VALUE CHAIN ANALYSIS

of Select Crops in

North Eastern States





SFAC
लघु कृषक
कृषि व्यापार संघ

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CONTENTS

LIST OF ABBREVIATIONS

AGMARKNET	Agricultural Marketing Information Network
APMC	Agricultural Produce Marketing Committee
FCGs	Focus Crop Groups
FGDs	Focussed Group Discussions
GDP	Gross Domestic Product
ha	Hectares
ISAP	Indian Society of Agribusiness Professionals
KVK	Krishi Vigyan Kendra
MAPs	Medicinal & Aromatic Plants
MoDoNER	Ministry of Development of North Eastern Region
MSL	Mean Sea Level
MT	Metric Tonnes
NE	North East
NEC	North Eastern Council
NEDFi	North Eastern Development Finance Corporation Ltd.
NER	North Eastern Region
NERAMAC	North Eastern Regional Agricultural Marketing Corporation Limited
NHB	National Horticulture Board
SFAC	Small Farmers' Agribusiness Consortium
VCA	Value Chain Analysis

PREFACE

The North East region of India, comprising of the state Assam, Arunachal Pradesh, Manipur, Meghalaya, Mizoram, Nagaland, Tripura and Sikkim, is a reservoir of rich natural resources. All the North-Eastern States have distinct advantages, and provide immense economic and trade opportunities to domestic and international players. The NE region shares borders with China in the north, Bangladesh in the South-West, Bhutan in the North-West and Myanmar in the East. This makes the North-East a prospective hub of international trade and commerce.

Unlike the rest of India, North East India has an added demographic advantage, in the sense that it occupies 7.8 percent of the country's total land space but has a population of only 44 million, which makes it approximately 3.80 percent of the country's population.

Blessed with rich biodiversity, conducive agro climatic conditions, forest wealth, fruits and vegetables, flowers, herbs and aromatic plants, rare and rich flora and fauna, NE India has all the potential to transform into a commercial horticulture hub.

The area is a vibrant source of varied horticultural crops, which can be linked to distant markets within the country as well as for export. Horticultural crops in the NE region cover 857 thousand ha, constituting 2.34% of the total horticulture area in the country. From the production point of view, NE region produces about 7815 thousand MT of horticulture produce and contributes 6.79% to the total production basket of the country.

Major horticultural crops grown in the NE region include citrus, pineapple, kiwi, mango, guava, litchi, banana among fruits, potato, onion, tomato, cauliflower, cabbage, brinjal, beans among vegetables, chrysanthemum, rose, orchids etc. in flowers, ginger, turmeric large cardamom, coriander, cumin among spices and cashew nut, arecanut and tea among plantation crops. The productivity of many of the horticultural crops in entire NE region is much below the National level. This weakness of the region can be converted into an opportunity, and productivity and production levels can be increased significantly to enhance the total production at national level, to meet the ever-growing demand for horticulture produce. Since horticulture provides higher return per unit of land and generates higher employment, development of horticulture also helps in alleviating the economic condition of people below the poverty line.

However, despite these distinct advantages, North-East horticulture has not grown at par with the rest of the country, and the region's horticulture potential has not been tapped, mainly due to lack of market led production practices, poor commercial understanding of farmers, insufficient infrastructure at the farm level, poor transportation system, inadequate road network, lack of post harvest infrastructure like dedicated markets, pack houses, cold storages, sorting grading lines, processing industries etc. Due to the lack of adequate post harvest infrastructure in the region, not only are post harvest losses high, but dependency of farmers on intermediaries for marketing is very high.

With significant initiatives taken by the Government of India to promote horticulture development in the North-East region, appropriate strategies like adoption of market-driven production system, enhancement of productivity, appropriate post-harvest handling through proper packaging, loading/unloading of commodities and promotion of pack house concept including collection centre in the production clusters, cold storage, processing and value addition, creation of adequate transportation infrastructure and organised marketing system are necessary additions to current interventions to provide remunerative prices to farmers.

With necessary infrastructure development within the region, and the building of connecting links between North-East and the rest of India, and North-East and South-East Asia, the horticulture potential of the region can be suitably exploited. Time-bound implementation of projects, monitoring of fund–flows and necessary marketing and branding of the region can truly transform this goldmine region into a vibrant hub of horticulture business and trade.

This value chain study by Small Farmers' Agribusiness Consortium is an initiative to understand the working of the production and supply chain of major high value works in the NE region and recommend or strategy to achieve the goal of making the North-Eastern region a true horticulture hub, not only of India but of the entire South-East Asian region.

1

CHAPTER

INTRODUCTION

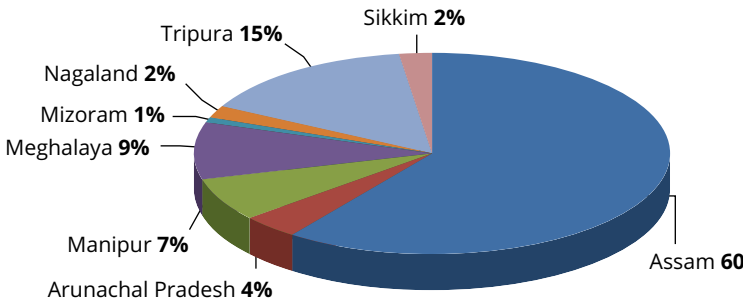
The North Eastern Region (NER) of India includes the states of Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim and Tripura. The eight states share a number of attributes such as frontier locations, rich natural resources, variety in agro-climatic conditions and inherited potential of growing various types of crops. Out of a total geographical area of the region, 65% is under undulating tracks and hills and remaining 35% is plain.

The North Eastern Region falls under the high rainfall zone and the climate ranges from tropical to alpine. The region is physiographically characterised by difficult terrain, wide variations in slopes and altitudes and traditionally indigenous cultivation practices.

Agriculture constitutes of 26% of the total GDP of NER and is one of the major contributors to the economy of North Eastern States, engaging one-third of the total work force in the region. The eight contiguous states of undulating terrains cover a total geographical area of 2.62 lakh Sq Km, out of which the gross cultivable area is 65,500 Sq Km. Paddy and maize dominate the rain-fed hill ecosystem, however, in selected areas, horticulture is emerging as a primary source of income for the farmers due to conducive physiographic conditions of the region. Assam and Tripura are the major states producing fruits and vegetables, with Assam leading with a contribution of 60 percent to the total horticulture produce of NER.

State-wise share of horticulture in NER is as follows:

Figure 1: State-wise Contribution to Horticulture in NER



Source: *ISAP Analysis & NHB Data, 2011*

Project Background

North East Region is endowed with diverse agro-climatic conditions which are conducive for cultivation/production of varied horticultural crops. Though NER has the potential to achieve maximum productivity, but it has not been capitalised so far because of various factors In order to evolve a strategic module for the wholesome development of horticulture, there is a need to identify gaps, efficiency levels, inherited advantages across value chain of potential horticultural crops of the North Eastern region.

With this background, Small Farmers' Agribusiness Consortium (SFAC) has decided to conduct a detailed value chain study of Focussed Crop Groups (FCGs) of North Eastern Region and has engaged the Indian Society of Agribusiness Professionals (ISAP) for this purpose. The study comprises of mapping of main and supporting activities of production, post-harvest operations, logistics, marketing and services etc.

Objectives

The specific objectives of the Value Chain Analysis were as follows:

- To map the movement of price and journey of the raw materials from farmers to commission agent, traders, processors, wholesalers, retail chains and ultimately to the end consumer;
- To track the food miles;
- To identify the location of the proposed collection centres in terms of the sustainable supply and profitability;
- To locate and pin point possible collection centres for the above mentioned crop groups;
- To develop the proposed crop calendar: Activity calendar from sowing to harvesting across various months;
- To calculate the number of man-days utilised for various crop groups in the district;
- To separate peak and off season of focus crop groups;
- To study particular crops from the view point of various stakeholders such as farmers, traders, consumers etc.

Scope of Work

The following six focus crop groups have been identified for detailed value chain mapping and analysis:

1. Root spices – Ginger/turmeric
2. Citrus – Mandarin/oranges and lemon
3. Pineapple
4. Naga Chilli
5. Vegetables – Legumes, solanaceous, cruciferous, cucurbitaceous and others
6. Others – location-specific crop groups

The project entailed studying the primary and supporting value chain activities for each of the six focus crop groups. The following activities were mapped under the project:

Primary Value Chain Activities

- Inbound logistics
- Operations
- Outbound logistics
- Marketing and sales
- Service

Supporting Value Chain Activities

- Procurement
- HRM
- Technology development
- Infrastructure

Approach and Methodology

Approach

As the scope of study required in-depth understanding of the product flow, its treatment at each level, price markup, roles being played by each value chain player as well as factors affecting the value chain, ISAP has adopted a combination of research tools including secondary and primary research followed by quantitative and qualitative assessment for comprehensive analysis to achieve the desired results and objective of the study.

Methodology

Secondary Research

This step served as a prefix of study, providing basic understanding of regions and helped in developing the approach for the next stage of the study. Secondary information helped in understanding the crop profile of catchment areas, existing levels of production, marketing infrastructure available for focus crops groups as well as infrastructure facilities for logistics, storage and marketing.

The following data sources were targeted for collecting various data and information:

- Data gathering from NHB, AGMARKNET, NEDFi, NERAMAC, State Horticulture Deptt. and other database to ascertain:
  - Current production, surplus, domestic & international trade
  - Information on current status of the infrastructure & basic facilities
- Literature study on current supply & value chains

Primary Research and Qualitative Assessment

An interaction was held with all the stakeholders in the identified belts and region and focus group discussions helped to gather information on the situation of horticulture across the value chain. This has lead to finding out the gaps and suggestions provided by all the stakeholders.

The following stakeholders across the value chain of horticulture produce were targeted in the identified clusters:

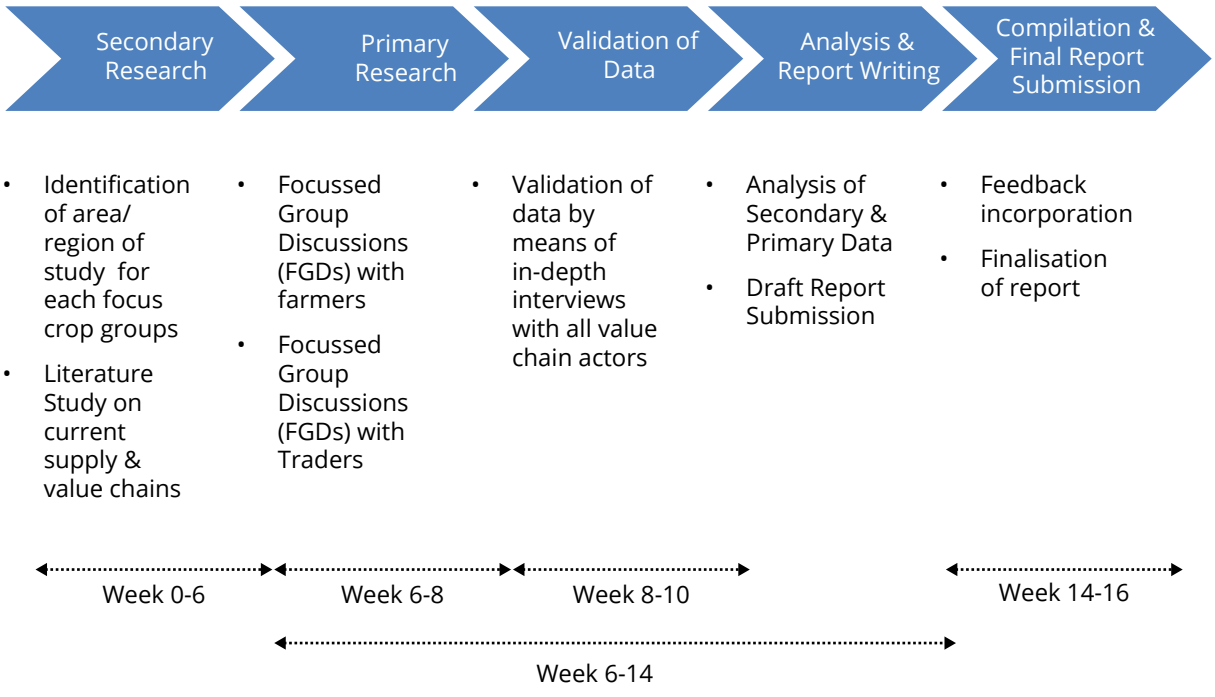
- Farmers
- Intermediaries
- Commission agents, wholesalers and retailers
- Service providers (logistics, storage, pack houses)
- Govt. officials including horticulture department, KVKs, APMCs, research stations, academic institutes etc.

The stakeholders were selected on the basis of secondary information on area and production, as well as by interacting with the state government officials. Interactions were either facilitated by the government officials at the local level or were introduced for getting desired information and inputs. In addition to the line department of the state governments, meetings were held with other concerned agencies/organisations/institutions involved directly or indirectly in the production and marketing of selected crops.

Focus Group Discussions (FGDs)

Two to three FGDs in each identified cluster of focus crop groups was conducted in each state. A focus group comprised of 8-10 people, in some cases it was a homogenous group comprising of crop producers, while in some cases, it was a heterogenous group and comprised of prominent stakeholders. In each focus group there were 4-5 focus crop growers, 1-2 grower/s willing to grow in future and 2-3 extension worker/marketing service providers. FGDs were conducted to understand the value chain – production practices, technology adoption, cultivation costs, movement of product and price markup from farm gate to the local and distant markets.

Figure 2: Approach & Methodology



In-depth Interviews

Discussion and in-depth interviews were held with state government officials, experts and policy makers.

Analysis, Compilation and Report Writing

The following steps were followed for report writing:

- Secondary data analysis
- Analysis of in-depth interviews and FGDs
- Compilation of data and analysis
- Draft report writing

Significance of Value Chain Analysis Study

Value Chain Analysis Study helps to map the value chain of a specific product involving various value chain actors, which may use qualitative or quantitative approach. While the produce moves from one chain actor to another chain actor, it gains value in the form of price markup. The chain actors who actually transact a particular product as it moves through the value chain, include input dealers (e.g., seed suppliers), farmers, traders, processors, transporters, wholesalers, retailers and final consumer.

The value chain framework has been used as a powerful analysis tool for strategic planning and is useful in identifying and understanding crucial aspects to achieve competitive strengths and core competencies in the marketplace. The model also reveals how the value chain activities are tied together to ultimately create value for the consumer.

In order to conduct the value chain analysis, the activities are split into primary and support activities (Figure VCA Framework). Primary activities are those that are related with production, while support activities are those that provide the background necessary for the effectiveness and efficiency, such as human resource management.

The primary and secondary activities are discussed in detail below:

Primary activities

The primary activities include the following:

- **Inbound logistics:** The activities concerned with receiving the material and handling them.
- **Operations:** The activities related to quality checks, processing, packaging, labelling of products etc.
- **Outbound logistics:** All the activities concerned with distributing the final product to the consumers.
- **Marketing and sales:** This functional area essentially analyses the needs and wants of consumers and is responsible for creating awareness among the consumers about the products and attract consumers to their products.

Support activities

The support activities include the following:

- **Procurement:** This function is responsible for purchasing the materials that are necessary for the operations. An efficient procurement department should be able to obtain the highest quality goods at the lowest prices.
- **Human Resource Management:** This is a function concerned with recruiting, training, motivating and rewarding the workforce. Human resources are increasingly becoming an important way of attaining sustainable competitive advantage.
- **Technology Development:** This is an area that is concerned with technological innovation, training and knowledge that is crucial today in order to survive.
- **Infrastructure:** This includes planning and control systems, such as finance, accounting and corporate strategy etc.

It is important to analyse the value chain with the core competence at its very heart. The nature of value chain activities differs greatly in accordance with the types of industries.

The five primary activities and four support activities form an interdependent system that is connected by linkages. The first step in conducting the value chain analysis is to break down the key activities according to the activities entailed in the framework. The next step is to assess the potential for adding value, through the means of cost advantage or differentiation. Finally, it is imperative for the analyst to determine strategies that focus on activities that would enable to attain sustainable competitive advantage.

Value chain analysis, specifically in case of studying various horticultural products of North Eastern region has specific relevance. The markets for most of the crops being produced or targeted for production are distant domestic markets and export markets. For a product of NER to be competitive, it is necessary to achieve price parity in these markets. Value chain, in this regard helps in defining the benchmarks for selected crops to compete in the market and therefore in the identification of key strengths, weaknesses, comparative advantages or disadvantages and analysing the efficacy and efficiency of the entire value chain as well as in finding solutions, interventions and identified challenges.

Figure 3: VCA Framework

With this background and adopting this approach and methodology to achieve the objective of the study, we need to study in detail the horticulture scenario of the entire NER.

2

CHAPTER

THE NORTH EAST REGION: AN OVERVIEW

The region falls in the foothills of the Himalayas in the eastern range and is surrounded by Bangladesh, Bhutan, China, Nepal and Myanmar. It includes the seven states - Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland and Tripura, along with a smaller state in the Himalayan fringes, namely, Sikkim.

Strategic Location

The location of the region is geo-politically important as it shares international boundaries with China and Bhutan in the north, Myanmar in the east, Nepal in the west and Bangladesh in the south and west. **This strategic location of NER makes it the potential hub for export of horticultural produce to neighbouring countries in order to cater to their growing need. It also aids the supply of produce to distant markets in India.**

Topography and Agro-Climatic Characteristics

The entire NE Region is located between 22°1' and 29°31' North latitude and 89°47' and 98°55' East longitude. The region is traversed by the Brahmaputra-Barak river systems and their tributaries.

The topography of the area varies from mountainous to plateaus, foothills to riverine plains with altitudes ranging between 100 m to 8400 m from MSL. **Being predominantly hilly terrain, altitudinal variation within limited geographical area is the characteristic feature of this region.** The region is endowed with all types of climatic conditions ranging from tropical to alpine and it receives rainfall ranging from 150-250 cm.

Connectivity/Logistics

Air Connectivity

All the states in the region are connected by air, expect Arunachal Pradesh and Meghalaya. NE Region has 10 airports, however 3 state capitals lack airport facility (Itanagar, Gangtok & Shillong).

Looking at the development in the region and potential for international trade with South East Asia, upgradation and improvement of air connectivity is vital.

Table 1: Existing Airport Facilities in NER

State	Airports
Assam	Guwahati, Dibrugarh, Tejpur, Jorhat, Silchar
Nagaland	Dimapur
Manipur	Imphal
Tripura	Agartala
Mizoram	Aizawl
W. Bengal	Bagdogra

Rail and Road Connectivity

Poor infrastructure development in terms of roads, railways, waterways, power and water is the main constraint in the development of NE Region. From the trade point of view, existing rail infrastructure is mainly limited to Assam (broad gauge track). However, improvement of road infrastructure work is under progress in some states of the NE Region. The entire NE Region shares three important border roads i.e. Stilwell road or the Ledo road (connects Assam to China), the Numaligarh-Mreh road (connects Assam, Nagaland & Manipur to Myanmar) and the Aizawl-Champhai-Zowkathar road (connects Mizoram to Myanmar). These border roads are crucial for the development of the NE Region. Of the three border roads, two are operational at present from the point of border trade. Proper infrastructure needs to be developed at these border points to boost trade between the countries. This in turn will benefit the entire NE Region. Discussions are in progress with the Bangladesh government to give road access for transportation of goods of Indian origin from West Bengal to Tripura through transit corridors. If such a proposal goes through, the transit time to the NE Region from other parts of the country will reduce substantially.

Inland Waterways

Opening of inland water route and access to the Chittagong port is important as it serves as a trade gateway for India to East Asian countries. This could provide a business basket to entire NE Region.

Demographic and Socioeconomic Characteristics

The eight states constitute 7.9 percent of the country's total geographical area, but have only approximately 4% of the total population of the country. Over 68 percent of the population of the region lives in the state of Assam alone. The density of population varies from 16 per sq km in Arunachal Pradesh to 396 per sq km in Assam.

Table 2: Comparative Socioeconomic Profile of NE States

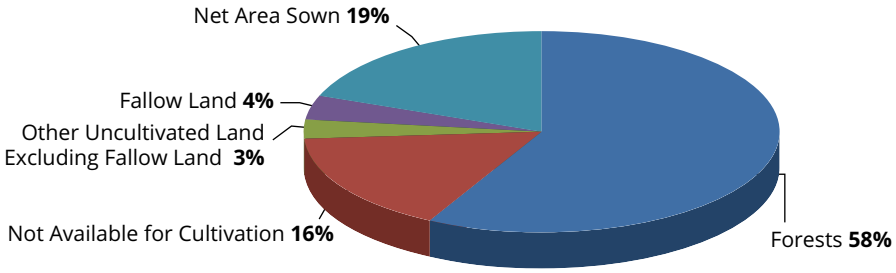
State	Arunachal Pradesh	Assam	Manipur	Meghalaya	Mizoram	Nagaland	Sikkim	Tripura
Geographical Location	27.06° N and 93.37° E. Shares its national border with Nagaland and Assam towards south and international border with China towards north, Bhutan towards west and Burma towards east	26.14° N and 91.77° E, the north eastern state of Assam lies in the river valleys of Barak and Brahmaputra. Assam is bordered by West Bengal and the other states of the Seven Sisters along with countries like Bhutan and Bangladesh	24.817° N and 93.95° E, Manipur has got the state of Nagaland to its north, Assam to its west and Mizoram to its south. The state has even got international borders by Burma to its east	25.57° N and 91.88° E, Meghalaya is surrounded by the state of Assam in north and the country of Bangladesh in south	23.36° N and 92.0° E. This north eastern state shares its national border with Assam, Manipur and Tripura and international border with Burma and Bangladesh	25.67° N and 94.12° E, the state is encircled by Assam and Arunachal Pradesh in the north, Manipur in the south and Burma in the east	27.33° N and 88.62° E, this landlocked state of India lies in the Himalayan range. Sikkim shares its border with Tibet towards north and east, Nepal towards west, Bhutan towards south-east and West Bengal towards south	23.84° N and 91.28° E. This third smallest Indian state is bordered by Mizoram and Assam towards east. Its position makes it share most of its boundary with Bangladesh on all the other three sides
No. of Districts	16	27	9	7	8	11	4	4
Geographical Area (sq km)	83,743	78,550	22,347	22,720	21,081	16,579	7,096	10,491,369
Population	1,382,611	31,169,272	2,721,756	2,964,007	1,091,014	1,980,602	6,07,688	3,671,032
Density of Population (per sq km)	16.5	396.8	121.8	130.5	51.8	119	85.6	349.9
Literacy Rate	66.95%	76.30%	79.85%	72.10%	89.90%	63.70%	76.60%	87.75%
Net Area Sown per thousand ha	211	2753	236	284	95	316	107	280
Total Cropped Area per thousand ha	276	3984	236	337	95	402	118	295

Source: *State Departments' websites, NEDFi Data*

Agriculture

As per the available data (NEDFI-2008-09), NE Region has 19% of net sown area. *Jhum* cultivation is widely prevalent in the entire NE Region (around 1.6 million hectare area is under shifting cultivation).

Figure 4: Land Utilisation Statistics of NE Region (2008-09)



Source: *MoDoNER & NEC*

Agriculture is predominantly characterised by low cropping intensity, subsistence farming and monocropping. Farming is mixed type and predominantly rice-based. With the present production level, foodgrain deficiency in the region is around 1.6 million tonnes.

Subsistence nature of agriculture, low intensity of farming and minimal use of inorganic fertilisers has resulted in retaining the characteristics of soil. In a majority of the region, irrigation facilities are inadequate. Absence of post-harvest, value addition infrastructure and marketing facilities gives the region a unique advantage. Overall the agriculture sector in the entire NE Region has remained unexploited and therefore offers vast opportunities.

SWOT Analysis of Agribusiness Scenario in North East Region

The chapter above has covered an overview and a brief glimpse of the NE Region, however, in the following chapters, a detailed description of the horticultural scenario and its potential has been included.

Figure 5: SWOT Analysis of Agribusiness Scenario in NE Region

SWOT

Strengths

- Agro climatic diversity ranging from tropical to alpine making it possible to grow a wide variety of crops
- Rich biodiversity
- Rich surface water resources through perennial rivers and its tributaries
- Proximity to export destinations such as Bangladesh and Myanmar
- Soil is rich in organic matter
- Potential to commercialise products such as kiwi and passionfruit

Opportunities

- Organic farming
- Infrastructural facilities can be created with the participation of private sector
- The number of government policies available for the NER can serve as a boosting factor for agricultural development
- International markets can be targeted due to geographical location and availability of produce
- Huge scope for value addition of surplus produce

Weaknesses

- Lack of infrastructural facilities along the food value chain
- Lack of market access - domestic & international
- Limited flow of men and material due to hilly terrain
- *Jhum* cultivation and subsistence farming is leading to deterioration of available resources
- Non-availability of skilled manpower
- Lack of business acumen

Threats

- Slow growth of infrastrucutre links
- Uncertainty in external trade scenario

3

CHAPTER

HORTICULTURE SCENARIO IN NORTH EAST REGION

Different sources have been analysed to compile the data of area and production of different horticultural crops in the North Eastern Region, such as National Horticulture Board, NEDFi and State Horticulture Department. However, the data of area and production of crops in NER available with different sources vary widely. Availability of systematic and accurate estimate of area and production of different horticultural crops is limited.

According to the data available (2010-11), horticultural crops cover 857 thousand ha, constituting 2.34% of the total horticulture area in the country. From the production point of view, NE Region produces about 7815 thousand MT of horticulture produce and contributes 6.79% to the production basket of the country.

