the period of 2003-04. Total achievement was 84.97 per cent which is shown in the Table. Similarly, under the women development programmes in Meghalaya, 1,555 women Self Help Groups were formed and 71 women received training. Total achievement was nearly 92.54 per cent which was reflected in the Table-3.14.

Chapter-IV

Socio-Economic Profile of the Sample Beneficiaries

In this chapter an attempt has been made to analyse the socio-economic profile of the sample beneficiary households such as their economic conditions, educational levels, occupational pattern, age and sex composition of population, land holding and land utilization pattern etc., as these are intimately linked with their socio-cultural life. The enormous human factors such as educational, sociological, institutional etc. are responsible for bringing changes in the adoption of technology in the production pattern of crops under family-farm system. There is a wide range of socio-economic diversity in Assam and Meghalaya.

It is needless to mention that the peculiar demographic features in the N.E. Region, there is a great significance in studying the socio-economic aspects of the sample beneficiary households; which has direct as well as indirect bearings with this study.

Demographic Features:

All the households covered by this study in two sample States were primarily engaged in cultivation. Landless families were not found in the sample area. There were of course agricultural labourers in the study area not because they were landless; they work as hired labour to earn additional income to meet the requirement of the family.

The distribution of population by age groups gives an idea of the composition of the family by family size and availability of labours force as well as the dependency ratio. The total population in the 80 sample beneficiary households in Assam was classified according to age groups and sex and was presented in Table – 4.1(a). Table shows that out of the total population covered by the study 259 (52.22 per cent) were males and 237(47.78 per cent) were females. The average size of family is 6.2 persons which was slightly higher as the State average family size of 5.42 in 2001. The sex ratio of populations worked out at 915 females per thousand males, which was by and large same with the State sex ratio, being 935 females per thousand of males in 2001.

Table: 4.1(a)**Distribution of Sample Beneficiary Households by Age Groups and Sex in Assam**

Age Groups (Years)	Kamrup District			Nagaon District			Total		Grand Total
	M	F	T	M	F	T	M	F	
Below 15	30	40	70	42	38	80	72	78	150
15 --- 25	29	28	57	28	19	47	57	47	104
25 --- 35	26	25	51	34	21	55	60	46	106
35 --- 45	14	12	26	13	16	29	27	28	55
45 --- 55	12	12	24	10	9	19	22	21	43
55 --- 65	5	5	10	7	5	12	12	10	22
65 & Above	5	4	9	4	3	7	9	7	16
Total	121	126	247	138	111	249	259	237	496
P.C. to Total	24.40	25.40	49.80	27.82	22.38	50.20	52.22	47.78	100.00

M-Male, F-Female, T-Total

The total population in the 80 sample beneficiary households in Meghalaya was classified according to age groups and sex and was presented in Table – 4.1(b).

Table:4.1(b)**Distribution of Sample Beneficiary Households by Age Groups and Sex in Meghalaya**

Age Groups (Years)	East Khasi Hills District			Ri-Bhoi District			Total		Grand Total
	M	F	T	M	F	T	M	F	
Below 15	36	29	65	45	32	77	81	61	142
15 --- 25	32	23	55	23	24	47	55	47	102
25 --- 35	21	17	38	19	11	30	40	28	68
35 --- 45	11	12	23	12	12	24	23	24	47
45 --- 55	11	9	20	8	9	17	19	18	37
55 --- 65	5	6	11	3	4	7	8	10	18
65 & Above	2	3	5	1	4	5	3	7	10
Total	118	99	217	111	96	207	229	195	424
P.C. to Total	27.83	23.35	51.18	26.18	22.64	48.82	54.01	45.99	100.00

M-Male, F-Female, T-Total

Table showed that out of the total population covered by the study 229 (54.01 per cent) were males and 195 (45.99 per cent) were females. The average size of family was 5.3 persons which was slightly higher than the State average family size of 5.49 in 2001. The sex ratio of populations was 915 females per thousand males, which was lower than the State sex ratio, being 975 females per thousand of males in 2001.

The marital status of population in Kamrup and Nagaon district of Assam was presented in Table – 4.2 (a) and 4.2(b) respectively. The marital status of

Table:4.2 (a)
Marital Status of Sample Beneficiary Households by Age
Groups and Sex in Kamrup District

Age group	Married		Un - Married		Widow/ Widower		Total		Grand
	M	F	M	F	M	F	M	F	Total
Below 15 Yrs.	0	0	30	40	0	0	30	40	70
15 --- 25 Yrs.	10	19	19	9	0	0	29	28	57
25 --- 35 Yrs.	22	21	4	4	0	0	26	25	51
35 --- 45 Yrs.	13	11	1	0	0	1	14	12	26
45 --- 55 Yrs.	10	8	0	2	2	2	12	12	24
55 --- 65 Yrs.	5	3	0	0	0	2	5	5	10
65 & Above	4	2	0	0	1	2	5	4	9
Total	64	64	54	55	3	7	121	126	247
P.C. to Total	25.91	25.91	21.86	22.27	1.21	2.83	48.99	51.01	100.00

M-Male, F-Female, T-Total

populations in Kamrup district was somewhat different. Table shows that out of total population in the sample district; 51.82 per cent were married (comprising of 50 per cent males and 50 per cent females), 44.13 per cent were unmarried (comprising of

Table:4.2(b)
Marital Status of Sample Beneficiary Households by Age
Groups and Sex in Nagaon District

Age group	Married		Un - Married		Widow/ widower		Total		Grand
	M	F	M	F	M	F	M	F	Total
Below 15 Yrs.	0	0	42	38	0	0	42	38	80
15 --- 25 Yrs.	9	12	19	7	0	0	28	19	47
25 --- 35 Yrs.	17	18	17	3	0	0	34	21	55
35 --- 45 Yrs.	12	14	1	1	0	1	13	16	29
45 --- 55 Yrs.	9	8	0	0	1	1	10	9	19
55 --- 65 Yrs.	6	3	0	0	1	2	7	5	12
65 & Above	3	1	0	0	1	2	4	3	7
Total	56	56	79	49	3	6	138	111	249
P.C. to Total	22.49	22.49	31.73	19.68	1.20	2.41	55.42	44.58	100.00

M-Male, F-Female, T-Total

49.54 per cent males and 50.46 per cent females) and rest 4.05 per cent were widowed. Table showed that out of total population in the sample district of Nagaon, 44.98 per cent were married (comprising of 50 per cent male and 50 per cent females), 51.41 per cent were unmarried (comprising of 61.72 per cent males and 38.28 per cent females),

and rest 3.61 per cent were widowed (comprising of 1.20 per cent males and 2.41 percent females) population.

The marital status of population in East Khasi Hills and Ri-Bhoi district of Meghalaya was presented in Table – 4.3(a) and 4.3(b) respectively. Table showed that

Table:4.3 (a)
Marital Status of Sample Beneficiary Households by Age Groups
and Sex in East Khasi Hills District

Age group	Married		Un - Married		Widow/ Widower		Total		Grand Total
	M	F	M	F	M	F	M	F	
Below 15 Yrs.	0	0	36	29	0	0	36	29	65
15 — 25 Yrs.	7	11	25	12	0	0	32	23	55
25 — 35 Yrs.	15	15	6	2	0	0	21	17	38
35 — 45 Yrs.	11	10	0	1	0	1	11	12	23
45 — 55 Yrs.	11	8	0	0	0	1	11	9	20
55 — 65 Yrs.	5	6	0	0	0	0	5	6	11
65 & Above	2	1	0	0	0	2	2	3	5
Total	51	51	67	44	0	4	118	99	217
P.C. to Total	23.46	23.64	30.82	20.24	0	1.84	54.28	45.72	100.00

M-Male, F-Female, T-Total

out of total population in the sample district of East Khasi Hills; 47.00 per cent were married (comprising of 50 per cent male and 50 per cent females), 51.06 per cent were

Table:4.3(b)
Marital Status of Sample Beneficiary Households by Age
Groups and Sex in Ri-Bhoi District

Age group	Married		Un - Married		Widow/ Widower		Total		Grand Total
	M	F	M	F	M	F	M	F	
Below 15 Yrs.	0	0	45	32	0	0	45	32	77
15 — 25 Yrs.	7	13	16	11	0	0	23	24	47
25 — 35 Yrs.	15	9	4	2	0	0	19	11	30
35 — 45 Yrs.	11	9	1	1	0	2	12	12	24
45 — 55 Yrs.	7	8	0	0	1	1	8	9	17
55 — 65 Yrs.	3	3	0	0	0	1	3	4	7
65 & Above	0	1	0	0	1	3	1	4	5
Total	43	43	66	46	2	7	111	96	207
P.C. to Total	20.77	20.77	31.88	22.22	0.97	3.38	53.62	46.38	100.00

M-Male, F-Female, T-Total

unmarried (comprising of 60.36 per cent males and 39.64 per cent females), and rest 1.84 per cent were widowed population. Table- 4.3(b) shows that out of total population in the sample district 41.54 per cent were married (comprising of 50 per cent males and

50 per cent females), 54.11 per cent were unmarried (comprising of 58.93 per cent males and 41.07 per cent females) and rest 4.35 per cent were widowed.

Educational Levels :

The levels and standard of education is an important indicator of quality of human resources engaged in agriculture and other activities. Their level of awareness, knowledge and acceptability to new technology, by and large, depends on their level of education. With higher education of the people it is likely that adoption of modern agricultural technology, selection of better source of marketing and enhanced bargaining power with the traders for their commodity is interrelated. Without education a farmer is indifferent to adopt any improved technology, selection of marketing channels and in exercising bargaining power. There is, however sufficient ground to believe that education of farmers may play a vital role in innovating their farms with modern technology for higher production and higher return per unit of area.

The educational level of the sample beneficiary households of Kamrup and Nagaon districts of Assam was classified by age groups and has been presented in Table – 4.4 (a) and 4.4(b). Table-4.4(a) showed that in Kamrup district out of the total population 29.55 per cent had educational qualification up to L.P. standard, 27.13 per cent had educational qualification up to M.E. standard, 20.24 per cent had educational qualification up to H.S.L.C. standard, 6.07 per cent passed H.S.L.C. and equivalent standard, 1.61 per cent had educational qualifications up to Higher Secondary, 0.81 per cent had educational qualification up to Graduate standard and 0.40 per cent had education up to Post Graduate level. From the Table it was found that in Kamrup district the percentage of literate person to the total population was 85.83 per cent. The number of illiterate to the total population was 14.17 per cent. Table indicated sufficiently that although overall educational level in the sample was found satisfactory, but its quality and standard were observed to be poor. From the Table 4.4(b), it was found that in Nagaon district the literacy rate to the total population was 83.13 per cent. The number of illiterate to the total population was 16.87 per cent. It was observed that in Nagaon district out of the total population 28.51 per cent had educational qualification up to L.P. standard, 30.12 had educational qualification up to M.E.

Table:4.4(a)
Educational Status of the Sample Beneficiary Households by Age- Groups in KamrupDistrict

Age Groups (Years)	Illiterate		Lit. up to Primary		Up to M.E.Std.		Up to High School Std.		H.S.L.C. Passed		H.S. Passed		Graduate Level		Post Graduate		Total		Grand Total
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	
Below 15	14	16	11	12	2	7	3	5	-	-	-	-	-	-	-	-	30	40	70
15 --- 25	-	-	6	10	9	8	6	7	5	3	2	-	-	-	1	-	29	28	57
25 --- 35	-	-	5	7	8	12	9	6	3	-	1	-	-	-	-	-	26	25	51
35 --- 45	-	-	3	4	5	7	4	1	-	-	-	-	2	-	-	-	14	12	26
45 --- 55	-	1	3	6	3	2	5	2	1	-	-	1	-	-	-	-	12	12	24
55 --- 65	1	1	2	1	1	1	-	1	1	1	-	-	-	-	-	-	5	5	10
65 & Above	1	1	1	2	2	-	-	1	1	-	-	-	-	-	-	-	5	4	9
Total	16	19	31	42	30	37	27	23	11	4	3	1	2	0	1	0	121	126	247
P.C	6.48	7.69	12.55	17.00	12.15	14.98	10.93	9.31	4.45	1.62	1.21	0.40	0.81	0.00	0.40	0.00	48.99	51.01	100.00

P.C --- > Percentage to Total

Table:4.4(b)**Educational Status of the Sample Beneficiary Households by Age- Groups in Nagaon District**

Age Groups (Years)	Illiterate		Lit. up to Primary		Up to M.E.Std.		Up to High School Std.		H.S.L.C. Passed		H.S. Passed		Graduate Level		Post Graduate		Total		Grand Total	
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F		
																				M
Below 15	16	17	10	7	12	9	4	5	-	-	-	-	-	-	-	-	-	42	38	80
15 --- 25	-	-	4	6	7	5	8	6	4	2	3	-	2	-	-	-	-	28	19	47
25 --- 35	-	-	6	9	14	8	9	4	3	-	1	-	1	-	-	-	-	34	21	55
35 --- 45	-	-	3	7	8	6	1	3	-	-	1	-	-	-	-	-	-	13	16	29
45 --- 55	1	2	4	5	2	2	2	-	1	-	-	-	-	-	-	-	-	10	9	19
55 --- 65	1	2	4	3	2	-	-	-	-	-	-	-	-	-	-	-	-	7	5	12
65 & Above	1	2	2	1	-	-	1	-	-	-	-	-	-	-	-	-	-	4	3	7
Total	19	23	33	38	45	30	25	18	8	2	5	-	3	-	-	-	-	138	111	249
P.C	7.63	9.24	13.25	15.26	18.07	12.05	10.04	7.23	3.21	0.80	2.01	0.00	1.20	0.00	0.00	0.00	0.00	55.42	44.58	100.00

P.C --- > Percentage to Total

Table: 4.5(a)
Educational Status of the Sample Beneficiary Households by Age- Groups in East Khasi Hills District

Age Groups (Years)	Illiterate		Lit. up to Primary		Up to M.E.Std.		Up to High School Std.		H.S.L.C. Passed		H.S. Passed		Graduate Level		Post Graduate		Total		Grand Total
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	
Below 15	10	17	12	7	8	2	6	3									36	29	65
15 --- 25	-	1	10	8	9	10	11	4	2	-	-	-	-	-	-	-	32	23	55
25 --- 35	1	1	7	7	10	7	1	2	1	-	-	-	1	-	-	-	21	17	38
35 --- 45	-	1	4	6	5	3	1	2	-	-	1	-	-	-	-	-	11	12	23
55 --- 65	2	1	-	3	1	2	2	-	-	-	-	-	-	-	-	-	5	6	11
65 & Above	1	1	-	1	1	1	-	-	-	-	-	-	-	-	-	-	2	3	5
Total	15	22	39	36	36	28	22	12	3	1	0	2	0	0	0	118	99	217	
P.C	6.91	10.14	17.97	16.59	16.59	12.90	10.14	5.53	1.38	0.46	0.46	0.92	0.00	0.00	0.00	54.38	45.62	100.00	

P.C --- > Percentage to Total

Table:4.4(b)**Educational Status of the Sample Beneficiary Households by Age- Groups in Nagaon District**

Age Groups (Years)	Illiterate		Lit. up to Primary		Up to M.E.Std.		Up to High School Std.		H.S.L.C. Passed		H.S. Passed		Graduate Level		Post Graduate		Total		Grand Total	
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F		
																				Total
Below 15	16	17	10	7	12	9	4	5	-	-	-	-	-	-	-	-	-	42	38	80
15 --- 25	-	-	4	6	7	5	8	6	4	2	3	-	2	-	-	-	-	28	19	47
25 --- 35	-	-	6	9	14	8	9	4	3	-	1	-	1	-	-	-	-	34	21	55
35 --- 45	-	-	3	7	8	6	1	3	-	-	1	-	-	-	-	-	-	13	16	29
45 --- 55	1	2	4	5	2	2	2	-	1	-	-	-	-	-	-	-	-	10	9	19
55 --- 65	1	2	4	3	2	-	-	-	-	-	-	-	-	-	-	-	-	7	5	12
65 & Above	1	2	2	1	-	-	1	-	-	-	-	-	-	-	-	-	-	4	3	7
Total	19	23	33	38	45	30	25	18	8	2	5	-	3	-	-	-	-	138	111	249
P.C	7.63	9.24	13.25	15.26	18.07	12.05	10.04	7.23	3.21	0.80	2.01	0.00	1.20	0.00	0.00	0.00	0.00	55.42	44.58	100.00

P.C ---- > Percentage to Total

Table: 4.5(b)
Educational Status of the Sample Beneficiary Households by Age- Groups in Ri-Bhoi District

Age Groups (Years)	Illiterate		Lit. up to Primary		Up to M.E.Std.		Up to High School Std.		H.S.L.C. Passed		H.S. Passed		Graduate Level		Post Graduate		Total		Grand Total
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	
Below 15	18	16	15	12	8	3	4	1	-	-	-	-	-	-	-	-	45	32	77
15 --- 25	-	1	7	14	10	4	6	5	-	-	-	-	-	-	-	-	23	24	47
25 --- 35	1	-	9	7	7	3	2	1	-	-	-	-	-	-	-	-	19	11	30
35 --- 45	1	1	3	5	3	4	2	2	1	1	1	1	1	-	-	-	12	12	24
45 --- 55	-	-	2	2	1	3	3	2	1	1	1	1	1	-	-	-	8	9	17
55 --- 65	1	2	-	1	1	1	1	1	-	-	-	-	-	-	-	-	3	4	7
65 & Above	-	-	2	1	2	0	-	-	-	-	-	-	-	-	-	-	1	4	5
P.C	10.14	10.63	17.87	20.77	14.49	8.70	8.70	5.31	0.97	0.48	0.48	0.48	0.97	0.00	0.00	0.00	53.62	46.38	100.00

P.C --- > Percentage to Total

standard, 17.27 per cent had educational qualification up to H.S.L.C. standard, 4.01 per cent passed H.S.L.C. and equivalent standard, 2.01 per cent had educational qualification up to Higher Secondary or equivalent standard, 1.20 per cent had educational qualification up to Graduate standard.

The educational level of population of the sample beneficiary household in East Khasi Hills and Ri-Bhoi district of Meghalaya was presented in Table-4.5(a) and 4.5 (b). From the Table it was found that in East Khasi Hills district the percentage of literate person to the total population was 82.95 per cent. The number of illiterate to the total population was 17.05 per cent. The grass root level data analysis showed that of the total population 34.56 per cent had educational qualification up to L.P. standard, 29.49 per cent had educational qualification up to M.E. standard, 15.67 per cent had educational qualification up to H.S.L.C. standard, 1.84 per cent passed H.S.L.C., 0.46 per cent had educational qualification up to H.S. or equivalent level, 0.92 per cent had educational qualification up to Graduate level. Table-4.5(b) showed that in Ri-Bhoi district the percentage of literate person to the total population was 79.23 per cent. The number of illiterate to the total population was 20.77 per cent. The grass root level data analysis showed that out of the total population, 38.64 per cent had educational qualification up to L.P. standard, 23.19 per cent had educational qualification up to M.E. standard, 14.01 per cent had educational qualification up to H.S.L.C. standard, 1.45 per cent passed H.S.L.C., 0.96 per cent had educational qualification up to H.S. or equivalent level and 0.97 per cent had educational qualification up to Graduate level.

There were some notable deficiencies in the standard of education of the people in both the study area. So far as in attaining the professional qualification or higher education was concerned, poor financial condition was one of the basic constraints in case of large majority of the people followed by inadequate educational infrastructural facilities for higher education. School dropouts were observed to be quite substantial and hence the population in the working age groups was engaged in agriculture and allied activities and thus underemployment situation was visible in agriculture sector.

Economic Status:

In order to study the economic status of population in the sample they

were classified as earner, earning dependent and dependent. The persons who were primarily engaged in any income generating economic activities were classified as earners or workers. The persons whose main activities were different but helped in economic pursuits of the household partially were classified as earning dependent or helper; the helpers were usually the children of below working age groups (below 15 years of age) but not attending to schools. The students of working age-groups who participated in income earning activities seldom in their off season and the persons who were above working age-groups were usually classified as helper or earning dependent. But, the persons classified as non-worker were minor children and the students below 15 years of age and the people who attained 65 years or above were treated as non-workers. The non-workers also included physically handicapped and disabled persons who are not able to do any productive work.