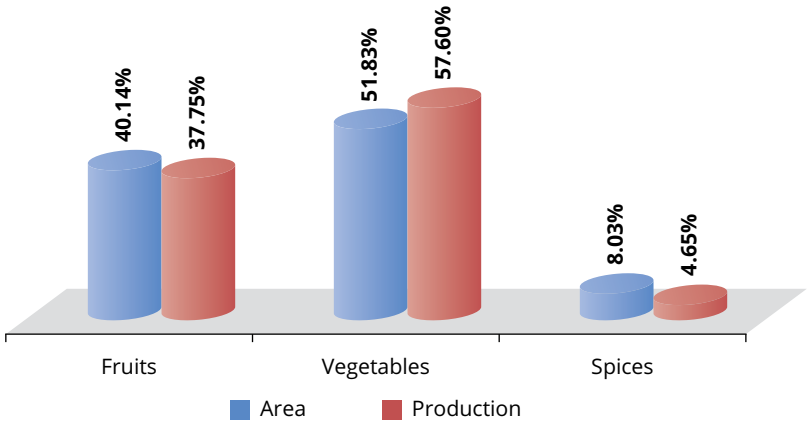
Table 3: Crop-wise Area, Production and Productivity of Horticultural Crops in NE Region (2010-11)

Crops	NER			India		
	Area (ha)	Production (MT)	Productivity (MT/ha)	Area (ha)	Production (MT)	Productivity (MT/ha)
Fruits	344,379	2,950,328	8.57	6,382,559	74,877,530	11.73
Vegetables	444,603	4,502,091	10.13	8,494,545	146,554,465	17.25
Spices	68,858	363,527	5.28	2,940,389	5,350,468	1.82
Grand Total	**857,840**	**7,815,946**	**9.11**	**17,817,493**	**226,782,463**	**12.73**

Source: *NHB and State Departments, 2010-11*

Within the horticulture sector in the NE Region, fruit crops occupy 40.14%, vegetables 51.83% and spices 8.03% area. From the production point of view, fruit crops contributed 37.75%, vegetables 57.60% and spices 4.65% to the horticulture production basket of the

Figure 6: Share in Area & Production of Horticulture Crops (2010-11)



Source: *ISAP analysis, NHB & State Department Data*

NE Region. Considering the excellent climatic conditions, abundant rainfall and fertile soil (high organic content) of the region, the productivity of different horticultural crops is quite low as compared to national productivity.

Table 4: Crop-wise Area, Production and Productivity of Horticultural Crops in NE Region (2010-11)

Sl. No.	Crop	NE Region			India	Leading	
		Area (ha)	Production (MT)	Productivity (MT/ha)	Productivity (MT/ha)	State	Productivity (MT/ha)
A	**Fruits**						
1	Apple	13,566	28,433	2.10	10.00	J&K	13.07
2	Banana	81,454	1,015,075	12.46	35.86	TN	65.83
3	Grapes	1,755	20,500	11.68*	11.08	PUN	28.32
4	Guava	6,952	103,048	14.82*	12.02	MP	28.99
5	Litchi	8,930	58,845	6.59*	6.41	PUN	14.67
6	Mango	11,133	74,611	6.70*	6.61	PUN	15.83
7	Papaya	11,211	176,128	15.71	39.75	TN	164
8	Citrus	115,482	611,521	5.30	8.82	KAR	20.73
9	Kiwi	2,670	4,079	1.53			
10	Passion Fruit	9,866	78,491	7.96			
11	Pineapple	59,276	706,877	11.93	15.95	KAR	62.0
12	Other Fruits	22,084	72,720	3.29			
	Total Fruits	**344,379**	**2,950,328**	**8.57**	**11.73**	**TN**	**30.96**
B	**Vegetables**						
1	Brinjal	22,567	316,398	14.02	17.49	UP	30.72
2	Cabbage	43,978	812,472	18.47	21.55	TN	56.13
3	Cauliflower	27,272	428,598	15.72	18.29	MEG	35.27
4	Okra	17,574	193,204	10.99	11.61	J&K	16.66
5	Onion	8,695	27,398	3.15	14.21	GUJ	24.42
6	Peas	30,329	79,949	2.64	9.51	J&K	31.28
7	Potato	121,740	1,067,775	8.77	22.72	WB	32.96
8	Tomato	24,367	483,299	19.83*	19.45	HP	39.06
9	Chilly	16,910	109,511	6.48			
10	Other Veg.	131,171	983,487	7.50			
	Total Veg.	**444,603**	**4,502,091**	**10.13**	**17.25**	**TN**	**29.86**
C	**Spices**						
1	Ginger	46,010	299,525	6.51			
2	Turmeric	22,848	64,002	2.80			
	Total Spices	**68,858**	**363,527**	**5.28**	**1.82**		
	Grand Total	**857,840**	**7,815,946**	**9.11**	**12.73**		

*Productivity is greater than national average productivity

Source: *NHB and State Departments (2010-11)*

Among fruits, citrus has the largest area under cultivation (34%), followed by banana (24%), pineapple (17%), apple (4%), papaya, mango, litchi, passion fruit (3% each), guava (2%) and kiwi (1%). Other fruits have 6% of the total horticulture area under cultivation.

In terms of production, banana has the largest share (34%), followed by pineapple (24%), citrus (21%), papaya (6%), mango, guava, passion fruit (3% each), litchi (2%), grapes and apple (1% each).

Figure 7: Fruit-wise Share in Area (2010-11)

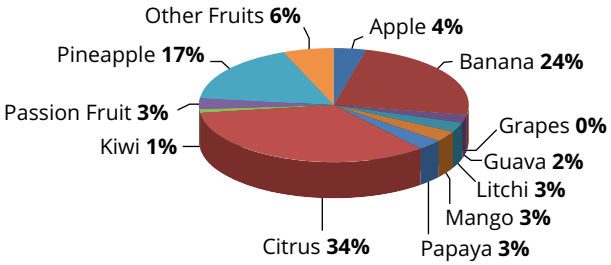
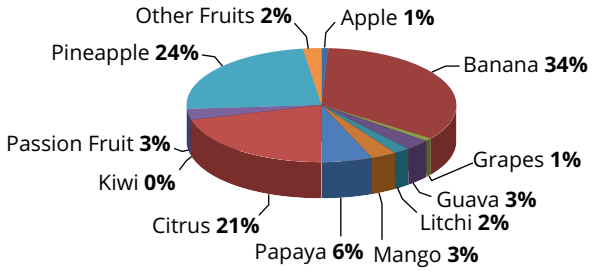


Figure 8: Fruit-wise Share in Production (2010-11)



Source: *ISAP analysis, NHB & State Department Data*

Figure 9: Vegetable-wise Share in Area (2010-11)

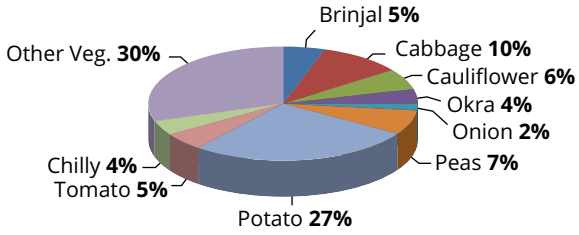
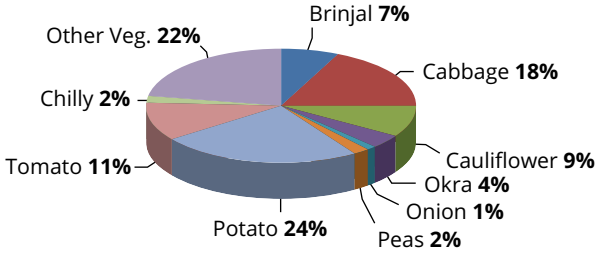


Figure 10: Vegetable-wise Share in Production (2010-11)



Source: *ISAP analysis, NHB & State Department Data*

Among vegetables, potato has the maximum area (27%) under cultivation followed by cabbage (10%), peas (7%), cauliflower (6%), tomato and brinjal (5%), okra and chilli (4%), onion (2%) while other vegetables have 30% of the total area under vegetable cultivation.

In terms of production, potato has the highest production and contributes 22% to vegetable production in NER followed by other vegetables (22%), cabbage (18%), tomato (11%), cauliflower (9%), brinjal (7%), okra (4%), peas and chilli (2% each) and onion (1%).

The horticulture sector in NE Region offers a variety of products in huge volumes and each state in the NE Region has speciality in the production of few horticultural crops as per the local agro-climatic conditions and have significant benefits for producing that particular horticulture crop. Identification of potential state-specific crops will help in efficient marketing, better prices, minimisation of losses and devoting resources to promote their cultivation.

State-wise Profile

Arunachal Pradesh

Agro-climatic Zones & Potential Crops Grown

The state has three distinct agro-climatic zones. The distribution of horticultural crops among these zones is as table 5:

Table 5: Agro-Climatic Zones in Arunachal Pradesh

Agro-Climatic Zones	Potential Horticultural Crops Grown	Districts/Areas
Subtropical	Orange, pineapple, black pepper, stevia	Plains/foothills of Lohit, Changlang, Tirap, Upper & Lower Dibang Valley, East Siang, West Siang, Papum Pare, West and East Kameng, Anjaw, Upper & Lower Subansiri, K/Kumey,
Subtemperate	Stone fruits & off season vegetables	Areas in between mid-hills and high-hills
Temperate	Apple, Kiwi and Saffron	High-hills of West Kameng, Tawang, Ziro, Anini, Anjaw, Upper Subansiri, Upper Siang

Source: *"An In-depth Market Study and Impact Assessment Report"*

Horticulture Scenario

As per the available data (2010-11), horticulture crops in the state occupy nearly 102 thousand ha, producing around 418 thousand MT. The overall productivity of horticulture crops in the state worked out to 4.10 MT/ha, which is far behind as compared to national level and NE Region.

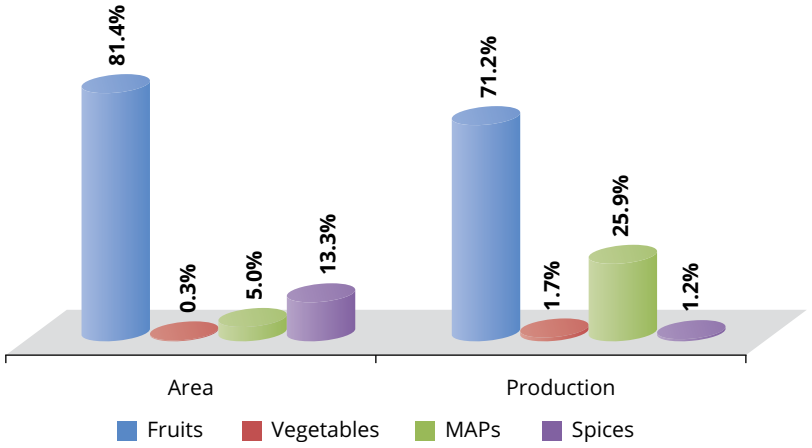
Table 6: Area, Production and Productivity of Horticultural Crops in Arunachal Pradesh (2010-11)

Crops	Arunachal Pradesh			NER	India
	Area (ha)	Production (MT)	Productivity (MT/ha)	Productivity (MT/ha)	Productivity (MT/ha)
Fruits	82,960	297,634	3.59	8.57	11.73
Vegetables	300	7087	23.62	10.13	17.25
MAPs	5148	108108	21.00	-	-
Spices	13559	5020	0.37	5.28	1.82
Total	**101,967**	**417,849**	**4.10**	**9.11**	**12.73**

Source: *Directorate of Horticulture, Itanagar, Arunachal Pradesh*

Within the horticulture sector in the state, fruit crops recorded maximum area (81.4%) under cultivation followed by spices (13.3%), Medicinal & Aromatic Plants (MAPs) (5%) and vegetables (0.3%). In terms of contribution in the horticulture production basket of the state, fruit crops contributed maximum (71.2%) followed by MAPs (25.9%), vegetables (1.7%) and spices (1.2%).

Figure 11: Share in Area & Production of Horticulture Crops (2010-11)



Source: *ISAP analysis and Directorate of Horticulture, Itanagar*

The state produces a wide variety of fruits, vegetable, flowers, spices and medicinal plants suitable for temperate and tropical climate. High valued crops such as apple, citrus, pineapple, kiwi, walnut, banana, ginger, large cardamom and black pepper have not only attained status as a popular enterprise among the new generation of growers on commercial lines, but have also proved to be a boon for the farmers of the state.

Table 7: Crop-wise Area, Production & Productivity of Horticultural Crops in Arunachal Pradesh (2010-11)

Sl. No.	Crops	Arunachal Pradesh			NE	India
		Area (ha)	Production (MT)	Productivity (MT/ha)	Productivity (MT/ha)	Productivity (MT/ha)
A	**Fruits**					
1	Citrus	38,296	164,673	4.30	5.30	8.82
2	Apple	13,506	28,363	2.10	2.10	10.00
3	Pineapple	11,435	65,180	5.70	11.93	15.95
4	Banana	5,685	21,603	3.80	12.46	35.86
5	Walnut	4,780	609	0.13		
6	Kiwi	2,620	3,930	1.50		
7	Other Fruits	6,638	13,276	2.00		
	Total Fruits	**82,960**	**297,634**	**3.59**	**8.57**	**11.73**
B	**Total Veg.**	**300**	**7,087**	**23.62**	**10.13**	**17.25**
C	**MAPs**	**5,148**	**108,108**	**21**		
D	**Spices**					
1	Large Cardamom	12,770	680	0.05		
2	Ginger	789	4,340	5.50		
	Total Spices	**13,559**	**5,020**	**0.37**	**5.28**	**1.82**
Grand Total		**101,967**	**417,849**	**4.10**	**9.11**	**12.73**

Source: *Directorate of Horticulture, Itanagar, Arunachal Pradesh*

Figure 12: Fruit-wise Share in Area (2010-11)

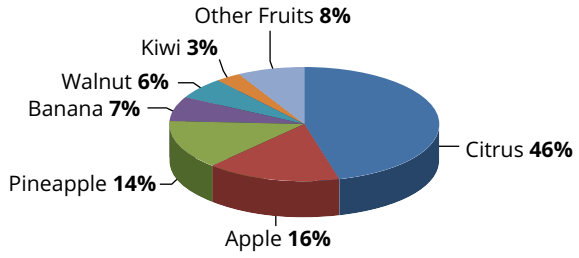
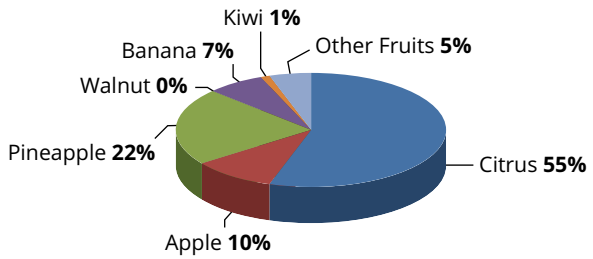


Figure 13: Fruit-wise Share in Production (2010-11)



Source: *ISAP analysis and Directorate of Horticulture, Itanagar*

In terms of fruit-wise area, citrus is cultivated on 46% of land under fruits. Apple has 16% area under cultivation followed by pineapple (14%), other fruits (8%), banana (7%), walnut (6%) and kiwi (3%).

Citrus is the leading crop in terms of production also and it contributes 55% of total fruit production. Pineapple is the second largest produced fruit (22%) followed by apple (10%), banana (7%), other fruits (5%) and kiwi (1%).

Total area under vegetables is only 300 ha with a production of 7,087 MT of vegetables.

The productivity of crops in the state, is observed to be lagging behind as compared to other states in the country due to old and senile orchards, use of own cultivars, insect/ pest/disease, rain-fed farming, negligible use of inputs by the farmers to increase the fertility of soil.

Figure 14: Seasonality of Crops in Arunachal Pradesh

Crops	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Apple												
Walnut												
Kiwi												
Citrus												
Pineapple												
Banana												
L. Cardamom												
Black Pepper												
Ginger												
Potato												
Tomato												
Cabbage												
										Beginning	Peak	Lean

Source: *"An In-depth Market Study and Impact Assessment Report"*

Salient Features of Horticulture in Arunachal Pradesh

- The state has unique distinction of having a vertical profile ranging from subtropical to temperate.
- Though inaccessible but able to produce economically important crops such as apple and kiwi along with off season vegetables.
- Area of cultivation is too low to be eligible for the economic scale of activity;
- Apart from interstate connectivity, intra state connectivity is also a major issue;
- Cultivation practices are traditional and subsistence.
- If developed commercially, kiwi has the potential to compete with the imported ones being sold in the metros.
- The citrus plantations are as old as 50 years.
- Supportive infrastructure for any kind of value addition is almost absent.
- Poor understanding of state level agencies/institutions involved in uplifting horticulture and horticultural markets.

The diverse agro-climatic conditions make Arunachal Pradesh suitable for cultivation of varied varieties of fruits, vegetables, spices, medicinal and aromatic crops. Apple, mandarin, pineapple, ginger, large cardamom, besides off season vegetables have big opportunity in the domestic markets. Kiwi, though grown in a small area, has good potential to scale it up to the commercial level.

Productivity of vegetables in the state of Arunachal is found to be higher (23.62 MT/ha) as compared to national (17.25 MT/ha) and NE Region (10.13 MT/ha) vegetables productivity. Due to the favourable climatic conditions, vegetables can be grown round the year and can be supplied to the plains or distant markets in the off season, when there is little production of vegetables in the plains or less supply of products in the distant market and can fetch good returns.

ASSAM

Agro-Climatic Zones & Potential Crops Grown

The state has five distinct agro-climatic zones. The distribution of horticultural crops among these zones is as follows:

Table 8: Agro-Climatic Zones of Assam

Agro-Climatic Zones	Potential Horticultural Crops Grown	Districts/Areas
North Bank Plain Zone	Banana, Potato, Vegetables, Lemon, Orange	Darrang, Sonitpur, Dhemaji, Lakhimpur
Upper Brahamputra	Banana, Potato, Vegetables, Lemon, Orange, Areca nut, Jackfruit, Pineapple, Guava, Litchi, Mango	Sibsagar, Tinsukia, Dibrugarh, Jorhat, Golaghat.
Central Brahamputra	Banana, Potato, Vegetables, Lemon, Orange, Areca nut, Jackfruit, Pineapple, Guava, Litchi, Mango	Nogaon, Morigaon, Kamrup
Lower Brahamputra	Banana, Potato, Vegetables, Lemon, Orange, Areca nut, Jackfruit, Pineapple, Guava, Litchi, Mango	Nalbari, Barpeta, Bongaigaon, Kokrajhar, Goalpara, Dhubri,
Barak Valley	Banana, Potato, Vegetables, Lemon, Orange, Areca nut, Jackfruit, Pineapple, Guava, Litchi, Mango	Cachar, Karinganj, Hailakandi

Source: *"An In-depth Market Study and Impact Assessment Report"*

Horticulture Scenario

Assam is the largest producer of fruits and vegetables in the northeast region and contributes 60% to the total horticulture production in the north east region. It is the gateway for the marketing of horticulture produce from the northeast to the rest of the country.

Horticultural crops in the state occupy nearly 15% of the gross cultivated area and the state produces more than 15.0 lakh MT of fruits, 29.0 lakh MT of vegetables and 1.0 lakh MT of spices besides nut crops, flowers and medicinal & aromatic plants annually. In spite of having such inherent potential, commercialisation of horticulture sector in Assam has not yet happened. From the productivity point of view, productivity of fruits in the state is more (13.50 MT/ha) as compared to national level (11.73 MT/ha) and NE Region (8.57 MT/ha). Productivity of vegetables in the state is found to be less (11.25 MT/ha) in comparison to national level (17.25 MT/ha) but more than NE Region (10.13 MT/ha). This situation leads to the opportunity of productivity enhancement.

Table 9: Area, Production and Productivity of Horticultural Crops in Assam (2010-11)

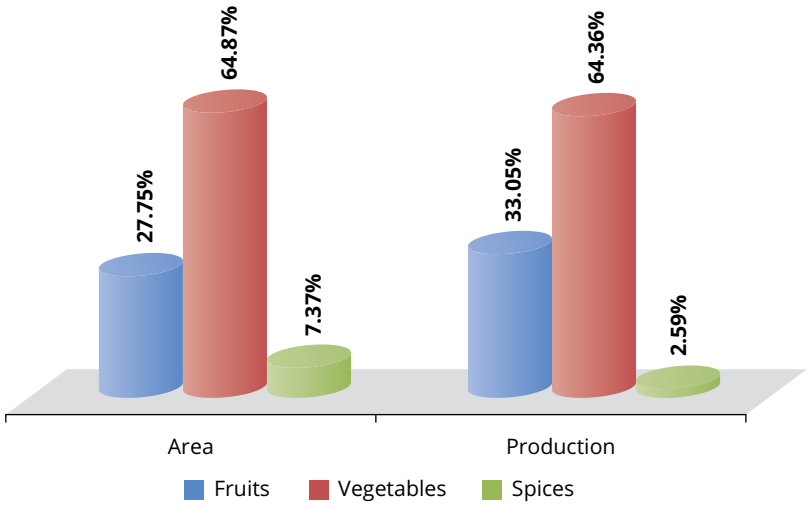
Crops	Assam			NER	India
	Area (ha)	Production (MT)	Productivity (MT/ha)	Productivity (MT/ha)	Productivity (MT/ha)
Fruits	111,300	1,502,200	13.50*	8.57	11.73
Vegetables	260,136	2,925,476	11.25	10.13	17.25
Spices	29,573	117,612	3.98	5.28	1.82
Grand Total	**401,009**	**4,545,288**	**11.33**	**9.11**	**12.73**

***** *Fruits productivity in Assam is greater than NER and national average productivity*

Source: *NHB*

In the state, vegetable crops recorded maximum area (64.87%) under cultivation followed by fruits (27.75%) and spices (7.37%). In terms of contribution in the horticulture production basket of the state, vegetable crops contribute maximum (64.36%), followed by fruits (33.05%) and spices (2.59%).

Figure 15: Share in Area & Production of Horticulture Crops (2010-11)



Source: *ISAP analysis and NHB*

Figure 16: Fruit-wise Share in Area (2010-11)

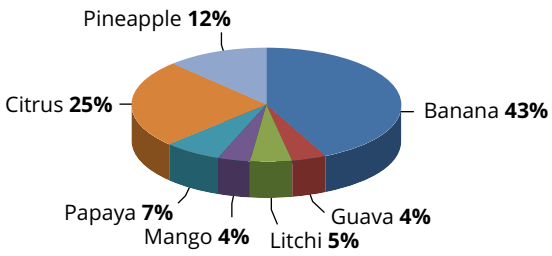
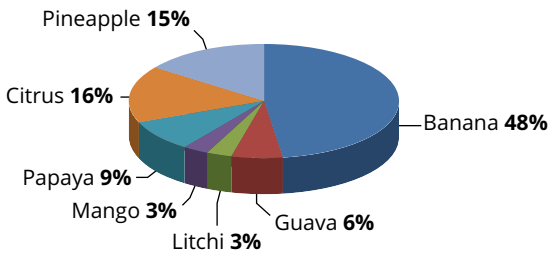


Figure 17: Fruit-wise Share in Production (2010-11)



Source: *ISAP analysis and NHB*

In terms of area under fruit crops, banana contributes 43% followed by citrus (25%), pineapple (12%), papaya (7%), litchi (5%), mango and guava (4% each) while production-wise banana contributes 48% of total fruit production followed by citrus (16%), pineapple (15%), papaya (9%), guava (6%), litchi and mango (3% each).

Figure 18: Vegetable-wise Share in Area (2010-11)

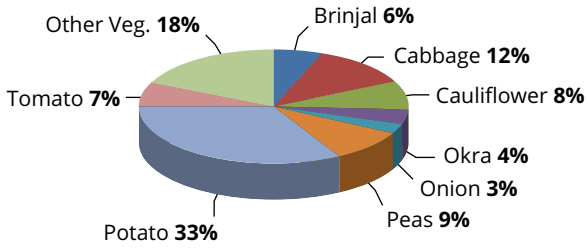
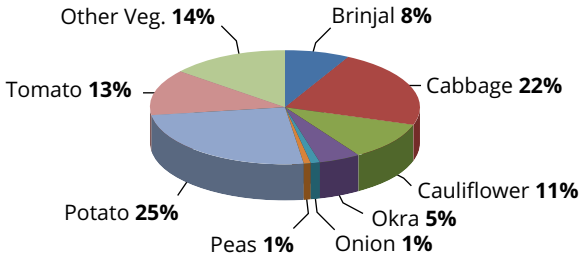


Figure 19: Vegetable-wise Share in Production (2010-11)



Source: *ISAP analysis and NHB*

In terms of area under vegetables potato has the largest share and has 33% of total area under vegetable cultivation. Potato is followed by other vegetables (18%), cabbage (12%), peas (9%), cauliflower (8%), tomato (7%), brinjal (6%) and okra (4%).

In terms of production, potato shares 25% of total vegetable production followed by cabbage (22%), other vegetables (14%), cauliflower (11%), brinjal (8%) and okra (5%).

Table 10: Crop-wise Area, Production and Productivity of Horticultural Crops in Assam (2010-11)

Sl. No.	Crops	Assam			NER	India
		Area (ha)	Production (MT)	Productivity (MT/ha)	Productivity (MT/ha)	Productivity (MT/ha)
A	**Fruits**					
1	Banana	47,600	723,600	15.20	12.46	35.86
2	Guava	4,900	97,300	19.86*	14.82	12.02
3	Litchi	5,200	40,500	7.79*	6.59	6.41
4	Mango	4,800	47,500	9.90*	6.70	6.61
5	Papaya	7,400	134,400	18.16	15.71	39.75
6	Citrus	27,400	238,200	8.69	5.30	8.82
7	Pineapple	14,000	220,700	15.76	11.93	15.95
	Total Fruits	**111,300**	**1,502,200**	**13.50***	**8.57**	**11.73**
B	**Vegetables**					
1	Brinjal	16,150	244,188	15.12	14.02	17.49
2	Cabbage	30,666	629,732	20.54	18.47	21.55
3	Cauliflower	20,879	328,844	15.75	15.72	18.29
4	Okra	11,068	147,758	13.35*	10.99	11.61
5	Onion	7,960	22,070	2.77	3.15	14.21
6	Peas	22,401	18,077	0.81	2.64	9.51
7	Potato	86,700	737,590	8.51	8.77	22.72
8	Tomato	16,634	387,239	23.28*	19.83	19.45
9	Other Veg.	47,678	409,978	8.60	7.50	
	Total Veg.	**260,136**	**2,925,476**	**11.25**	**10.13**	**17.25**
C	**Spices**					
1	Ginger	15,690	107,893	6.88		
2	Turmeric	13,883	9,719	0.70		
	Total Spices	**29,573**	**117,612**	**3.98**	**5.28**	**1.82**
	Grand Total	**401,009**	**4,545,288**	**11.33**	**9.11**	**12.73**

***** *Productivity is greater than NER and national average productivity*

Source: *NHB*

Figure 20: Seasonality of Major Crops in Assam

Crops	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Banana												
Jackfruit												
Pineapple												
Orange												
Guava												
Litchi												
Mango												
Potato												
Chilies												
Ginger												
K. Vegetables												
R. Vegetables												
										Beginning	Peak	Lean

Source: *"An In-depth Market Study and Impact Assessment Report"*

Assam is traditionally rich in horticultural production due to its diverse and varied agro climatic condition which is conductive for growing a wide range of horticultural crops such as various fruits, vegetables, flowers, spices, nuts, tuber crops. Citrus is one of the major fruits and the productivity level of citrus in the state is found to be almost equal (8.69 MT/ha) to the national level (8.82 MT/ha) productivity but lagging behind Karnataka where the recorded productivity is 20.73 MT/ha. Major citrus varieties under cultivation in the state are *khasi mandarin, Assam lemon, Eureka, Kachai lemon and lime*. Though the state is one of the major producers of fruits & vegetables in the country, but the quantity is not sufficient to meet the demand of the growing population of the state and dependence on neighbouring states to meet the demand is more during summer months (March to June).

Salient Features of Horticulture in Assam

- It serves as a gateway for the inbound and outbound horticulture produce of North East to the rest of the country.
- Having distinction of being the largest producer as well as consumption and distribution centre in the NE Region.
- Assam lemon is a distinctive crop which is being supplied to most of the states in NE.
- Although Assam is the largest producer of horticultural produce in NER but the level of technological interventions from production to post-harvest is very low as compared to the leading states.
- Old and senile citrus orchards leading to low productivity and prevalence of diseases.
- Huge gap between demand and supply during the pre monsoon season and generally demand is met by supply from Meghalaya and prices tend to be on a higher side.
- Supportive infrastructure across the value chain either poor or non-existent leading to substantial wastages.
- Main market is being fed by the primary market which is leading to price rise and inefficient supply chain.
- During discussions with stakeholders, it emerged that illegal collection of money is practiced at the check posts.

Manipur

Agro-Climatic Zones & Potential Crops Grown

The state has three distinct agro-climatic zones. The distribution of horticultural crops among these zones is as follows:

Table 11: Agro-Climatic Zones in Manipur

Agro-Climatic Zones	Potential Horticultural Crops Grown	Districts/Areas
Temperate Subalpine Zone	Passion Fruit, Plum, Peach, Pear, Vegetables, Pineapple, Lime, Orange	Senapati, Ukhrul
Mild Tropical Hill Zone	Banana, Papaya, Jackfruit, Orange, Pineapple	Thoubal, Tamenglong, Chandal, Churchandpur
Mild Tropical Plain Zone	Pineapple, Banana, Papaya, Mango, Guava, Jackfruit, Vegetables, Lemon	Imphal East, Imphal West, Bishnupur

Source: *"An In-depth Market Study and Impact Assessment Report"*

Horticulture Scenario

Diverse agro-climatic conditions and abundant rainfall provide immense opportunity for horticulture crops in the state of Manipur. As per the available data (2010-11), the state has 78 thousand ha of area under various horticulture crops, producing nearly 671 thousand MT with overall productivity level of 8.58 (MT/ha) which is lower in comparison to the national and NER productivity levels.

Table 12: Area, Production and Productivity of Horticultural Crops in Manipur (2010-11)

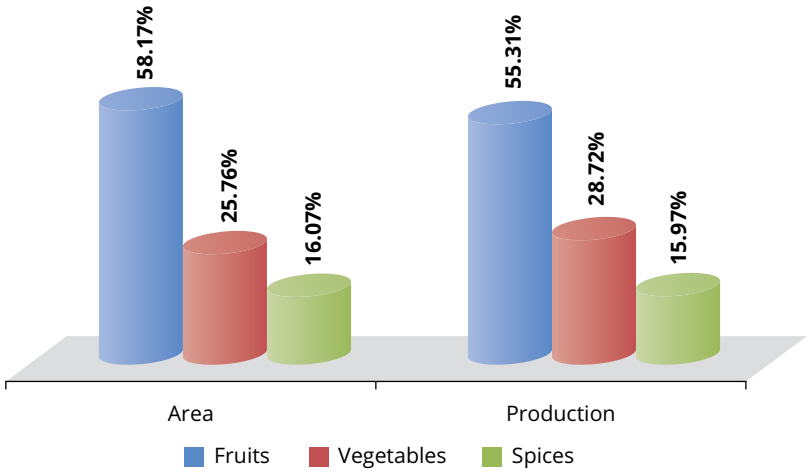
Crops	Manipur			NER	India
	Area (ha)	Production (MT)	Productivity (MT/ha)	Productivity (MT/ha)	Productivity (MT/ha)
Fruits	45,574	371,601	8.15	8.57	11.73
Vegetables	20,185	192,955	9.56	10.13	17.25
Spices	12,590	107,298	8.52	5.28	1.82
Grand Total	**78,349**	**671,854**	**8.58**	**9.11**	**12.73**

Source: *Directorate of Horticulture and Soil Conservation, Imphal*

Horticulture area in the state constitutes of fruits (58.17%), vegetables (25.76%) and spices (16.07%). From the production point of view, fruits contribute nearly 55.31% to the production basket of the state followed by vegetables (28.72%) and spices (15.97%). The major horticultural crops in the state are passion fruit, banana, citrus, pineapple, ginger, turmeric, tomato, cabbage, pea and potato. It has good potential to export these crops to Myanmar (Burma). Cabbage, tomato and pea are the major vegetables which can cater to neighbouring states.

In terms of area under fruits in Manipur, the largest area is under pineapple (26%), followed by other fruits (23%), passion fruit (18%), banana (13%), orange and lime/lemon (10%) while in terms of production, pineapple share 30% of total fruits production followed by banana (21%), passion fruit (19%), other fruits (15%), lime/lemon (8%) and orange (7%).

Figure 21: Share in Area & Production of Horticulture Crops (2010-11)



Source: *ISAP Analysis & Directorate of Horticulture and Soil Conservation, Imphal*

Table 13: Crop-wise Area, Production and Productivity of Horticultural Crops in Manipur (2010-11)

Sl. No.	Crops	Manipur			NER	India
		Area (ha)	Production (MT)	Productivity (MT/ha)	Productivity (MT/ha)	Productivity (MT/ha)
A	**Fruits**					
1	Pineapple	12120	110598	9.13	11.93	15.95
2	Banana	5899	76422	12.96	12.46	35.86
3	Lime/Lemon	4480	29405	6.56	5.30	8.82
4	Orange	4410	25990	5.89	5.30	8.82
5	Passion Fruit	8344	72581	8.7		
6	Other Fruits	10321	56605	5.48		
	Total Fruits	**45574**	**371601**	**8.15**	**8.57**	**11.73**
B	**Vegetables**					
1	Cauliflower	2340	22935	9.8	15.72	18.29
2	Cabbage	5720	57624	1.07	18.47	21.55
3	Tomato	2210	20156	9.12	19.83	19.45
4	Pea	4688	45502	9.71*	2.64	9.51
5	Other Veg.	5227	46738	8.94		
	Total Veg.	**20185**	**192955**	**9.56**	**10.13**	**17.25**
C	**Spices**					
1	Chillies	8210	61661	7.51		
2	Ginger	2200	25443	11.57		
3	Turmeric	1440	16323	11.34		
4	Other Spices	740	3871	5.23		
	Total Spices	**12590**	**107298**	**8.52**	**5.28**	**1.82**
	Grand Total	**78349**	**671854**	**8.58**	**9.11**	**12.73**

***** Pea productivity is greater than NER and national average productivity

Source: *Directorate of Horticulture and Soil Conservation, Imphal*

Figure 22: Fruit-wise Share in Area 2010-11

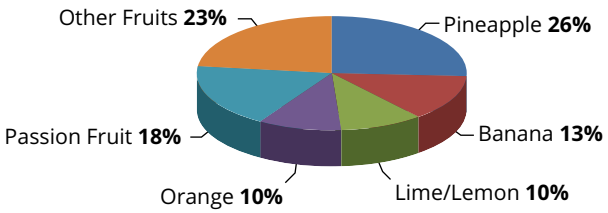
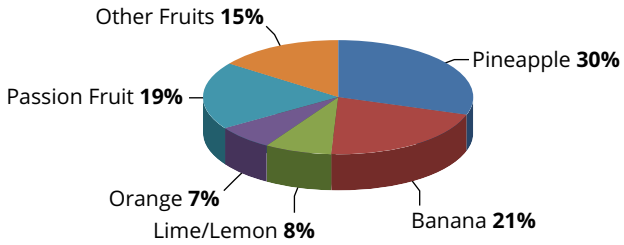


Figure 23: Fruit-wise Share in Production 2010-11



Source: *ISAP Analysis & Directorate of Horticulture and Soil Conservation, Imphal*

Cabbage has largest share of 28% of total area under vegetable cultivation followed by other vegetables (26%), peas (23%), cauliflower (12%) and tomato (11%). While in terms of production, cabbage has 30% share, followed by peas and other vegetables (24% each), cauliflower (12%) and tomato (10%).

Figure 24: Vegetable-wise Share in Area 2010-11

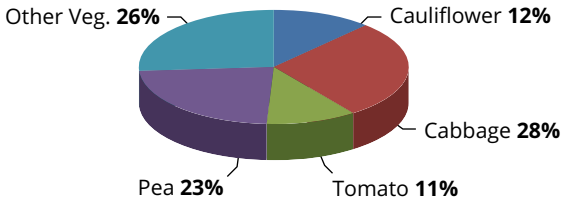
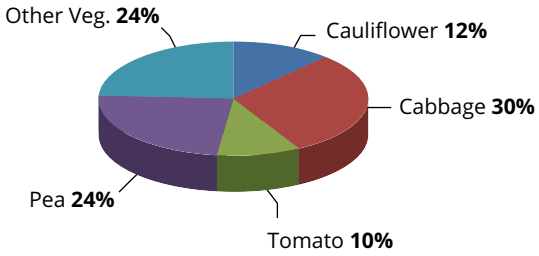


Figure 25: Vegetable-wise Share in Production (2010-11)



Source: *ISAP Analysis & Directorate of Horticulture and Soil Conservation, Imphal*

Figure 26: Seasonality of Major Crops in Manipur

Crops	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Banana												
Jackfruit												
Pineapple												
Orange												
Litchi												
Mango												
Potato												
Turmeric												
Ginger												
K. Vegetables												
R. Vegetables												
										Beginning	Peak	Lean

Source: *"An In-depth Market Study and Impact Assessment Report"*

In the state, pineapple is mostly grown on hill slopes as a rain-fed crop. Giant Kew and Queen are the two leading varieties being grown. Kew is suitable for processing whereas Queen is grown for table purposes. In citrus, Khasi mandarin and orange are popular, besides Assam, Eureka and Kachai lemon. Remarkable area of hatkora (citrus) used as a spice is recorded in the warm and humid areas of Chandel and Jiribam.

Due to favourable climate, Manipur has a good potential for the production of off season vegetables. Current off season vegetables grown in the state are cabbage, tomato, peas and beans. However, large scale production and optimum yield are yet to be achieved.

Salient Features of Horticulture in Manipur

- The state is characterised by three distinct agro climatic zones, but it is net importer of horticulture produce from the other neighbouring states as well as Burma.
- Khasi mandarin is being grown in Tamenglong district but the orchards are old and senile and easily qualify as wild produce.
- Fruits occupy more than 50 percent of total horticulture produce but forced to consume locally due to exceptionally very high logistic cost.
- It has emerged during discussions with the stakeholders that there is a good potential for exporting some horticultural crops like Pineapple, citrus, subject to the supportive environment in term of logistics, law and order and infrastructural support.

Meghalaya

Agro-Climatic Zones & Potential Crops Grown

The state has two distinct agro-climatic zones. The distribution of horticultural crops among these zones is as follows:

Table 14: Agro-climatic zones in Meghalaya

Agro-Climatic Zones	Potential Horticultural Crops Grown	Districts/Areas
Mild Tropical Hill zone	Pineapple, Pear, Peach, Plum, Potato, Vegetables, Passion Fruit, Strawberry, Mandarin, Black Pepper	Ri-Bhoi, East Khasi Hills, West Khasi Hills, Jaintia Hills, Part of Garo Hills
Mild Tropical Plain Zone	Pineapple, Mandarin, Potato, Vegetables, Cashewnut, Black Pepper	East Garo Hills, West Garo Hills

Source: *"An In-depth Market Study and Impact Assessment Report"*

Horticulture Scenario

As per the available data during the period (2010-11), horticulture crops occupy nearly 73 thousand ha in the state. Among various horticulture crops, vegetable crops occupied maximum area (57.20%), followed by fruit crops (27.37%) and spices (15.43%).

Table 15: Area, Production and Productivity of Horticultural Crops in Meghalaya (2010-11)

Crops	Meghalaya			NER	India
	Area (ha)	Production (MT)	Productivity (MT/ha)	Productivity (MT/ha)	Productivity (MT/ha)
Fruits	20,000	131,700	6.59	8.57	11.73
Vegetables	41,800	356,500	8.53	10.13	17.25
Spices	11,276	63,904	5.67	5.28	1.82
Grand Total	**73,076**	**552,104**	**7.56**	**9.11**	**12.73**

Source: *NHB*

During the period, the state recorded about 552 thousand MT of horticulture production. As far as production is concerned, vegetable crops contributed about 64.57% to the horticulture production basket of the state, followed by fruit crop contributing 23.85% and spices 11.57%.

The overall productivity of horticultural crops in the state was found to be lower (7.56 MT/ha) in comparison to national and NER productivity levels.

Table 16: Crop-wise Area, Production and Productivity of Horticultural Crops in Meghalaya (2010-11)

Sl. No.	Crops	Meghalaya			NER	India
		Area (ha)	Production (MT)	Productivity (MT/ha)	Productivity (MT/ha)	Productivity (MT/ha)
A	**Fruits**					
1	Papaya	800	6,800	8.50	15.71	39.75
2	Citrus	9,500	38,900	4.09	5.30	8.82
3	Pineapple	9,700	86,000	8.87	11.93	15.95
	Total Fruits	**20,000**	**131,700**	**6.59**	**8.57**	**11.73**
B	**Vegetables**					
1	Brinjal	858	11,641	13.57	14.02	17.49
2	Cabbage	1,644	36,022	21.91*	18.47	21.55
3	Cauliflower	1,000	35,271	35.27*	15.72	18.29
4	Okra	717	5,868	8.18	10.99	11.61
5	Onion	363	3,078	8.48	3.15	14.21
6	Peas	740	4,780	6.46	2.64	9.51
7	Potato	17,722	162,445	9.17	8.77	22.72
8	Tomato	1,826	27,522	15.07	19.83	19.45
9	Other Veg.	16,930	69,873	4.13	7.50	
	Total Veg.	**41,800**	**356,500**	**8.53**	**10.13**	**17.25**
C	**Spices**					
1	Ginger	9,321	54,009	5.79		
2	Turmeric	1,955	9,895	5.06		
	Total Spices	**11,276**	**63,904**	**5.67**	**5.28**	**1.82**
	Grand Total	**73,076**	**552,104**	**7.56**	**9.11**	**12.73**

* Cabbage and cauliflower productivity is greater than NER and national average productivity

Source: *NHB*

Figure 27: Fruit-wise Share in Production 2010-11

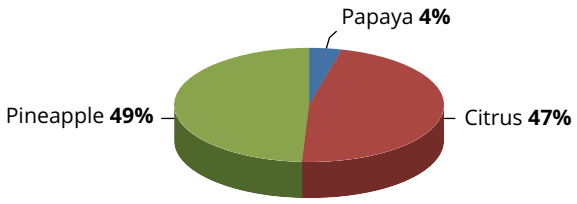
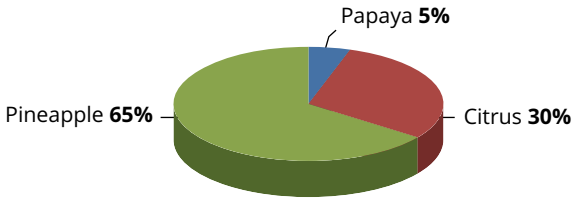


Figure 28: Fruit-wise Share in Production (2010-11)



Source: *ISAP Analysis & NHB*

Pineapple has largest area under cultivation i.e., 49% followed by citrus (47%) and papaya (4%) while production-wise also pineapple has largest share of 65% followed by citrus (30%) and papaya (5%).

Figure 29: Vegetable-wise Share in Area 2010-11

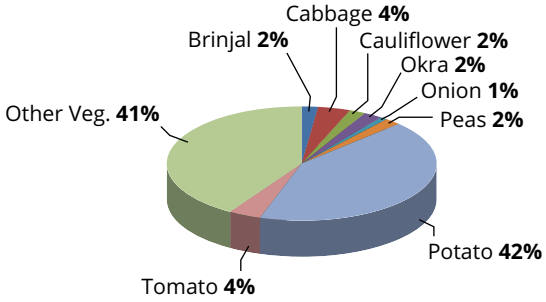
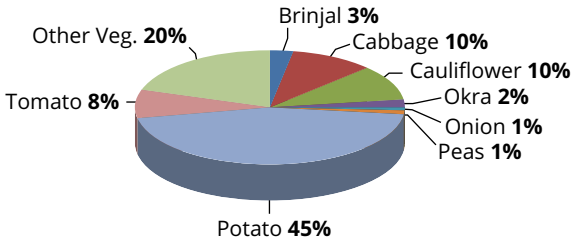


Figure 30: Vegetable-wise Share in Production 2010-11



Source: *ISAP Analysis & NHB*

In terms of vegetables, potato contributes 42% of area under vegetable cultivation, followed by other vegetables (41%), cabbage (4%), peas, brinjal, okra and cauliflower (2% each) and onion (1%). While production-wise also, potato shares 45% in the total vegetable production followed by other vegetables (20%), cabbage and cauliflower (10% each), tomato (8%), brinjal (3%), okra (2%) and peas and onion (1% each).

A wide range of tropical, subtropical and temperate fruits such as mandarin, orange, pineapple, banana, lemon, guava, pear and plum etc. are grown all over the state. A large variety of vegetables, both indigenous and exotic are grown across a wide range of agro-climatic zones.

The productivity status of cabbage and cauliflower in the state is significant and found higher (21.91 & 35.27 MT/ha) as compared to the national (18.47 & 15.72 MT/ha) and NER (21.55 & 18.29 MT/ha) productivity levels. In case of cauliflower, Meghalaya is the leading state in the country, in terms of productivity; however, it is lagging behind Tamil Nadu in case of cabbage productivity (56.13 MT/ha) in the country.

Figure 31: Seasonality of Major Crops in Meghalaya (2010-11)

Crops	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Banana												
Jackfruit												
Pineapple												
Mandarin												
Chillies												
Black Pepper												
Mango												
Potato												
Turmeric												
Ginger												
K. Vegetables												
R. Vegetables												
										Beginning	Peak	Lean

Source: *"An In-depth Market Study and Impact Assessment Report"*

The higher altitudes provide a conducive ecosystem to grow traditional vegetables such as potato and cole crops during the rainy season. Tuber and root crops such as sweet potato and tapioca, spices such as turmeric, ginger, chillies, etc. also grow abundantly. Vegetables such as tomato, cabbage and chayote are the major off season vegetables which are supplied to other neighbouring states.

Over a period of time, Meghalaya has postioned itself not only as a major supplier of vegetables to the neighbouring states but also as an off season vegetable producer and supplier for the distant market.

Salient Features of Horticulture in Meghalaya

- Two distinct agro climatic zones which make it conducive to produce a wide range of vegetable crops and these vegetable crops qualify for off season vegetables.
- Production belts happen to be close to the consumption market as well as exit points/ distribution transit points.
- More than half of the horticulture produce is contributed by vegetable production, but the productivity of vegetable crops is half of the national average productivity and even less than the NER vegetable productivity, however, paradoxically cole crops recorded the highest productivity.
- A substantial quantity of vegetable finds its way to Bangladesh through unofficial channels.
- Over a period of time, due to the climate and its strategic location, Meghalaya has emerged as an off season vegetable production hub, not only for NER, but also for the neighbouring countries of Bangladesh along with the distant Kolkata market. However, during discussions with stakeholders, it has emerged that climatic changes have started making a detrimental impact on the seasonality and productivity which can lead to its losing the competitive advantage of off season vegetables.
- Lack of post-harvest infrastructure, specifically modern vegetable packing houses is a major impediment in maintaining the comparative advantage in the changing market scenario.

Mizoram

Agro-Climatic Zones & Potential Crops Grown

The state has three distinct agro-climatic zones. The distribution of horticultural crops among these zones is as follows:

Table 17: Agro-Climatic Zones in Mizoram

Agro-Climatic Zones	Potential Horticultural Crops Grown	Districts/Areas
Temperate Zone	Passion Fruit, Plum, Peach, Pear, Vegetables, Pineapple, Lime, Orange	Eastern and South Mizoram, Major portion of Champhai, Saitual of Aizawl District. S. Vanlaiphai areas of Lunglei District and Saiha Tuipang areas of Chhimtuipui District
Subtropical Zone	Mango, Guava, litchi, Jackfruit, Orange, Pineapple, Vegetables	Central Aizawl, Ngopa areas of Champhai & Lunglei sub-division of Southern Mizoram
Tropical Zone	Pineapple, Citrus, Banana, Papaya, Mango, Sapota, Vegetables	Kolasib area of North Mizoram, Mamit areas of Western part of Mizoram bordering Tripura, Demagiri (Lunglei sub-div) and Chawngte sub-division of Southern Mizoram

Source: *"An In-depth Market Study and Impact Assessment Report"*

Horticulture Scenario

As per the available statistics (2010-11), horticulture area in the state accounted for more than 69 thousand ha with production of 490 thousand MT of various crops. The overall productivity of horticulture crops in the state is around 7.03 (MT/ha) which is lower as compared to the national (9.11 MT/ha) and NER (12.73 MT/ha) productivity levels.

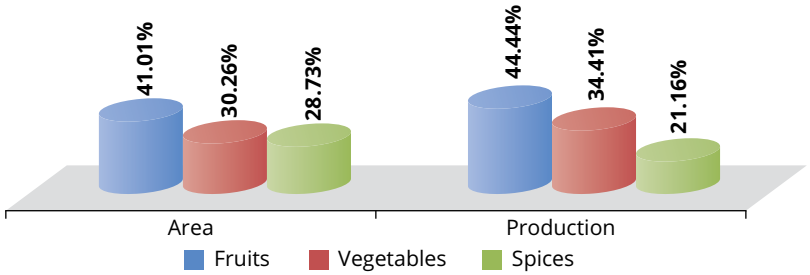
Table 18: Area, Production and Productivity of Horticultural Crops in Mizoram (2010-11)

Crops	Mizoram			NER	India
	Area (ha)	Production (MT)	Productivity (MT/ha)	Productivity (MT/ha)	Productivity (MT/ha)
Fruits	28,618	218,169	7.62	8.57	11.73
Vegetables	21,120	168,909	8.00	10.13	17.25
Spices	20,048	103,858	5.18	5.28	1.82
Grand Total	**69,786**	**490,936**	**7.03**	**9.11**	**12.73**

Source: *Directorate of Horticulture, Aizawl*

Horticulture area in the state consists of fruits (41.01%), vegetables (30.26%) and spices (28.73%) area. In terms of share in the production basket of the state, fruits contribute nearly 44.44%, vegetables 34.41% and spices 21.16%.