The economic status of sample households and population of Kamrup and Nagaon districts were presented in Table 4.6(a) and 4.6(b). In Kamrup district out of

Table:4.6 (a)
Economic Status of Sample Beneficiary Households by Age Groups and Sex in Kamrup District

Age Groups (Years)	Earner			Earning Dependent			Dependent			Total		Grand Total
	M	F	T	M	F	T	M	F	T	M	F	
Below 15	-	-	-	16	24	40	14	16	30	30	40	70
15 — 25	22	18	40	7	8	15	-	2	2	29	28	57
25 — 35	19	15	34	7	8	15	-	2	2	26	25	51
35 — 45	9	5	14	3	6	9	2	1	3	14	12	26
45 — 55	8	4	12	2	5	7	2	3	5	12	12	24
55 — 65	2	-	2	2	2	4	1	3	4	5	5	10
65 & Above	-	-	0	2	2	4	3	2	5	5	4	9
Total	60	42	102	39	55	94	22	29	51	121	126	247
P.C.	24.29	17.00	41.30	15.79	22.27	38.06	8.91	11.74	20.65	48.99	51.01	100.00

M-Male, F-Female, T-Total

the total population 41.30 per cent were earner or worker (comprising of 58.82 per cent males and 41.18 per cent females), 38.06 per cent were earning dependent or helper (comprising of 41.49 per cent males and 58.51 per cent females) and 20.65 per cent were dependent or non-worker (comprising of 43.14 per cent males and 56.86 per cent females) It was found that in the Nagaon sample out of the total population ; 31.73 per cent were earner or worker (comprising of 77.22 per cent males and 22.78 per cent

Table:4.6 (b)
Economic Status of Sample Beneficiary Households by Age Groups
and Sex in Nagaon District

Age Groups (Years)	Earner			Earning Dependent			Dependent			Total		Grand Total
	M	F	T	M	F	T	M	F	T	M	F	
Below 15	-	-	-	23	20	43	19	18	37	42	38	80
15 --- 25	16	5	21	12	11	23	-	3	3	28	19	47
25 --- 35	28	7	35	5	13	18	1	1	2	34	21	55
35 --- 45	9	4	13	4	10	14	-	2	2	13	16	29
45 --- 55	6	2	8	2	1	3	2	4	6	10	9	19
55 --- 65	2	-	2	3	4	5	2	5	5	7	5	12
65 & Above	-	-	-	1	1	2	3	2	5	4	3	7
Total	61	18	79	50	60	110	27	33	60	138	111	249
P.C. to Total	24.50	7.23	31.73	20.08	24.10	44.18	10.84	13.35	24.10	55.42	44.58	100.00

M-Male, F-Female, T-Total

females) 44.18 per cent were earning dependent or helper (comprising of 45.45 per cent males and 54.55 per cent females) and 24.10 per cent were dependent or non-worker (comprising of 45.00 per cent males and 55.00 per cent females).

The economic status of sample households of East Khasi Hills and Ri-Bhoi district was presented in Table – 4.7 (a) and 4.7(b). It was found that in East Khasi

Table:4.7 (a)
Economic Status of Sample Beneficiary Households by Age Groups
and Sex in East Khasi Hills District

Age Groups (Years)	Earner			Earning Dependent			Dependent			Total		Grand Total
	M	F	T	M	F	T	M	F	T	M	F	
Below 15	-	-	-	16	12	28	20	17	37	36	29	65
15 --- 25	21	13	34	11	9	20	-	1	1	32	23	55
25 --- 35	17	12	29	4	5	9	-	-	-	21	17	38
35 --- 45	8	6	14	3	5	8	-	1	1	11	12	23
45 --- 55	7	2	9	4	5	9	-	2	2	11	9	20
55 --- 65	1	1	2	3	3	6	1	2	3	5	6	11
65 & Above	-	-	-	1	-	1	1	3	4	2	3	5
Total	54	34	88	42	39	81	22	26	48	118	99	217
P.C. to Total	24.88	15.67	40.55	19.35	17.97	37.33	10.14	11.98	22.12	54.38	45.62	100.00

M-Male, F-Female, T-Total

Hills out of the total population 40.55 per cent were earner or worker (comprising of 61.36 per cent males and 38.64 per cent females), 37.33 per cent were earning dependent (comprising of 51.85 per cent males and 48.15 per cent females) and 22.12 per cent were dependent or non-worker (comprising of 45.83 per cent males and 54.17

Table:4.7 (b)
Economic Status of Sample Beneficiary Households by Age Groups
and Sex in Ri-Bhoi District

Age Groups (Years)	Earner			Earning Dependent			Dependent			Total		Grand Total
	M	F	T	M	F	T	M	F	T	M	F	
Below 15	-	-	-	21	14	35	24	18	42	45	32	77
15 --- 25	12	9	21	10	13	23	1	2	3	23	24	47
25 --- 35	13	6	19	6	5	11	-	-	-	19	11	30
35 --- 45	7	4	11	5	7	12	-	1	1	12	12	24
45 --- 55	6	5	11	2	2	4	-	2	2	8	9	17
55 --- 65	1	1	2	1	1	2	1	2	3	3	4	7
65 & Above	-	-	-	-	2	2	1	2	3	1	4	5
Total	39	25	64	45	44	89	27	27	54	111	96	207
P.C. to Total	18.84	12.08	30.92	21.74	21.26	43.00	13.04	13.04	26.09	53.62	46.38	100.00

M-Male, F-Female, T-Total

per cent females). In Ri-Bhoi district out of the total population 30.92 per cent were earner or worker (comprising of 60.94 per cent males and 39.06 per cent females), 43.00 per cent were earning dependent or helper (comprising of 50.56 per cent males and 49.44 per cent females) and 26.08 per cent were dependent or non-worker (comprising of 50.00 per cent males and 50.00 per cent females)

Occupational Pattern:

The main occupation of population in the working age group is agriculture and allied activities. Industrial category wise classification of population in the sample of Kamrup and Nagaon districts was presented in Table – 4.8(a) and 4.8(b). Table-4.8(a) shows that of the total working population in the sample District of Kamrup; 33.33 per cent were primarily engaged as cultivator, 10.78 per cent were as agricultural labourers, 8.82 per cent were as non-agricultural labourers and 8.82 per cent were engaged in livestock, forestry and fisheries sector. In the non-agricultural sector like household cottage industries engaged 16.67 per cent of worker, 7.84 per cent engaged in weaving, 7.84 per cent engaged in services and professions and 5.88 per cent in petty trade, commerce and transport. Of the total working population 35 workers found to have pursued some activities as secondary occupation as shown in Table .

Table 4.8(b) showed that in Nagaon district out of the total working population 49.37 per cent were primarily engaged in agriculture, 8.86 per cent were as

Table:4.8(a)
Distribution of Working Population of the Sample Beneficiary
Households in Kamrup District by Category of Works

Category of Works	Primary			Secondary		
	Male	Female	Total	Male	Female	Total
Cultivators	34	0	34 (33.33)	12	0	12 (34.29)
Agricultural Labour	6	5	11 (10.78)	2	0	2 (5.71)
Non - Agril. Labour	3	6	9 (8.82)	1	1	2 (5.71)
Livestock, Forestry & Fishery	5	4	9 (8.82)	2	2	4 (11.43)
Weaving	0	8	8 (7.84)	0	4	4 (11.43)
Other Household Cottage Industries	6	11	17 (16.67)	6	2	8 (22.86)
Service	2	6	8 (7.84)	0	0	0 0.00
Trade, Commerce & Transport	4	2	6 (5.88)	1	2	3 (8.57)
Total Workers	60	42	102 (100.00)	24	11	35 (100.00)
Earning Dependent	39	55	94			
Dependent	22	29	51			
Total Population	121	126	247			

Note: Figures in parentheses indicate percentage to total workers.

agricultural labourers, 6.33 per cent were as non-agricultural labourers and 12.66 per cent engaged in livestock, forestry and fisheries sector. In the non-agricultural sector like household cottage industries engaged 8.86 per cent of worker, 4.81 per cent engaged in weaving, 3.80 per cent engaged in services and professions and 6.33 per cent in petty trade, commerce and transport. Of the total working population 14 workers found to have pursued some activities as secondary occupation as shown in Table. It was observed that secondary occupations were usually pursued by the poorer and economically weaker section of population. Some working population primarily

Table:4.8(b)
Distribution of Working Population of the Sample Beneficiary
Households in Nagaon District by Category of Works

Category of Works	Primary			Secondary		
	Male	Female	Total	Male	Female	Total
Cultivators	39	0	39 (49.37)	3	0	3 (21.43)
Agricultural Labour	6	1	7 (8.86)	0	0	0 0.00
Non - Agril. Labour	2	3	5 (6.33)	1	1	2 (14.29)
Livestock, Forestry & Fishery	4	6	10 (12.66)	2	1	3 (21.43)
Weaving	0	3	3 (4.81)	0	0	0 0.00
Other Household Cottage Industries	3	4	7 (8.86)	3	1	4 (28.57)
Service	3	0	3 (3.80)	0	0	0 0.00
Trade, Commerce & Transport	4	1	5 (6.33)	2	0	2 (14.29)
Total Workers	61	18	79 (100.00)	11	3	14 (100.00)
Earning Dependent	50	60	110			
Dependent	27	33	60			
Total Population	138	111	249			

Note: Figures in parentheses indicate percentage to total workers.

engaged in services and professions, petty trade, commerce and transport, non-agricultural labour also engaged in their family farm as cultivator.

The occupational distribution of population in the sample of East Khasi hills and Ri-Bhoi districts is presented in Table – 4.9(a) and 4.9(b). Table-4.9(a) showed that of the total working population of East Khasi Hills district, 35.23 per cent were primarily engaged in agriculture, 12.50 per cent were as agricultural labourers, 9.09 per cent were as non-agricultural labourers and 11.36 per cent were engaged in livestock, forestry and fisheries sector. In the non-agricultural sector like household cottage industries engaged 12.50 per cent of worker, 10.23 per cent engaged in weaving, 4.55 per cent engaged in services and professions, and 4.55 per cent engaged in petty trade,

commerce and transport. Of the total working population 36 workers found to have pursued some activities as secondary occupation as shown in Table.

Table:4.9(a)

Distribution of Working Population of the Sample Beneficiary Households in East Khasi Hills District by Category of Works

Category of Works	Primary			Secondary		
	Male	Female	Total	Male	Female	Total
Cultivators	31	0	31 (35.23)	14	0	14 (38.89)
Agricultural Labour	8	3	11 (12.50)	2	1	3 (8.33)
Non - Agril. Labour	3	5	8 (9.09)	2	2	4 (11.11)
Livestock, Forestry & Fishery	2	8	10 (11.36)	0	4	4 (11.11)
Weaving	0	9	9 (10.23)	0	5	5 (13.89)
Other Household Cottage Industries	5	6	11 (12.50)	2	3	5 (13.89)
Service	3	1	4 (4.55)	0	0	0 0.00
Trade, Commerce & Transport	2	2	4 (4.55)	1	0	1 (2.78)
Total Workers	54	34	88 (100.00)	21	15	36 (100.00)
Earning Dependent	42	39	81			
Dependent	22	26	48			
Total Population	118	99	217			

Note: Figures in parentheses indicate percentage to total workers.

Table-4.9(b) showed that of the total working population in the sample District of Ri-Bhoi; 39.06 per cent were primarily engaged as cultivator, 20.31 per cent were as agricultural labourers, 10.00 per cent were as non-agricultural labourers and 7.81 per cent engaged in livestock, forestry and fisheries sector. In the non-agricultural sector like household cottage industries engaged 12.50 per cent of worker, 4.69 per cent engaged in weaving, 3.13 per cent engaged in services and professions and 4.69 per cent engaged in petty trade, commerce and transport. Of the total working population

20 workers found to have pursued some activities as secondary occupation as shown in Table.

Table:4.9(b)
Distribution of Working Population of the Sample Beneficiary
Households in Ri-Bhoi District by Category of Works

Category of Works	Primary			Secondary		
	Male	Female	Total	Male	Female	Total
Cultivators	23	2	25 (39.06)	9	0	9 (45.00)
Agricultural Labour	5	8	13 (20.31)	1	2	3 (15.00)
Non - Agril. Labour	2	3	5 (7.81)	1	1	2 (10.00)
Livestock, Forestry & Fishery	1	4	5 (7.81)	0	2	2 (10.00)
Weaving	0	3	3 (4.69)	0	2	2 (10.00)
Other Household Cottage Industries	4	4	8 (12.50)	1	0	1 (5.00)
Service	2	0	2 (3.13)	0	0	0 0.00
Trade, Commerce & Transport	2	1	3 (4.69)	1	0	1 (5.00)
Total Workers	39	25	64 (100.00)	13	7	20 (100.00)
Earning Dependent	45	44	89			
Dependent	27	27	54			
Total Population	111	96	207			

Note: Figures in parentheses indicate percentage to total workers.

From the analysis of primary data it is found that the workers who are primarily engaged in some occupation also pursued another occupation as secondary source of employment and income. The service holders who are primarily school teachers also worked as cultivator in their family farm. A good number of workers engaged in other occupations also pursued as agricultural and non-agricultural labourers for wage employment in their spare time.

Land Resources:

Land holding naturally refers to operational holding. The pattern of land ownership and operational holding plays an important role in the determination of economic condition of the people. So, it is considered as an important aspect of this study. The operational holdings of the families are the true indicator of the economic condition of the family, as the level of employment and income in the hill areas are mainly depend upon the size of operational holdings..

Land holding pattern according to ownership of holdings and operational holding by the sample households in Kamrup district of Assam were presented in Table -4.10(a) and 4.10 (b) respectively. Table 4.10(a) showed that of the total land owned by the sample beneficiaries in Kamrup district were 78.24 hectares only, of which 15.70 per cent were under field crops, 81.52 per cent were under horticultural land, 2.04 per cent were under homestead and the rest 0.74 per cent were fallow land. Table showed that the total land possessed by the size group of below 1 hectares (Marginal farmers) was 9.59 per cent, the land possessed by the size group of 1.00 to 2.00 hectares (small farmer) was 23.67 per cent, the land possessed by the size group of 2.00 to 4.00 hectares (semi-medium) was 39.03 per cent and the land utilized by the households in size group of 4.00 to 10.00 hectares (Medium farmer) was 27.71 per cent.

The operational holdings by farm size groups in Kamrup were presented in Table – 4.10(b) .Table showed that out of the operational holdings in Kamrup district 16.15 per cent were field crops and 83.85 per cent of land were under horticultural crops. The average size of operational holding per family varied from 0.60 hectares to 5.29 hectares with an overall average of 1.90 hectares. The operational holdings in the size group of below 1.00 hectares were 9.39 per cent of area operated by 30.00 per cent of households, 23.60 per cent were operated by 37.50 per cent of households in the size group of 1.00 to 2.00 hectares, 39.22 per cent of the land were operated by 22.50 per cent of households in the size group of 2.00 to 4.00 hectares and the rest 27.79 per cent were operated by 7.50 per cent of households in the size group of 4.00 to 10.00 hectares.

Land holding pattern according to ownership of holdings and operational holding by the sample households in Nagaon district of Assam were presented in Table

Table-4.10(a)
Land Holding Pattern of the Sample Beneficiary Households in Kamrup District of Assam
 (Area in Hectare)

Farm Size (Ha.)	No. of HHs	Field Crops		Horticultural Crops					Home Stead Land	Fallow Land	Total Land
		Irr	Un-irr	Total	Orange	Banana	Vegetables	Potato			
Below 1.00	12	0.00	1.12	1.12	4.90	0.65	0.46	0.00	6.02	0.36	7.50
1.00 - 2.00	15	2.38	1.68	4.06	11.81	0.65	0.68	0.75	13.89	0.57	18.52
2.00 - 4.00	9	3.20	1.80	5.00	20.81	2.06	0.62	1.34	24.83	0.45	30.54
4.00 - 10.00	4	1.12	0.98	2.10	16.98	1.03	0.54	0.49	19.04	0.22	21.68
Total	40	6.70 (8.56)	5.58 (7.13)	12.28 (15.70)	54.5 (69.66)	4.40 (5.62)	2.30 (2.94)	2.58 (3.30)	63.78 (81.52)	1.60 (2.04)	78.24 (100.00)

Note: Figures in Parentheses indicate percentage to total Land

Table: 4.10(b)
Distribution of Operational Holding by the Sample Households in Kamrup
District of Assam by Farm Size Groups

Farm Size (Ha.)	No. of HHs	(Area in Hectare)										Total Opel. Holding	Ave. Size of Opel Holding
		Field Crops					Horticultural Crops						
		Irr	Un-irr	Total	Orange	Banana	Vegetables	Potato	Total				
Below 1.00	12	0.00	1.12	1.12	4.90	0.66	0.46	0.00	6.02	7.14	0.60		
1.00 - 2.00	15	2.38	1.68	4.06	11.81	0.65	0.68	0.75	13.89	17.95	1.20		
2.00 - 4.00	9	3.20	1.80	5.00	20.81	2.06	0.62	1.34	24.83	29.83	3.31		
4.00 - 10.00	4	1.12	0.98	2.10	16.98	1.03	0.54	0.49	19.04	21.14	5.29		
Total	40	6.70 (8.81)	5.58 (7.34)	12.28 (16.15)	54.5 (71.65)	4.40 (5.78)	2.30 (3.02)	2.58 (3.39)	63.78 (83.85)	76.06 (100.00)	1.90		

Note: Figures in Parentheses indicate percentage to total Operational Holding

-4.11 (a) and 4.11 (b) respectively Table 4.11(a) showed that of the total land owned by the sample beneficiaries in Nagaon district were 80.62 hectares only, of which 11.96 per cent were under field crops, 81.75 per cent were under horticultural land, 2.29 per cent were under homestead, and the rest 1.10 per cent were fallow land. Table showed that the total land possessed by the size group of below 1 hectares (Marginal farmers) was 11.81 per cent, the land possessed by the size group of 1.00 to 2.00 hectares (small farmer) was 26.25 per cent, the land possessed by the size group of 2.00 to 4.00 hectares (semi-medium) was 36.93 per cent and the land utilized by the households in size group of 4.00 to 10.00 hectares (Medium farmer) was 25.01 per cent.

The operational holdings by farm size groups in the selected district of Nagaon were presented in Table - 4.11(b) .Table showed that out of the operational holdings in Nagaon district 15.38 per cent were field crops and 84.62 per cent of land was under horticultural crops. The average size of operational holding per family varied from 0.69 hectares to 6.53 hectares with an overall average of 1.95 hectares. The operational holdings in the size group of below 1.00 hectares are 11.56 per cent of area were operated by 32.50 per cent of households, 26.14 per cent were operated by 37.50 per cent of households in the size group of 1.00 to 2.00 hectares, 37.15 per cent of the land were operated by 22.50 per cent of households in the size group of 2.00 to 4.00 hectares and the rest 25.15 per cent were operated by 7.50 per cent of households in the size group of 4.00 to 10.00 hectares.

Land holding pattern according to ownership of holdings and operational holding by the sample households in East Khasi Hills district of Meghalaya were presented in Table -4.12 (a) and 4.12 (b) respectively. Table 4.12 (a) showed that of the total land owned by the sample beneficiaries in East Khasi Hills district were 71.70 hectares only, of which 8.19 per cent were under terrace land, 69.67 per cent land were under orange orchards 13.84 per cent were under pineapple and other horticultural crops, 2.83 per cent were under jhum land, 2.76 per cent were under tea land, 1.42 per cent were under homestead, and the rest 0.73 per cent were under fallow land. Table showed that the total land possessed by the size group of below 1 hectares (Marginal farmers) was 10.04 per cent, the land possessed by the size group of 1.00 to 2.00 hectares (small farmer) was 22.47 per cent, the land possessed by the size group of 2.00

Table-4.11(a)
Land Holding Pattern of the Sample Beneficiary Households in Nagaon
District of Assam by Farm Size Groups

Farm Size (Ha.)	No. of HHs	Field Crops		Horticultural Crops					Total	Home Stead	Fallow Land	Total Land
		Irr	Un-irr	Total	Banana	Assam Lemon	Vegetables	Potato				
Below 1.00	13	0.00	1.34	1.34	7.06	0.22	0.38	0.00	7.66	0.52	0.00	9.52
1.00 - 2.00	15	2.69	1.54	4.23	14.13	0.58	0.69	0.73	16.13	0.65	0.15	21.16
2.00 -4.00	9	2.92	0.99	3.91	20.75	2.13	0.74	1.40	25.02	0.50	0.34	29.77
4.00 -10.00	3	2.50	0.00	2.50	14.88	1.34	0.48	0.39	17.09	0.18	0.40	20.17
Total	40	8.11 (10.06)	3.87 (4.80)	11.98 (14.86)	56.82 (70.48)	4.27 (5.30)	2.29 (2.84)	2.52 (3.13)	65.90 (81.74)	1.85 (2.29)	0.89 (1.10)	80.62 (100.00)

Note: Figures in Parentheses indicate percentage to total Land

Table:4.11(b)
Distribution of Operational Holding by the Sample Households in Nagaon
District of Assam by Farm Size Groups
(Area in Hectare)

Farm Size (Ha.)	No. of HHS	Field Crops		Horticultural Crops				Total Opel. Holding	Ave. Size of Ope. Holding		
		Irr	Un-irr	Total	Banana	Assam Lemon	Vegetables			Potato	Total
Below 1.00	13	0.00	1.34	1.34	7.06	0.22	0.38	0.00	7.66	9.00	0.69
1.00 - 2.00	15	2.69	1.54	4.23	14.13	0.58	0.69	0.73	16.13	20.36	1.36
2.00 - 4.00	9	2.92	0.99	3.91	20.75	2.13	0.74	1.40	25.02	28.93	3.21
4.00 - 10.00	3	2.50	0.00	2.50	14.88	1.34	0.48	0.39	17.09	19.59	6.53
Total	40	8.11 (10.41)	3.87 (4.97)	11.98 (15.38)	56.82 (72.96)	4.27 (5.48)	2.29 (2.94)	2.52 (3.24)	65.90 (84.62)	77.88 (100.00)	1.95

Note: Figures in Parentheses indicate percentage to total Operational Holding

Table:4.12
Land Holding Pattern of the Sample Households in East Khasi Hills District of Meghalaya

Farm Size(Ha.)	No. of HHs	Terrace Land	Orange	Other Hort. Crops	Jhum Land	Tea Land	Home Stead	Fallow Land	Total Land
Below 1.00	11	1.53	3.73	0.98	0.52	0.00	0.37	0.07	7.20
1.00 - 2.00	14	1.00	11.80	1.56	0.28	0.78	0.52	0.17	16.11
2.00 - 4.00	8	1.30	12.85	2.15	0.37	1.20	0.29	0.09	18.25
4.00 - 10.00	7	2.04	21.57	5.23	0.86		0.24	0.20	30.14
Total	40	5.87 (8.19)	49.95 (69.67)	9.92 (13.84)	2.03 (2.83)	1.98 (2.76)	1.42 (1.98)	0.53 (0.73)	71.70 (100.00)

Note: Figures in Parentheses indicate percentage to total Land

Table:4.12 (b)
Distribution of Operational Holding by the Sample Households in
East Khasi Hills District of Meghalaya

Farm Size (Ha.)	No. of HHs	Terrace Land	Orange	Other Hort. Crops	Jhum Land	Tea Land	Total Opel Holding	Ave. Size of Opel Holding
Below 1.00	11	1.53	3.73	0.98	0.52	0.00	6.76	0.61
1.00 - 2.00	14	1.00	11.80	1.56	0.28	0.78	15.42	1.10
2.00 - 4.00	8	1.30	12.85	2.15	0.37	1.20	17.87	2.23
4.00 - 10.00	7	2.04	21.57	5.23	0.86	0	29.70	4.24
Total	40	5.87 (8.42)	49.95 (71.61)	9.92 (14.22)	2.03 (2.91)	1.98 (2.84)	69.75 (100.00)	1.74

Note: Figures in Parentheses indicate percentage to total Operational Holding

to 4.00 hectares (semi-medium) was 25.45 per cent and the land utilized by the households in size group of 4.00 to 10.00 hectares (Medium farmer) was 42.04 per cent.

The operational holdings by farm size groups in East Khasi Hills were presented in Table – 4.12(b). Table showed that out of the operational holdings in East Khasi Hills district 8.42 per cent were under terrace land, 71.61 per cent were land under orange orchards 14.22 per cent were under pineapple and other horticultural crops, 2.91 per cent were under jhum land, 2.84 per cent were under tea land. The average size of operational holding per family varied from 0.61 hectares to 4.24 hectares with an overall average of 1.74 hectares. The operational holdings in the size group of below 1.00 hectares were 9.69 per cent of area operated by 27.50 per cent of households, 22.11 per cent were operated by 35 per cent of households in the size group of 1.00 to 2.00 hectares, 25.62 per cent of the land were operated by 20 per cent of households in the size group of 2.00 to 4.00 hectares and the rest 42.58 per cent were operated by 17.50 per cent of households in the size group of 4.00 to 10.00 hectares.

Land holding pattern according to ownership of holdings and operational holding by the sample households in Ri-Bhoi district of Meghalaya were presented in Table -4.13(a) and 4.13 (b) respectively. Table 4.13(a) showed that out of the total land owned by the sample beneficiaries in Ri-Bhoi district were 80.07 hectares only, of which 8.21 per cent were under terrace land, 74.37 per cent were land under pineapple orchards, 3.08 per cent were under other horticultural crops, 3.63 per cent were under jhum land, 8.16 per cent were under tea land, 1.84 per cent were under homestead, and the rest 0.71 per cent were under fallow land. Table showed that the total land possessed by the size group of below 1 hectares (Marginal farmers) was 3.41 per cent, the land possessed by the size group of 1.00 to 2.00 hectares (small farmer) was 18.66 per cent, the land possessed by the size group of 2.00 to 4.00 hectares (semi-medium) was 30.82 per cent and the land utilized by the households in size group of 4.00 to 10.00 hectares (Medium farmer) was 47.11 per cent.

The operational holdings by farm size groups in Ri-Bhoi district were presented in Table – 4.13(b). Table showed that out of the operational holdings in Ri-Bhoi district 8.42 per cent were under terrace land, 76.32 per cent were land under

Table:4.13(a)
Land Holding Pattern of the Sample Households in Ri-Bhoi District of Meghalaya
by Farm Size Groups

Farm Size (Ha.)	No. of HHs	Terrace Land	Pineapple	Other Hort. Crops	Jhum Land	Tea Land	Home Stead	Fallow Land	Total Land
Below 1.00	7	0.30	1.98	0.00	0.29	0.00	0.13	0.03	2.73
1.00 - 2.00	13	2.02	10.15	0.45	0.65	1.05	0.42	0.20	14.94
2.00 - 4.00	11	1.73	18.18	0.76	0.72	2.68	0.53	0.08	24.68
4.00 - 10.00	9	2.52	29.24	1.26	1.25	2.80	0.39	0.26	37.72
Total	40	6.57 (8.21)	59.55 (74.37)	2.47 (3.08)	2.91 (3.63)	6.53 (8.16)	1.47 (1.84)	0.57 (0.71)	80.07 (100.00)

Note: Figures in Parentheses indicate percentage to total Land

Table:4.13(b)
Distribution of Operational Holding by the Sample Households in Ri-Bhoi District of Meghalaya by Farm Size Groups

Farm Size (Ha.)	No. of HHs	Tarrace Land	Pineapple	Other Hort. Crops	Jhum Land	Tea Land	Total Opel. Holding	Ave. Size of Ope Holding
Below 1.00	7	0.30	1.98	0.00	0.29	0.00	2.57	0.37
1.00 - 2.00	13	2.02	10.15	0.45	0.65	1.05	14.32	1.10
2.00 -4.00	11	1.73	18.18	0.76	0.72	2.68	24.07	2.19
4.00 -10.00	9	2.52	29.24	1.26	1.25	2.80	37.07	4.12
Total	40	6.57 (8.42)	59.55 (76.32)	2.47 (3.17)	2.91 (3.73)	6.53 (8.37)	78.03 (100.00)	1.95

Note: Figures in Parentheses indicate percentage to total Operational Holding

pineapple orchards, 3.17 per cent were under other horticultural crops, 3.73 per cent were under jhum land, 8.37 per cent were under tea land. The average size of operational holding per family varied from 0.37 hectares to 4.12 hectares with an overall average of 1.95 hectares. The operational holdings in the size group of below 1.00 hectares were 3.29 per cent of area operated by 17.50 per cent of households, 18.35 per cent were operated by 32.50 per cent of households in the size group of 1.00 to 2.00 hectares, 30.85 per cent of the land were operated by 27.50 per cent of households in the size group of 2.00 to 4.00 hectares and the rest 47.51 per cent were operated by 22.50 per cent of households in the size group of 4.00 to 10.00 hectares.

It was observed that in both the selected districts of Meghalaya, jhum land was community land. Allotment of such jhum land to a particular family is done by the village community. Tea has been very recently introduced in Meghalaya by a few farmers on experimental basis. This indicated a major shift of hill farmers of Meghalaya from their traditional shifting (jhum) cultivation to horticultural crop cultivation.

Chapter –V Production and Marketing of Horticultural Crops

It has been already discussed in the first chapter that both Assam and Meghalaya are bestowed with suitable land and agro-climatic conditions for growing horticultural crops. In this chapter an attempt has been made to study the production and marketing of horticultural crops grown by the sample beneficiary farmers. This chapter is divided into two parts. Part-I deals with the production and productivity of crops grown by the sample beneficiary farmers and Part-II deals with the marketing of horticultural crops. From the potentiality point of view one can say that the horticulture sector in Assam and Meghalaya can play a pivotal role in enhancing the production and productivity if considerable thrust is given for the development and improvement followed by marketing and processing facilities.

Part-I

Land is the basic resource for a farmer's family as it provides employment and income to the family members. It has been noticed that in Assam a good numbers sample farmers possessed paddy land for cultivation besides horticultural crops. Similarly, in Meghalaya also sample farmers possessed terrace, jhum land for cultivation besides horticultural land. In Meghalaya, due to the shortening of jhum cycle many tribes in the hill areas considered terrace cultivation and horticultural crops cultivation as profitable and advantageous from many points of view.

Table-5.1 and Table -5.2 show the distribution of area, production and yield of crops grown by the sample beneficiary farmers of Kamrup and Nagaon district respectively.

Table- 5.1 shows the distribution of area, production and productivity of crops grown by the sample beneficiary farmers of Kamrup district. Table shows that out of total paddy area of 12.28 hectares under cultivation 6.70 hectares (54.56 cent) had irrigation facility and the rest 5.58 hectare (45.44 per cent) were rain fed land for cultivation. The average yield of irrigated paddy was found to be 3553 kg/ha and the average yield of un-irrigated paddy was found to be 2987 kg/ha. The sample orange

beneficiary farmers raised 54.50 hectares of land for orange cultivation in the reference year. The yield of orange varied from 10,630 kg/ha to 11,750 kg/ha with an overall average of 12,539 kg/ha. The sample farmers raised 2.30 hectares of land for vegetable cultivation. The productivity of vegetables varied from 13,948 kg/ha to 15,560 kg/ha with an overall average of 14587 kg/ha.

Table-5.2 shows that out of the total paddy area of 11.98 hectares in the sample of Nagaon district, 8.11 hectare (67.70 per cent) were with irrigation facility and the rest 3.87 hectare (32.30 per cent) were under rain fed condition. The average yield of irrigated paddy was found to be 3714 kg/ha for the sample as a whole. The average yield of paddy per hectare in un-irrigated paddy of the sample beneficiary farmers was found to be 3188 kg. only. The yield rate of crops in un-irrigated paddy land was found to be lower in all farm sizes than the irrigated paddy. The sample beneficiary farmers found to have paid high priorities in horticultural crops because of the suitability of their soil, climate and marketing potential and assistance provided under the TMIDH. The average productivity of banana was found at 14413 kg/ha and the average productivity of Assam lemon was found at 6582 kg/ha. The sample farmers also cultivated 2.29 hectares of vegetables crops. The average productivity of vegetables was 14276 kg/ha, while the average productivity of potato was found to be 11,636 kg/ha.

Table -5.3 shows that the sample average beneficiary households in East Khasi Hills raised 5.87 hectares of land for terrace cultivation. The average yield of terrace paddy in the hilly areas was 1144 kg/ha. Though jhum cultivation is the main traditional practice of crop production in hill areas, some major changes were found in the present study. Some farmers of the hills realized the harmful effects of jhum cultivation and shifted to some other improved methods of crop production. The 40 sample orange beneficiary households raised orange cultivation in 49.95 hectares of land. The average productivity of orange was 5639 kg/ha. These farmers considered orange gardening as the main source of income for their families. Table shows that the yield rate of orange was highest in the case of the marginal farmers (5953 kg/ha) followed by the small farmers (5842 kg/ha) and the semi-medium farmers (5716 kg/ha). It is rather strange to note that the medium group of beneficiaries could produce only

Table: 5.1
Distribution of Area, Production and Yield of Crops Grown by the Sample Orange Beneficiary Households in Kamrup District of Assam by Farm Size Groups

Farm Size (Ha.)	No. of HHs	Paddy (Ahu+Sali+Boro)		Total	Horticultural Crops			
		Irr	Un-irr		Orange	Banana	Vegetables	Potato
Below 1.00	A	0	1.12	1.12	4.90	0.66	0.46	0
	P	0	34.81	34.81	575.75	94.11	71.58	0
	Y	0	3108	3108	11750	14259	15560	0
1.00 - 2.00	A	2.38	1.68	4.06	11.81	0.65	0.68	0.75
	P	86.87	51.41	138.28	1324.85	85.86	101.02	97.37
	Y	3650	3060	3406	11218	13209	14856	12983
2.00 - 4.00	A	3.20	1.80	5.00	20.81	2.06	0.62	1.34
	P	112.19	52.83	165.02	2262.46	255.48	87.59	141.89
	Y	3506	2935	3300	10872	12402	14128	10589
4.00 - 10.00	A	1.12	0.98	2.10	16.98	1.03	0.54	0.49
	P	38.98	27.64	66.61	1804.97	116.26	75.32	48.29
	Y	3480	2820	3172	10630	11287	13948	9855
Total	A	6.70	5.58	12.28	54.5	4.40	2.30	2.58
	P	238.04	166.68	404.72	5968.03	551.71	335.51	287.55
	Y	3553	2987	3296	10951	12539	14587	11145

A = Area in Hectare P = Production in Qtl. Y = Yield in Kg./ha

Table: 5.2
Distribution of Area, Production and Yield of Crops Grown by the Sample Banana Beneficiary Households in Nagaon District of Assam by Farm Size Groups

Farm Size (Ha.)	No. of HHs	Paddy (Ahu+Sali+Boro)			Total	Horticultural Crops			
		Irr	Un-irr	Total		Banana	Assam Lemon	Vegetables	Potato
Below 1.00	A	0	1.34	1.34	7.06	0.22	0.38	0	
	P	0	43.82	43.82	1117.20	15.40	58.63	0	
	Y	0	3270	3270	15824	7000	15430	0	
1.00 - 2.00	A	2.69	1.54	4.23	14.13	0.58	0.69	0.73	
	P	101.63	48.69	150.32	2055.30	39.74	98.33	98.45	
	Y	3778	3162	3554	14546	6852	14250	13486	
2.00 - 4.00	A	2.92	0.99	3.91	20.75	2.13	0.74	1.40	
	P	107.16	30.87	138.03	2929.90	138.88	105.61	156.44	
	Y	3670	3118	3530	14120	6520	14272	11174	
4.00 - 10.00	A	2.50	0.00	2.50	14.88	1.34	0.48	0.39	
	P	92.45	0.00	92.45	2086.90	87.03	64.36	38.33	
	Y	3693	0.00	3693	14025	6495	13408	9828	
Total	A	8.11	3.87	11.98	56.82	4.27	2.29	2.52	
	P	301.24	123.38	424.62	8189.30	281.05	326.93	293.22	
	Y	3714	3188	3544	14413	6582	14276	11636	

A = Area in Hectare P = Production in Qtl. Y = Yield in Kg./ha

Table: 5.3
Distribution of Area, Production and Yield of Crops Grown by the Sample Orange Beneficiary Households in East Khasi Hills District of Meghalaya by Farm Size Groups

Farm Size (Ha.)	No. of HHs	Terrace Paddy	Horticultural Crops			Tea Crops
			Orange	Pineapple	Jhum Land	
Below 1.00	A	1.53	3.73	0.98	0.52	0
	P	18.62	222.05	86.12	5.87	0
	Y	1217	5953	8788	1128	0
1.00 - 2.00	A	1.00	11.80	1.56	0.28	0.78
	P	11.58	689.36	135.13	3.06	93.02
	Y	1158	5842	8662	1092	11926
2.00 - 4.00	A	1.30	12.85	2.15	0.37	1.20
	P	14.72	734.51	177.16	3.91	144.13
	Y	1132	5716	8240	1056	12011
4.00 - 10.00	A	2.04	21.57	5.23	0.86	0
	P	22.22	1170.82	388.85	8.41	0
	Y	1089	5428	7435	978	0
Total	A	5.87	49.95	9.92	2.03	1.98
	P	67.13	2816.73	787.26	21.24	237.15
	Y	1144	5639	7936	1046	11978

A = Area in Hectare P = Production in Qtl. Y = Yield in Kg./ha, Yield of Tea is in Rs.

5,639 kg/ha. It is because of the fact that the farmers in the medium farm size group brought some new area under orange cultivation under the area expansion programme of TM-IDH and were yet to attain the fruit bearing stage. The productivity of pineapple cultivation varied from 7435 kg/ha to 8788 kg/ha. The sample farmers had only 2.03 hectares of land under jhum cultivation in the reference year. The average yield of jhum cultivation was found to be 1046 kg/ha. It was observed that some of the beneficiary households totally abandoned jhum cultivation. This was a major shift in the method of farming in the hilly areas. Tea cultivation became a lucrative enterprise in Meghalaya too. Some of the sample beneficiary households already started mini tea gardens in 1.98 hectares of land indicating a transition in the hill farming. These new tea gardens had not yet attained the optimum productivity stage. The average yield rate from these tea gardens varied from 11,926 kg/ha to 12,011 kg/ha with pooled average of 11,978 kg/ha.

Table -5.4 shows that the sample pineapple beneficiary households in Ri-Bhoi district of Meghalaya raised 6.57 hectares of land for terrace cultivation. The average yield of terrace paddy in the sample varied from 1088 kg/ha to 1297 kg/ha with pooled average of 1166 kg/ha. Table shows that the productivity of pineapple varied from 11,448 kg/ha to 12,420 kg/ha with pooled average of 11,740 kg/ha. The sample farmers raised 2.47 hectares of land for orange cultivation. The average yield of orange was found 4722 kg/ha. The productivity of jhum cultivation in Ri-Bhoi district varied from 997 kg/ha to 1088 kg/ha. The productivity of recently introduced tea cultivation varied from 11,125 kg/ha to 13,438 kg/ha with an overall average of 12138 kg/ha.

Table-5.5 indicates that the total production of orange was 3,87,9218 numbers (5968.03 quintals) in Kamrup district. It was Rs.2882631.10 in value terms.

Home consumption of fruits was considered the amount actually consumed by the members of the farmers family and fruits offered to guests and relatives as gift and also the fruits given free of cost to the labourers working in the fruit gardens. Total home consumption accounted for 1, 53,677 numbers (236.43 quintals) per annum.

Marketable surplus in the subsistence farming system is that which is left over after meeting the genuine family requirements i.e. home consumption. The total marketable surplus of orange for the 40 sample beneficiary farmers of Kamrup district

of Assam was 5731.60 quintals i.e.96.04 per cent of total production. Actually a small portion of the harvested orange was consumed at home and the rest was disposed of either on the day of harvesting or on the next day. Because of high perish ability the farmers could not store or holdback the harvested orange for a longer period for better price. The entire lot of marketable surplus was found to be marketed.

The total gross return from sale of the marketable surplus of orange of the sample beneficiary farmers was Rs. 2,76,5437.00 and the per household return was Rs. 69136.00. It was observed that average annual income per household from orange cultivation increases with the increases with the increase of size of farm. This indicated that production and income from orange cultivation had direct relationship with the size of farm

Table- 5.6 shows the area, production and sale of banana produced by the sample beneficiary farmers of Nagaon district of Assam. The marketable surplus of banana was 96.01 per cent of the total production. It was seen from the Table that the total sale proceeds from banana for the sample beneficiary farmers was Rs. 40,83,096.23 and the average per household income from the sale of banana was Rs. 10,2077.00.