Figure 32: Share in Area and Production of Horticulture Crops (2010-11)



Source: *ISAP Analysis & Directorate of Horticulture Aizawl*

Table 19: Crop-wise Area, Production and Productivity of Horticultural Crops in Mizoram (2010-11)

Sl. No.	Crops	Mizoram			NER	India
		Area (ha)	Production (MT)	Productivity (MT/ha)	Productivity (MT/ha)	Productivity (MT/ha)
A	**Fruits**					
1	Mandarin	6515	19700	3.02	5.30	8.82
2	Banana	10040	118600	11.81	12.46	35.86
3	Lime/Lemon	4823	24150	5.00	5.30	8.82
4	Pineapple	1532	13590	8.87	11.93	15.95
5	Grape	1575	20400	12.95*	11.68	11.08
6	Passion Fruit	1522	5910	3.88		
7	Papaya	800	6750	8.43	15.71	39.75
8	Mango	645	2850	4.42	6.70	6.61
9	Other Fruits	1166	6219	5.33		
	Total Fruits	**28618**	**218169**	**7.62**	**8.57**	**11.73**
B	**Vegetables**					
1	Brinjal	2010	12,108	6.02	14.02	17.49
2	Bitter Gourd	3715	16,889	4.55		
3	Cabbage	2600	33,569	12.91	18.47	21.55
4	Chayote	3500	56,849	16.24		
5	Bean	2290	4,956	2.16		
6	Okra	2800	18,710	6.68	10.99	11.61
7	Cucumber	775	3,651	4.71		
8	Tomato	675	6,180	9.16	19.83	19.45
9	Peas	450	1,933	4.30	2.64	9.51
10	Other Veg.	2305	14,064	6.10		
	Total Veg.	**21120**	**68,909**	**8.00**	**10.13**	**17.25**
C	**Spices**					
1	Black Pepper	68	88	1.29		
2	Ginger	6500	31,950	4.92		
3	Turmeric	4780	23,970	5.01		
4	Bird's Eye Chilli	8700	47,850	5.50		
	Total Spices	**20048**	**103858**	**5.18**	**5.28**	**1.82**
	Grand Total	**69786**	**90,936**	**7.03**	**9.11**	**12.73**

***** *Grape productivity is greater than NER and national average productivity*

Source: *Directorate of Horticulture, Aizawl*

Figure 33: Fruit-wise Share in Area (2010-11)

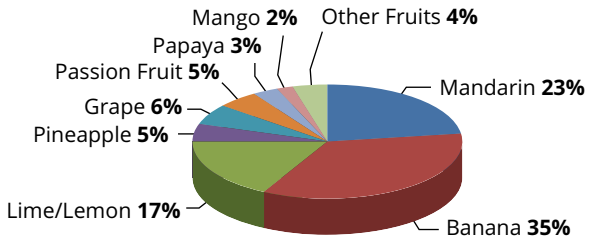
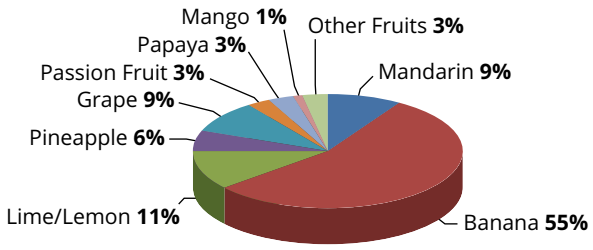


Figure 34: Fruit-wise Share in Production (2010-11)



Source: *ISAP Analysis & Directorate of Horticulture, Aizawl*

In terms of area under fruits, banana makes up for 35% of the total area under fruits, followed by mandarin (23%), lime/lemon (17%), grape (6%), pineapple and passion fruit (5% each), other fruits (4%), papaya (3%) and mango (2%).

Banana shares 55% in fruit production followed by lime/lemon (11%), grape and mandarin (9%) each, pineapple (6%), papaya, passion fruit and other fruits (3% each).

Figure 35: Vegetable-wise Share in Area

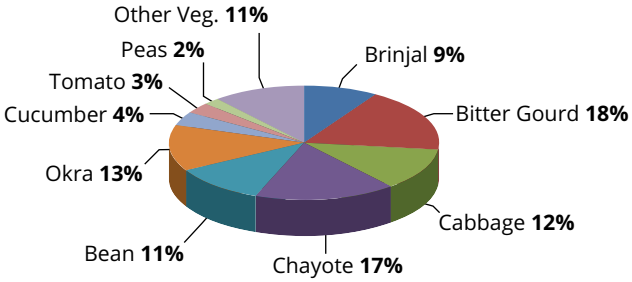
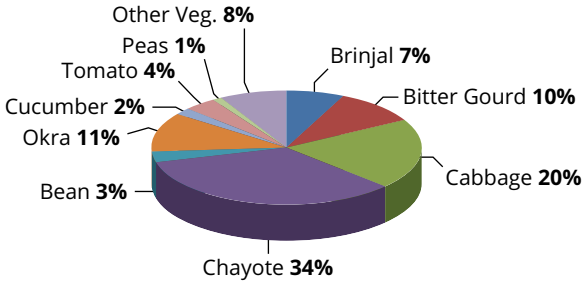


Figure 36: Vegetable-wise Share in Production



Source: *ISAP Analysis & Directorate of Horticulture, Aizawl*

In terms of area under vegetables, bitter gourd has 18% of total area under vegetables followed by chayote (17%), okra (13%) cabbage (12%), bean and other vegetables (11%), brinjal (9%), cucumber (4%) and tomato (3%).

In terms of production, chayote shares 34% in total vegetable production followed by cabbage (20%), okra (11%), bitter gourd (10%), other vegetables (8%), brinjal (7%) and tomato (4%).

Figure 37: Seasonality of Major Crops in Mizoram

Crops	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Banana												
Mandarin												
Passion Fruit												
Ginger												
Turmeric												
Cabbage												
Mango												
										Beginning	Peak	Lean

Source: *"An In-depth Market Study and Impact Assessment Report"*

Use of fertilisers and pesticides in agriculture and horticulture fields in Mizoram is almost non-existing. As such, all agri horticulture output of Mizoram are organic products of very high-value in national and international market. Out of the cultivable area, potential area for horticultural activities is found to be 6.31 lakh hectares, which consist of gentle to moderate slope. Out of this potential area, the area under horticulture crops during 2010-11 as recorded is more than 69,000 hectares which is only 11.05% of potential area for horticulture. Therefore, the scope and potential for expanding the activities under horticulture is enormous.

Mizoram state produces grapes mainly in the off season and productivity of grapes in the state is found higher (12.95 MT/ha) as compared to national (11.08 MT/ha) and NER (11.68 MT/ha) productivity level. Productivity of grapes in Maharashtra which is the main production cluster of grapes in the country is also found lower (9 MT/ha) as compared to Mizoram. Besides grapes, crops like mandarin orange, passion fruit, pineapple, papaya, tomato, brinjal, bird's eye chillies, ginger, turmeric are also grown and have tremendous potential for marketing outside the State. Most of the vegetables produced in the state are off season vegetables and hence will fetch a higher price if dispatched to the main land markets.

Salient Features of Horticulture in Mizoram

- Mizoram is characterised by mountainous and hilly track, divided into three agro-climatic zones and has the potential to become next major hub for off season vegetables.
- Major fruit crops are Khasi mandarin, grapes, passion fruit and lime lemon.
- Major consolidation point for Mizo products are Silchar and Karimganj.
- Unique system of direct marketing is practiced in Mizoram that farmers sell their produce directly to the consumers in the weekly market, having dual benefit – remunerative price to the farmers and low cost of produce to the consumer.
- Good quantity of turmeric is produced in the region which is being procured by the state government as seed for the distribution in the whole state through the government channel.
- Marketing infrastructure is poor and underutilised.
- Existing fruits and vegetable processing units are running far below their capacity, no strong tie-ups to market the product even in NER resulting in heavy loss.
- Huge opportunity of trade with Bangladesh and Myanmar is still untapped due to law and order situation.

Nagaland

Agro-Climatic Zones & Potential Crops Grown

The state has two distinct agro-climatic zones. The distribution of horticultural crops among these zones is as follows:

Table 20: Agro-Climatic Zones in Nagaland

Agro-Climatic Zones	Potential Horticultural Crops Grown	Districts/Areas
Subtropical Hill Zone	Orange, Pineapple, Passion Fruit, Vegetables, Potato, Chow Chow	Dimapur, Kohima, Mokok Chong, Mon, Tuenchang, Phek
Mild Tropical Hill Zone	Pineapple, Citrus, Banana, Papaya, Pear, Peach Vegetables (Ginger)	Kohima, Zunheboto

Source: *"An In-depth Market Study and Impact Assessment Report"*

Horticulture Scenario

The total area covered by horticulture crops has been estimated at 27,473 ha (2010-11) which represents about 8% of the gross cropped area, with nearly 2.51 lakh MT of horticulture produce. The state produces 1.41 lakh MT of fruits, 0.79 lakh MT of vegetables and 0.30 lakh MT of spices. Productivity of fruits in the state is found to be higher as compared to NER (8.57 MT/ha) but it lags behind the national productivity level (11.73 MT/ha). Overall productivity of horticultural crops is lower in comparison to national and NER productivity levels.

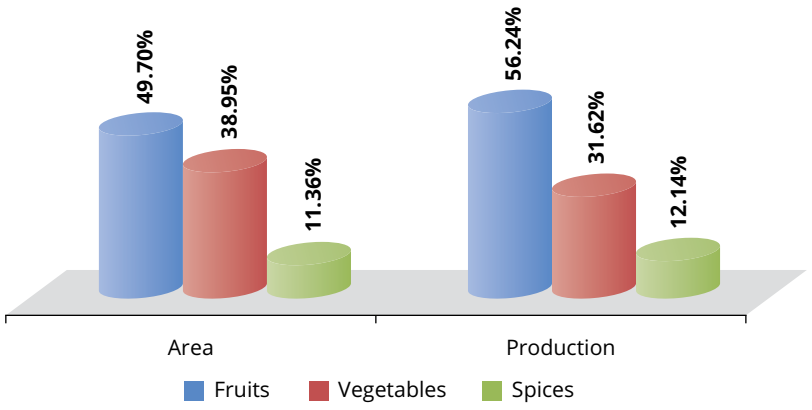
Table 21: Area, Production and Productivity of Horticultural Crops in Nagaland (2010-11)

Crops	Nagaland			NER	India
	Area (ha)	Production (MT)	Productivity (MT/ha)	Productivity (MT/ha)	Productivity (MT/ha)
Fruits	13,653	141,250	10.35	8.57	11.73
Vegetables	10,700	79,400	7.42	10.13	17.25
Spices	3,120	30,495	9.77	5.28	1.82
Grand Total	**27,473**	**251,145**	**9.14**	**9.11**	**12.73**

Source: *NHB*

Horticulture area in the state represents fruits (49.70%), vegetables (38.95%) and spices (11.36%). In terms of horticulture production, fruits contribute 56.24%, vegetables 31.62% and spices 12.14%. Important among the vegetable crops grown are potato, cassava, colocasia, cabbage, cauliflower, peas and cucumber while ginger, chillies, cardamom, garlic, black pepper make up the major spice crops. Amongst the plantation crops, areca, coconut, tea and rubber offer the best potential for cultivation on a commercial scale. Among the fruit crops, pineapple, mandarin orange and passion fruit are already being produced on a commercial scale.

Figure 38: Share in Area & Production of Horticulture Crops (2010-11)



Source: *ISAP Analysis & NHB*

Figure 39: Fruit-wise Share in Area (2010-11)

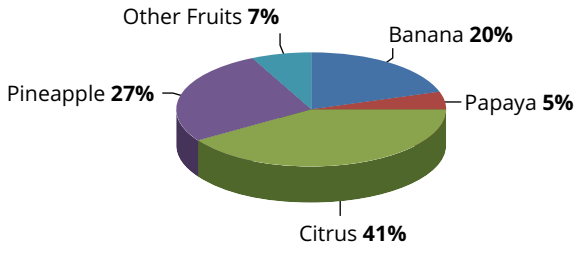
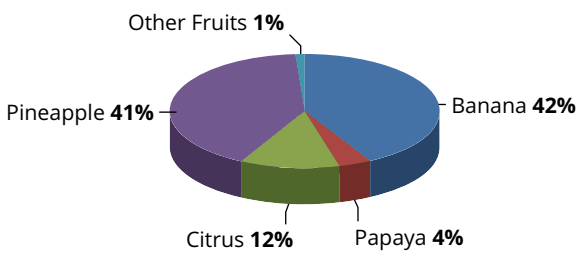


Figure 40: Fruit-wise Share in Production (2010-11)



Source: *ISAP Analysis & NHB*

In Nagaland, citrus is grown on 41% of total area under fruits followed by pineapple (27%), banana (20%), other fruits (7%) and papaya (5%) while in terms of production banana is the largest crop and shares 42% in total fruit production followed by pineapple (41%), citrus (12%), papaya (4%) and other fruits (1%).

Figure 41: Vegetable-wise Share in Area (2010-11)

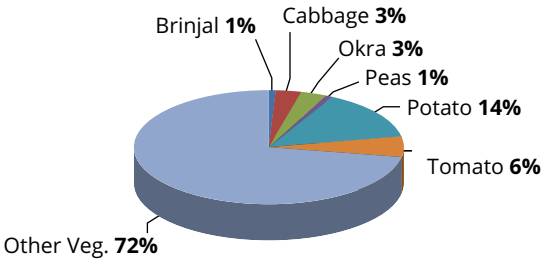
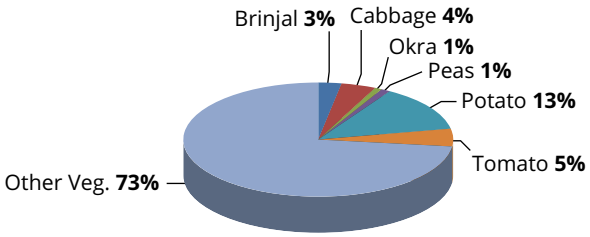


Figure 42: Vegetable-wise Share in Production (2010-11)



Source: *ISAP Analysis & NHB*

In terms of area under vegetables, other vegetables share 72% of total area followed by potato (14%), tomato (6%), okra and cabbage (3% each), peas and brinjal (1% each). While in terms of production, other vegetables contribute 73% followed by potato (13%), tomato (5%), cabbage (4%), brinjal (3%), peas and okra (1% each).

Table 22: Crop-wise Area, Production and Productivity of Horticultural Crops in Nagaland (2010-11)

Sl. No.	Crops	Nagaland			NER	India
		Area (ha)	Production (MT)	Productivity (MT/ha)	Productivity (MT/ha)	Productivity (MT/ha)
A	**Fruits**					
1	Banana	2,700	59,000	21.85	12.46	35.86
2	Papaya	670	5,600	8.36	15.71	39.75
3	Citrus	5,650	17,030	3.01	5.30	8.82
4	Pineapple	3,700	57,500	15.54	11.93	15.95
5	Other Fruits	9,33	2,120	2.27		
	Total Fruits	**13,653**	**141,250**	**10.35**	**8.57**	**11.73**
B	**Vegetables**					
1	Brinjal	100	2,200	22.00*	14.02	17.49
2	Cabbage	300	3,000	10.00	18.47	21.55
3	Okra	300	1,200	4.00	10.99	11.61
4	Peas	100	1,000	10.00*	2.64	9.51
5	Potato	1,500	10,000	6.67	8.77	22.72
6	Tomato	700	4,000	5.71	19.83	19.45
7	Other Veg.	7,700	58,000	7.53	7.50	
	Total Veg.	**10,700**	**79,400**	**7.42**	**10.13**	**17.25**
C	**Spices**					
1	Ginger	3,000	30,000	10.00		
2	Turmeric	120	495	4.13		
	Total Spices	**3,120**	**30,495**	**9.77**	**5.28**	**1.82**
	Grand Total	**27,473**	**251,145**	**9.14**	**9.11**	**12.73**

* Productivity is greater than NER and national average productivity

Source: *NHB*

Figure 43: Seasonality of Major Crops in Nagaland

Crops	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Banana												
Jackfruit												
Pineapple												
Mandarin												
Chillies												
Litchi												
Mango												
Potato												
Turmeric												
Ginger												
K. Vegetables												
R. Vegetables												
										Beginning	Peak	Lean

Source: *"An In-depth Market Study and Impact Assessment Report"*

Based on the elevation, both subtropical fruits such as pineapple, banana, citrus, guava, etc. and temperate fruits such as plum, peach, pear, passion fruit and various nuts have potential for exploitation. In case of pineapple, productivity status of state (15.54 MT/ha) is almost equivalent to national level (15.956 MT/ha) and more as compared to NER (11.93 MT/ha). Productivity of banana in the state is also more than NER.

In case of vegetables, the productivity of brinjal and peas in the state is higher (22 & 10 MT/ha) as compared to national (17.49 & 9.51 MT/ha) and NER (14.02 & 2.64 MT/ha) productivity levels. However, the requirement of crops such as potato, leafy vegetables, peas, brinjal, okra, apple, papaya and several other fruits and vegetables for domestic consumption, exceeds the existing production and to meet the consumption demand leads to increased dependence on other states.

Salient Features of Horticulture in Nagaland

- The state is divided into two agro-climatic zones – subtropical hilly and mild tropical hilly.
- Fruit production contributes more than 50 percent of total horticulture production, major fruits being pineapple and banana.
- Initiative taken by NHB and local institute Central Institute of Horticulture (CIH) to market the Nagaland pineapple to distant markets of Delhi and Bangalore has opened new vistas of organised distant markets.
- The ginger produced in Nagaland is one of the best quality, the productivity is relatively higher; five-fingered with low fibre content which makes it suitable for processing.
- General apprehension of law and order to outside traders who are interested in purchasing products like pineapple, ginger etc.
- Naga chilli is an ethnic product of Nagaland which sells at a premium, although the volumes are low.
- Charges levied by various insurgent groups on transportation and trade are not only restricting the trade but also adding to the cost.

Sikkim

Agro-Climatic Zones & Potential Crops Grown

The distribution of horticultural crops among zones based on rainfall is as follows:

Table 23: Agro-Climatic Regions in Sikkim

Rainfall	Potential Horticulture Crops	Air temperature	Altitude
> 300 cm Very heavy rainfall zone	Ginger, Vegetables, Potatoes, Large Cardamom	12-16°C in the southern parts of North District and 15-18°C whole of East District from north-western parts to south-eastern parts	1000-2000
300 to 200 cm Heavy rainfall zone	Ginger, Vegetables, Potatoes, Large Cardamom, Oranges, Citrus, Banana, Papaya	13-17°C in the northern parts of South and West Districts; 16-19°C in the central parts of South & West Districts and over the valleys between East and South Districts and South and West Districts; and >20°C in the southern most parts of East, South and West Districts and over the valleys between East and South Districts and South and West Districts.	Less than 1000 m to 2000 m
200 to 100 cm Moderate rainfall zone	Seed-Potato, Cabbage, Peas, Radish, Other winter vegetables, Off season cabbage	7-9°C	2000-3000 m
< 100 cm Low rainfall zone	Cultivable land is not available above 4000 m. Vegetation is mainly herbs or medicinal herbs.	6.5°C	Above 3000 m

Source: *"An In-depth Market Study and Impact Assessment Report"*

Horticulture Scenario

The state is endowed with varied agro-climatic conditions suitable for the cultivation of large number of subtropical and temperate horticultural crops but mainly due economic viability, mandarin and passion fruit are being commercially cultivated. In the state, the vegetables are grown mainly in three seasons viz. *kharif, rabi* and off season. Ginger, large cardamom, turmeric, off season vegetables, floriculture etc. can be commercially cultivated to enhance income per unit area. The small size holdings of the farmers could be utilised efficiently with family labour thereby generating both employment and additional income.

Table 24: Area, Production and Productivity of Horticultural Crops in Sikkim (2010-11)

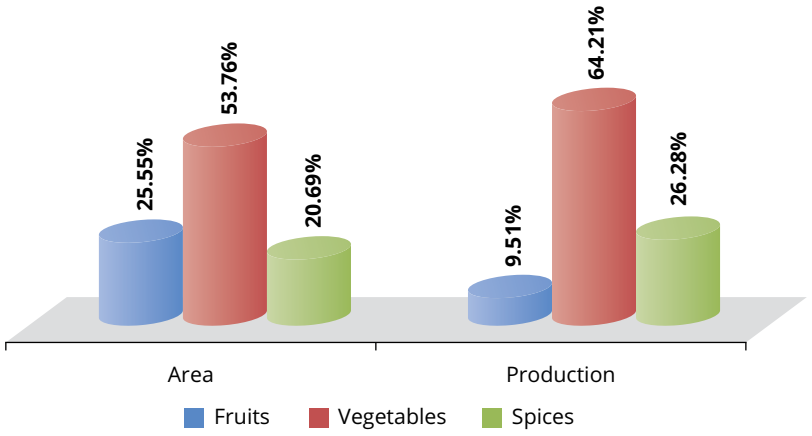
Crops	Sikkim			NER	India
	Area (ha)	Production (MT)	Productivity (MT/ha)	Productivity (MT/ha)	Productivity (MT/ha)
Fruits	11,340	17,900	1.58	8.57	11.73
Vegetables	23,855	120,900	5.07	10.13	17.25
Spices	9,180	49,490	5.39	5.28	1.82
Grand Total	**44,375**	**188,290**	**4.24**	**9.11**	**12.73**

Source: *NHB*

During the year 2010-11, the state recorded 44,375 (ha) land under horticultural crops cultivation accounting for 188000 MT in production. The overall productivity level of horticultural crops in the state is observed to be low, to the tune of 4.24 MT/ha which is far below national and NER productivity levels.

Commodity-wise area under vegetable cultivation found maximum (53.76%) followed by fruits (25.55%) and spices (20.69%). Though area under fruit cultivation is significant, but production is observed very low (9.51%), on the contrary contribution of vegetables (64.21%) and spices (26.28%) to the production basket of the state is observed to be significant.

Figure 44: Share in Area & Production of Horticulture Crops (2010-11)



Source: *ISAP Analysis & NHB*

Figure 45: Fruit-wise Share in Area (2010-11)

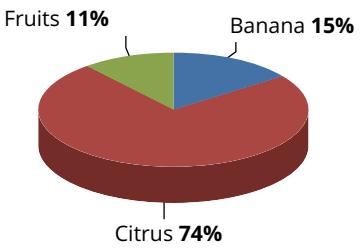
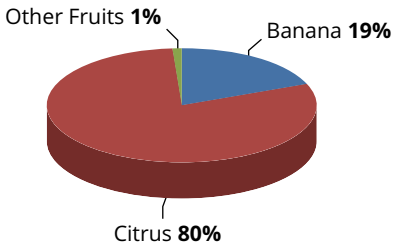


Figure 46: Fruit-wise Share in Production (2010-11)



Source: *ISAP Analysis & NHB*

Citrus shares 74% in total area under cultivation, followed by banana (15%) and other fruits (11%) while in production, citrus are 80% of total fruits produced followed by banana (19%). and other fruits (1%).

Potato shares 39% area under vegetable cultivation followed by other vegetables (34%), peas (8%), cabbage and okra (5% each), tomato (4%) and cauliflower (3%). Production-wise potato shares 38% of the total vegetable production, followed by other vegetables (31%), tomato and peas (7% each), okra and cabbage (6% each) and cauliflower (3%).

Figure 47: Vegetable-wise Share in Area (2010-11)

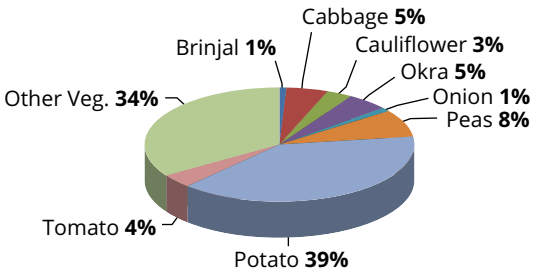
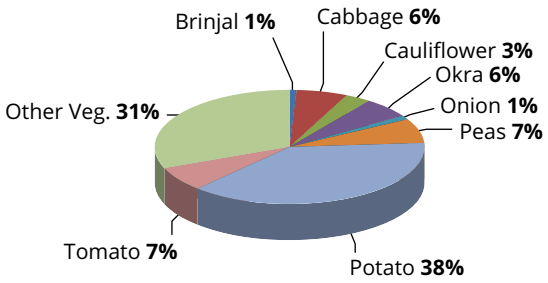


Figure 48: Vegetable-wise Share in Production (2010-11)



Source: *ISAP Analysis & NHB*

Table 25: Crop-wise Area, Production and Productivity of Horticultural Crops in Sikkim (2010-11)

Sl. No.	Crop	Sikkim			NER	India
		Area (ha)	Production (MT)	Productivity (MT/ha)	Productivity (MT/ha)	Productivity (MT/ha)
A	**Fruits**					
1	Banana	1,730	3,350	1.94	12.46	35.86
2	Citrus	8,330	14,420	1.73	5.30	8.82
3	Other Fruits	1,280	130	0.10		
	Total Fruits	**11,340**	**17,900**	**1.58**	**8.57**	**11.73**
B	**Vegetables**					
1	Brinjal	250	1,590	6.36	14.02	17.49
2	Cabbage	1,180	6,900	5.85	18.47	21.55
3	Cauliflower	740	3,900	5.27	15.72	18.29
4	Okra	1,100	7,170	6.52	10.99	11.61
5	Onion	300	1,600	5.33	3.15	14.21
6	Peas	1,950	8,550	4.38	2.64	9.51
7	Potato	9,400	45,700	4.86	8.77	22.72
8	Tomato	940	8,050	8.56	19.83	19.45
9	Other Veg.	7,995	37,440	4.68	7.50	
	Total Vegetables	**23,855**	**120,900**	**5.07**	**10.13**	**17.25**
C	**Spices**					
1	Ginger	8,510	45,890	5.39		
2	Turmeric	670	3,600	5.37		
	Total Spices	**9,180**	**49,490**	**5.39**	**5.28**	**1.82**
	Grand Total	**44,375**	**188,290**	**4.24**	**9.11**	**12.73**

Source: *NHB*

The horticultural crops of Sikkim such as mandarin and passion fruit are commercially cultivated and can be processed and marketed to distant markets, profitably. The state has made considerable improvement in vegetable production, but certain vegetables of subtropical and tropical region are being imported from other states. However, the off season vegetables grown in the high altitude areas are being exported to other states. In case of spices, the state is the largest producer of large cardamom. Also, floriculture has immense potential due to favourable climate and altitude.