Area, production and sale of orange of the sample beneficiary farmers of East Khasi Hills district in Meghalaya are presented in Table- 5.7. It was found that out of the total produce of 18, 89,889 numbers (2699.84 quintals) were found to be marketed surplus (95.85 per cent) in the reference year. The rest of 4.15 per cent were for home consumption. The total sale proceeds from the marketed surplus were found at Rs. 12, 65,510.00 and the average per household receipt from sale proceeds was Rs. 31,638.00. The average return per orange was Rs.0.67 in the district.

Table- 5.8 shows the production of pineapple, home consumption and proportion of sale for the sample beneficiary farmers of Ri-Bhoi district in Meghalaya. The total marketed surplus of pineapple of the sample beneficiary farmers was 5, 96,304 numbers (6700.05 quintals) which were 95.84 per cent of the total production. The total receipt (Rs. 95,433.00) from the sale proceeds of pineapple was higher in medium farms. The average per household receipt from the sale proceeds of pineapple was Rs. 49650.00. The average farm harvest price per pineapple at grower's level was

Table: 5.4
Distribution of Area, Production and Yield of Crops Grown by the Sample Pineapple Beneficiary Households in Ri-Bhoi District of Meghalaya by Farm Size Groups

Farm Size (Ha.)	No. of HHs	Terrace Paddy	Horticultural Crops		Jhum Land	Tea Crops
			Pineapple	Orange		
Below 1.00	A	0.30	1.98	0	0.29	0
	P	3.89	245.92	0	3.16	0
	Y	1297	12420	0	1088	0
1.00 - 2.00	A	2.02	10.15	0.45	0.65	1.05
	P	25.61	1239.72	22.29	6.79	120.98
	Y	1268	12214	4953	1045	11522
2.00 - 4.00	A	1.73	18.18	0.76	0.72	2.68
	P	19.65	2157.97	36.05	7.26	360.14
	Y	1136	11870	4743	1008	13438
4.00 - 10.00	A	2.52	29.24	1.26	1.25	2.80
	P	27.42	3347.40	58.29	12.46	311.50
	Y	1088	11448	4626	997	11125
Total	A	6.57	59.55	2.47	2.91	6.53
	P	76.58	6991.00	116.62	29.67	792.62
	Y	1166	11740	4722	1020	12138

A = Area in Hectare P = Production in Qtl. Y = Yield in Kg./ha Yield of Tea is in Rs.

Table:5.5

Area, Production and Sale of Orange by the Sample Beneficiary Farmers of Kamrup District

Farm Size (Ha.)	No. of HHs	Area (Hect.)	Production (Nos.)	Value (Rs.)	Home Consumption/Relatives/Guests	Value (Rs.)	Sale (Nos.)	Sale Value (Rs.)	Per Unit Price (Rs.)
Below 1.00	12	4.90	374237 (575.75)	374237.00	17963 (27.64)	17963.38	356274 (548.11)	356274 (29689)	1.00
1.00 - 2.00	15	11.81	861152 (1324.85)	775036.80	38752 (59.62)	34876.66	822400 (1265.23)	740160 (49344)	0.90
2.00 - 4.00	9	20.81	1470599 (2262.46)	1029419.30	61765 (95.02)	43235.61	1408834 (2167.44)	986184 (109576)	0.70
4.00 -10.00	4	16.98	1173230 (1804.97)	703938.00	35197 (54.15)	21118.14	1138033 (1750.82)	682820 (170705)	0.60
Total	40	54.50	3879218 (5968.03)	2882631.10	153677 (236.43)	117193.78	3725541 (5731.60)	2765437 (69136)	0.82

Note: 1. Figures in parentheses in Sale Value column are the per household income.

2. Figures in parentheses in column other than the value column are Orange in qtls.

Table:5.6

Area, Production and Sale of Banana by the Sample Beneficiary Farmers of Nagaon District

Farm Size (Ha.)	No. of HHs	Area (Hect.)	Production (Nos.)	Value (Rs.)	Home Consumption/Relatives/Guests	Value (Rs.)	Sale (Nos.)	Sale Value (Rs.)	Per 12 Unit Price (Rs.)
Below 1.00	13	7.06	1228920 (1117.20)	614460.00	58988.16 (53.63)	29494.08	1169931.84 (1063.57)	643954.08 (49535)	6.00
1.00 - 2.00	15	14.13	2260830 (2055.30)	1039981.80	113041.5 (102.77)	51999.09	2147788.5 (1952.54)	1091980.89 (72799)	5.50
2.00 - 4.00	9	20.75	3222890 (2929.90)	1353613.80	122469.82 (111.34)	51437.32	3100420.18 (2818.56)	1405051.12 (156117)	5.00
4.00 -10.00	3	14.88	2295590 (2086.90)	918236.00	59685.34 (54.26)	23874.14	2235904.66 (2032.64)	942110.14 (314037)	4.80
Total	40	56.82	9008230 (8189.30)	3926291.60	354184.82 (321.99)	156804.63	8654045.18 (7867.31)	4083096.23 (102077)	5.23

Note: 1. Figures in parentheses in Sale Value column are the per household income.

2. Figures in parentheses in column other than the value column are Banana in qtls.

Table:5.7

Area, Production and Sale of Orange by the Sample Beneficiary Farmers of East Khasi Hills District

Farm Size (Ha.)	No. of HHs	Area (Hect.)	Production (Nos.)	Value (Rs.)	Home Consumption / Relatives /Guests	Value (Rs.)	Sale (Nos.)	Sale Value (Rs.)	Per Unit Price
Below 1.00	11	3.73	155435 (222.05)	124348	8083 (11.55)	6466.10	147352 (210.50)	117882 (10707)	0.80
1.00 - 2.00	14	11.80	482552 (689.36)	337786	26058 (37.23)	18240.47	456494 (652.13)	319546 (22825)	0.70
2.00 - 4.00	8	12.85	514157 (734.51)	334202	19538 (27.91)	12699.68	494619 (706.60)	321502 (40188)	0.65
4.00 -10.00	7	21.57	781956 (117.08)	469174	28150 (40.21)	168902.50	753806 (1076.87)	300271 (42896)	0.60
Total	40	49.95	1971718 (2816.73)	1265510	81829 (116.90)		1889889 (2699.64)	1265510 (31638)	0.67

Note: 1. Figures in parentheses in Sale Value column are the per household income.

2. Figures in parentheses in column other than the value column are Orange in qtls.

Table:5.8

Area, Production and Sale of Pineapple by the Sample Beneficiary Farmers of Ri-Bhoi District

Farm Size (Ha.)	No. of HHs	Area (Hect.)	Production # (Nos.)	Value (Rs.)	Home Consumption/ Relatives/Guests	Value (Rs.)	Sale # (Nos.)	Sale Value (Rs.)	Per Unit Price
Below 1.00	7	1.98	21886 (245.92)	87544	832 (9.34)	3326.67	21054 (236.57)	84217.33 (12031)	4.00
1.00 - 2.00	13	10.15	110335 (1239.72)	419273	5186 (58.27)	19705.83	105149 (1181.45)	399567.17 (30736)	3.80
2.00 - 4.00	11	18.18	192059 (2157.97)	672206.5	8259 (92.79)	28904.88	183800 (2065.17)	643301.62 (58482)	3.50
4.00 -10.00	9	29.24	297919 (3347.40)	893757	11619 (130.55)	34856.52	286300 (3216.86)	858900.48 (95433)	3.00
Total	40	59.55	622199 (6991.00)	2072780.5	25894.79 (290.95)	86793.91	596304 (6700.05)	1985986.59 (49650)	3.35

Note: 1. Figures in parentheses in Sale Value column are the per household income.

2. Figures in parentheses in column other than the value column are Pineapple in qtls.

Rs.3.35. The highest sale value of Rs. 4.00 per unit was received by the marginal farmers and lowest Rs. 3.00 was received by the medium farmers.

Part-II

Market Structure:

Market structure is the functional activity of marketing organizations. In general marketing structure means the organizations which perform marketing activity at various stages. The farm produce like pineapple, orange and banana are produced by a number of small, marginal, medium and big farmers scattered in a wide area comprising of cluster of villages. Due to lack of daily/bi-weekly market it may not be possible for the individual farmer to sell his produce directly to the consumer due to low volume of sale of the produce to undertake direct marketing at distant markets. Moreover, the fruits growers did not have their own means of transport. They had to depend primarily on the village traders, and other commission men in the market. The growers usually sell their produce to the market middlemen like commission agents or village level traders; these are then taken to wholesale markets and then to retailers and consumers.

Agricultural Marketing functions are considered as the main planks of economic development in a situation like Assam and Meghalaya. An efficient marketing system is indispensable for the success of the agricultural production programme. In a country like India production functions and choice of crops depend upon the food habits and consumption pattern of the people. In such areas of the country selected crops are grown for commercial purposes. In such areas the improved marketing system ensures better economic returns and considered to be the most important pre-requisite for a break through in agricultural development.

The most important characteristics of the market supply of agricultural commodities in India are that it consists largely for home consumption and its demand are also by and large domestic. Marketing in subsistence agriculture is linked with subsistence. The quantum of sale in many cases to obtain a few items which the farmers cannot produce themselves is a kind of distress sale.

Characteristics of Fruits Marketing:

Perishable commodities like fruits have some special characteristics, which have a bearing on agricultural marketing systems and organizations. Horticulture produce like pineapple, orange and banana are bulky and their weights and volume are quite large. Moreover, pineapple, orange and banana are delicate fruits and rapidly become over ripen if they are not harvested in proper time and kept in special storage till it reaches the final consumer. In hot and humid climate without the facility of refrigerated transport and storage its quality may deteriorate soon. So, it requires careful handling at all stages to reach the final consumer without deterioration of quality.

One characteristic of fruits is that these come to maturity relatively in a short period of time. This seasonal characteristic imposes heavy demand on the marketing system (i.e. transport, storage, credit etc.) during the harvesting season. So far as marketing functions, market conditions and marketing channels are concerned these are found to have varied from area to area depending upon the marketing facilities, road transport and communication facilities.

For perishable commodity like fruits usually involve a number of marketing functions to collect from the point of production until they are in the hands of the ultimate consumer. Basically three marketing functions are carried out viz: (i) Assembling (ii) Processing and (iii) Dispersion. In carrying out market functions certain other secondary services are needed to perform the marketing process. The secondary services are standardization and grading, packaging, transportation, storage and financing. So far as the markets structures are concerned, three types of structures are visualized for agricultural crop viz (i) area structure, (ii) agency structure and (iii) price structure.

Area Structure:

The area structures are termed as selling area and buying area. The buying area is the local buyers, middlemen or commission agents, wholesalers and the retail traders etc. The selling area may be the production area where the producers of the commodity sell their produce at the farm site. This production area is the source in which the marketable produce are collected and channeled to the consuming centres

through different categories of the traders. In the field it was observed that amongst the traders there were some kind of mutual understanding regarding the area covered by each trader so that, there is no competition amongst them. As a result, the sellers (growers) are almost forced to sell the produce at a price fixed by the traders.

The wholesale trade area is the main marketing centre through which goods are distributed to the surrounding area. The retail traders are restricted to the neighborhood of a marketing centre, which depends upon the consumption habit of the consumer.

Agency Structure:

The agency structure refers to some organized business establishments performing various marketing functions such as assembling, wholesale, retail sale, consumer's cooperatives, manufacturing or processing industries etc. The middleman or commission agents are considered to be the prime agency of collecting the goods from so many individual growers. They are the key business organizations who assemble the produces for meeting the demand of the individual consumers of distant places and provide sufficient volume of business to wholesalers and retailers. The operational jurisdiction of agency structures is limited in case of fruit crops mainly because of the delicacies of crops.

Price Structure:

The concept of price structure refers to the price of unification of the goods, which depends upon the supply and demand. The price structure denotes the variation of prices of goods into an overall system of marketing depending upon the supply and demand, erratic market forces and market intervention by the government. In general marketing system postulates existence of three kinds of people, one who produce the goods and have some marketable surplus, another who need those surpluses to their consumption needs and there is yet another section in between who intend to earn something by transacting the marketable goods i.e. the traders operating at different levels. However, the overall variations of price structure depend upon the pricing policy, if there is any, or the supply and demand. The other influencing factors are distribution policy depending upon the product characteristics and behaviour of the trading community at different levels. Distribution policy and net work also varies

considerably depending upon consumer's behaviour and demand for the product by processing units.

Marketing Channels of Fruits:

The marketing channel is defined as the path of transferring the produce from the point of production to the point of consumption. Marketing agencies carry out the marketing functions or services through various channels.

The market study reveals that the marketing channels of fruits displayed wide variations from area to area. The reasons are that the growers could not sell their produce to the potential consumers directly, as the consuming centres were usually located at far off places. The whole marketing functions depend upon the product characteristics, availability of secondary support services and the location of processing units. It was observed that most of the rural markets are poorly equipped in respect of roads, transport, storage and other facilities and small quantities are left for different marketing by the growers.

Marketing channels of perishable commodities like fruits are more circuitous and involve a large number of handling agents in forwarding the produce to the consumers. The marketing of horticultural crops are in the hands of private traders who act as commission agents, middlemen and the wholesalers, retailers, hawkers etc. for channeling the marketing of marketable surplus produce to the consumers. The general pattern of marketing of fruits indicated the dominance of middlemen or commission agents. The rural markets were dominated by the traders who siphoned off a major share of consumer's rupee by purchasing the produce from the growers at very lower prices. It was observed that a series of market functionaries were involved in handling and marketing of banana, orange and pineapple. The marketing agents or middlemen had their own methods of demarcation of area under their operation.

In a few cases producers undertook direct marketing in local weekly, bi-weekly markets. Direct marketing is usually been done by the small growers. In some potential areas the growers also disposed of their produce directly to the retailers. But a major part has been handed by the village level traders, commission agents, who transshipped their assembled produces to the wholesalers, distant wholesalers and supplied to processing units. The direct sale of orange was reported to be negligible due

to lack of market and poor road transport facilities. Of the total marketable surplus in the sample area the growers disposed of their produce through many channels.

The marketing channels of orange, pineapple and banana were identified as per market survey. As per reports of the growers and discussions with the State Agriculture Department various levels of market functionaries the marketing channels are identified.

The identified major marketing channels of orange, pineapple and banana in Assam and Mēghalaya were:

1. Producer- Retailer – Consumer
2. Producer –Commission Agent – Retailer – Consumer.
3. Producer –Commission Agent – Wholesaler – Retailer – Consumer.
4. Producer –Commission Agent – Wholesaler – Processing Unit.
5. Producer –Commission Agent – Processing Unit.

Besides these five dominant marketing channels there was another marketing channel identified in Meghalaya.

6. Producer – State Government Marketing Board/Cooperative – Departmental Processing Units.

In case of channels 4, 5 & 6 price spread could not be worked out as the consumer received the processed products of orange, pineapple and banana in various forms like juice, squash, jam, jellies, slices, titbits etc.

Price Spread:

The price spread refers to the difference between the price received by the producers and the price paid by the consumers. It is observed that there were wide variations of price received by the growers and price paid by the final consumer. This is mainly due to the wide margin enjoyed by the market functionaries and the costs involve in assembling the marketable produce from large number of growers scattered over a wide area. The secondary services like grading, packaging, transportation, storage, handling and labour charges and market charges etc., are also substantial. The various costs involved in different levels of market functionaries and commission of the traders inflated the consumer's price. Thus, a major share of consumer's rupee is

enjoyed by the different levels of market functionaries and a considerable part is involved in the form of various services and marketing costs.

As stated earlier in Assam and Meghalaya there were 3 (three) common marketing channels in which orange, pineapple and banana were marketed. The price spread for these channels were worked out.

Price-spread of orange in Channel – 1, Channel –II and Channel – III was worked out for Shillong, Guwahati and Boko markets and presented in Tables – 5.9. It was seen from the Tables that excluding the transportation and market charges the producer's share of consumer's rupee was 48.75 per cent in Shillong market, 50.00 per cent in Guwahati and 52.78 per cent in Boko markets. The growers reported that they usually sold the fully matured orange to the retailers which were not collected by the commission agent. The retailer's net margin was found at 46.87 per cent in Shillong market, 45.75 per cent in Guwahati market and 43.06 per cent at Boko market. The price-spread analysis as per channel – 2 (Table – 5.9) shows that the grower's share of consumer's rupee was 41.87 per cent in Shillong market, 39.00 per cent in Guwahati market and 38.50 per cent in Boko market. The commission agent's share of consumer's rupee was 22.12 per cent in Shillong market, 21.80 per cent in Guwahati market and 22.00 per cent in Boko market. Excluding the transportation, sorting and market charges the retailers share of consumer's rupee was 32.25 per cent in Shillong market, 34.45 per cent in Guwahati market and 34.50 per cent in Boko market.

The price-spread of orange in Channel – 3 was worked out for Shillong market, Guwahati and Boko market. The producer's share of consumer's rupee was 37.50 per cent in Shillong market, 35.50 per cent in Guwahati market and 34.72 in Boko market. The commission agent's share was 15.56 per cent in Shillong market, 14.35 per cent in Guwahati market and 15.22 at Boko market. The wholesaler's net margin was found 12.50 per cent in Shillong market, 12.65 per cent in Guwahati market and 12.06 per cent in Boko market. In channel-3, retailer's margin varied from 29.43 per cent in Shillong market, 31.75 per cent in Guwahati market and 31.88 per cent in Boko market. Handling, transportation, grading storage charges, market charges/market fees etc. also varied from market to market depending upon the local rates.

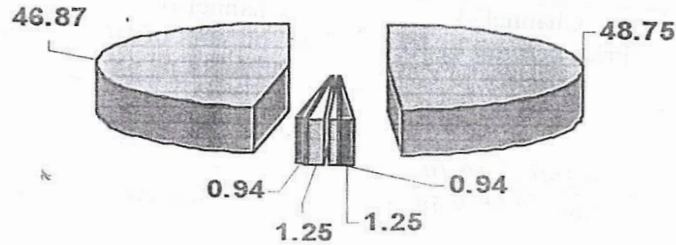
Table-5.9Price Spread of Orange in Shillong, Guwahati and Boko Market

Items of Costs at Different Market Functionaries Level	Channel -1 Price per unit of 10 nos(Rs.)	Channel-II Price per unit of 10 nos(Rs.)	Channel-III Price per unit of 10 nos(Rs.)
Gross price received by producer(Rs.)	8.15(10.00) 9.90	-	-
Cost Incurred(Rs.)	0.35(0.50) 0.40	-	-
Net price received by Producer(Rs.)	7.80(10.00) 9.50	6.70(7.80) 6.93	6.00(7.10) 6.25
Commission Agents Purchase Price(Rs.)	-	6.70(7.80) 6.93	6.00(7.10) 6.25
Cost Incurred(Rs.)	-	0.25(0.50) 0.50	0.25(0.50) 0.45
Margin(Rs.)	-	3.54(4.36) 3.96	2.49(2.87) 2.74
Commission Agents Selling Price(Rs.)	-	9.69(12.66) 11.34	8.74(10.47) 9.44
Wholesalers Purchase Price(Rs.)	-	-	8.74(10.47) 9.44
Cost Incurred(Rs.)	-	-	0.20(0.20) 0.20
Margin(Rs.)	-	-	2.00(2.53) 2.17
Wholesalers selling price(Rs.)	-	-	10.94(13.20) 11.81
Retailers Purchase Price(Rs.)	8.15(10.50) 9.90	9.69(12.66) 11.34	10.94(13.20) 11.81
Cost Incurred(Rs.)	0.35(0.35) 0.35	0.35(0.45) 0.45	0.35(0.45) 0.45
Margin(Rs.)	7.50(9.15) 7.75	5.16(6.89) 6.21	4.71(6.35) 5.74
Retailers selling price(Rs.)	16.00(20.00) 18.00	16.00(20.00) 18.00	16.00(20.00) 18.00
Consumers Purchase Price(Rs.)	16.00(20.00) 18.00	16.00(20.00) 18.00	16.00(20.00) 18.00
Total Costs(Rs.)	0.70(0.85) 0.75	0.60(0.95) 0.95	0.80(1.15) 1.10
Total Margin(Rs.)	16.00(20.00) 18.00	16.00(20.00) 18.00	16.00(20.00) 18.00
Price Spread(Rs.)	8.20(10.00) 10.50	9.30(12.20) 11.07	10.00(12.90) 11.75
Marketing Efficiency (%)	28.60	41.32	30.08
Effectiveness (%)	8.12(8.46) 8.18	22.87(23.16) 22.52	12.14(13.78) 12.84

Note: Figures in parentheses indicate the price spread of Guwahati market and figures in italic size indicate the price spread of Boko market.

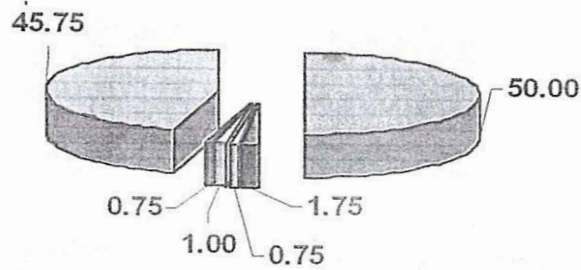
Figure- I, figure- II and figure -III shows, the price-spread of orange in channel - I for Shillong, Guwahati and Boko markets respectively.

Fig.-I
Price Spread of Orange in Shillong Market
(Channel - I: Producer-Retailer-Consumer)



- Net Price to the growers
- Transportation Costs (borne by the growers)
- Market Charges/Fees etc. (borne by the growers)
- Handling, Grading, Stacking costs borne by the retailers
- Market charges/fees and other expenses
- Retailers Selling Price (i.e. Consumers purchase price)

Fig.-II
Price Spread of Orange in Guwahati Market
(Channel - I: Producer-Retailer-Consumer)



- Net Price to the growers
- Transportation Costs (borne by the growers)
- Market Charges/Fees etc. (borne by the growers)
- Handling, grading, stacking
- Market charges/fees, other expenses
- Retailers Selling price (i.e. Consumer's Purchase Price)

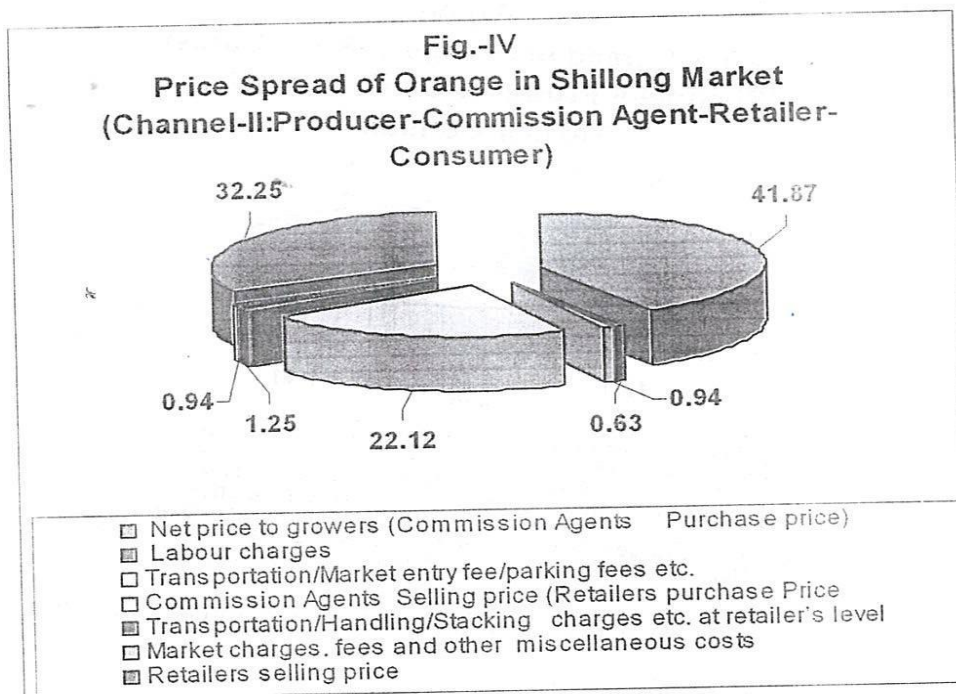
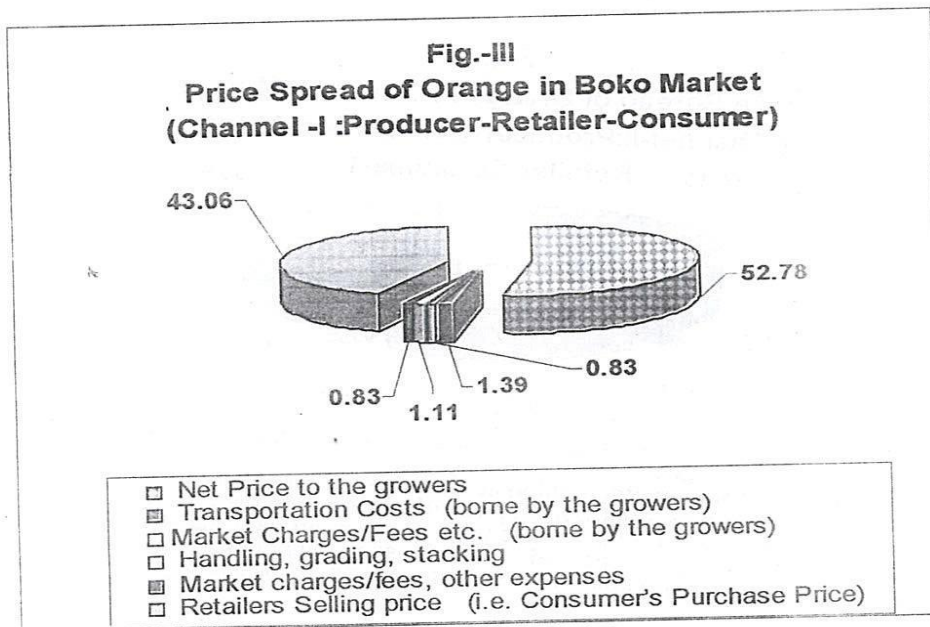
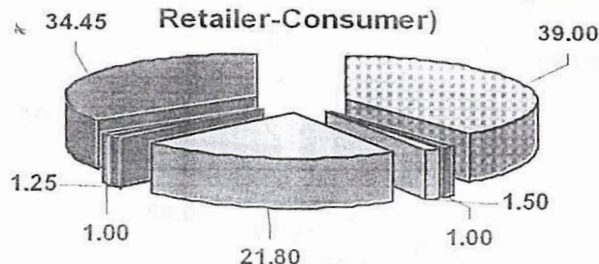


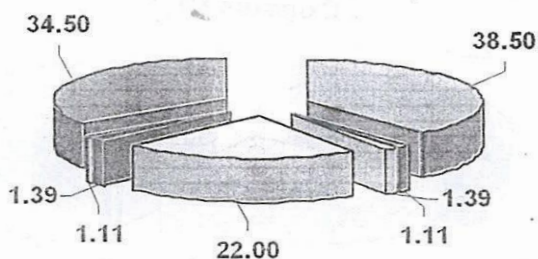
Fig - IV, Fig - V and Fig - VI show the Price- Spread of pineapple in Channel - 2 for Shillong, Guwahati and Boko market respectively.

Fig.-V
Price Spread of Orange in Guwahati Market
**(Channel-II:Producer-Commission Agent-
 Retailer-Consumer)**



- Net price to growers (Commission Agents Purchase price)
- ▒ Labour charges
- Costs of Transportation/Market entry fee/parking fees etc.
- Commission Agents Selling price (Retailers purchase Price)
- ▒ Transportation/Handling/Stacking charges etc. at retailer's level
- Market charges, fees and other miscellaneous costs
- ▒ Retailers selling price (i.e. Consumer's purchase price)

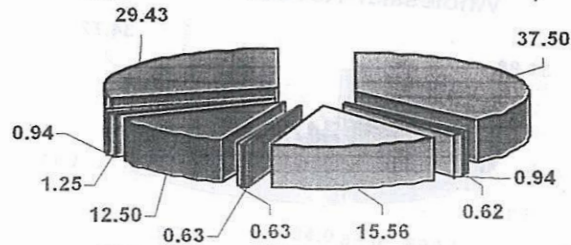
Fig.-VI
Price Spread of Orange in Boko Market
**(Channel-II:Producer-Commission Agent-
 Retailer-Consumer)**



- Net price to growers (Commission Agents Purchase price)
- ▒ Labour charges
- Costs of Transportation/Market entry fee/parking fees etc.
- Commission Agents Selling price (Retailers purchase Price)
- ▒ Transportation/Handling/Stacking charges etc. at retailer's level
- Market charges, fees and other miscellaneous costs
- ▒ Retailers selling price (i.e. Consumer's purchase price)

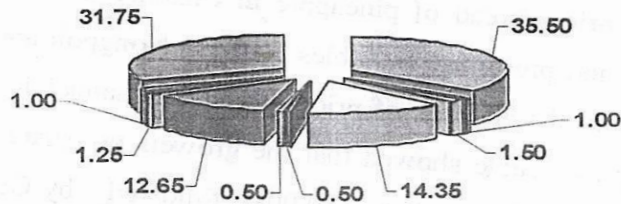
Fig - VII, Fig -VIII and Fig-IX show the Price Spread of orange in channel -
 3 for ...ong, Guwahati and Boko markets.

Fig.VII
Price Spread of Orange in Shillong Market
(Channel-III: Producer-Commission Agent-Wholesaler-Retailer-Consumer)

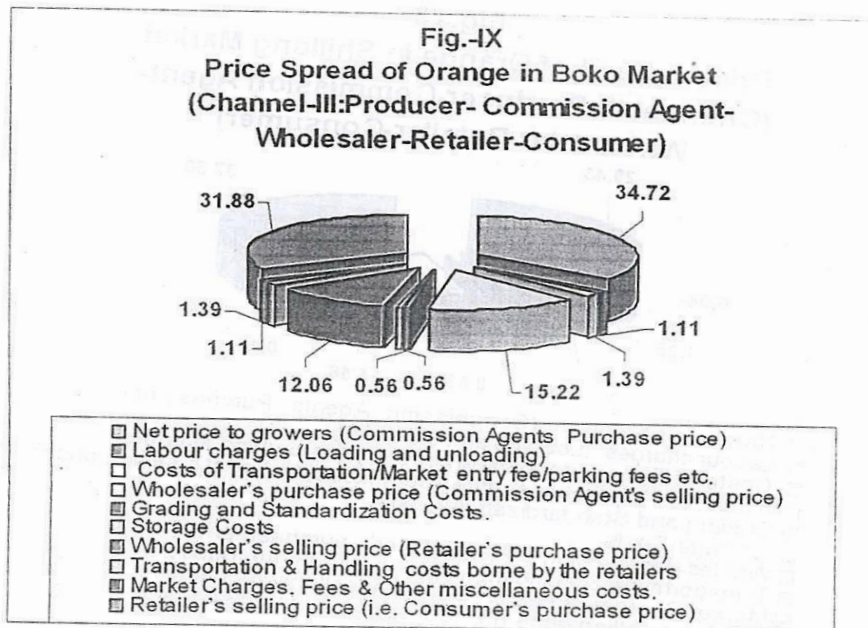


- Net price to growers (Commission Agents Purchase price)
- Labour charges (Loading and unloading)
- Costs of Transportation/Market entry fee/parking fees etc.
- Wholesaler's purchase price (Commission Agent's selling price)
- Grading and Standardization Costs.
- Storage Costs
- Wholesaler's selling price (Retailer's purchase price)
- Transportation & Handling costs borne by the retailers
- Market Charges, Fees & Other miscellaneous costs.
- Retailer's selling price (i.e. Consumer's purchase price)

Fig.-VIII
Price Spread of Orange in Guwahati Market
(Channel -III: Producer-Commission Agent-Whole saler-Retailer-Consumer)



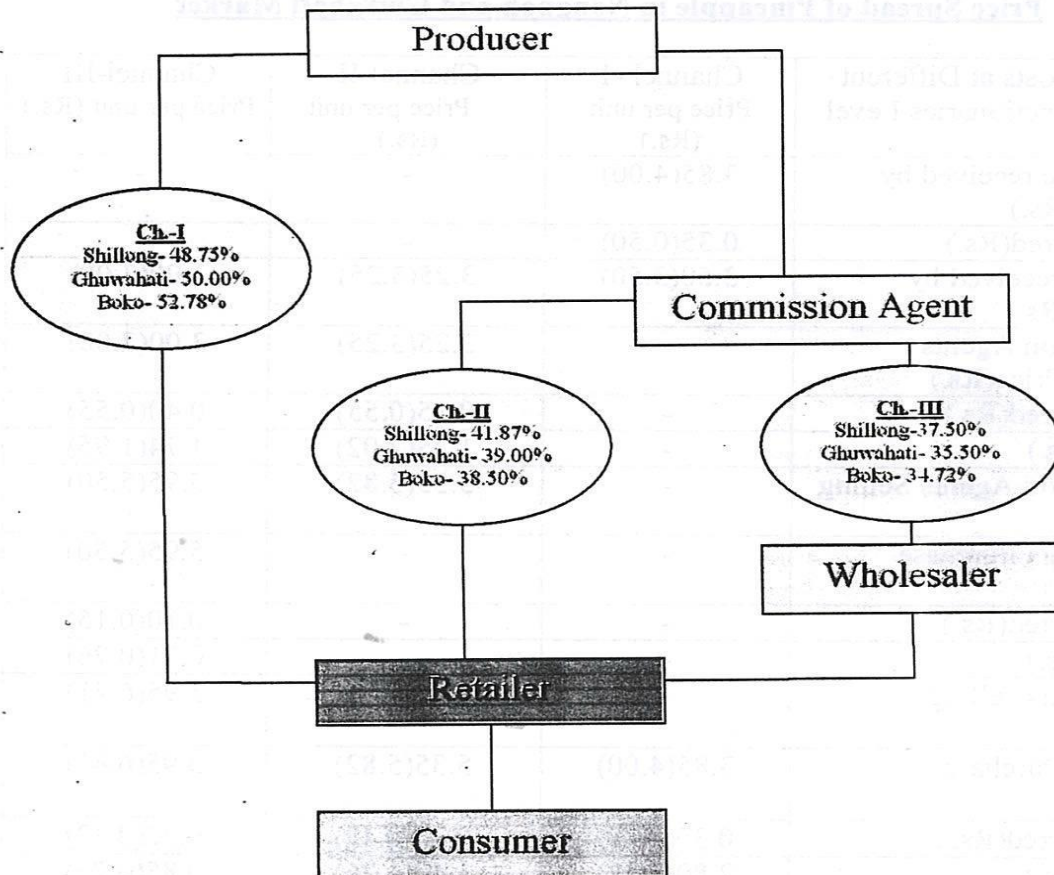
- Net price to growers (Commission Agents Purchase price)
- Labour charges (Loading and unloading)
- Costs of Transportation/Market entry fee/parking fees etc.
- Wholesaler's purchase price (Commission Agent's selling price)
- Grading and Standardization Costs.
- Storage Costs
- Wholesaler's selling price (Retailer's purchase price)
- Transportation & Handling costs borne by the retailers
- Market Charges, Fees & Other miscellaneous costs.
- Retailer's selling price (i.e. Consumer's purchase price)



Producer's share of consumer's rupee (Price-Spread) of orange in Shillong, Guwahati and Boko Markets via three marketing channels of the sample beneficiary households are shown in the Fig-X- Flow Chart (A)

The price spread of pineapple in Channel-1, Channel-II and Channel-III was worked out and presented in Tables 5.10 for Nongpoh and Guwahati markets. It was observed from the analysis of price spread in Channel-1, growers comparatively enjoyed better price. Table showed that the growers net share of consumers of rupee was highest in Nongpoh market (50.00) followed by Guwahati market (46.67). The growers viewed that in this channel they were getting better prices than selling at farm site on contract. The retailers were found to be making handsome margin, it was highest being 40.40 per cent in Guwahati and 40.00 per cent in Nongpoh market.

It was found that some of the commission agent invested fund and transacted pineapple business into their own level. The price spread of pineapple in Channel -2 shows that the grower's share of consumer's rupee was 46.43 per cent in Nongpoh market and 43.33 per cent in Guwahati market. The commission agent's share of consumer's rupee

Figure-X-Flow Chart(A)**Producer's Share of Consumer's Rupee (Price-Spread) of Orange in Shillong, Guwahati and Boko Markets via Three marketing Channels**

was 25.00 per cent in Nongpoh market and 26.93 per cent in Guwahati market. Excluding the transportation, sorting and market charges the retailer's share of consumer's rupee was 20.00 per cent in Nongpoh and 16.80 per cent in Guwahati market.

The price-spread analysis of pineapple in Channel-3 shows that the producer's share of consumer's rupee was 42.86 per cent in Nongpoh and 40.00 per cent in Guwahati market. The commission agent's share was 24.86 per cent Nongpoh market and 26.00 in Guwahati market. The wholesaler's net margin was found 10.14 per cent in Nongpoh market and 10.13 per cent in Guwahati market. In channel-3,

retailer's margin varied from 12.14 per cent in Nongpoh market and 10.26 per cent in Guwahati market.

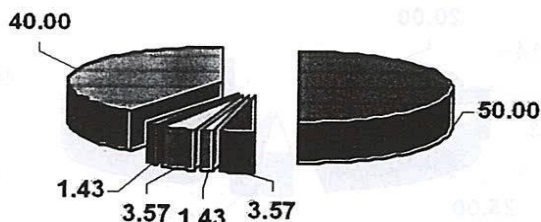
Table-5.10
Price Spread of Pineapple in Nongpoh and Guwahati Market

Items of Costs at Different Market Functionaries Level	Channel -1 Price per unit (Rs.)	Channel-II Price per unit (Rs.)	Channel-III Price per unit (Rs.)
Gross price received by producer(Rs.)	3.85(4.00)	-	-
Cost Incurred(Rs.)	0.35(0.50)	-	-
Net price received by Producer(Rs.)	3.50(3.50)	3.25(3.25)	3.00(3.00)
Commission Agents Purchase Price(Rs.)	-	3.25(3.25)	3.00(3.00)
Cost Incurred(Rs.)	-	0.35(0.55)	0.40(0.55)
Margin(Rs.)	-	1.75(2.02)	1.74(1.95)
Commission Agents Selling Price(Rs.)	-	5.35(5.82)	5.95(5.50)
Wholesalers Purchase Price(Rs.)	-	-	5.95(5.50)
Cost Incurred(Rs.)	-	-	0.10(0.15)
Margin(Rs.)	-	-	0.71(0.76)
Wholesalers selling price(Rs.)	-	-	5.95(6.41)
Retailers Purchase Price(Rs.)	3.85(4.00)	5.35(5.82)	5.95(6.41)
Cost Incurred(Rs.)	0.35(0.47)	0.25(0.42)	0.20(0.32)
Margin(Rs.)	2.80(3.03)	1.40(1.26)	0.85(0.77)
Retailers selling price(Rs.)	7.00(7.50)	7.00(7.50)	7.00(7.50)
Consumers Purchase Price(Rs.)	7.00(7.50)	7.00(7.50)	7.00(7.50)
Total Costs(Rs.)	0.70(0.97)	0.60(0.97)	0.70(1.02)
Total Margin(Rs.)	7.00(7.50)	7.00(7.50)	7.00(7.50)
Price Spread(Rs.)	3.50(4.00)	3.75(4.25)	4.00(4.50)
Marketing Efficiency (%)	16.23	48.16	35.61
Effectiveness (%)	7.13(8.63)	24.80(23.53)	15.69(13.52)

Note: Figures in parentheses indicate the price spread of Guwahati market

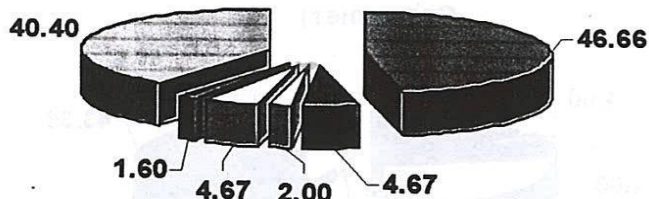
Fig - XI and Fig-XII show the Price Spread of pineapple in channel - 1 for Nongpoh and Guwahati markets.