Figure 49: Seasonality of Major Crops in Sikkim

Crops	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Banana												
Passion Fruit												
Mandarin												
Cabbage												
Cauliflower												
Peas												
Potato												
L. Cardamom												
Ginger												
Off Season Vegetables												
										Beginning	Peak	Lean

Source: *"An In-depth Market Study and Impact Assessment Report"*

Salient Features of Horticulture in Sikkim

- Sikkim has four agro-climatic zones based on the altitude and rainfall.
- Horticultural scenario is characterised by very low productivity. Two-third of horticulture production comprises of vegetables, while fruits contribute less than 10 percent to the total horticultural production.
- Seasonality of mandarin is same as the Bhutan mandarin but it is unable to compete with the Bhutanese mandarin at the market because of high per unit logistic cost, thus slowly Sikkim mandarin is being replaced by Bhutan mandarin for export to Bangladesh.
- Sikkim ginger is one of the major crops and contributes one-fourth to the total horticultural production. During season, there is a situation of glut in the market. Government agencies such as SIMFED & NERAMAC are procuring ginger and transporting it to Gangtok and Siliguri market. However, these two agencies are profit making bodies and do not support farmers in case of glut.
- Sikkim produces more than 90 percent of the total large cardamom produced in India, various market-led interventions such as auctioning system have led to high price realisation by the farmers.

Tripura

Agro-Climatic Zones & Potential Crops Grown

The ICAR has categorised Tripura under agro-climatic zones of Humid Eastern Himalayan Region. The distribution of horticultural crops among districts is depicted below:

Table 26: Agro-Climatic Zones in Tripura

Sl. No.	Potential Horticultural Crops Grown	Districts/Areas
1	Pineapple	All Districts of State but mainly North (Nalkata, Kanchanchera, Nepaltila, Darchar, Betchera) and West (Kamramgatali, Sheelghati, Mohan Bhog, Jumerdhepa, Baidagi Bazar) districts
2	Jackfruit & Litchi	All Districts of State (South, West, Dhalai and North)
3	Orange	North and Dhalai District
4	Banana	West and South Districts
5	Potato	South and West Districts
6	Tomato	West District
7	Cauliflower and Cabbage	West, South and North District
8	Ginger	South and North District
9	Turmeric	South District

Source: *"An In-depth Market Study and Impact Assessment Report"*

Horticulture Scenario

The state occupies about 66 thousand ha area under horticultural crops cultivation and produces 802 thousand MT of varied horticulture produce. The overall productivity of horticulture crops in the state analysed to be 11.98 (MT/ha) which is higher compared to NER productivity levels (9.11 MT/ha) but lower than national levels (12.73 MT/ha). The productivity of both fruits and vegetables in the state is found to be more than NER productivity levels.

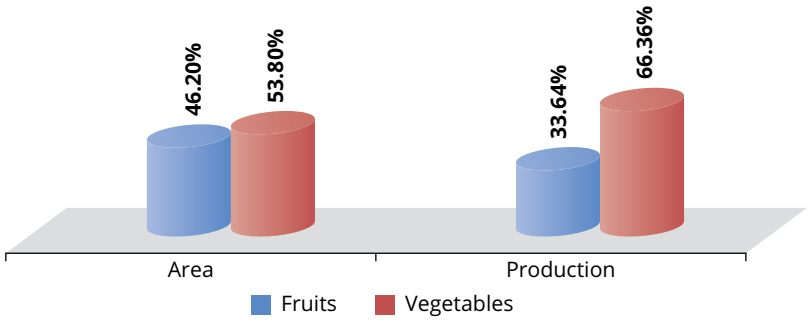
Table 27: Area, Production and Productivity of Horticultural Crops in Tripura (2010-11)

Crops	Tripura			NER	India
	Area (ha)	Production (MT)	Productivity (MT/ha)	Productivity (MT/ha)	Productivity (MT/ha)
Fruits	31,934	269,894	8.72	8.57	11.73
Vegetables	36,019	532,337	14.78	10.13	17.25
Grand Total	**66,953**	**802,211**	**11.98**	**9.11**	**12.73**

Source: *NHB*

Amongst horticulture crops grown in the state, fruits occupy nearly 46.20% of the area and vegetables 53.80%. From the production point of view, fruits add about 33.64% and vegetables 66.36% to the production basket of the state. Most of the cultivators follow traditional methods of producing crops. The state government of Tripura has taken special steps to improve the agricultural growth of the region.

Figure 50: Share in Area & Production of Horticulture Crops (2010-11)



Source: *ISAP Analysis & NHB*

Table 28: Crop-wise Area, Production and Productivity of Horticultural Crops in Tripura (2010-11)

Sl. No.	Crop	Tripura			NER	India
		Area (ha)	Production (MT)	Productivity (MT/ha)	Productivity (MT/ha)	Productivity (MT/ha)
A	**Fruits**					
1	Banana	7,800	12,500	1.60	12.46	35.86
2	Litchi	2,934	16,565	5.65	6.59	6.41
3	Mango	5,408	23,861	4.41	6.70	6.61
4	Papaya	1,541	22,578	14.65	15.71	39.75
5	Citrus	6,078	39,053	6.43	5.30	8.82
6	Pineapple	6,789	153,309	22.58*	11.93	15.95
7	Other Fruits	384	2,008	5.23		
	Total Fruits	**31,934**	**269,894**	**8.72**	**8.57**	**11.73**
B	**Vegetables**					
1	Brinjal	3,199	43,876	13.72	14.02	17.49
2	Cabbage	1,868	45,625	24.42	18.47	21.55
3	Cauliflower	1,843	33,752	18.31*	15.72	18.29
4	Okra	1,589	12,498	7.87	10.99	11.61
5	Potato	6,238	109,790	17.60	8.77	22.72
6	Tomato	1,382	30,152	21.82*	19.83	19.45
7	Other Veg.	19,900	256,644	12.90	7.50	
	Total Vegetables	**36,019**	**532,337**	**14.78**	**10.13**	**17.25**
	Grand Total	**66,953**	**802,211**	**11.98**	**9.11**	**12.73**

* Productivity is higher than NER and national average productivity

Source: *NHB*

Figure 51: Fruit-wise Share in Area (2010-11)

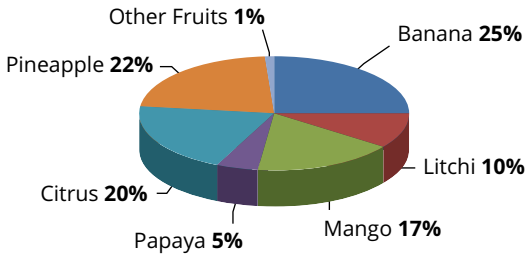
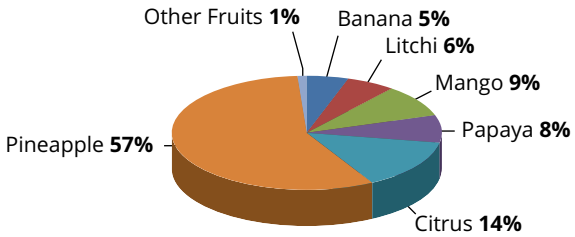


Figure 52: Fruit-wise Share in Production (2010-11)



Source: *ISAP Analysis & NHB*

In terms of fruit area, banana has 25% area under cultivation followed by pineapple (22%) citrus (20%), mango (17%), litchi (10%) and papaya (5%) while in terms of production pineapple shares 57% followed by citrus (14%), mango (9%), papaya (8%), litchi (6%) and banana (5%).

Figure 53: Vegetable-wise Share in Area 2010-11

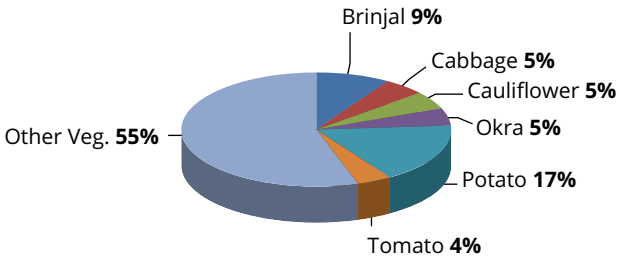
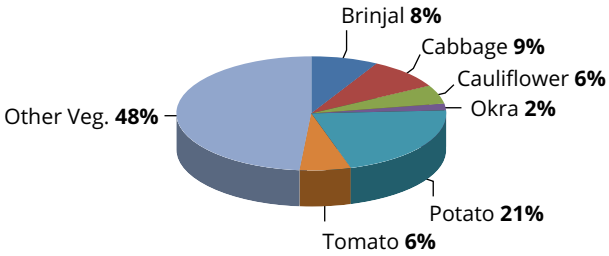


Figure 54: Vegetable-wise Share in Production (2010-11)



Source: *ISAP Analysis & NHB*

In terms of area under vegetables, other vegetables have 55% area under cultivation, followed by potato (17%), brinjal (9%), cabbage, cauliflower and okra (5% each) and tomato (4%) while in terms of production, other vegetable have 48% share, followed by potato (21%), cabbage (9%), brinjal (8%), tomato and cauliflower (6% each) and okra (2%).

Contribution of other vegetables in the state accounted for 32%. Over the years, the production of vegetables has also gained momentum in the state. Previously, vegetables from outside the state used to come to Tripura, whereas some vegetables such as 'kakrol', *'chara kachu' (mukhi), patol*, radish, sweet gourd etc. are also reaching the markets of other states. The cultivation of vegetables, which was mainly confined to traditional areas, has now spread over to non-traditional areas. Also, introduction of hybrid vegetables has started a new era in vegetable cultivation in the state.

Figure 55: Seasonality of Major Crops in Tripura

Crops	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Banana												
Pineapple												
Orange												
Mango												
Potato												
Lemon												
										Beginning	Peak	Lean

Source: *"An In-depth Market Study and Impact Assessment Report"*

Tripura has favourable climatic conditions which offer immense scope for cultivation of various kinds of horticultural crops including fruits, vegetables, spices, nuts and flowers. Agriculture is the backbone of the economy of Tripura. Most of the indigenous local inhabitants of the state are engaged in the traditional occupation of cultivating fruits and vegetables. Some of the important agricultural products of the state of Tripura are jackfruit, orange, pineapple, banana, mango, litchi, lemon, *kharif* vegetables, potato, *rabi* vegetables, cashewnut, coconut, areca nut, turmeric, ginger and chilly. The farmers of the state practice organic cultivation of fruits, vegetables and spices.

Tripura has a distinctive advantage and potential in some of the horticulture commodities such as pineapple (22.58 MT/ha), cabbage (24.42 MT/ha), cauliflower (18.31 MT/ha) and tomato (21.82 MT/ha). The productivity levels of these crops in the state are found to be higher, compared to national and NER productivity levels.

Based on the above discussion, it has emerged that there is a wide variety of horticulture produce/crops available in all the states of NER. However, all these crops do not qualify to meet the parameter of commercial threshold level to be projected as a potential crop; therefore an exercise is being carried out to select the potential crops for undertaking detailed value chain study.

Salient Features of Horticulture in Tripura

- Vegetable produced constitute 2-3rd of the total horticulture crops, although fruits are only 1/3rd of the total crops. Pineapple is produced in large area, but there is a problem of abundance.
- Productivity of horticulture crops is better than or at par with entire NE Region.
- Major chunk of pineapple, jackfruit and vegetables are sent to Bangladesh through unofficial channels.
- Tripura has been notified as an AEZ for pineapple.
- The only conduit for pineapple is biweekly markets which present daily harvesting of produce hence quality degradation of the fields.
- Government initiatives have made farmers adopt staggering plants to extend the availability of the produce.

4

CHAPTER

IDENTIFICATION OF FOCUS CROP GROUPS

With a view to identify the commercially potential crops, various crops have been rated on the basis of certain parameters, which have been devised keeping various production and market-related factors in mind. These parameters have helped in selecting the crops in a particular state as well as crop production clusters within a state, so that the crops for detailed value chain analysis may be decided.

The key parameters adopted for the selection of focus crop groups and their production clusters are detailed below:

- **Contribution of crops in the NER:** To assess the importance of each crop in the total crop basket of horticultural crops, percentage contribution has been calculated on the basis of volume and value, as these crops, due to high value or volume have the potential to achieve economy of scale and can make space in distant markets. Crops contributing significantly to this basket have been selected for the detailed value chain study.
- **Economically important crops:** There are few high value crops in the region which can absorb the cost of logistics to compete in the distant markets with products arriving from various other production belts either domestically or internationally.
- **Exclusive window of production:** Certain horticulture crops are produced only in some states of NER during times when there is no production in other parts of the country; such crops are transported to the other states during the times when there is no production and qualify for off season crops.
- **Demand in distant market:** Certain crops which are produced in abundant quantity or such products which are ethnic in nature in NER and have a good demand in the distant markets have also been included in the list of Focussed Crop Groups for the purpose of study.
- **Inherited advantage:** The agro-climatic conditions prevalent in a particular region are suitable for the production of certain crops. Such regions/states possess inherited advantage in the production of these crops.
- **Contiguity of potential area:** The production clusters of a crop in a state are either contiguous or non-contiguous which determines the feasibility of consolidation of produce and its further movement to the markets. On the basis of the contiguity of production areas and taking into account the potential production areas, crops have been selected.
- **Integration of activities for commercial uptake:** The availability of post-harvest, marketing and logistics infrastructure, processing and value addition facilities have been taken into account to arrive at the commercial viability of different crops.

Product-wise Contribution of States in NER Production Basket (2010-11)

Table 29: Product-wise Contribution of States in NER Production Basket (2010-11)

Sl. No.	State/Crop	Arunachal Pradesh	Assam	Manipur	Meghalaya	Mizoram	Nagaland	Sikkim	Tripura	Total NER Production (MT)	% Share in Total NER Production
		% Share in Total NER Production (Volume)									
1	Apple	99.75%	0.00%	0.00%	0.00%	0.00%	0.18%	0.07%	0.00%	28,433	0.96%
2	Banana	2.13%	71.29%	7.53%	0.00%	11.68%	5.81%	0.33%	1.23%	1,015,075	34.41%
3	Grapes	0.00%	0.00%	0.00%	0.00%	99.51%	0.49%	0.00%	0.00%	20,500	0.69%
4	Guava	0.00%	94.42%	0.00%	0.00%	2.18%	1.36%	0.09%	1.95%	103,048	3.49%
5	Litchi	0.00%	68.82%	0.00%	0.00%	2.70%	0.29%	0.03%	28.15%	58,845	1.99%
6	Mango	0.00%	63.66%	0.00%	0.00%	3.82%	0.54%	0.00%	31.98%	74,611	2.53%
7	Papaya	0.00%	76.31%	0.00%	3.86%	3.83%	3.18%	0.00%	12.82%	176,128	5.97%
8	Citrus	26.93%	38.95%	9.06%	6.36%	7.17%	2.78%	2.36%	6.39%	611,521	20.73%
9	Kiwi	96.35%	0.00%	0.00%	0.00%	3.65%	0.00%	0.00%	0.00%	4,079	0.14%
10	Passion Fruit	0.00%	0.00%	92.47%	0.00%	7.53%	0.00%	0.00%	0.00%	78,491	2.66%
11	Pineapple	9.22%	31.22%	15.65%	12.17%	1.92%	8.13%	0.00%	21.69%	706,877	23.96%
12	Other Fruits	19.09%	0.00%	77.84%	0.00%	3.07%	0.00%	0.00%	0.00%	72,720	2.46%
	Fruit Production (MT)	**297,634**	**1,502,200**	**371,601**	**131,700**	**218,169**	**141,250**	**17,900**	**269,874**	**2,950,328**	**100.00%**
13	Ginger	1.45%	36.02%	8.49%	18.03%	10.67%	10.02%	15.32%	0.00%	299,525	12.42%
14	Turmeric	0.00%	15.19%	25.50%	15.46%	37.45%	0.77%	5.62%	0.00%	64,002	10.77%
15	Brinjal	0.00%	77.18%	0.00%	3.68%	4.08%	0.70%	0.50%	13.87%	316,398	4.67%
16	Cabbage	0.00%	77.51%	7.09%	4.43%	4.13%	0.37%	0.85%	5.62%	812,472	12.91%
17	Cauliflower	0.00%	76.73%	5.35%	8.23%	0.86%	0.05%	0.91%	7.87%	428,598	6.81%
18	Okra	0.00%	76.48%	0.00%	3.04%	9.68%	0.62%	3.71%	6.47%	193,204	3.99%
19	Onion	0.00%	80.55%	0.00%	11.23%	2.37%	0.00%	5.84%	0.00%	27,398	0.58%
20	Peas	0.00%	22.61%	56.91%	5.98%	2.55%	1.25%	10.69%	0.00%	79,949	2.02%
21	Potato	0.00%	69.08%	0.00%	15.21%	0.21%	0.94%	4.28%	10.28%	1,067,775	10.42%
22	Tomato	0.00%	80.12%	4.17%	5.69%	1.28%	0.83%	1.67%	6.24%	483,299	10.71%
23	Chilly	0.00%	0.00%	56.31%	0.00%	43.69%	0.00%	0.00%	0.00%	109,511	10.53%
24	Other Vegetables	0.79%	41.69%	5.15%	7.10%	9.49%	5.88%	3.81%	26.10%	983,487	14.18%
	Veg. Production (MT)	**12,107**	**3,043,088**	**300,253**	**420,404**	**277,144**	**109,895**	**170,390**	**532,337**	**4,865,618**	**100.00%**

Source: *ISAP analysis, NHB and Sate Horticulture Departments*

Product-wise Contribution of States in NER Production Value (2010-11)

Table 30: Product-wise Contribution of States in NER Production Value (2010-11)

Sl. No.	State/Crop	Arunachal Pradesh	Assam	Manipur	Meghalaya	Mizoram	Nagaland	Sikkim	Tripura	Total NER Production (Value in Cr)	% Share in Total NER Production (Value)
		% Share in Total NER Production (Value)									
1	Apple	28.69%	0.00%	0.00%	0.00%	0.00%	0.12%	0.37%	0.00%	271.45	3.10%
2	Banana	7.93%	55.06%	26.22%	0.00%	51.80%	53.18%	22.65%	5.92%	3,516.94	40.15%
3	Grapes	0.00%	0.00%	0.00%	0.00%	21.15%	0.21%	0.00%	0.00%	168.61	1.92%
4	Guava	0.00%	2.14%	0.00%	0.00%	0.28%	0.36%	0.18%	0.27%	103.05	1.18%
5	Litchi	0.00%	5.58%	0.00%	0.00%	1.26%	0.28%	0.24%	14.21%	369.40	4.22%
6	Mango	0.00%	4.93%	0.00%	0.00%	1.70%	0.49%	0.00%	15.41%	352.75	4.03%
7	Papaya	0.00%	8.64%	0.00%	6.80%	2.49%	4.26%	0.00%	9.03%	515.58	5.89%
8	Citrus	47.48%	14.24%	14.93%	36.17%	15.04%	12.06%	76.56%	14.52%	1,663.90	18.99%
9	Kiwi	2.50%	0.00%	0.00%	0.00%	0.11%	0.00%	0.00%	0.00%	24.47	0.28%
10	Passion Fruit	0.00%	0.00%	17.97%	0.00%	1.86%	0.00%	0.00%	0.00%	196.23	2.24%
11	Pineapple	13.40%	9.40%	21.25%	57.02%	3.32%	29.02%	0.00%	40.64%	1,371.46	15.66%
12	Fruit (value)	5.15%	0.00%	19.62%	0.00%	0.98%	0.00%	0.00%	0.00%	254.52	2.91%
	Total Fruits	**943.73**	**4,552.93**	**1,009.65**	**292.60**	**793.32**	**384.37**	**51.25**	**731.92**	**8,759.77**	**100.00%**
13	Ginger	61.64%	8.84%	7.91%	25.69%	10.44%	50.16%	44.61%	0.00%	1,292.19	12.42%
14	Turmeric	0.00%	3.23%	20.59%	19.09%	31.76%	3.36%	14.20%	0.00%	1,120.04	10.77%
15	Brinjal	0.00%	7.12%	0.00%	1.97%	1.50%	1.31%	0.55%	8.51%	485.61	4.67%
16	Cabbage	0.00%	19.77%	6.87%	6.56%	4.20%	1.92%	2.57%	9.53%	1,342.91	12.91%
17	Cauliflower	0.00%	10.32%	2.73%	6.43%	0.46%	0.13%	1.45%	7.05%	708.42	6.81%
18	Okra	0.00%	6.04%	0.00%	1.39%	3.05%	1.00%	3.48%	3.40%	415.62	3.99%
19	Onion	0.00%	0.92%	0.00%	0.75%	0.11%	0.00%	0.79%	0.00%	60.22	0.58%
20	Peas	0.00%	0.90%	8.62%	1.38%	0.41%	1.02%	5.06%	0.00%	210.08	2.02%
21	Potato	0.00%	14.22%	0.00%	18.18%	0.17%	3.93%	10.46%	14.09%	1,084.14	10.42%
22	Tomato	0.00%	16.95%	3.35%	6.99%	1.08%	3.57%	4.18%	8.78%	1,113.93	10.71%
23	Chilly	0.00%	0.00%	44.45%	0.00%	36.23%	0.00%	0.00%	0.00%	1,095.11	10.53%
24	Other Veg.	38.36%	11.68%	5.47%	11.56%	10.60%	33.60%	12.65%	48.65%	1,475.23	14.18%
	Veg. (value)	**30.37**	**5,264.98**	**1,387.12**	**907.00**	**1,320.84**	**258.03**	**443.79**	**791.36**	**10,403.49**	**100.00%**

Source: *ISAP analysis, NHB and Sate Horticulture Departments*

1. Pineapple

Sl. No.	Criteria	Ar. Pradesh	Assam	Meghalaya	Manipur	Mizoram	Nagaland	Sikkim	Tripura	Total
1	Contribution of crops in NER	1	2.9	1.5	1.2	0.1	0.8	0	2.5	10
2	Economically important crop/s	0	2	2	1.5	0	1.5	0	3	10
3	Exclusive window of production	1	1	1	1	1	2	0	3	10
4	Accessability	0.5	2.5	1.5	1.25	1.25	1.5	0	1.5	10
5	Contiguity of potential area	0.5	1	2	0.5		3		3	10
6	Integration of activities for commercial uptake	0.5	1.5	1.5	0.5		2	0	4	10
	Total	**3.5**	**10.9**	**9.5**	**5.95**	**2.35**	**10.8**	**0**	**17**	

2. Citrus

Sl. No.	Criteria	Ar. Pradesh	Assam	Meghalaya	Manipur	Mizoram	Nagaland	Sikkim	Tripura	Total
1	Contribution of crops in NER	2.7	3.9	1	0.6	0.7	0.2	0.2	0.7	10
2	Economically important crop/s	Same for all states								
3	Exclusive window of production	Same for all states								
4	Accessability	0.5	2	1.5	1	1	1	2	1	10
5	Contiguity of potential area	1.5	2	2	0.5	0.5	0.5	2	1	10
6	Integration of activities for commercial uptake	0.5	2	1	3	1		1.5	1	10
	Total	**5.2**	**9.9**	**5.5**	**5.1**	**3.2**	**1.7**	**5.7**	**3.7**	

3. Ginger

Sl. No.	Criteria	Ar. Pradesh	Assam	Meghalaya	Manipur	Mizoram	Nagaland	Sikkim	Tripura	Total
1	Contribution of crops in NER	0.1	3.6	0.9	1.8	1	1	1.5	0.1	10
2	Inherited Advantage	1	1.5	1	1	1.5	2	1	1	10
3	Exclusive window of production	Same for all states								
4	Accessability	0.5	1.75	1.75	1	1	1.5	1.5	1	10
5	Contiguity of potential area	0.7	2	1.8	1.75	0.75	1.25	1.25	0.5	10
6	Integration of activities for commercial uptake	0	2.5	2	1	0.5	1	3	0	10
	Total	**2.3**	**11.35**	**6.95**	**6.55**	**4.75**	**6.75**	**8.25**	**2.6**	

4. Turmeric

Sl. No.	Criteria	Ar. Pradesh	Assam	Meghalaya	Manipur	Mizoram	Nagaland	Sikkim	Tripura	Total
1	Contribution of crops in NER	0	1.5	2.5	1.5	3.7	0.1	0.6	0.1	10
2	Inherited Advantage	Same for all states								
3	Exclusive window of production	Same for all states								
4	Accessability	0.5	1.75	1.75	1	1	1.5	1.5	1	10
5	Contiguity of potential area	0.5	2.5	1	1.5	2	1	1	0.5	10
6	Integration of activities for commercial uptake	0.5	2.5	1	2	2	1	0.5	0.5	10
	Total	**1.5**	**8.25**	**6.25**	**6**	**8.7**	**3.6**	**3.6**	**2.1**	

Source: *ISAP Analysis*

Identified Focus Crop Groups Based on the Parameters Identified for Selection Criteria

Table 31: Identified Focus Crop Groups

Focus Crop Group	Arunachal Pradesh	Assam	Manipur	Meghalaya	Mizoram	Nagaland	Sikkim	Tripura
Pineapple		√		√		√		√
Citrus		√	√	√			√	
Ginger		√		√			√	
Turmeric		√		√	√			
Passion Fruit						√		
Kiwi Fruit	√							
Naga Chilli						√		
Large Cardamom							√	
Vegetables		√		√				

Source: *ISAP Analysis*

Identified Production Clusters of FCGs*

Table 32: Identified Production Clusters of FCGs

Crops	Arunachal Pradesh	Assam	Manipur	Meghalaya	Mizoram	Nagaland	Sikkim	Tripura
Citrus		Kamrup (R), Kamrup (M), Tinsukia, Karbi Anglong, N.C. Hills	Tamenglong, Ukhrul, C.Cpur	East Khasi Hills, West Khasi Hills, Jaintia Hills			East, South, West	
Kiwi	Tawang, West Kameng, Lower Subansiri							
Pineapple		Cachar, Kamrup, Karbi Anglong, N.C. Hills		Ri Bhoi, East Garo Hills, West Garo Hills		Kohima, Wokha, Mokokchung, Dimapur, Peren		South, West, Dhalai, North
Passion Fruit						Kohima, Wokha, Mokokchung		
Ginger		N C Hills, Karbi Anglong, Golaghat, Sonitpur		Ri Bhoi, East Garo Hills, West Garo Hills			East, South, West	
Turmeric		Kamrup, Barpeta, Sonitpur, Nagaon, Baksa, Golaghat, Lakhimpur, Karbi Anglong		Jaintia Hills, West Garo Hills	Saiha, Champhai, Mamit, Kolasib, Serchhip			
Naga Chilli						Kohima, Dimapur, Peren		
Large Cardamom							North, East	
Vegetables		Darrang, Kamrup, Barpeta, Marigaon		East Khasi Hills, Jaintia Hills, East Garo Hills, West Garo Hills				

* Detailed criteria of clusters selection in identified states are given in annexure

Source: *ISAP Analysis*

A complex matrix of criteria described above was prepared for all the eight states of NER based on field experience and inputs from experts, which has led to shortlisting the focus crop groups which will be studied for a specific state. Weighted average method was adopted to select the state and for identification of cluster for study, major production cluster was taken into account. The score cards for each crop have been depicted below. As these score cards have been based on field observation and perception of experts, there are chances that opinion of people may differ from each other; however, an exercise has been done to compile these tables as practically as possible.