Fig.-XI
Price Spread of Pineapple in Nongpoh
(Channel-I: Producer-Retailer-Consumer)



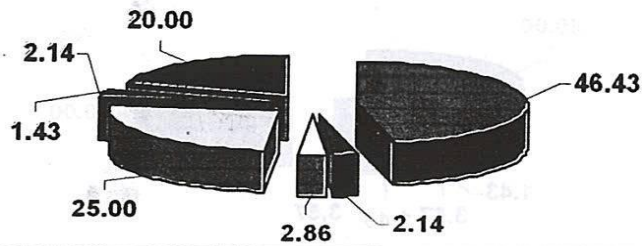
- Net Price to the growers
- Transportation Costs (Borne by the growers)
- Market Charges/Fees etc. (Borne by the growers)
- Handling, Grading, Stacking costs borne by the retailers
- Retailers Selling Price (i.e. Consumers purchase price)

Fig.-XII
Price Spread of Pineapple in Guwahati
Market (Channel-I: Producer-Retailer-Consumer)



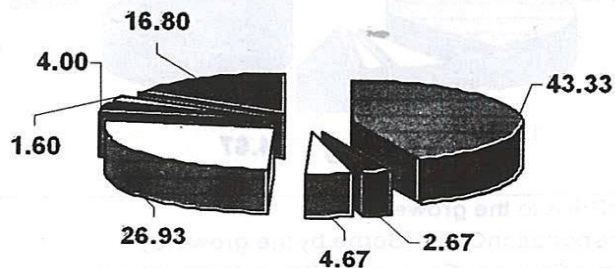
- Net Price to the growers
- Transportation Costs (Borne by the growers)
- Market Charges/Fees etc. (Borne by the growers)
- Handling, Grading, Stacking costs borne by the retailers
- Market charges/Fees and other expenses
- Retailers Selling Price (i.e. Consumers purchase price)

Fig.-XIII
Price Spread of Pineapple in Nongpoh Market
(Channel-II:Producer-Commission-Retailer-Consumer)



- Net price to growers (Commission Agents Purchase price)
- Labour charges
- Transportation/Market entry fee/parking fees etc.
- Commission Agents Selling price (Retailers purchase price)
- Transportation/Handling/Stacking charges etc. at retailer's level
- Market charges, fees and other miscellaneous costs
- Retailers selling price

Fig.-XIV
Price Spread of Pineapple in Guwahati Market
(Channel-II:Producer- Commission Agent- Retailer-Consumer)



- Net price to growers (Commission Agents Purchase price)
- Labour charges
- Transportation/Market entry fee/parking fees etc.
- Commission Agents Selling price (Retailers purchase price)
- Transportation/Handling/Stacking charges etc. at retailer's level
- Market charges, fees and other miscellaneous costs
- Retailers selling price

Fig - XIII and Fig-XIV show the Price Spread of pineapple in channel – 2 for Nongpoh and Guwahati markets.

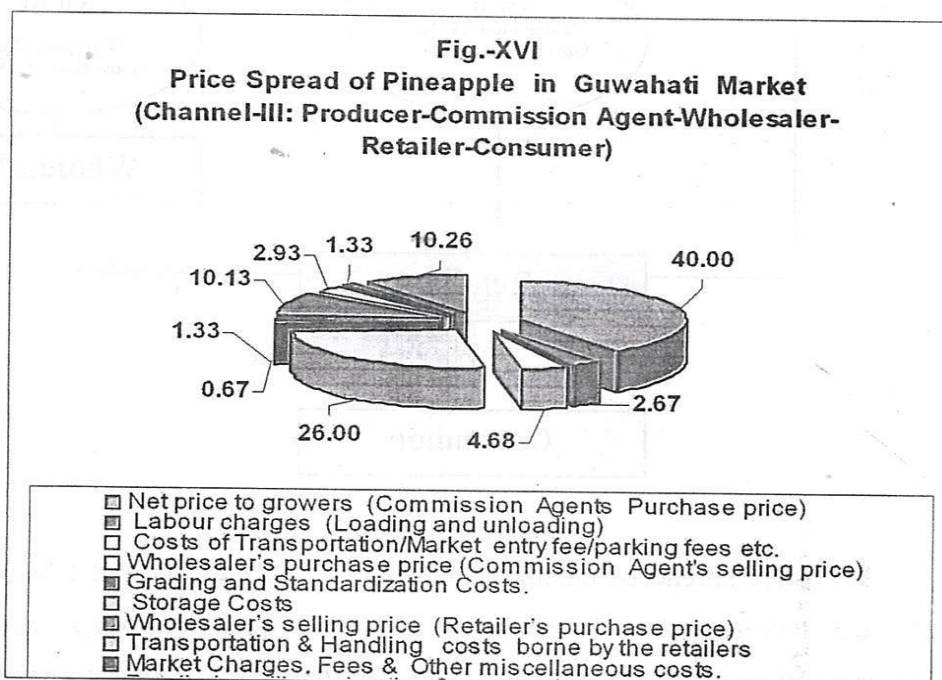
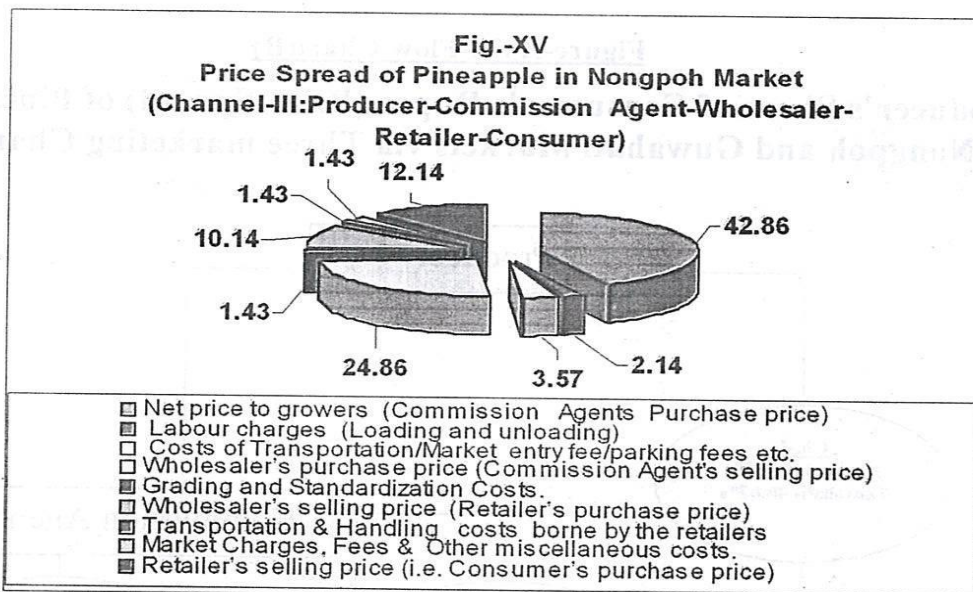
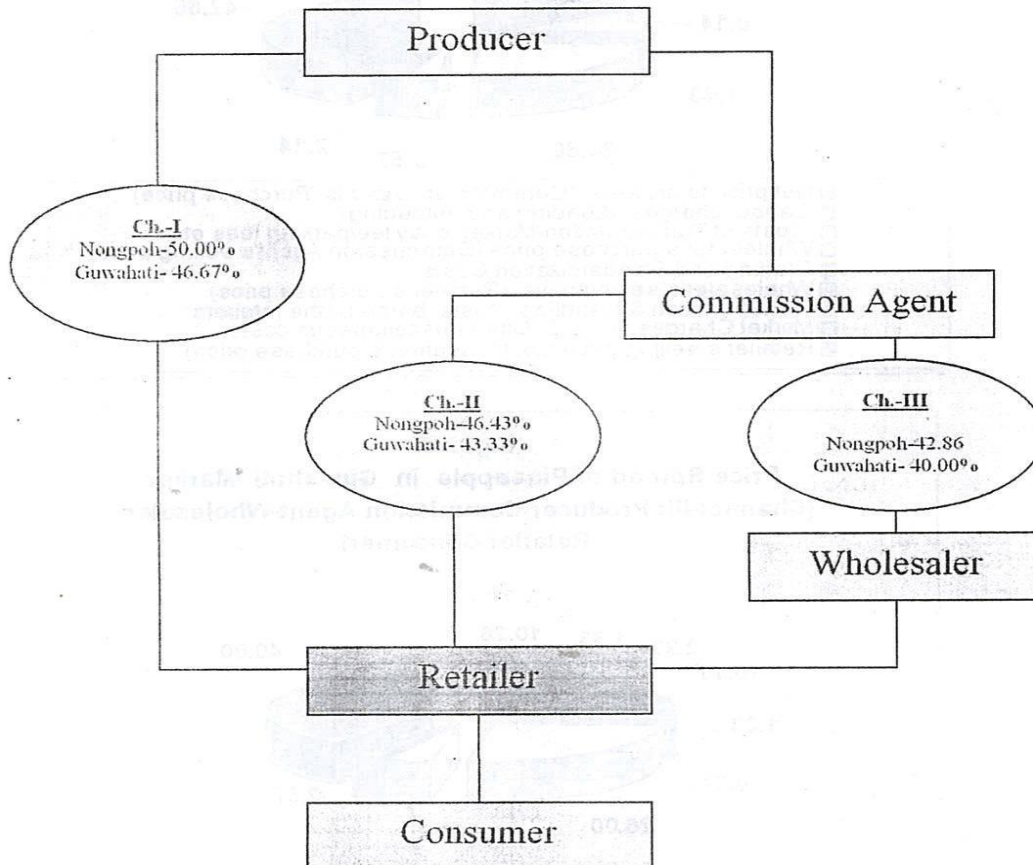


Fig -XV and Fig-XVI show the Price -Spread of pineapple in channel – 3 for Nongpoh and Guwahati markets.

Producer's share of consumer's rupee (Price-Spread) of pineapple in Nongpoh and Guwahati Markets via three marketing channels of the sample beneficiary households are shown in the Flow Chart (B) in Fig-XVII.

Figure-XVII-Flow Chart(B)

Producer's Share of Consumer's Rupee (Price-Spread) of Pineapple in Nongpoh and Guwahati Markets via Three marketing Channels



The price spread of banana in Channel-1, Channel-II and Channel-III was worked out and presented in Table -5.11 for Nagaon and Sonitpur markets. It was observed from the analysis of price spread in Channel-1, growers comparatively enjoyed better price. Table showed that the growers net share of consumers of rupee was highest in Nagaon market (49.20 per cent) followed by Sonitpur market (48.08 per cent). The retailers were found to be making handsome margin, it was 43.80 per cent in Nagaon market and 43.83 per cent in Sonitpur market.

Table-5.11**Price Spread of Banana in Nagaon and Sonitpur Market**

Items of Costs at Different Market Functionaries Level	Channel -1 Price per unit of 12 Nos.(Rs.)	Channel-II Price per unit of 12 Nos.(Rs.)	Channel-III Price per unit of 12 Nos.(Rs.)
Gross price received by producer(Rs.)	5.27(6.27)	-	-
Cost Incurred(Rs.)	0.35(0.50)	-	-
Net price received by Producer(Rs.)	4.92(5.77)	4.73(5.30)	4.09(4.60)
Commission Agents Purchase Price(Rs.)	-	4.73(5.30)	4.09(4.60)
Cost Incurred(Rs.)	-	0.35(0.55)	0.40(0.50)
Margin(Rs.)	-	2.52(3.26)	2.24(2.82)
Commission Agents Selling Price(Rs.)	-	7.60(9.11)	6.73(7.97)
Wholesalers Purchase Price(Rs.)	-	-	6.73(7.97)
Cost Incurred(Rs.)	-	-	0.10(0.15)
Margin(Rs.)	-	-	1.00(1.32)
Wholesalers selling price(Rs.)	-	-	7.83(9.44)
Retailers Purchase Price(Rs.)	5.27(6.27)	7.60(9.11)	7.83(9.44)
Cost Incurred(Rs.)	0.35(0.47)	0.25(0.42)	0.20(0.32)
Margin(Rs.)	4.38(5.26)	2.10(2.47)	1.97(2.24)
Retailers selling price(Rs.)	10.00(12.00)	10.00(12.00)	10.00(12.00)
Consumers Purchase Price(Rs.)	10.00(12.00)	10.00(12.00)	10.00(12.00)
Total Costs(Rs.)	0.70(0.97)	0.60(0.97)	0.70(0.97)
Total Margin(Rs.)	10.00(12.00)	10.00(12.00)	10.00(12.00)
Price Spread(Rs.)	5.08(6.23)	5.27(6.70)	5.91(7.40)
Marketing Efficiency (%)	23.16	38.61	38.23
Effectiveness (%)	15.50(14.72)	18.29(17.48)	12.03(12.73)

Note: Figures in parentheses indicate the price spread of Banana in Sonitpur market

The price-spread analysis of banana in Channel – 2 shows, that the grower's share of consumer's rupee was 47.30 per cent in Nagaon market and 44.17 per cent in Sonitpur market. The commission agent's share of consumer's rupee was 25.20 per cent in Nagaon market and 27.16 per cent in Sonitpur market. Excluding the transportation, sorting and market charges the retailer's share of consumer's rupee was 21.00 per cent in Nagaon market and 20.58 per cent in Sonitpur market. The price-spread of orange in Channel-3 for Nagaon and Sonitpur markets shows that the producer's share of consumer's rupee was 40.90 per cent in Nagaon market and 38.33 per cent in Sonitpur market. The commission agents share was 22.40 per cent in Nagaon market and 23.50 in Sonitpur market. The wholesaler's net margin was found

10.00 per cent in Nagaon market and 11.00 per cent in Sonitpur market. In channel-3, retailer's margin varied from 12.14 per cent in Nongpoh market and 10.26 per cent in Guwahati market.

Fig - XVIII and Fig-XIX show the Price Spread of banana in channel – 1 for Nongpoh and Guwahati markets.

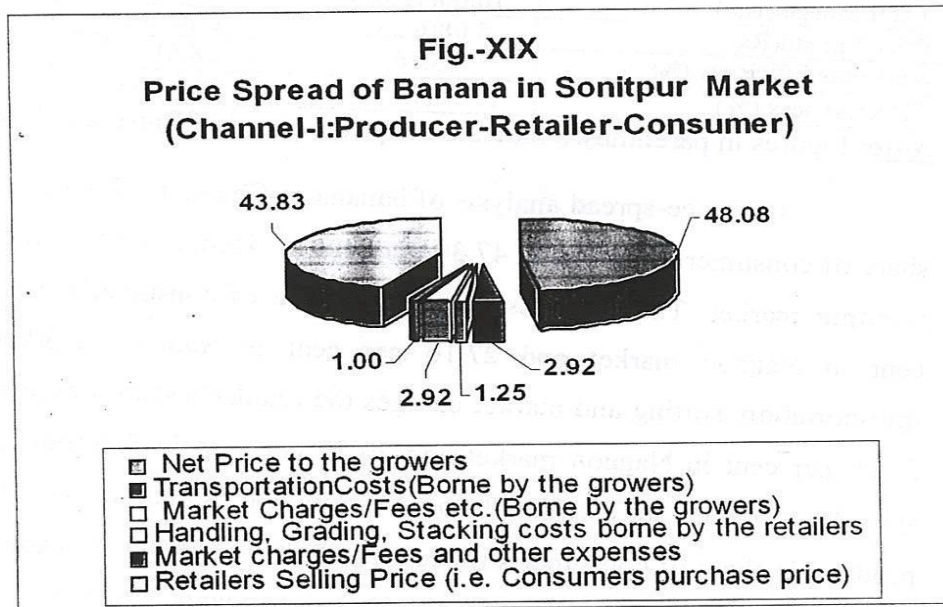
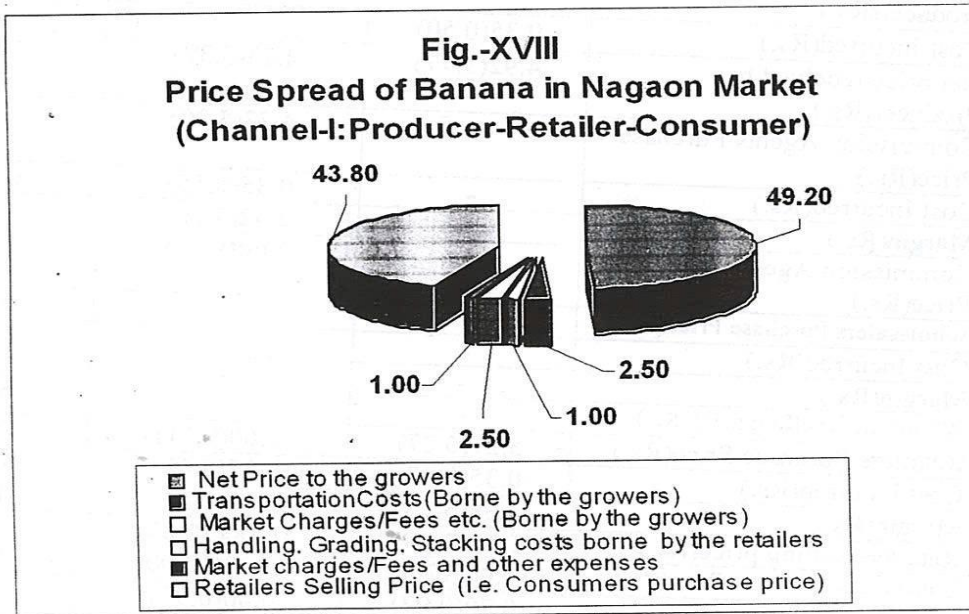


Fig - XX and Fig-XXI show the Price Spread of banana in channel – 2 for Nagaon market and Sonitpur markets.

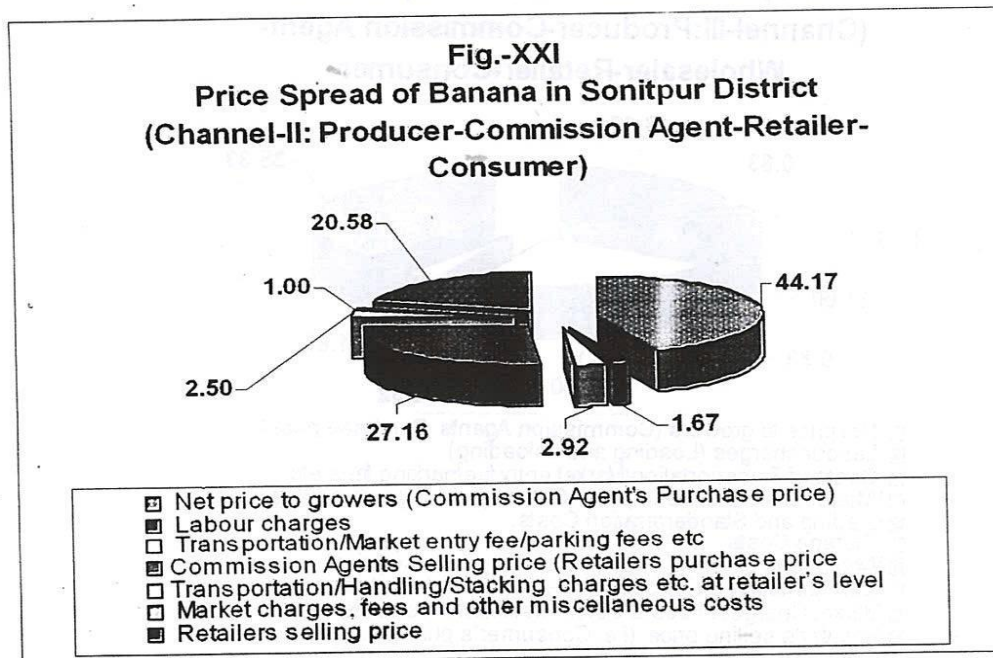
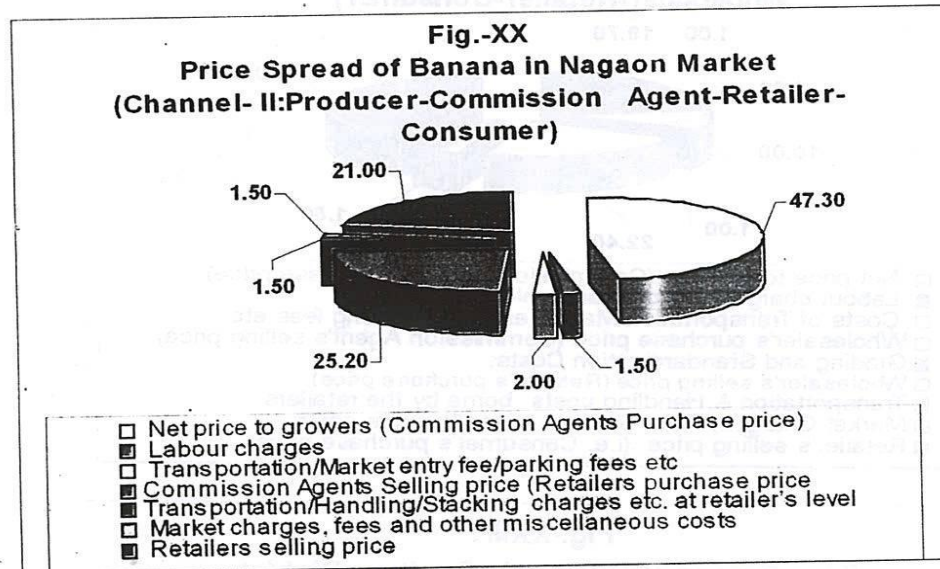
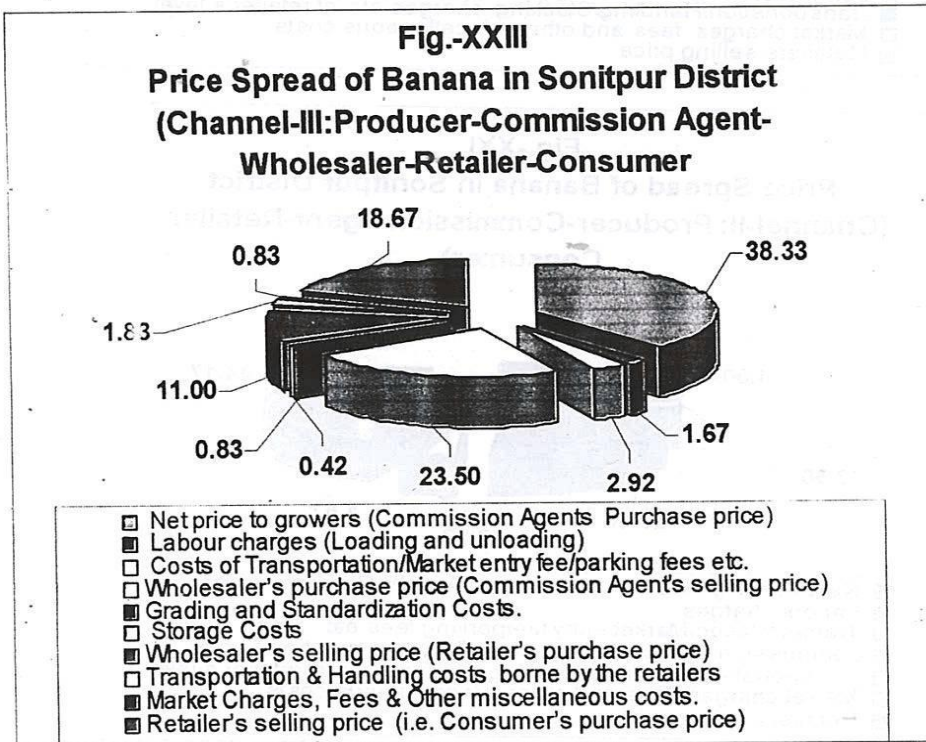
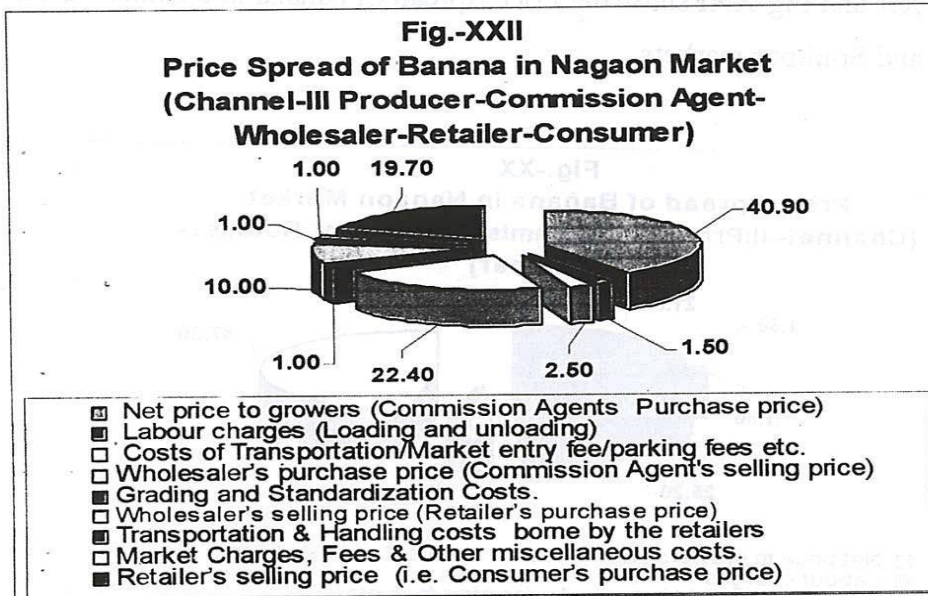
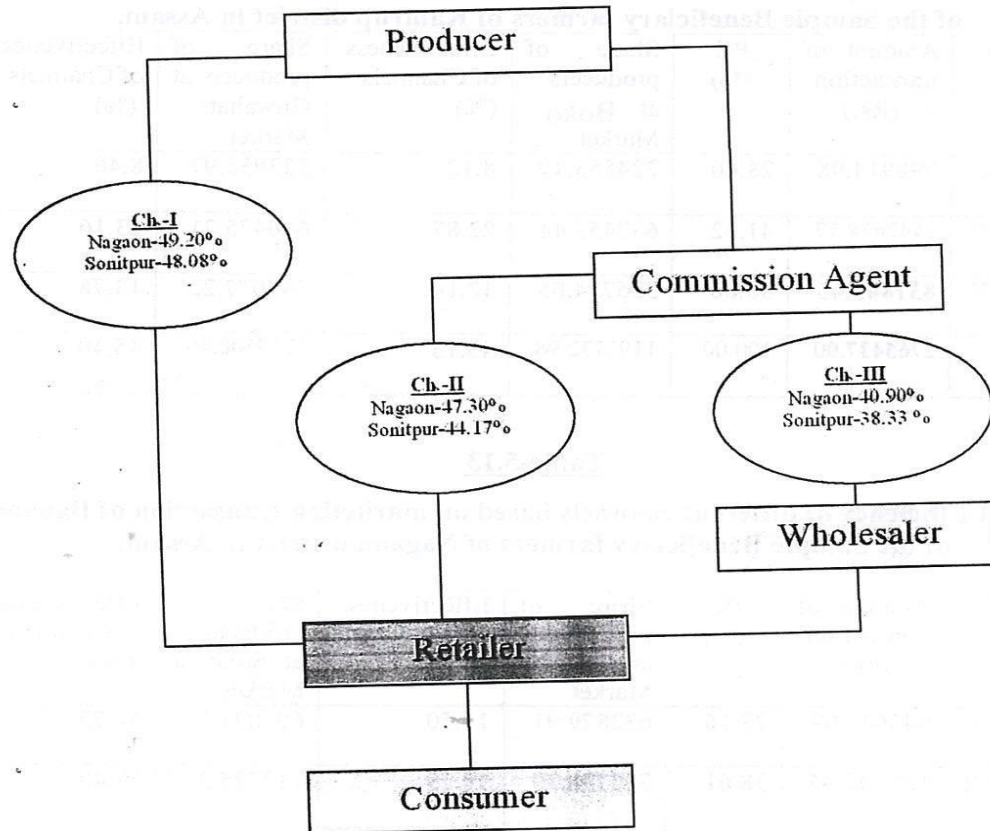


Fig -XXII and Fig-XXIII show the Price Spread of pineapple in channel – 3 for Nagaon market and Sonitpur markets.



Producer's share of consumer's rupee (Price-Spread) of Banana in Nagaon and Sonitpur Markets via three marketing channels of the sample beneficiary households are shown in the Flow Chart (C) in Fig-XXIV.

Figure- XXIV-Flow Chart(C)**Producer's Share of Consumer's Rupee (Price-Spread) of Banana in Nagaon and Sonitpur Markets via Three marketing Channels****Efficiency of Marketing Channel:**

The efficiency of marketing channels could be judged from the grower's net return point as well as different market functionaries point of view. Market efficiency of three marketing channels in two markets on orange of the sample beneficiary households of Kamrup district of Assam has been examined and presented in Table-5.12. The sample beneficiary households reported that 28.60 percent of their produces were sold through Channel – 1 i.e. Producer-Retailer-Consumer, 41.32 per cent were sold through Channel – 2 i.e. Producer- Commission Agent- Retailer-Consumer and

30.08 per cent were sold through Channel-3 i.e. Producer- Commission Agent- Wholesaler-Retailer-Consumer.

Table-5.12

Market Efficiency of different channels based on marketing transaction of orange of the Sample Beneficiary farmers of Kamrup district in Assam.

Channels	Amount of transaction (Rs.)	PC (%)	Share of producers at Boko Market	Effectiveness of Channels (%)	Share of producers at Guwahati Market	Effectiveness of Channels (%)
Channel-I	790914.98	28.60	224553.49	8.12	233955.97	8.46
Channel-II	1142678.57	41.32	632455.44	22.87	640475.21	23.16
Channel-III	831843.45	30.08	335724.05	12.14	381077.22	13.78
Total	2765437.00	100.00	1192732.98	43.13	1255508.40	45.40

Table-5.13

Market Efficiency of different channels based on marketing transaction of Banana of the Sample Beneficiary farmers of Nagaon district in Assam.

Channels	Amount of transaction (Rs.)	PC (%)	Share of producers at Nagaon Market	Effectiveness of Channels (%)	Share of producers at Sonitpur Market	Effectiveness of Channels (%)
Channel-I	945645.09	23.16	632879.91	15.50	601031.77	14.72
Channel-II	1576483.45	38.61	746798.30	18.29	713725.22	17.48
Channel-III	1560967.69	38.23	491196.48	12.03	519778.15	12.73
Total	4083096.23	100.00	1870874.69	45.82	1834535.14	44.93

Market efficiency of three marketing channels in two markets on banana of the sample beneficiary households of Nagaon district of Assam was examined and presented in Table-5.13. The sample beneficiary households reported that 23.16 percent of their produces were sold through Channel – 1 i.e. Producer-Retailer-Consumer, 38.61 per cent were sold through Channel – 2 i.e. Producer- Commission Agent-

Retailer-Consumer and 38.23 per cent were sold through Channel-3 i.e. Producer-Commission Agent-Wholesaler-Retailer-Consumer.

Table-5.14

Market Efficiency of different channels based on marketing transaction of Pineapple of the Sample Beneficiary farmers of Ri-Bhoi district in Meghalaya

Channels	Amount of transaction (Rs.)	PC (%)	Share of producers at Nongpoh Market	Effectiveness of Channels (%)	Share of producers at Guwahati Market	Effectiveness of Channels (%)
Channel-I	322325.62	16.23	141600.84	7.13	171390.64	8.63
Channel-II	956451.14	48.16	492524.67	24.80	467302.64	23.53
Channel-III	707209.83	35.61	311601.30	15.69	268505.39	13.52
Total	1985986.59	100.00	945726.81	47.62	907198.67	45.68

Table-5.15

Market Efficiency of different channels based on marketing transaction of Orange of the Sample Beneficiary farmers of East Khasi Hills district in Meghalaya

Channels	Amount of transaction (Rs.)	PC (%)	Share of producers at Shillong Market	Effectiveness of Channels (%)	Share of producers at Guwahati Market	Effectiveness of Channels (%)
Channel-I	157682.55	12.46	91749.47	7.25	111617.98	8.82
Channel-II	522275.97	41.27	296002.78	23.39	286638.02	22.65
Channel-III	585551.48	46.27	210074.67	16.60	195141.64	15.42
Total	1265510.00	100.00	597826.92	47.24	593397.64	46.89

Market efficiency of three marketing channels in two markets on orange of the sample beneficiary households of East Khasi Hills district of Meghalaya has been examined and presented in Table-5.14. The sample beneficiary households reported that 12.46 per cent of their produces were sold through Channel – 1 i.e. Producer-Retailer-Consumer, 41.27 per cent were sold through Channel – 2 i.e. Producer- Commission

Agent-Retailer-Consumer and 46.27 per cent were sold through Channel-3 i.e. Producer- Commission Agent-Wholesaler-Retailer-Consumer.

Market efficiency of three marketing channels in two markets on pineapple of the sample beneficiary households of Ri-Bhoi district of Meghalaya has been examined and presented in Table-5.15. The sample beneficiary households reported that 12.46 percent of their produces were sold through Channel – 1 i.e. Producer-Retailer-Consumer, 41.27 per cent were sold through Channel – 2 i.e. Producer- Commission Agent-Retailer-Consumer and 46.27 per cent were sold through Channel-3 i.e. Producer- Commission Agent-Wholesaler-Retailer-Consumer.

Spoilage of Fruits of different market functionaries level:

The spoilage of banana, pineapple and orange in different stages of marketing was reported by the market functionaries. The quantum of spoilage depends upon the degree of ripeness, mode of transportation and handling. The middlemen or the village level traders usually collected the matured half-ripped banana, pineapple and orange from the growers to minimize spoilage in the process of transportation, loading and unloading.

At the commission agents level the rate of spoilage was reported to be about 3 per cent to 4 per cent. At the wholesaler's level the rate of spoilage was reported to be about 2 per cent. The wholesaler's usually disposed of the stock at the earliest possible time to avoid spoilage. When they had to send to the distant wholesalers or processing units, they usually sent directly without loading and grading at their level.

The rate of spoilage at the retailer's level was reported to be higher which varied from 3 per cent to 5 per cent. The spoilage at the retailer's level was high because of lack of uniformity of demand in the season. The fruits either dried up or got rotten at the retailers vendor. The spoilage of pineapple in the process of retailing actually minimized the quantum of net margin of the retailer's although in the price spread analysis revealed that the retailers enjoyed a fairly high margin. From the analysis of price-spread in marketing of banana, pineapple and orange, Channel – 1 is the most efficient channel for the growers to dispose off the marketable surplus. The middlemen/commission agents were enjoying highest margin in channel – 2. The wholesalers were operating in channel 3, their margin were by and large same in both

the selected markets. From the analysis of price-spread it was noticed that there is a wide gap between the price received by the growers and the price paid by the consumer. The analysis of price-spread indicated that the major share of consumer's rupee have been enjoyed by the different levels of market functionaries is one of the distressing issues affecting the interest of the growers in undertaking pineapple cultivation in a commercial scale.

From the analysis of price spread it was noticed that there is a wide gap between the prices received by the farmer and the prices paid by the consumer. In case of perishable horticultural crops like orange, banana and pineapple there is no minimum support price system which helped the traders to fix the prices in their favour. The marketing channels were found to be more circuitous and involve a large number of handlings which means increased costs in the agricultural marketing and fluctuation of prices from market to market for the same quality of produce.

Another distinguishing feature of marketing of orange, banana and pineapple was that these fruits were harvested in a limited period. During this short harvesting period there was heavy demand from growers for marketing the fruits. In the consuming centres demand for fruits were found to be relatively inelastic at wholesale and retail markets. Prices of orange and pineapple fluctuated considerably depending upon supply and demand conditions.

So far as the selling areas (grower's level) of pineapple, banana and orange were concerned it appeared to be almost dominated by the different levels of market functionaries. It was also observed that accessibility of producers to assembling or terminal markets were not possible due to physical, economic and other reasons. The situation in the interior hill areas were worst where there was no road and market infrastructure. It was found that a very small percentage of growers near the terminal market supplied their marketable items to retail sellers and wholesalers. In the selling area the fruit market was found to be dominated by the middlemen. These market functionaries fixed the price of the produce at a much lower rate than the prevailing market price. This is the way how the fruits produced by the growers enriched the traders who had no interest in the upliftment of village economy.

Chapter-VI

Problems of Commercial Cultivation of Horticultural Crops and Suggest Policy Implications

Based on the primary level data and observation an attempt has been made in this chapter to highlight the problems of commercial horticultural crop cultivation and to suggest policy implications. It is needless to mention that development depends upon the physical accessibility and socio-cultural environment of the area. The remarkable improvement of horticulture sector in the study area has been due to implications of TM-IDH which resulted higher fruit production.

The study highlighted that horticultural crop cultivation generate considerable marketable surplus as crops is grown by the farmers on commercial proposition. In commercial farming system farmers emphasised to earn profit and marketed the whole marketable surplus. Horticultural crop require special care in harvesting, handling, transportation and proper storage before sending to the final consumer without loss of quality. Considering the delicacy of fruits special marketing facilities are needed. Despite the vast available potential of horticultural crops in Assam and Meghalaya, these crops have not been picked up as expected due to a number of constraints. The identified constraints are pertaining to lack of marketing potential, inadequate development of fruit canning, processing and preservation units, poor road and transport communication; lack of cold storage facilities, inadequate technology as well as weak extension support in the field of horticulture are hindering the development of horticulture sector in the North Eastern Region. Many villages in the study area growing horticultural crops remain inaccessible during the monsoon season, which is the harvesting season of pineapple and banana.

1. Lack of Horticultural Research and Development and Extension:

In order to improve the quality of pineapple, orange and banana inadequate horticultural research programme has been taken up by the Department of Agriculture, Government of Assam and Meghalaya. In order to get healthy fruits it is necessary to apply soil nutrients at appropriate doses, which should be based on

soil testing. It is felt that due to lack of progeny orchards of selected horticultural crops the growers did not pay required attention for the development of quality of pineapple, banana and orange. Above all extension support, in the study are not satisfactory, particularly in the field of horticulture.

2. Inadequate Technology and Unscientific Method of Cultivation:

The development of technology to boost up production of horticultural crops in both the States was inadequate. As the horticultural research has not been picked up for improvement of technology, the orchardists adopting the outdated age-old traditional technology for which the quality of produced in the States were of poor quality. Due to lack of development of improved technology indigenous varieties are covering the large part of areas for which yield rate is not so encouraging.

In the study area pineapple is grown purely as a rain fed crop up to the elevation of about 1000 meters above MSL. Because of excellent agro-climatic condition some quality fruits are harvested; but yield rate remains at 5 to 9 tonnes per hectare against the optimum yield potential of 40 tonnes. The major reason of low yield is lack of proper technology and unscientific method of cultivation.

3. Undulating Topography and Land Ownership Pattern :

Due to undulating topography and hill terrains, there is great variation in altitude. Thus, the varying range of altitudes creates problem of soil moisture conservation for horticultural crop cultivation since the technology adopted for a particular altitude cannot be applied in another altitude. Due to undulating topography improved method of cultivation cannot be adopted. In the hill areas of the North-Eastern Region, community ownership system of landholding prevails. In some cases the village head man is the custodian of land and he distributes land to his fellow villagers according to the number of working hands of the family. The different land ownership pattern of the region acts as hindrance in the development of agriculture in general and horticulture in particular. The farmers do not pay any attention on land development as they have no any individual right on the land they used for crop cultivation. Absence of proper individual ownership with proper land

records also comes in the way of taking up any development programme of land on permanent basis.

4. Inadequate Road, Transport and Communication Facilities:

The road, transport and communication linkage in the North-Eastern Region as a whole is utterly unsatisfactory. About 85 per cent of the villages in the region do not have proper link roads. According to an estimate about 88 per cent of total marketable surplus to primary markets in Manipur, 70 per cent in Meghalaya, 56 per cent in Assam are carried on head load several miles by the producers¹. The producers in interior hills often stay overnight on the way to the market. Inadequate road communication limits the range of marketing, which is largely responsible for the slow growth of marketing infrastructure. Marketing outlets are not accessible to many of the producers having marketable surplus. Many important agricultural areas are linked with the rest of the country only during the winter season (dry period) of the year. It was observed that most of the horticultural growing areas in the study area are connected by bridle path or kutcha road. As the pineapple and banana are harvested in the monsoon season the Kutcha roads are not useable for motor transport. In the far-flung hill areas the situation is even worse as only one village out of 10 villages is connected by motorable road. The conditions of road in the harvesting period of pineapple are miserable, the farmers have to carry the harvests to the road side on their heads². Obviously, such inadequate road transport and communication cannot serve the need of the commercial pineapple growers and in fact they are forced to sell the produce in the village to the middlemen or commission agents at a much lower price than the prevailing market rate. Many studies also proved that monopsony conditions are prevailing in the agricultural produce markets.

5. Lack of Storage Facilities:

For perishable commodities like pineapple, orange and banana cold storage facility and refrigerated transport is necessary to maintain its quality in fresh

¹ Agarwala, A.K. : "Agricultural Marketing : The Crux of the Problem" *Opcit*, p.154

² A.K. Agarwal : "Marketing of Agricultural Produce in the North-Eastern Region" in J.B. Ganguly (Ed.), *Marketing in North-East India*, Omsons Publications, 1983, p.p.34 - 35.

form. The study revealed that due to lack of appropriate cold storage facility in the growing area the horticultural growers immediately sell their produce just after harvest to the market functionaries. The traders and middlemen take full advantage of the situation and exploit the growers from their due share of the produce. The storage facilities in the horticultural growing areas and in the primary markets are totally absent. So, in fear of deterioration of quality they agreed to sell the produce at whatever price offered by the traders.