Seasonality of Selected FCGs

In case of perishable produce, it is important to know the availability of the produce for marketing and getting better prices. In NE Region, vegetables & banana are available throughout the year. Ginger is available mainly in the months of February and May. Pineapple is harvested twice in a year i.e. May to August and December to January. Mandarin is available from November to January. Turmeric is harvested from December to January. Passion fruit is harvested in the months between September and December. Cardamom is harvested twice in a year i.e. July–August and November–January. Therefore, it is important to understand that one or the other horticultural crops are available throughout the year from NER and due to varying altitude, the availability of each crop is possible for extended duration from different production clusters.

Figure 56: Availability of Horticultural Produce in NE Region

Crops	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Kiwi												
Pineapple												
Mandarin												
Large Cardamom												
Turmeric												
Passion Fruit												
Ginger												
Vegetables												
Naga Chilli												
										Beginning	Lean	Peak

Source: *"An In-depth Market Study and Impact Assessment Report"*

On the basis of parameters followed for the selection of Focus Crop Groups, the major crops, seasonality and their production clusters have been mapped. A detailed product rank matrix has been developed to filter out the crops, which have potential and have been selected for detailed value chain mapping.

5

CHAPTER

VALUE CHAIN ANALYSIS

An extensive study of the production region of the crops was undertaken during the field visits to map the detailed value chain from production to post-harvest management and marketing. The stages covered during value chain study are production, pre-harvest, post-harvest and marketing. During the survey and analysis, various aspects of production such as sources of input material supply, production practices, level of input application, crop varieties, labour requirement, technology adoption, intercultural operations, harvesting time and methods, seasonality, logistics and marketing were covered. Detailed value chains of the following crops have been mapped:

- Pineapple – Assam, Meghalaya, Tripura, Nagaland
- Citrus – Assam, Manipur, Meghalaya, Sikkim
- Ginger – Assam, Meghalaya, Sikkim
- Turmeric – Assam, Meghalaya, Mizoram
- Kiwi – Arunachal Pradesh
- Passion Fruit – Nagaland
- Vegetables – Assam, Meghalaya
- Naga Chilli – Nagaland
- Large Cardamom – Sikkim

Pineapple

All the eight North Eastern states produce pineapple. The advantageous position of NER in terms of fertile and organically rich soils, abundant rainfall, water resources and great agro-climatic diversity supports the cultivation of best quality pineapple in the region. The region produces more than 40 percent of pineapple produced in the country and almost 90-95 percent of the produce is organic. Pineapple produced in the region is qualitatively different and is said to be among the best in the world as they are sweet (high TSS) with less fibre.

Pineapple is a perennial crop with an economic life of 5-7 years, however, in the North Eastern region; the farmers cultivate it beyond 12-15 years through crop manipulation and traditional agronomic practices. In many parts of North Tripura and in the Barak valley of Assam, even 20-25 year old plantations can be seen.

Assam, Tripura, Meghalaya and Nagaland are major pineapple producing states.

There are two popular varieties of pineapple cultivated in North East:

1. Kew (also known as Smooth Cayenne) – Suitable for canning with an average fruit weight of 2-3 kg.
2. Queen – Table fruit variety with an average fruit weight of 1-2 kg.

Assam

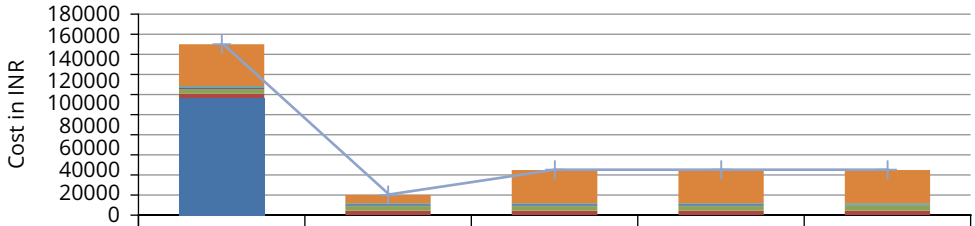
In Assam, pineapple is cultivated in all districts, while the identified clusters for pineapple cultivation are Cachar, Kamrup, Sonitpur, Karbi Anglong and North Cachar Hills. Kew, Giant Kew and Queen are the major varieties grown in the state.

❖ Production Practices

Planting is done from April to October. About 30,000 to 40,000 plants are accommodated in one ha area. Propagation of pineapple is done through suckers which costs ₹ 3 per sucker. Flowering starts next year in March-April and June-July while fruiting starts five months after flowering.

Pineapple is a perennial crop; hence cultivation lasts for four to seven years. The crop cycle of pineapple for optimum production is four years but farmers in Assam take the crop till the seventh year from planting. Productivity starts decreasing 4th year onwards. As per the FGDs held with the farmers, the cost of production of pineapple for the first five years is as follows:

Figure 57: Cost of Pineapple Production in Assam

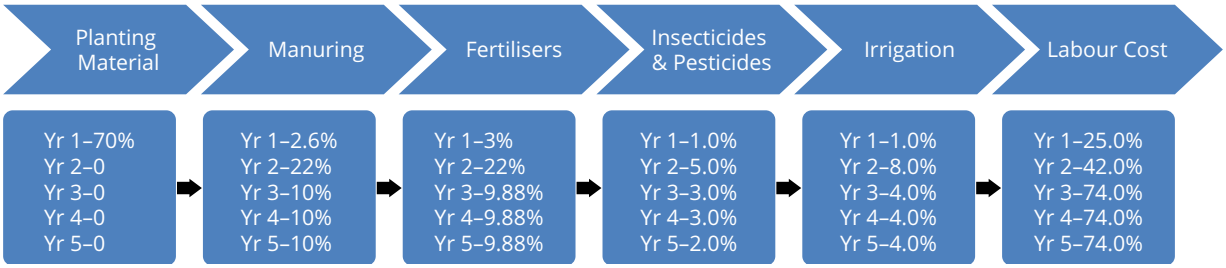


	Year 1	Year 2	Year 3	Year 4	Year 5
Labour cost (Manday)	37500	7500	30000	30000	30000
Irrigation	1500	1500	1500	1500	1000
Insecticide/Pesticide	1000	1000	1000	1000	500
FERTILIZER	4000	4000	4000	4000	5000
FYM/VERMICOMPOST	4000	4000	4000	4000	4000
Planting Material Cost	105000	0	0	0	0
Total Cost	153000	18000	40500	40500	40500

Source: *ISAP Analysis from farmers' interaction*

In the first year, the plantingv material cost is the major cost which accounts for about 70 percent of the total production cost. The other costs involved are the costs for irrigation, manures and fertilisers, insecticides and pesticides which remain almost constant during the first four years. The labour cost during first year is nearly 25 percent of the total cost which gradually increases to 40 percent in second year and 74 percent in the subsequent years. Labour in the first year is employed for farm operations such as land preparation and sowing while from the second year onwards it is employed for intercultural operations and harvesting. Around 200-250 mandays are required in the first year, while in the second year 50 mandays are employed and from the third year onwards 200-250 mandays are required for various farm operations such as application of manures, fertilisers, pesticides, weeding and harvesting.

Figure 58: Cost Analysis of Pineapple Value Chain in Assam



Source: *ISAP Analysis*

The above cost analysis has been carried out taking into account the cost of production for the first five years during which the fruit yield is optimum and cost of planting material dominating in the first year and labour being another predominant part of the value chain.

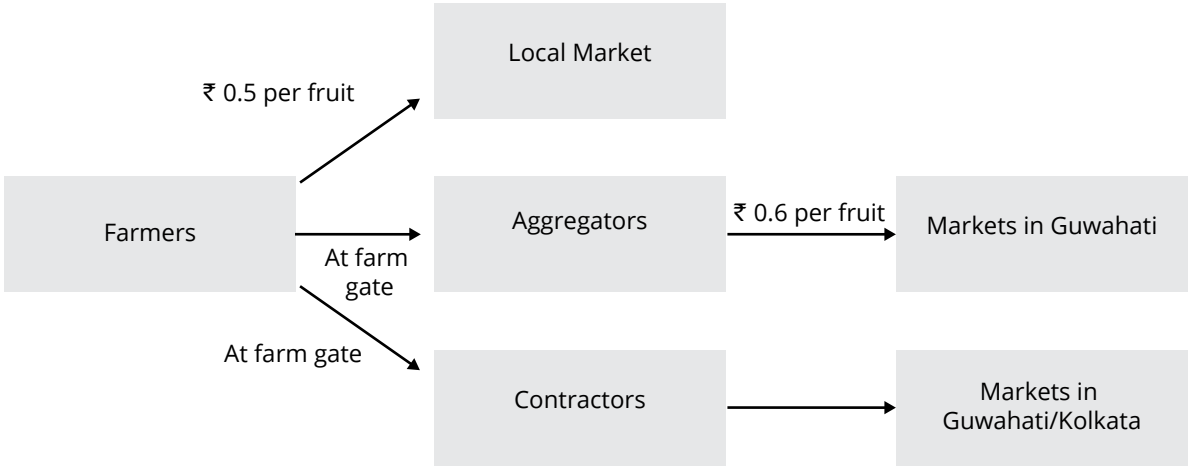
❖ **Post-harvest Practices:**

- **Harvesting**: The fruiting starts from the second year onwards, the fruit bearing is good till the fourth year of planting and reduces afterwards. However, the farmers take the crop till the seventh or eighth year. The fruits are harvested in May-August and November-December. Average weight of each pineapple is 1-1.5 kg and yield of Kew variety is 30-35 MT/ha.

Average cost of production is approximately ₹ 3 per piece. The farm gate price per piece varies from ₹ 4 to ₹ 12 depending upon the production and market demand. During the lean season, the farmer gets ₹ 8-12 per piece while during the peak season, when there is abundant supply in the market, the farmer is able to sell it at ₹ 4-6 per piece.

- **Value Addition at Farm Level:** Before taking to the market, the farmers grade the produce as per size. Generally fruits of 1 to 1.5 kg weight are more acceptable.
- **Marketing and Logistics:** Marketing channels followed by the farmer are as depicted in the figure below:

Figure 59: Marketing Channel of Pineapple in Assam



Case Study - Bongaon

From villages in Bongaon and Boko, pineapple is transported to the nearest market in gunny bags/plastic bags in small quantity by farmers while when taking to distant markets such as Guwahati, the produce is carried in Tata ACE/mini trucks in loose form. As most of the farmers do not have large quantity of produce and therefore are not able to afford to transport to the Guwahati market, they sell their product at the farm gate only. Markets at sub-division/block level act as consolidation point and from there the produce moves to Guwahati.

Tata Ace of 2000-2500 fruits capacity is charged around around ₹ 1200 to 1500 depending upon the distance. During transportation, wastages range from 4-5 percent. At the wholesalers and retailers level, due to handling and post-harvest losses, the wastages are nearly 2 percent.

Table 33: Price Build-up-of Pineapple from Farm Gate in Bongaon to Guwahati (per piece)

Price Build-up	Amount (in ₹)	Price Markup (₹ Per Piece)	% contribution
Farm gate price	8.00	8.00	34%
Aggregator Margin @30%	2.40	10.40	10%
Transportation	0.60	11.00	3%
wastage@ 5%	0.55	11.55	2%
Wholesaler (@30%)	3.47	15.02	15%
wastage@ 2%	0.30	15.32	1%
Retailer (50%)	7.66	22.97	33%
wastage@ 2%	0.46	23.43	2%

Source: *ISAP analysis from various stakeholders' interaction*

In Assam, there is issue of post-harvest losses in the field when it is glut in the market and farmers leave the produce in the field itself without harvesting. Most of the produce is consumed fresh and the opportunity of processing is also not being tapped.

Tripura

❖ Production Practices

Pineapple is cultivated in the entire state; however, few clusters such as Kumbharghat and Nalkota are major production areas. North, South, West and Dhalai districts are major pineapple producing districts in the state.

Pineapple field in Tripura

Both the varieties of pineapple - Queen and Kew are grown in Tripura during mid-May to mid-September. The variety used for processing i.e. Kew covers the maximum area. Nearly 25,000-30,000 plants are being planted in one hectare of land. The economic life of the crop is 5-7 years, although farmers in the region cultivate it up to 12-15 years through traditional agronomic practices. The plants do not require much care, the farmers generally clean the cultivation patches after harvesting and can get a healthy fruit crop the next year.

Case Study - Bishramganj

In the district of Sipahijila (Bishramganj), the average land holding of farmers under pineapple cultivation is 0.5 to 1 hectare (3-6 *kenis* – local unit).

Since 80 percent of the crop becomes ready for harvest within a short period of 2-3 months (May-June-July), there is a situation of glut in the market which forces the farmers to sell the produce at low prices. In order to overcome this problem, ICAR Research Centre at Agartala, Tripura has come up with the following solutions to produce the fruit for more than five months in a year:

1. Use of different planting material
2. Staggered planting & chemical induction of flowering
3. Genotypic diversification

Various farmers have adopted these techniques due to which they are able to get regular yield of pineapple for more than five months in a year.

❖ Post-harvest Practices

- **Harvesting:** The peak season for pineapple harvesting in the region is May to July. The yield is around 20,000 to 25,000 fruits per ha per season. Fruit size varies from 0.5 to 2 kg (average 1 kg/piece). Thus, the production is 20 to 25 MT per ha per season.

Individual farmers are able to harvest around 300-500 fruits on a daily basis to be taken to the market, however, due to non-availability of regular markets, around 20 percent of the fruits are wasted at the field level itself.

- **Value Addition at Farm Level:** Farmers, generally do not carry out any kind of grading at the field level and all sizes of fruits are sold as one lot. However, some progressive farmers have started grading as per size.
- **Marketing & Logistics**: The fruits are carried from the field (from Batsuli village) to the nearby market (Bishramganj market) in a jeep or auto. At Bishramganj, the trade of pineapple takes place during two days of the week only (Sunday & Thursday). Transportation cost is approximately ₹ 30 per 100 fruits, which comes to approximately ₹ 0.30 per kg/per piece. There is no wastage during the transit.

In the Bishramganj market, the fruit is generally procured by traders from Sonamara who then export it to Bangladesh through unofficial trade channels. Some produce is procured by traders from Agartala also. During early season, the wholesale price of the fruit remains at ₹ 10 per piece, however, during peak season, the rates drop to as low as ₹ 2 per piece. At times, when there is no market demand, the prices drop even further. The rate mainly depends upon the size of the fruit; large and same size fruits get better price in the market.

The traders from Agartala transport the produce to Agartala market in vehicles such as Bolero, Commander etc. The transportation distance is around 60 km and the cost varies from ₹ 0.40-0.50 per piece. The price in Agartala market varies from ₹ 20-40 per fruit-based on the demand and supply.

Figure 60: Marketing Channel of Pineapple in Tripura

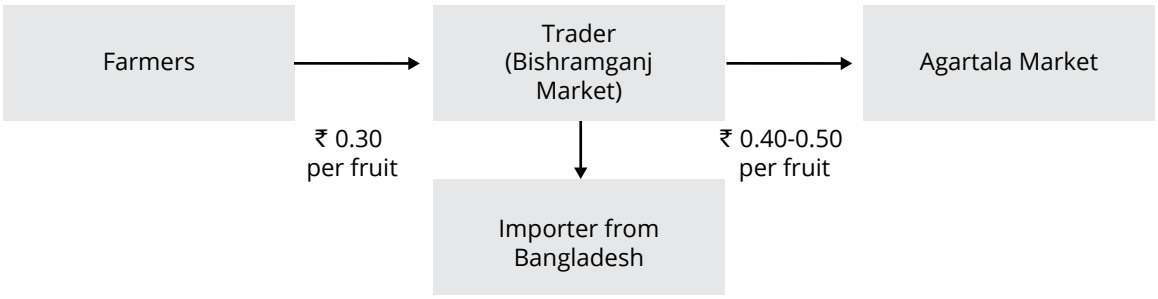


Table 34: Price Build-up of Pineapple from Farm Gate in Bishramganj to Agartala Market (per piece)

Price Build-up	Amount (in ₹)	Price Markup (₹ Per Piece)	% Contribution
Farm gate price	7.00	7.00	34.04%
Loading/unloading	0.20	7.20	0.97%
Aggregator Margin @20%	1.40	8.60	6.81%
Transportation to local market	0.30	8.90	1.46%
wastage@ 0%	0.00	8.90	0.00%
Transportation to main market	0.50	9.40	2.43%
Wholesaler (@40%)	3.76	13.16	18.29%
wastage@ 2%	0.28	13.44	1.36%
Retailer (50%)	6.72	20.16	32.68%
wastage@ 2%	0.40	20.56	1.96%

Source: *ISAP analysis from various stakeholders' interaction*

Issues:

- At production level, although the farmers have started adopting practice of staggering, However, general production practices are still not very advanced. Regular weeding or intercultural operations are not followed by the farmers and there is no use of scientific irrigation for pineapple crop. Yield of pinapple can be improved significantly if farmers are motivated to adopt the scientific package of practices for pineapple production in the state.
- The marketing of pineapple has been the biggest challenge for the farmers, as during the peak season, the price goes very low and sometimes there are no buyers. Earlier, companies such as Dabur and NERAMAC (North Eastern Regional Agricultural Marketing Corporation Limited) used to buy pineapple for processing purpose, but now the NERAMAC plant has been closed down and Dabur does not buy due to high logistics cost.
- Market is organised twice in a week at Bishramganj (for this particular cluster) and farmers do not have any other choice to bring the produce in the market, other than these two days. This leads to high level of product wastage at field level due to over-maturing.

Meghalaya

In Meghalaya, the pineapple cultivation is carried out on the slopes. Ri Bhoi, East Garo Hills and West Garo Hills are the main production clusters identified after the study. Both the varieties – Queen and Kew are cultivated in the state.

❖ Production Practices

The plantations are congested as the plant to plant spacing is very less. There are about 37,500-50,000 plants per ha. For new plantations, the farmers get the planting material i.e. either sucker or crown for ₹ 2-3 per piece. Sowing is carried out in the month of May-June.

The farmers generally do not use FYM/Vermicompost, chemical fertilisers, insecticides/ pesticides or weedicides. No irrigation is applied and the crop is dependent on the monsoon for its water requirement. Weeding is mainly done manually by the farmers and his family members. The labour is employed for harvesting and other intercultural operations. Total mandays of 400-500 are required for carrying out farm operations but generally the hired labour is available for only 100-150 mandays.

The pre-harvest fruit loss due to fruit drop, insect pest attack and diseases generally ranges from 3-5 percent at the field level.

❖ Post-harvest Practices:

- **Harvesting:** The peak season for pineapple harvesting in Meghalaya is from May to July. The average yield in the region is nearly 12-15 MT per acre (25-30 MT/ha).
- **Value Addition at Farm Level:** At the field level, the farmers do manual grading of fruits based on sizes (small: upto 1 kg, medium: 1.5-2.5 kg, large: 3-4 kg). The uniform and bigger sized fruits get a better price in the market.
- **Marketing & Logistics:** The fruits are packed in bamboo baskets which accommodate 40-50 big fruits or 60-70 small fruits. The cost of the bamboo basket is ₹ 60 per basket and the life is one year. The produce is sold on the basis of kuri (1 *kuri* = 20 pineapple pieces) or big *bhar* (1 big *bhar* =64 pieces) in the local market. Thus, one bamboo baskets accommodates 2 *kuri* (40 pineapple pieces).

The farmers usually carry the produce as head loads to the nearest transport point and from there it is transported by jeep/maxi to the local market. The transportation cost for carrying the produce to local market is ₹ 20-25 per bamboo basket which translates into ₹ 0.50-0.60 per fruit. The transportation loss while taking the produce from field to local market is approximately 0.25 percent.

The produce moves through the following marketing channels:

In the local market, the farmer sells the produce to the middlemen/aggregator, who then transports to the main market in the same packaging by means of mini trucks or buses. The transportation cost by mini truck is ₹ 40-50 per bamboo basket (₹ 1-1.20 per fruit) and ₹ 30-35 per bamboo basket (₹ 0.75-0.875 per fruit). The transportation cost varies with the distance also. During the transportation from the local market to main market such as Bara Bazaar and Maowing market in Shillong, the loss is about 3 percent, while at the wholesaler's and retailers' level the post-harvest and handling losses are 2 percent each.

Figure 61: Marketing Channel of Pineapple in Meghalaya

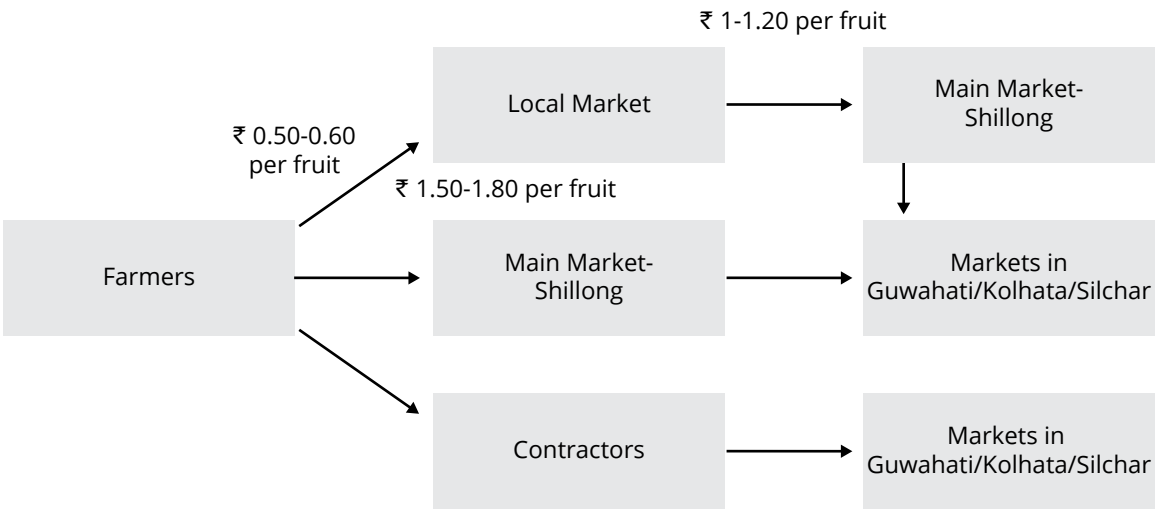


Table 35: Price Build-up of Pineapple from Farm Gate to Shillong

Particular	Amount (in ₹)	Price Markup (₹ Per Piece)	% contribution
Average Selling of Farmers	15	15	41.73%
Loading/Unloading	0.2	15.2	0.56%
Transportation to Local Market	0.5	15.7	1.39%
Cost of wastage (@ 0.25% till local market)	0.04	15.74	0.11%
Aggregator charges (20%)	3.14	18.88	8.76%
Transport to Main Market	1	19.88	2.78%
Cost of wastage (@ 3% till Main Market)	0.59	20.47	1.64%
Wholesaler's margin (@25%)	5.11	25.59	14.24%
Cost of wastage (@ 2% wholesale)	0.51	26.10	1.42%
Retailer's Margin (@35%)	9.13	35.24	25.42%
Cost of wastage (@ 2% Retail level)	0.7	35.94	1.95%

Source: *ISAP analysis from various stakeholders' interaction*

Nagaland

In Nagaland, major production clusters are Dimapur, Peren, Kohima, Mokokchung and Wokha. Molvom (Jharnapani) is the pioneer village in pineapple cultivation in the state, where every farmer family in the village is growing pineapple. Almost 90 percent of the fields in the villages are covered with pineapple. In the entire state, pineapple variety Giant Kew is the most popular variety cultivated. It is larger than the normal variety and average weight of a single fruit is 1.5-2 kg.

❖ Production Practices

The planting of pineapple is carried out in the months of March-April. Earlier the farmers were carrying out single row planting due to which the fruits used to be oversized, which are less acceptable in the market and used to fetch lower price. However, now the Government is providing training and encouraging the farmers to plant in double rows. Double row planting leads to a smaller fruit size of 1 to 1.15 kg.

The average number of plants per ha is 30,000 to 35,000. Up to the fourth year of harvest, the fruit size and weight is uniform and fruit is of good quality but after the fourth year, the fruit weight and size starts declining. But the farmers usually take the crop till seventh year.

Farmers do not apply any farm input like chemicals, pesticides etc. A limited number of farmers are applying vermicompost. The grass near the fields is cut and spread in the field which after decomposing provides the nutrition to the plants. No outside labour is hired by the farmers for carrying out farm operations. They work in each other's field and carry out all the necessary farm operations. Average number of mandays required for carrying out field operation in a season varies from 250-300 per ha. The wastages during production and harvesting due to rodents and heart rot account for a loss of 8 to 10 percent.