6. Small Scale Production and Perishability :

The field level study revealed that although pineapple is grown on commercial basis most of the units of production are small. Moreover, direct marketing at distant places is not possible as the quantity of production of individual growers is very small and fruits are not ready for harvest at a time. The middlemen and the village level traders collected small supplies from the growers scattered over a wide area. Due to the socio-economic handicaps to which orchardists of Meghalaya are subjected to actually retarded the development of horticultural crop cultivation in general and pineapple cultivation in particular.

7. Inadequate Fruit Processing Industry Units :

The number of fruit canning and processing units in the study area is very limited. Public and Private sector small units are not sufficient to cope with the quantity available for canning. Due to geographical isolation and inadequate transport net work the industrialists are not coming forward to invest in fruit canning units. It was observed in the field that some of the wholesalers used to send pineapple from Meghalaya to the fruit canning units in the neighboring States, particularly to West Bengal.

There is sufficient scope for steady export of processed value-added fruit products of pineapple to the neighboring countries. Owing to inadequate processing unit's export of processed items are also not taking place, as the importing countries are demanding quality products of international standard. So far, no export promotional efforts have been made. This is considered to be other handicaps for the commercial cultivation of pineapple in Meghalaya.

8. Lack of Proper Packaging Handling and Refrigerated Transport:

Adoption of proper packaging and handling in accordance with the delicacy of fruit is essential to improve the marketing efficiency. Special packaging and handling of ripe fruits are essential otherwise there are chances of wilts and rots in the process of transportation in the tropical climate. So far as the pineapple is concerned packaging of fruits for transportation was not done. For this reason transit loss was found to be 5 to 6 per cent for pineapple.

Besides proper packaging and handling, refrigerated transport is essential for transportation of delicate fruits to distant places without deterioration of quality. But such facilities are unknown in the study area.

9. Lack of Grading and Standardization:

Harvested pineapple, banana and orange is not graded or standardized according to size, shape and degree of ripeness before handling over to market functionary. The usual product is that fruit of all the sizes and qualities are sold in one common lot. So, the farmers producing better qualities were not assured of better price. From the common lot the wholesalers and the retailers graded the produce according to size, shape and degree of ripeness and they charged different rates for different grades of items and thus earned handsome margins.

The studies conducted on marketing of agricultural commodities in the N.E. Region highlighted that in many cases the traders and the middlemen resort to various malpractices like under pricing by giving wrong information to the growers about market situation.

10. Inadequate Marketing Net work:

The greatest handicap in marketing of horticultural crops is the absence of market near the growing centres in the study area. The layout of location of rural markets is not the outcome of proper planning. Although the Government provides Rs. 13,000/- to each of the farmers for area expansion of horticulture crops under TM-IDH yet, the farmers are reluctant to increase their crop area due to lack of proper marketing infrastructure. It is also to be noted that there is no local demand for pineapple as the local people used to get the fruits as gift from the growers. So,

the markets in the rural areas either suffer from glut or from lack of business. In some areas the producer had to move long distance to dispose of the small marketable surplus and hence the growers preferred to hand over the produce to the itinerant traders operating in their areas.

In the hill areas agricultural marketing is still in a rudimentary stage. The number of unregulated markets is substantially large where the traders exploited the growers.

11. Dominance of Traders and Un-regulated Markets:

The general pattern of marketing of pineapple was that almost entire marketing structure is dominated by a large number of intermediaries and traders. Almost entire marketed produce is channeled through many hands before reaching the final consumers who actually inflated the consumer's price.

Besides the dominance of market intermediaries there are malpractices in unregulated markets. The poor bargaining power of the growers gave rise to numerous mal-practices like deduction from sales proceeds on some pretext, wrong weights and measures etc. The growers of pineapple were cheated by the unscrupulous traders due to lack of standard specification of weights and measures and the produce were marketed under adverse conditions.

12. Inadequate Market Information and Market-knowledge:

The farmers in the study area did not have information on market demand and market prices of pineapple, banana and orange in different terminal markets. Due to lack of access to market information the growers accepted whatever price was offered by the traders. Coverage of media like radio, television and newspaper on market prices of fruits are very limited. So, inadequate market information and market knowledge is considered as another major constraint for the producers and also the traders.

13. Lack of Credit Facilities for Fruit Growers:

It was observed in the study that in many occasions the fruit growers resorted to distress sale by making pre-harvest contract, as they needed cash to

purchase essential items like food grains and for other emergent purposes. So, to purchase food grains they could not wait for harvesting time and hence took money in advance. Under pricing of the agricultural produce by the market functionaries is a normal feature, which may be the outcome of poverty, illiteracy and ignorance of the rural poor. The institutional credit was not easily available to the commercial fruit growers in particular for which they approached the village moneylenders for loan at a high rate of interest. This is considered to be another major constraint for developing the fruit orchards and pineapple in particular on commercial line.

14. Ineffective Enactment of Legislation for Regulation of Market:

The relevance of regulated market for marketing of agricultural commodities is concerned for operational efficiency and effective pricing policy legislation for market regulation have been enacted. So, regulation of market is considered as an essential pre-requisite for growth of marketing facilities. Despite increase in the number of regulated markets no effective enactment of market regulation could be enforced due to a number of reasons. The market regulations covered mainly food grains and cash crops, fruit like pineapple are not in the purview of market regulation. This is considered to be another major constraint in marketing of pineapple.

15. Defective Pricing Policies and Higher Risk:

There is a wide range in prices of the same quality or produce within the same locality or nearby areas, which was the outcome of cost of transportation, storage, handling, grading and other changes. There is no pricing policy for fruits. It fluctuated depending on demand and supply. Due to product characteristics of pineapple, orange and banana, the growers are not in a position to release the produce according to the market demand, as pineapple is a seasonal fruit. In the peak season the growers had to sell the produce at a very lower rate due to seasonal glut. In some cases handling and transportation cost differentials caused adverse effect upon pricing of marketable items.

The risk involved in all stages of production due to natural climatic hazards also influences supply of fruits adversely and causes hike in prices. If the

marketable produce requires long distance transport, there is every chance of damage of fruits in transit for which the traders charge extra rate on the rest of the produce to compensate the loss. The successful market functionary takes calculated risk in transacting the fruit business. Risk is also there due to fluctuations of prices in a competitive market. The market survey and research can only help to minimize the risk, which are badly lacking in the N.E. Region. So, the risk element in marketing of pineapple is sufficiently higher.

16. High Market Fees, Rent etc.:

The charges on farm produces in the form of municipal tax, the market fees, octroi rent etc. were sufficiently high because of bulkiness of produce. The traders usually transport the fruits like pineapple, orange and banana to market and they often reported that they had to pay entry taxes to the municipal corporation markets at various stages. The collection of fees and other charges by the lessee was not uniform and as such charges varied from market to market and from commodity to commodity. The lesses are always interested to ensure profits by charging higher rate of market fees, parking fees and shop rent burden of which falls on the final consumers. Due to this additional taxation the traders usually offered lower prices to the growers showing that they had to pay taxes and fees at various stages while channeling their produce to the market.

17. Handicap in the Establishment of Trade with Export Market:

Pineapple has the international market with high export potentiality. However, the export market of pineapple from the region is not so developed and the production mainly feeds the domestic market. Export of pineapple from the region is hindered mainly due to lack of farmer's organization for export and lack of initiative from the Government. Besides, lack of technological innovation for quality improvement of pineapple and orange needed in the export market and which enhances the export market of value added products.

It has also been observed that the problems in the hill areas differ according to the topography, road communication net work, availability of market infrastructures etc. which determine horticultural development. It is imperative that

Growers can strengthen their market power by farming. It can not be denied that absence of farmer's growers co-operative in the production areas to free from the clutches of unscrupulous traders. The State of Meghalaya has high potentiality of pineapple production in commercial line with chain management and needs policy decisions.

Policy Implications:

Based on the findings of the study and the observations and problems identified at the field level the following policy implications have been suggested for development of horticulture in Assam and Meghalaya.

1. Improved Production Possibilities and Research:

Research and development activities on pineapple, banana and orange should be strengthened to increase production and productivity with improvement in quality to increase profit per unit of area. This will also increase the export potentiality of the production. (Attention: Assam Agricultural University and Indian Council of Agricultural Research Complex, Barapani)

2. Strengthening Input Supply and Extension Services.

Extension services in the state should be strengthened with field demonstrations on scientific cultivation of pineapple. (Attention: Attention: Directorate of Horticulture of concerned States.

3. Development of Growers Marketing Co-operative Society:

A Multipurpose Grower's Marketing Co-operative Society with cold storage and transport facilities may ensure remunerative return to the fruit growers. Such co-operative with sound financial position with good management and equipped with needed infrastructural support can go a long way in eliminating the monopolistic trade practices of market functionaries. A sound marketing co-operative with able management can undertake the fruit canning and processing units and thereby enhance the value of produce. The government should render active support and encouragement for organizing the multipurpose co-operative with emphasis on credit, storage facilities, transport facilities with subsidies, processing and marketing. (Attention: Concerned Agriculture Marketing Boards of State Governments.)

4. Establishment of Cold Storage Facilities:

There is urgent need to establish cold storage facilities at the assembling market places. The cold storage facilities may be enacted in private and public sector. Due to lack of cold storage facilities near the growing areas the orchardists almost had to make distress sale to the traders immediately after harvest at a lower price. So, the expansion of cold storage facilities in the fruit growing areas should receive priority. The suggested growers co-operative can be a potential organisation to credit to establish such cold storage facilities for the benefit of the members. The Central Ware Housing Corporation has a bigger role to play in this regard. The Centrally Sponsored Scheme for Rural Go downs can also be created and facilities should be introduced in potential area. International funding agencies may also be approved for establishing cold chains. **(Attention: Directorate of Horticulture of concerned States.)**

5. Development of Rural Roads and Transport Facilities :

It is utmost necessity to develop the road communication system to facilitate the transportation of marketed surplus to the places of assembling and marketing Centres. To provide minimum road communication facilities link roads should be build to connect a cluster of villages growing pineapple and other crops having marketable surplus. Improvement of rural roads/communication facilities would ensure marketing of the produce and reduce the cost of transportation as well as the transit losses. The road conditions in the hill areas are worst particularly, in the harvesting season of pineapple. In the interior areas the farmers had to carry the marketable goods on head load. The development of rural road will not only ensure easy marketing, it will also be helpful in improvement of the status of socio-economic conditions of the hill people. **(Attention: State P.W.D., DRDA and Panchayats of the respective State Governments)**

6. Grading, Standardization and Packaging:

The growers of pineapple may be encouraged to adopt some post-harvest technology including grading and standardization of pineapple according to size, shape and degree of ripeness. Such a step may help the growers to get different

rates for different grades instead of selling at one common lot, which led to lower returns to growers.

It may be mentioned that adoption of suitable handling methods and packaging is needed in accordance with particular quality features and climatic conditions. The perishable commodities like pineapple cannot be carried on heavy sacks. So, suitable packaging is necessary to avoid deterioration of quality. The State Agriculture Marketing Board and Horticulture Department have a greater role to play in evolving the proper techniques of handling methods. **(Attention: Extension Wings of Directorate of Horticulture of concerned State Governments)**

7. Setting up of Regulated Markets:

Market regulation is also one of the important measures to improve the agricultural marketing. Necessary steps should be taken to standardize the weights and measures in marketing of important commercial horticultural crops. A comprehensive plan to build regulated market with all facilities like storage, shade in at least one developed primary market in each Block should be ensured. The basic objectives of regulated markets are removing the inherent in the traditional market practices. The State government should not only initiate measures for enacting the required legislations but should also ensure proper implementation of statutory provisions in marketing of horticultural produce. Market regulation needs to be strengthened in context of trade liberalization. **(Attention: Concerned Agriculture Marketing Boards of State Governments)**

8. Setting up of Fruit Canning and Processing Units:

The inadequacy of fruit canning and processing units in the area under study is considered as one of the major constraints in marketing of commercial horticultural crops. There is urgent necessity of establishing processing units in the concentrated growing areas for canning and processing of surplus fruits. The Government of Meghalaya can take the responsibilities to establish fruit processing units in potential areas. The processed fruit products can be supplied to the army cantonments in the region besides supplying the products in local markets. The

canned items produced by the Meghalaya State Agriculture Marketing Board show the ways of adoption of suitable policies. **(Attention: Directorate of Horticulture and State Agriculture Marketing Boards of concerned State Governments)**

9. Market Information and News Services:

The market information and news may be linked with agricultural extension services, adult literacy centres, gaon panchayats to educate the illiterates' poor hill farmers regarding the prevailing market prices, market arrivals etc, which would be helpful to the growers to make bargain with market functionaries as per prevailing prices in the markets. **(Attention: Horticulture Information Wings of Concerned State Governments.)**

10. Use of Standard Weights and Measures:

As per the standard weights acts the Government introduced metric system of weights and measures since 1958 for various items and it was made compulsory. But no proper standard weights and measures have been adopted in this direction so far as commercial horticultural crops like pineapple are concerned. It is, therefore, desirable that uniform system of weights and measures be introduced and implemented for the advantage of both producers and consumers of horticultural produce. **(Attention: Weight and Measures Department of Assam and Meghalaya.)**

11. Pricing Policies and Provisions of Support Price:

The Government policy of announcing support price system helped the growers of certain important cereal and cash crops only. But there is no provision of fixation of prices for commercial horticultural crops like pineapple. It is, therefore, suggested that the concerned State Governments should be empowered to enact pricing policy to fix minimum prices for the principal horticultural crops in the State. The delegation of this power by the Directorate of Economics and Statistics, Government of India is necessary as in Meghalaya the situation is quite different. **(Attention: Ministry of Agriculture, Government of India.)**

12. Provisions of Institutional Credit:

The provision of institutional credit particularly from co-operative and

institutional sources should be strengthened, so that the sale of produce by the member loanee is ensured. Due to the non-availability of institutional credit the wholesalers/merchant wholesalers of fruits make pre-harvest contract by extending loan at an exorbitant rate of interest. The provision of institutional credit may help in maintaining the stability of prices and the growers will be benefitted. **(Attention: Commercial Banks, Regional Rural Banks, Co-operative Banks and NABARD of the concerned States.)**

13. Market Inspection and Survey:

Considering the complex problems in agricultural marketing the State Government should conduct regular inspection of markets and also market surveys to study the various problems and situations. In some of the States market intelligence on stock, arrivals and sales are regularly collected from primary and secondary markets of policy formations. The market inspection and survey may collect information on price fluctuations and trend of arrivals. Results should be communicated to Panchayats, Community Development Centres etc. In some markets prices are displayed in the notice board. It was felt that the Government of Meghalaya should make concerted efforts to remove the hurdles for having an effective and reliable market intelligence service. Through such efforts only regular supply of agricultural produce at reasonable prices of consumers and remunerative prices to the growers can be ensured. **((Attention: Extension Wings of Directorate of Horticulture of concerned State Governments))**

14. Scope of Export Marketing :

It was observed that there is considerable scope of export of processed products of pineapple to the neighbouring countries. The agricultural scientists and horticulture department officials viewed that about 10 to 20 per cent of pineapple is generally unfit for marketing in fresh form, which however can be used for processing. The processed products bear value additions as well as high prices mainly due to high rate of excise duty and other taxes on processed products. It is, therefore, suggested that the State government should exempt the processed fruit products from excise and other taxes to promote export of horticultural crops.

Considering the favourable Agro-Climatic conditions the concerned State Governments should be given priorities for improvement of quality and standard having export potential research and development effort is needed to improve the quality, adoption of post harvest technology, pre-packaging treatment, use of improved packaging materials for maintenance of quality and standard. The export quality of produce must be transported through refrigerated van to maintain its quality. Moreover, improved processing industries are needed to promote export of process fruits.

To achieve the untapped potential of export, systematic market survey should be conducted by Agricultural and Processed Food Products Export Development Authority (APEDA) on demand of fruits and fruit products in different countries. Some of the private exporters may be encouraged for setting up of modern fruit processing industries in the region for promotion of export. With steady increase of exports there is scope for increasing producer's return from fruit crops. (**Attention: Agricultural and Processed Food Products Export Development Authority (APEDA)**)

15. Strengthening the State Agricultural Marketing Boards:

The State Agricultural Marketing Boards were set up almost in all the north-eastern States to improve the marketing conditions of agriculture commodities. The powers of the Board range from advisory to fully control over sales of some agricultural produce. The Boards are expected to perform certain task of the State Agriculture Department to protect the interest of the growers.

The marketing Board's activities were however not protecting the interest of the growers of horticultural crops. It is desirable that the commercial horticultural crops, like pineapple should also be within the purview of the Board. Various methods of control over sales can be used by the Marketing Boards to improve the farmer's return through market control devices. (**Attention: Directorate of Agriculture of concerned State Governments**)

Conclusions:

Keeping in tune with global competitiveness, the Technology Mission

for Integrated Development of Horticulture in Assam and Meghalaya since its inception is trying to transform horticultural potentiality into reality through location, crop and technology specific approach, helping to venture into market oriented and commercial production of fruits, vegetables, flowers, spices, medicinal and aromatic to augment farmers incomes, adding new dimensions to valued horticultural assets of Assam and Meghalaya through comprehensive approach, bringing farmers nearer to frontier technologies and ushering an era of optimism amongst those associated with horticulture.

The study has highlighted that the prospect of horticultural crops in Meghalaya is bright provided the marketing facilities and the needed infrastructural supports are ensured. The study has sufficiently focused that with the establishment of fruit processing industry and improvement of marketing net work may go a long way in commercialization of horticultural crop cultivation in Meghalaya. It also revealed that due to lack of infrastructural support and sound marketing net work the pineapple growers have been deprived of remunerative prices. Moreover, under the present method of cultivation production of fruits is very low because of adoption of traditional farm practices without using any manure and chemical fertilizer is used.

The major lacuna in horticulture sector in Meghalaya is lack of horticultural plans with adequate machinery and expertise at various administrative levels. Horticultural planning, research and development activities in horticulture sector had been regarded as a peripheral activity for which the requisite expertise has not been developed. The climate, rainfall, soils in the hill areas and terrains is more suitable to horticultural crops particularly to fruits and vegetables rather than field crops. Under the new economic environment, horticulture sector can play a pivotal role in development of State's economy if proper planning, research and development to promote value addition by the State department or by encouraging the private players to set up fruit processing industries in the State.

In the hill areas plantation of horticultural crops is considered to be a viable alternative to destructive jhuming. The returns from horticultural crops are found to be quite encouraging. Horticultural crops generate more income and employment than jhum cultivation. The ICAR Research Complex for N.E. Hill Region dovetailed and

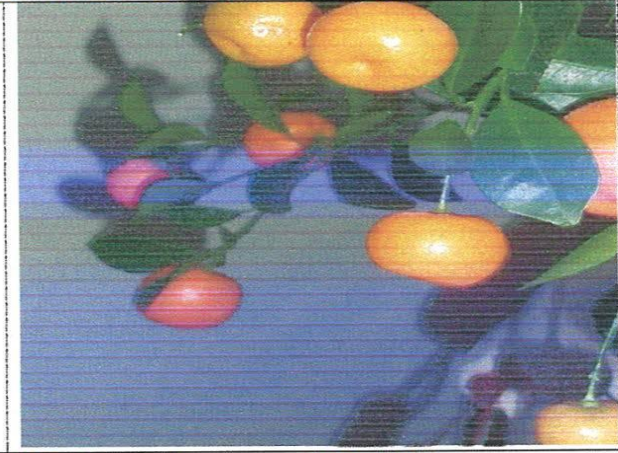
implemented some strategy for the development of horticulture sector in the hill areas. They also emphasised that the horticultural crops in the hills help in maintaining ecological balance by checking soil erosion, maintenance of soil moisture level and soil management. The land which is otherwise not suitable for cultivation such uncultivable wasteland can be utilised for fruit cultivation. So, the potentiality to develop horticulture for economics and ecology of the region has to be supported by sound marketing, needed infrastructure and proper planning.



Banana Cultivation under Technology Mission in Nagaon District of Assam



Pineapple Cultivation under Technology Mission in Assam and Meghalaya



Orange Cultivation under Technology Mission in Assam and Meghalaya

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