❖ Post Harvest Practices

- Harvesting

The fruits are harvested twice a year in summer and winter as below:

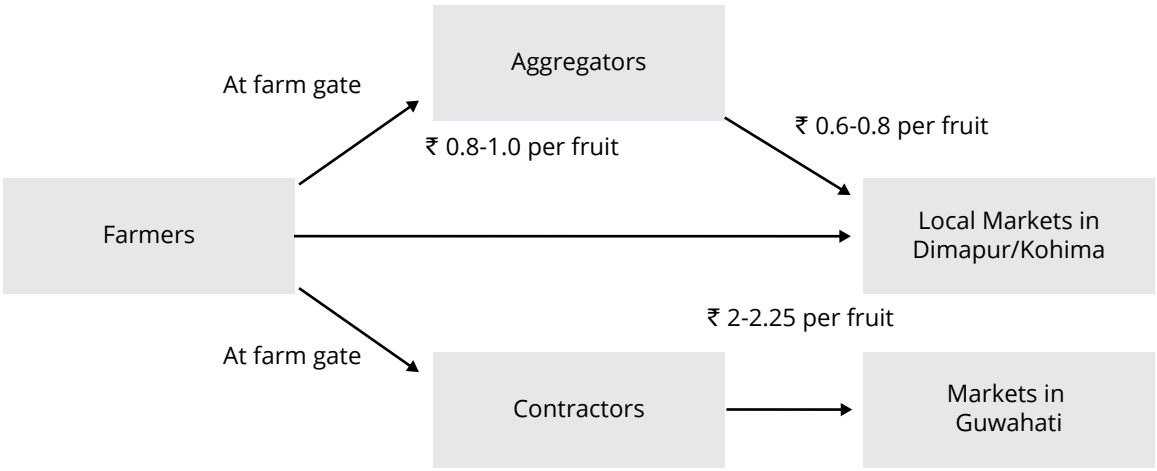
Crop	Flowering	Harvesting
Summer	March-April	July-August
Winter	July-September	November-January

The average yield per ha is 30-35 MT per ha which includes both summer and winter harvest. During the first year, the production is nearly 40 percent of the total yield (optimum yield), which goes up to 80 percent and 90 percent during the second and third years of harvest respectively.

- Value Addition at Farm Level

Farmers do not carry out any kind of value addition at the farm level except size grading. The produce moves through the following marketing channels:

Figure 62: Marketing Channel of Pineapple in Nagaland



Farmers take the produce to local markets in Dimapur – Murgi Patti, New Market and Old Daily market, where they sell to the aggregators/wholesalers. Post-harvest loss during transit from field to market is around 1 percent. However, due to poor connectivity, limited transportation facility and less volumes, the farmers are sometimes bound to sell the produce to the aggregator who collects it from the farm gate.

❖ Marketing and Logistics

The transportation of fruits from Village to the markets in Dimapur or Guwahati is done through Tata ACE/minitruck, which can carry 2000-2500 fruits. The transportation cost from Molovom village to Dimapur is ₹ 1000-2000 (₹ 0.80-1.0 per fruit) and from Molovom to Guwahati is ₹ 4500-5000 (₹ 2-2.25 per fruit). The aggregator who collects the produce from farm gate usually takes it to distant markets such as Guwahati for better price realisation. The post-harvest losses during transit range 5-6 percent. During peak season, 10-20 mini trucks are loaded from Molovom on a daily basis. At the wholesaler's and retailer's level, average post-harvest and handling wastage accounts to 2 percent of the produce value.

Table 36: Price Build-up of Pineapple from Farm Gate to Dimapur (per piece)

Price Build-up	Amount (in ₹)	Price Mark-up (₹ Per Piece)	% Contribution
Farm gate price	8.00	8.00	39%
Aggregator Margin (@20%)	1.60	9.60	8%
Loading/Unloading	0.20	9.80	1%
Transportation	0.50	10.10	2%
wastage@ 1%	0.10	10.20	0%
Wholesaler (@30%)	3.06	13.26	15%
wastage@ 2%	0.27	13.53	1%
Retailer (50%)	6.76	20.29	33%
wastage@ 2%	0.41	20.70	2%

Source: *ISAP analysis from various stakeholders' interaction*

Table 37: Price Build-up of Pineapple from Farm Gate to Guwahati (per piece)

Particular	Amount (in ₹)	Price Markup (₹ Per Piece)	% Contribution
Average selling price of farmers	8.00	8.00	34%
Loading/Unloading	0.20	8.20	1%
Transport to Guwahati	2.00	10.20	9%
Cost of wastage (@ 5% till Main Market)	0.51	10.71	2%
Wholesaler's Margin @40%	4.28	14.99	18%
Wastage (@ 2% wholesale level)	0.30	15.29	1%
Retailer's Margin (@50%)	7.65	22.94	33%
Wastage (@ 2% retail level)	0.46	23.40	2%

Source: *ISAP analysis from various stakeholders' interaction*

However, there are times when the price in the market is so less, that the farmers are forced to leave their produce in the field. Pineapple is not being processed at commercial level in the state. At the time of field visit in end of February, as the season was coming to an end, the wholesale price was ₹ 20 per piece in the New Market and retail price was ₹ 25 per piece in the Old Daily Market.

ICCOA - Direct Procurement from Farmers – A Case Study

During the visit to Nagaland, a meeting was held with officials from ICCOA. ICCOA is directly procuring pineapple from the farmers as per the client's demand for which they pay a premium of 20-30 percent above the market price. The produce is picked from the farmers' field, packaged in CFB boxes by labourers and then transported to the railway station by means of a mini carrier of 2.5 MT capacities. This carriage costs around ₹ 1500 from farm gate to Dimapur railway station (30-35 km), thus the transportation cost comes to around ₹ 0.60 per kg (₹ 0.90 per fruit). From Dimapur to Kolkata, the produce is shipped via a goods train, which costs around ₹ 3.5 to 4 per kg. The wastages during rail transport range from 2-3 percent.

During summer season last year (2011), ICCOA procured approximatelly 6 MT of pineapple from the farmers directly. ICCOA is implementing Organic Cluster Project (OCP) in Molvom (Dimapur) and Gaili (Peren) for pineapple.

ICCOA is involved in training of farmers on organic farming of pineapple, ginger, turmeric, passion fruit and Naga chilli. It becomes easy to procure by making farmers' group for a particular crop in a cluster. They are working to make farmers' groups in the production cluster villages for potential crops. Along with government bodies they are working to improve the post-harvest practices and certification of organic farming.

Their model of procurement of pineapple can be implemented in other places also by improving the cultivation, post-harvest and linkage practices. This will be helpful to directly procure from farmers and reduce the transaction cost and wastage.

Conclusion

Pineapple which is a very significant crop of the North East is also one of the traditional crops of the region and has abundant potential in terms of production and productivity. The key points which have emerged out of discussions with various value chain actors and field visits are as follows:

- Key Observations:
  - In most of the states, the farmers do not apply any farm inputs, so the produce is organic by default and can be positioned as a premium product. However, in Assam, where the pineapple cultivation is carried out on plain area, the farmers are well-versed with the cultivation practices. They are applying fertilisers, insecticides, pesticides and irrigation as per their affordability.
  - Farmers in Tripura have started adopting staggered planting which is leading to the availability of pineapple for 5-6 months of the year.
- Strengths/USP:
  - In all the states and regions visited, except Assam, there are no expenses on fertilisers and chemicals, making the produce largely organic.
  - The cultivation practices are labour-intensive with labour employed for almost all the activities from land preparation to harvesting.

- Issues in Pineapple Cultivation:
  - The plantations are very congested and the plant to plant spacing is very less, which leads to low productivity.
  - No technological intervention is carried out and the crop is cultivated in a traditional method which costs a huge amount of labour and time. Mechanisation of cultivation practices, especially harvesting would save on the time and resources.
- Issues in Pineapple Marketing:
  - During the peak season, the markets are covered with big heaps of pineapple, which leads to a glut in the market. Of the total production, barely 67 percent of the fruit is processed, the rest being consumed in the fresh form, which leads to a very low price.
  - There is no regular market in most of the production zones and a large quantity of pineapple gets wasted in the field itself.
  - No value addition is being undertaken by the farmers at the field level. The fruit being perishable has a short shelf life. The absence of any kind of cold chain adds to the post-harvest wastages.

Citrus

The North Eastern Region where citrus is cultivated in valleys, sub-mountane areas and in low hills, has been identified as one of the major centres of diversity for citrus. The Khasi Mandarin is the most important commercial citrus crop being grown in the hilly regions of NER. Another important citrus crop is Assam lemon, which is a seedless variety of lemon and is under cultivation to a considerable extent in the region.

Khasi mandarin is well-known for its quality, colour development, unique sugar acid blend and shelf life which makes it the most sought after and popular citrus cultivar in the North Eastern Region of the country. It covers the largest area in the region due to its commercial value. Assam and Meghalaya have the maximum area and production of Khasi mandarin.

Assam lemon, developed from a chance seedling, is quite popular and is grown on a commercial scale in Assam and other states. In the state of Manipur, Kachai lemon – a very high yielding variety of rough lemon mainly cultivated in Kachai village of Ukhrul district is a popular variety.

The value chain of lemon has been studied in detail in Assam while that of Khasi mandarin has been detailed in Assam, Arunachal Pradesh, Manipur, Meghalaya, Mizoram and Sikkim.

Assam

Khasi mandarin and Assam lemon are the major focus citrus crop groups identified in Assam.

Kamrup, Tinsukia, Karbi Anglong and North Cachar Hills are leading production clusters of Khasi mandarin while Barpeta, Nalbari, Darrang, Kamrup have been identified as the major production clusters of Assam lemon.

Khasi Mandarin

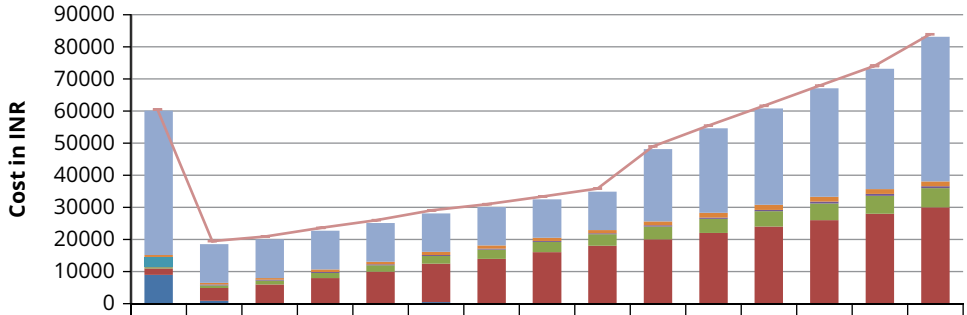
❖ Production Practices

The Khasi mandarin orchards are nearly 50-100 years old, which has led to low productivity of the fruits. One hectare orchard accommodates 300-400 trees. The fruit bearing per tree is nearly 300-400 fruits. The government is encouraging the farmers to use budded plants for planting new orchards and the rejuvenation of old orchards. However, the farmers are less interested in carrying out the rejuvenation of the orchards because they are getting produce from old orchards effortlessly while the new plantation will take time in fruiting. There is very limited input used in the orchards. Only few farmers who receive fertilisers and micronutrients from government department apply it to their fields.

The planting of budded plants is carried out before the monsoons between May and August.

As per the discussions held with the farmers, the cost of cultivation of Khasi mandarin was calculated as follows:

Figure 63: Cost of Khasi Mandarin Production in Assam



	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Labour cost (Rs./Manday)	4500	1200	1200	1200	1200	1200	1200	1200	1200	2250	2625	3000	3375	3750	4500
Irrigation	500	500	500	800	800	1000	1000	1000	1000	1200	1500	1500	1500	1500	1500
Staking	3000														
Insecticide/Pesticide	200	300	300	300	300	300	300	300	300	450	450	450	600	600	600
FERTILIZER	400	800	1200	1600	2000	2400	2800	3200	3600	4000	4400	4800	5200	5600	6000
FYM/VERMICOMPOST	2000	4000	6000	8000	1000	1200	1400	1600	1800	2000	2200	2400	2600	2800	3000

Source: *ISAP analysis from farmers' interaction*

Cultivation cost is worked out from planting till 15th year when the yield reaches its optimum level. Labour cost is the major cost in the first year of cultivation as labour is employed for land preparation, cleaning, planting and other farm operations. During the later years, the labour cost increases with the years as labour is generally employed for various intercultural operations and harvesting. The mandays requirement is 250-300 mandays per ha for fully grown orchard.

The planting material cost in the first year is nearly 15 percent of the total cost, 5 percent during second year and 2 percent in the fifth year, which is mainly the cost of filling the gaps and replacing the mortal plants.

Thus, the cost of cultivation of per kg is estimated at ₹ 8.6, which has been calculated taking into consideration the fact that the trees start bearing fruits in the sixth year and optimum yield is obtained till the eleventh year of bearing.

❖ Post-harvest Practices:

- Harvesting

The orchard starts bearing in the sixth year from planting, fruit bearing is around 50 fruits per tree in the sixth year which goes up to 150 fruits in the seventh year and 200-400 fruits in the subsequent years; per kg cost of production comes to around ₹ 8-9. However, at the production level, about 5-6 percent of the fruit is lost due to fruit drop and citrus decline. Harvesting starts in the month of November which extends up to February. The big farmers with 100 or more than 100 trees sell the fruit to the contractor before harvesting, at a pre-fixed price; the contractor does the harvesting to sell the fruit to the wholesaler in the main market.

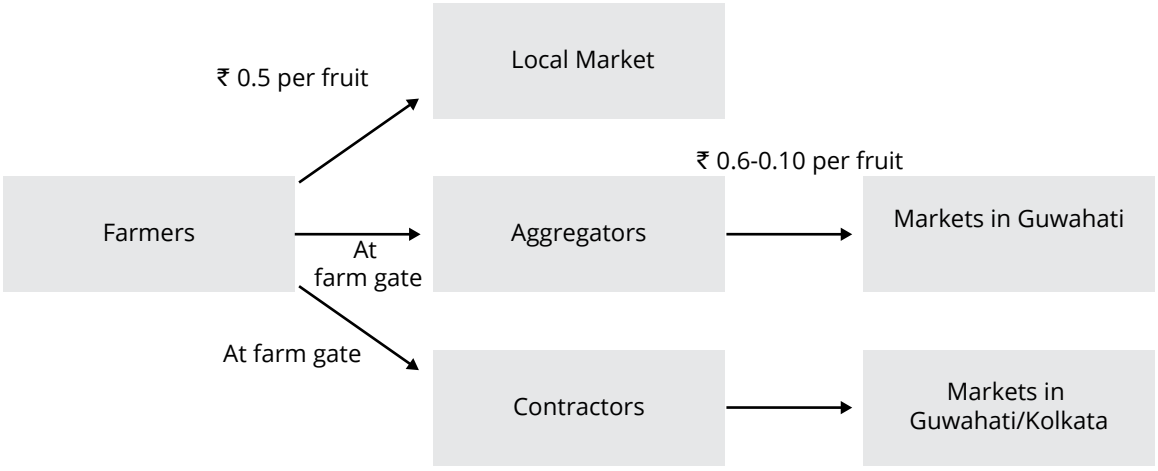
- Value Addition at Farm Level

Farmers do the manual grading of fruits in orchards only. They separate the damaged fruits and grade the fruits in three different sizes and pack them in gunny/plastic bag. When the orchard is sold to traders then all these activities are done by hired labour.

- Marketing and Logistics

Following channels for the marketing of the produce are adopted in Assam:

Figure 64: Marketing Channel of Khasi Mandarin in Assam



The farmers take the produce to the nearest market in plastic/gunny bags of capacity 30-35 kg. The produce is carried on the rooftop of a bus/jeep etc. which costs ₹ 10 per gunny bag. The farm gate price varies from ₹ 2-5 per piece (₹ 20 per kg). Per kg transportation cost is approximately ₹ 0.60. During transportation, the losses are up to 5 percent when transported from the village to Main market in Guwahati. At the wholesaler and retailer level, the losses are approximately 2 percent.

One of the major constraints is that farmers are not able to access the markets in Guwahati and they sell their produce to the contractors/middlemen at the farm level. Either they are selling small quantity of citrus in local markets or orchards to the contractors; there is no organised procurement system which can help the farmers in realising better price.

Table 38: Price Build-up of Khasi Mandarin from Farm Gate to End-consumer in Guwahati (per kg)

Price Build-up	Amount (in ₹)	Price Mark-up (₹ Per kg)	% Contribution
Farm gate price	20.00	20.00	39%
Aggregator Margin @20%	4.00	24.00	8%
Loading/unloading	0.20	24.20	0%
Transportation	0.06	24.26	0%
wastage@ 5%	1.21	25.47	2%
Wholesaler (@30%)	7.64	33.11	15%
wastage@ 2%	0.66	33.78	1%
Retailer (50%)	16.89	50.67	33%
wastage@ 2%	1.01	51.68	2%

Source: *ISAP analysis from various stakeholders' interaction*

Assam Lemon

Assam lemon is a locally grown variety which is elongated in shape, unlike the North Indian lemon which is round in shape. Many farmers are growing it in the backyard of their houses but commercial level cultivation is also done to sell in the distant markets in Assam and neighbouring states.

Assam Lemon in Market in Assam

❖ Production Practices

Farmers grow 10-20 plants in the backyard, for which they generally use their own planting material grown through stem cuttings and layering for propagation. The planting is carried out between the months of May and August before the onset of Monsoon. Nearly 800-900 plants are accommodated in one ha in a commercially managed orchard.

During the first year, 300-400 mandays are required approximately for farm operations such as cleaning, land preparation, planting etc., while in the subsequent years, 200-250 labour mandays are required for various farm operations.

❖ Post-harvest Practices:

- **Harvesting:** The plant starts bearing fruit in the second year, July to September is the peak time of harvesting. About 100-120 fruits are borne per tree under normal conditions. Fruit is borne during the entire year, off season fruit can be harvested in March. Nearly 8-10 percent of the fruit is lost at the field level due to insects, pests and diseases. Harvesting is done when the fruits gain full size.
- **Value Addition at Farm Level:** Only packing in gunny/plastic bags is done.

- **Marketing & Logistics:** The farmer generally transports the fruit in gunny bags to the nearby markets; one gunny bag accommodates about 50 kg of fruit. The transportation is through private vehicles such as bus/mini trucks which costs ₹ 10 per gunny bag. The post-harvest losses during transportation are nearly 3 percent, while at wholesaler and retailer level, the handling losses are about 2 percent. In the local market, the farmers sell the fruit to the aggregators who then further sell it to the wholesalers. Big farmers having more than 100 plants per orchard sell the orchard to the contractor who then gets the harvesting done and sells the fruit to the wholesaler or retailer directly.

Lemon Village Coming up in Assam

First tried out in Japan and Thailand, a concept village is coming up in a sleepy hamlet in Assam's Nalbari district where thousands of lemon trees will be planted to improve local economy. Under the concept of 'one village one product', the North East Financial Development Corporation along with a leading NGO is setting up what it describes as a 'lemon village' at Arora, not very far from Guwahati.

The institution's chairman-cum-managing director, Kashi Nath Hazarika, says that the concept, which has been a success in Japan and Thailand, is being tried out for the first time in the Northeast with planting of nearly 10,000 lemon saplings.

Assam Lemon farmer in Arora village, Nalbari

Hazarika says the yield, which will find a ready market among local population, will generate annual average revenue of ₹ 10 lakh per year. He exudes confidence that the climatic condition was suitable for the growth of lemon and the village will be able to generate its own market for the product. Hazarika during the recent launching of the scheme urged youth to set up plants for processing lemons from 2012 onwards after mass-scale production begins.

Arora is an agrarian village with nearly 600 families most of whom are farmers. Initially, 250 farmers have been provided with lemon saplings. The NEDFI has facilitated one-time funding for initial requirement of manure and insecticide and has engaged a technician as mentor for the project. Hazarika hoped in the third year around 10,000 lemon plants will be grown in the village which will yield at least 10 lakh lemons. "The availability of such a large quantity of lemons from a single village will not only help the farmers, but also benefit the market."

Table 39: Price build-up of Assam lemon from Farm-gate in Boko to Guwahati (per 80 piece)

Price Build-up	Amount (in ₹)	Price Markup (₹ Per 80 Piece)	% contribution
Farm gate price	80.00	80.00	40%
Aggregator Margin @20%	16.00	96.00	8%
Loading/unloading	1.00	97.00	1%
Transportation	5.00	102.00	3%
wastage@ 3%	3.06	105.06	2%
Wholesaler (@30%)	31.52	136.58	16%
wastage@ 2%	2.73	139.31	1%
Retailer (40%)	55.72	195.03	28%
wastage@ 2%	3.90	198.93	2%

Source: *ISAP analysis from various stakeholders' interaction*

Manipur

Tamenglong, Ukhrul and Chudachandpur are the major districts of citrus production in Manipur. Khasi Mandarin is the most important commercial citrus species grown up to an altitude of 1000 m above mean sea level and is the most popular cultivar in the region.

❖ Production Practices

On an average, there are 100-200 trees per family, out of which 60-70 percent are fruit-bearing trees. ICAR Research Centre at Imphal and KVKs are providing technical support for citrus cultivation in the state. The farmers buy the planting material (budded seedlings) from nurseries, the cost of which is around ₹ 10 per seedling. Approximately 300 seedlings of citrus are required for planting in one ha, planting is done at a distance of 5.5 X 5.5 m. Labour is employed for clearance of jungle and land development. After clearing the land, land preparation is done and digging and filling up of pits is carried out. All these operations are carried out by hired labour. After the filling up of the pits, the transplanting is carried out. For land preparation and planting operations, approximately 100-110 labourers are employed. The labour rates are ₹ 120 to ₹ 130 per manday.

During the subsequent years, the farmers do not employ much labour and farm operations like weeding etc are done manually by family members only. The application of manures, fertilisers and pesticides is negligible. However, nowadays some farmers have started applying lime in the fields. The orchards are rain-fed with no irrigation facitilities during the growth years.

Although, the package of practices has been developed by the research centre, farmers in the field are following traditional practices. Most of the citrus orchards in the state are very old and senile. Yield of existing orchards can be improved significantly by rejuvenation. The state government has received a huge fund from Central government for citrus rejuvenation; however, a very limited difference is being seen on ground.

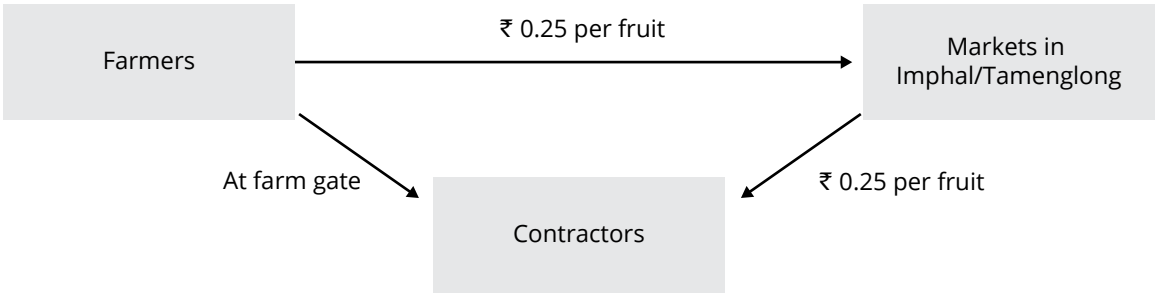
❖ Post-harvest Practices:

- **Harvesting:** A good bearing tree of 20 years can produce around 400-500 fruits (60-70 kg) per year. However, at the field level, due to not harvesting the fruit on time, the losses range from 10-20 percent.

- **Marketing & Logistics:** The harvested fruit is generally packed in jute bags at the farm level for transportation; one bag accommodates on an average 200 pieces (30-35 kg). The farmers take the produce to the markets in Imphal or Tamenglong by jeep, depending upon the nearness to the market and sell it to the wholesalers. The transportation cost to Imphal (70-80 km) is ₹ 50 per bag of 200 pieces (30-35 kg), thus the per kg logistics cost is ₹ 1.50-1.80 per kg (₹ 0.25 per fruit).

Occasionally the wholesalers buy the fruits from the farm gate itself and transport it to the market. In such cases, the transportation cost is borne by the wholesaler. Upto the point the produce reaches the retailers, the wastages during handling range from 4-5 percent, while at the retailers end, due to rejection by customers, the losses vary from 5 to 8 percent.

Figure 66: Marketing Channel of Khasi Mandarin in Manipur



The wholesale selling price of the fruit in Imphal is ₹ 250 per 100 pieces (15-17 kg) for good quality fruits, ₹ 120-150 per 100 pieces for average quality fruits and ₹ 70 per 100 pieces for poor quality fruits. The price also depends on seasonality and demand supply scenario. The retail price in the Imphal market is around ₹ 60-80 per kg (5-8 pieces).

Financial Assistance:

- Manipur has got special financial package of ₹ 218 crore from Prime Minister's office for next five year for revival of citrus orchards in the state.
- In addition to the above, ₹ 1.5 cr has been approved for setting-up of pack-houses and ₹ 21 crore for processing unit (from DoNER, SFAC & MoFPI).

Table 40: Price Build-up of Khasi Mandarin from Farm Gate to Imphal Market

Price Build-up	Amount (in ₹)	Price Markup (₹ Per kg)	% Contribution
Farm gate price	16.00	16.00	39%
Aggregator Margin @20%	3.20	19.20	8%
Loading/unloading	0.20	19.40	0%
Transportation	0.06	19.46	0%
wastage@ 5%	0.97	20.43	2%
Wholesaler (@30%)	6.13	26.56	15%
wastage@ 2%	0.53	27.09	1%
Retailer (50%)	13.55	40.64	33%
wastage@ 2%	0.81	41.45	2%

Source: *ISAP analysis from various stakeholders' interaction*

Issues and Challenges

Currently, the citrus/mandarins of Manipur are losing their importance in the market due to various reasons; some of them are as follows:

- Lack of awareness amongst farmers about modern package of practices and inputs usage.
- Major production area for Citrus is in Tamenglong district of Manipur and every year Manipur Small Farmers' Agri-business Consortium organises Orange Festival in the district. However, over a period of time, the focus of the festival has shifted from promoting Oranges to spending on Orange Queen (A Fashion Show organised as part of the Orange Festival).
- Citrus orchards in the state are very old (above 50 years) and have started decaying due to lack of care and maintenance.
- Citrus decline has become a major threat to the orchards in the state due to improper planting material, inadequate nutrition, poor management practices and damage caused by pests and diseases.
- Productivity has declined drastically over a period of time.
- Accessibility to production area is the biggest challenge.
- Although the quality of citrus is very good, however, marketing is a major issue.
- Transportation cost in Manipur is very high, approximately four times as that in any other part of the country and this makes any product of Manipur uncompetitive in the market and same is applicable for citrus.
- Marketing facilities & infrastructure is non-existing in the state, specifically pack-house, waxing facility, storage facilities etc.
- KVK has started training farmers on orchard maintenance – which includes plant rejuvenation practices, application of fertiliser and pesticides, pruning and proper irrigation etc.
- Demonstration of these practices have been organised at KVK campus as well as at farmers' fields, however, there is still resistance to adoption of these practices amongst the farmers.
- Current political situation, issues of underground insurgency groups and lack of seriousness at state government level for revival of citrus crop in the state are few factors, which have restricted the development of citrus in the state.

Meghalaya

The main citrus variety cultivated in Meghalaya is Khasi mandarin. Major production clusters of Khasi mandarin in Meghalaya are East Khasi Hills, West Khasi Hills and Jaintia Hills. Majority of the orchards are very old upto 80-150 years.

Production Practices

Due to less plant to plant spacing, the plantations are congested. Number of trees per acre varies from 200 to 300 (500-750 per ha). For new plantations, the planting material costs ₹ 15-25 per plant. The sowing for new orchards is carried in the months of June-July.

Most of the farmers apply FYM/Vermicompost to enhance the fertility of soil. The farmers are not using any kind of chemical fertiliser in the orchards. Use of insecticides and pesticides by

the farmers in the region is negligible. Approximately 10-15 percent of the fruit is lost in the field due to insect/pests (trunk borer, leaf miner, mealy bug white flies, fruit flies and sucking moth), diseases (citrus canker, gummosis, root rot and powdery mildew) and fruit drop. Only recently, for last 2-3 years few farmers have started using insecticides/pesticides.

Weeding is mainly done manually by the farmers with few exceptions using weedicides (glysophate). Majority of crops in the region are monsoon-dependent.

On an average 250-300 labour mandays per acre are engaged for doing various cultivation practices in citrus. The cost is around ₹ 200 per day for a male labourer while it is ₹ 100 per day for a female labourer:

❖ Post-harvest Practices

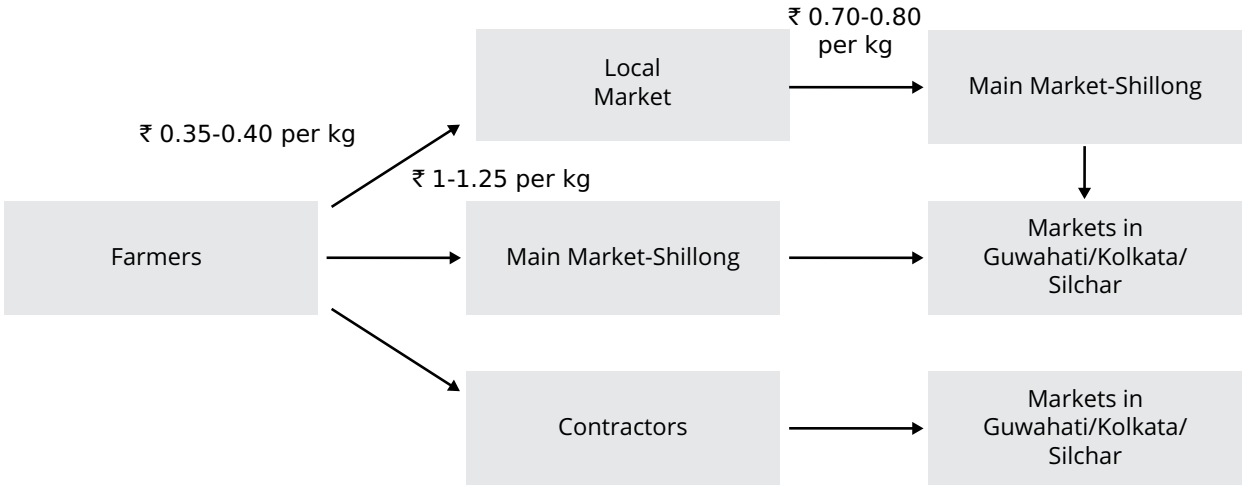
- **Harvesting:** The plants start bearing fruit in November–December and the fruiting period continues up to February. Average yield in the region is nearly 15-20 MT/Acre.
- **Value Addition at Farm Level:** Manual grading of fruits based on sizes (large: 100-150 gms, medium: 80-100 gms, small: 40-50 gms) is carried out by the farmers.
- **Marketing & Logistics:** The fruit is generally packed in bamboo baskets (small basket accommodates 55-60 kg and big basket accommodates 80-85 kg). The farmers carry the bamboo baskets on head loads to the nearest transportation point and from there it is transported by jeep/maxi which cost the farmers ₹ 20-25 per bamboo basket. Thus, the per kg transportation cost for local market comes to around ₹ 0.35 to 0.40 per kg.

Farmers sell the produce to the aggregator who carries it to the main market by mini trucks or buses. Logistics cost for mini truck and bus is ₹ 40-50 per basket and ₹ 30-35 per basket respectively. However, this cost varies as per the distance from the main market. During transportation from farm gate to local market, the post-harvest losses are around 0.5 percent, while from local market to main market, the losses are upto 2 percent.

The produce is sold on the basis of *bhar* (1 small *bhar*=32 pieces and 1 big *bhar*=64 pieces). Price of product varies with the sizes (small, medium and large).

The marketing channels by which the produce moves in Meghalaya are:

Figure 67: Marketing Channel of Khasi Mandarin in Meghalaya



At the Wholesaler's Level and Retailer's Level, the losses are one percent each.

Table 41: Price Build-up of Citrus from Farm Gate to Consumers in Shillong

Particular	Amount (in ₹)	Price Markup (₹ Per kg)	% Contribution
Average Selling of Farmers	32.00	32.00	56.82%
Transportation to Local Market	0.70	32.70	1.24%
Cost of wastage (@ 0.5% till local market)	0.16	32.86	0.29%
Aggregator charges (10%)	3.29	36.15	5.84%
Transport to Main Market	1.50	37.65	2.66%
Cost of wastage (@ 2% till Main Market)	0.75	38.40	1.34%
Wholesaler's margin (@15%)	5.76	44.16	10.23%
Cost of wastage (@ 1% wholesale)	0.44	44.60	0.78%
Retailer's Margin (@25%)	11.15	55.76	19.80%
Cost of wastage (@ 1% Retail level)	0.56	56.31	0.99%

Source: *ISAP analysis from various stakeholders' interaction*

Sikkim

The only mandarin variety cultivated all over Sikkim is Khasi Mandarin which is also known as Sikkim Mandarin. Major production clusters are East, South and West districts. The orchards are around 60 years old. The rejuvenation of old orchards is very limited. One ha area accommodates 350-400 plants.

❖ Production Practices

Labour cost is one of the major cost in the first year as manpower is used for land preparation and planting. In the subsequent years, the labour requirement reduces lesser activities.

❖ Post-harvest Practices:

- **Harvesting:** The fruits are harvested between October–February. At the field level, due to fruit drop, the crop loss in the production stage is 8-10 percent. The yield of the old orchards is nearly 200-250 fruits per plant.
- Value Addition at Farm Level.
- Marketing & Logistics.

The marketing channels followed by the farmers are:

1. Farmer ------- Aggregator -------- Wholesaler (Gangtok) ------- Retailer --------- Consumers
2. Farmer ------- Wholesaler (Gangtok) ------- Retailer -------- Consumers
3. Farmer -------- Traders/Contractor (village level) ------- Wholesalers (Siliguri/Kolkata) ------- Retailers -------- Consumers

The fruit is manually sorted and graded as per the size. The fruits are packed in gunny bags. In some cases, the farmers sell the produce to the aggregator at the village level, who then takes it to the wholesale market in Gangtok. The fruits in gunny bags are then carried on the rooftops of private vehicles to the market in Gangtok (20-30 km) and sold to the wholesaler. During transportation to Gangtok, the post-harvest losses due to handling are about 5 percent, while when carried to the distant markets of Siliguri and Kolkata, the post-harvest and handling losses are nearly 10 percent.

Another channel through which the produce reaches the market is through the trader/ contractor at the village level who buys the crop at a pre-fixed price before harvesting. He is responsible for the harvesting. Once the crop is harvested, the traders/contractors carry the fruits to the distant markets in Siliguri and Kolkata.

Table 42: Price Build-up of Mandarin from Farm Gate to Gangtok (per kg)

Price Build-up	Amount (in ₹)	Price Markup (₹ Per kg)	% Contribution
Farm gate price	20.00	20.00	40%
Aggregator Margin @20%	4.00	24.00	8%
Loading/unloading	0.20	24.20	0.4%
Transportation	0.70	24.90	1.4%
wastage@ 5%	1.25	26.15	3%
Wholesaler (@30%)	7.84	33.99	16%
wastage@ 2%	0.68	34.67	1%
Retailer (40%)	13.87	48.54	28%
wastage@ 2%	0.97	49.51	2%

Source: *ISAP analysis from various stakeholders' interaction*

Table 43: Price Build-up of Mandarin from Farm Gate to Siliguri (per kg)

Price Build-up	Amount (in ₹)	Price Markup (₹ Per kg)	% Contribution
Farm gate price	22.50	22.50	39%
Loading/unloading	0.20	0.20	0.3%
Transportation	1.50	24.00	2.6%
wastage@ 10%	2.40	26.40	4%
Contractor's Margin (@40%)	10.56	36.96	18%
wastage@ 2%	0.74	37.70	1%
Retailer (50%)	18.85	56.55	33%
wastage@ 2%	1.13	57.68	2%

Source: *ISAP analysis from various stakeholders' interaction*

NERAMAC and SIMFED are supporting to realise the better price but there is competition with Bhutan Mandarin in the markets of Siliguri and Bangladesh. During the end of the season (February/March), price at retail level reaches ₹ 100-120 for 12 pieces of orange.

Conclusion

- Issues in Citrus Cultivation:
  - The overall productivity level of North East Region is lagging behind compared to other states such as A.P., Karnataka, TN and MH.
  - Majority of mandarin orchards are senile and need rejuvenation.
  - Farmers use seeds from previous crops to raise the seedlings, which are grown without any care which leads to poor quality of planting material and hence low productivity.
  - Poor investment capability of the farmers has lead to dependency on govt. subsidy for rejuvenation, inputs, equipments and nutrient requirements.
  - Farmers practice traditional cultivation methods in the absence of technical know-how which has led to deterioration of the orchards due to various insect pests and diseases, specifically citrus decline.
  - Majority of farmers sell their produce in the nearby local markets without any value addition.

- Though govt. regulated market are operational (catchment area of 100-200 km) still dependency of farmers on the intermediaries & commission agents due to lack of proper F&V handling infrastructure.
- Cash requirement of farmers forces them to distress sell in case of mandarin, ginger & turmeric.
- Lack of proper logistics arrangements for fruits and vegetables adds higher transportation cost, lack of fruit processing industry due to which the farmers have to sell the produce at throw away prices to the traders.

Ginger

Ginger is an important spice crop in the world. It is cultivated in almost all the states of the country; however, the North Eastern Region is one among the highest ginger productivity areas in the world. The agro-climatic conditions of North East India, characterised by warm and humid summers with abundant rainfall and cool winters are favourable for ginger cultivation. The North Eastern States of Arunachal Pradesh, Mizoram, Sikkim, Meghalaya, Manipur, Tripura and Nagaland account for 24.6% of area under ginger and 24.1% of India's ginger production. The ginger produced in NER also has higher oil and oleoresin content, making it one of the best in quality.

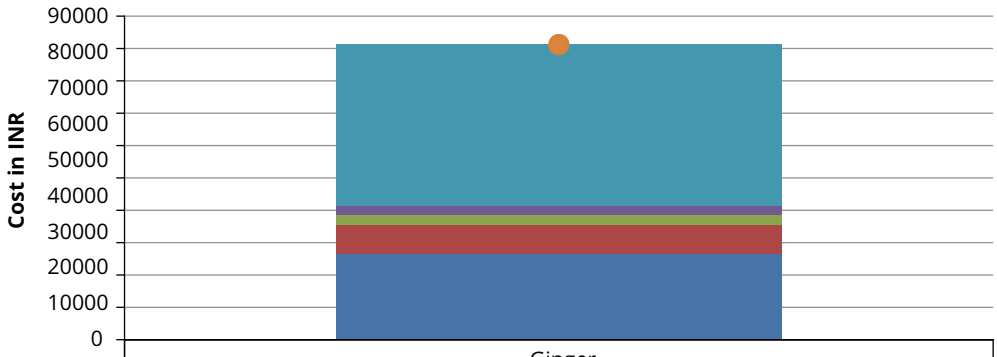
The traditional system of ginger cultivation in the North East is *jhum* system or shifting cultivation which is prevalent in all states except Sikkim.

Assam

Maran and Nadia are the most popular varieties of ginger grown in Assam. Major identified production clusters are Sonitpur, Udalguri, Golaghat, Tinsukia, Karbi Anglong and North Cachar Hills.

❖ Production Practices

Figure 68: Production Cost of Ginger in Assam



	Ginger
Labour	45000
Irrigation	2200
Fertilizers	2900
Manures	8000
Seed/Planting Materials	24000
Total	82100

Source: *ISAP analysis from farmers' interaction*

Approximately 1 to 1.2 MT seed ginger is used for planting one ha area. Planting is carried out in month of March-April. The farmers generally do not use much fertiliser; those who can afford the fertilisers do apply it in small quantity. Nearly 300 labour mandays are required for various farm operations such as land preparation, weeding and harvesting. At the field level, the losses are nearly 8-10 percent of the crop value due to pests and diseases.

❖ **Post-harvest Practices:**

- **Harvesting:** Harvesting of the rhizomes starts in October which continues till January.
- **Value Addition at Farm Level:** The farmers do the cleaning, washing and packing of the rhizomes before taking it to the markets. The rhizomes are packed in gunny bags which accommodates 50 kg each.
- **Marketing & Logistics:** The farmer usually sells the rhizome to the aggregator at the village level, who then takes it to the main market where it is sold to the wholesaler. The post-harvest and handling loss during transportation and at wholesaler's and retailer's level is about 2 percent each.

The yield comes to 8-10 MT per ha. Thus, the production cost per kg comes to be ₹ 10 per kg. The average selling price of the farmer is ₹ 12-15, thus the farmer earns about ₹ 14000 per ha. Excluding the cost of family labour add to more profit.

Most prevailing marketing channel of ginger in the region is as below:

Figure 69: Marketing Channel of Ginger in Assam

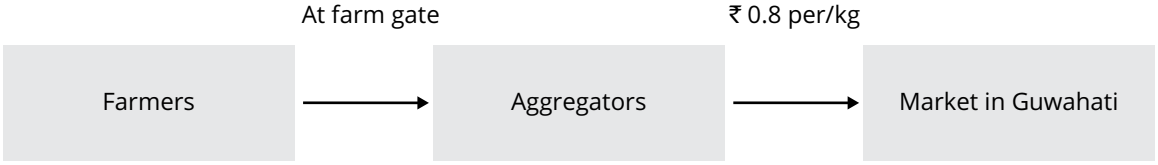


Table 44: Price Build-up of Ginger from Farm Gate in Boko to Guwahati (per kg)

Price Build-up	Amount (in ₹)	Price Markup (₹ Per kg)	% Contribution
Farm gate price	10.00	10.00	34%
Aggregator Margin @30%	3.00	13.00	10%
Loading/unloading	0.40	13.40	1%
Transportation	0.80	14.20	3%
wastage@ 2%	0.28	14.48	1%
Wholesaler (@30%)	4.35	18.83	15%
wastage@ 2%	0.38	19.21	1%
Retailer (50%)	9.60	28.81	33%
wastage@ 2%	0.58	29.38	2%

Source: *ISAP analysis from various stakeholders' interaction*

In most ginger growing districts except Karbi Anglong, farmers are not realising better price due to involvement of aggregators and farmers' inability to sell the produce directly in the markets. Established ginger pack house is yet to be utilised so that farmers can supply directly to pack house.

Meghalaya

In Meghalaya, ginger is cultivated on slopes. The most popular varieties under cultivation are Nadia and Vara in the identified major cluster of Ri Bhoi, East Garo Hills and West Garo Hills. Nadia is popular due to its low fibre content.

❖ Production Practices

Farmers generally use their own seeds (rhizomes) for cultivation purpose. The seed rate varies from 1 MT to 1.5 MT per ha. Sowing is mainly carried out in the month of April-May in the region and harvesting starts from November and goes on up to January. Farmers apply FYM/Vermicompost at the rate of 5-6 MT per ha. Use of chemical fertilisers, insecticides/ pesticides or weedicides is not practiced by the farmers in the region.

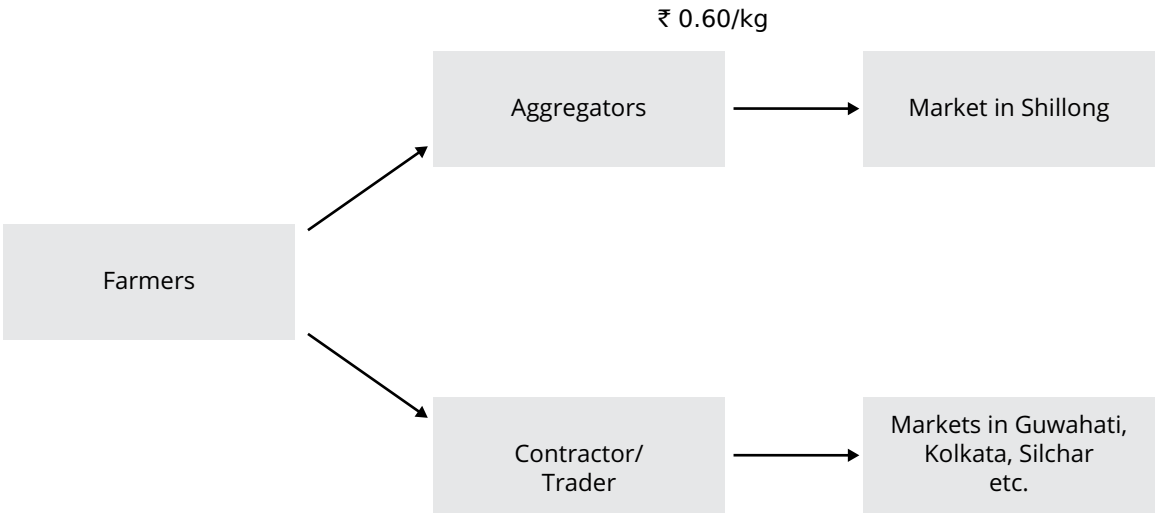
The farmers usually spread the straw, grasses and other plant residues on the ginger beds immediately after planting. This acts as mulch which protects the seedlings from rain, prevents weed growth, keeps the soil moist and soft and accelerates plant growth.

The crop is monsoon-dependent. Weeding is mainly done manually by the farmers. During the entire season from May to January, labour is employed for land preparation, intercultural operations and harvesting. The labour mandays used for ginger cultivation in 1 ha area range from 200 to 250. The rate of a male labour is ₹ 200 per day, while a female labourer charges ₹ 100 per day. In the field, the losses due to insects, pests and diseases range from 1-2 percent.

❖ Post-harvest Practices:

- **Harvesting:** Ginger attains harvest maturity in 8-9 months. Hence, the peak harvest starts from November and extends till January. On an average, 8-10 MT of ginger is harvested from a hectare.
- **Value Addition at Farm Level:** Farmers carry out the manual grading of rhizomes based on size (small, medium and large). Price of rhizomes varies with size. Most of the farmers sell the produce to the middlemen or aggregator or the trader from the distant market in the village itself. The rhizomes are packed in gunny bags of size 50 kg which costs the farmers ₹ 15-20 per gunny bag.
- **Marketing & Logistics:** The marketing channels followed by the farmers are as follows:

Figure 70: Marketing Channel of Ginger in Meghalaya



The farmers sell the ginger on the basis of rhizome size; small sized rhizomes for ₹ 5-6 per kg, medium sized for ₹ 8-10 per kg and large sized rhizomes for 12-15 per kg.

The aggregator/middlemen then carry the produce to the main market where it is sold to the wholesaler who sells it further to the retailer. The traders from other states i.e, Guwahati, Kolkata and Silchar, who come to the farm gate to collect the produce, carry the ginger to their respective markets in the state to sell it to the wholesalers and retailers. The transportation cost of one gunny bag from the village to the main market by jeep/bus varies between ₹ 30-40 depending on the distance. At the wholesaler's level and retailers' level, the post-harvest losses vary from 0.5 to 1 percent due to handling.

Table 45: Cost Economics of Ginger Cultivation in Meghalaya

Sl. No.	Particular	Amount (in ₹)
1	Planting Material (1-1.5 MT/ha)	60,000
2	Manures (5-6 MT/ha)	9,000
3	Fertilizers & Pesticides	0
4	Irrigation	0
5	Labour (including family labour)	50,000
6	Total Production cost	1,19,000
7	Average production cost (₹ Per kg)	13.5
8	Yield (in MT/ha)	9
9	Average Selling price (₹ Per kg)	10-12
10	Total income per ha. (in ₹)	90,000-108,000
11	Net loss (₹ per ha.)	11, 000-29,000

Source: *ISAP analysis from farmers' interaction*

The table above shows net loss of ₹ 11,000-29,000 per hectare, this loss is mainly due to consideration of high labour cost, which is in most of the cases, farmer's own family working

Table 46: Cost Build-up of Ginger from Farm Gate to Consumers

Particulars	Amount (in ₹)	Price Markup (₹ Per kg)	% Contribution
Production Cost	13.5	13.5*	
Average Selling price of Farmers	12	12	44.64%
Loading/unloading	0.4	12.4	1.49%
Carriage Cost (Gunny Bags ₹ 20 per 50 kg bag)	0.4	12.8	1.49%
Middlemen/Aggregator charges (10-15%)	1.86	14.66	6.92%
Transport to Main Market (₹ 30-40 per 50 kg gunny bag)	0.6	15.26	2.23%
Wholesaler's margin (25-30%)	4.46	19.72	16.59%
Cost of wastage (@ 0.5% wholesale)	0.1	19.82	0.37%
Retailer's Margin (30-35%)	6.8	26.62	25.30%
Cost of wastage (@ 1% Retail level)	0.26	26.88	0.97%

* After reducing the family labour cost, cost of production comes below the farm gate price.

Source: *ISAP analysis from various stakeholders' interaction*

in the field. If own labour is deducted, cultivation of ginger turns profitable. Similarly, manure used by the farmers is also not purchased from the market, it is mainly dung collected from domestic animals.

Sikkim

Major production belts in all four districts of Sikkim are as below:

North Sikkim: Lower Rongong, Lingdok, Nampatam, Nadey, Passingdong, Lum, Gor, Sangtok

East Sikkim: Whole area

South Sikkim: Poklok, Kamrang, Namchi, Singithang, Namthang, Rateypani, Melli, Barfung, Rangyang, Ynagyang, Temi, Namphing

West Sikkim: Tikjyek, Lungik, Rathang, Tikpur, Ambotey, Lower Buriokhop

Ginger is grown in all four districts upto 6000 mt. altitude hence production is less in North District which has higher altitudes. It is one of the major spice crops in the region which contributes 14 percent to the total ginger production on the North Eastern Region.

❖ Production Practices

Local varieties Bhaisey, Majaole and Gurubathaney etc. are used for cultivation. Farmers use the seed rhizomes preserved in the last season for the sowing purpose. The horticulture department also distributes seeds free of cost to the farmers but only a few farmers get the free seeds. In case, the farmer needs to buy the seed from the market, in the peak season, the cost reaches ₹ 1000 per 25 kg bag (₹ 40 per kg). The sowing of the seed rhizome is carried out in the February-end which extends up to April-end.

Farmers do apply FYM in the fields. Some farmers who have their own vermicompost units built with the subsidy from the Government Department use vermicompost as per the availability.

Sikkim has been declared as an Organic State, hence the use of chemicals and fertilisers is not allowed. A limited quantity of biofertilisers and biopesticides supplied by the govt. department are used, however, the farmers are reluctant to buy the organic fertilisers from the market. The crop is mainly rain-fed as irrigation facilities are limited in the state. Availability of labour for agriculture purpose is also a constraint. The labour requirement is 350-400 mandays which includes family labour. The manday cost is ₹ 150 per day plus one time food. No major insects, pests or diseases have been noticed in the area. However, sometimes there is damage due to soft rot. The losses during the production at the field level are about 5-6 percent.

The Horticulture Department is now supplying seed rhizomes of improved varieties which have minimised the occurrence of the diseases and insects and pests.

❖ Post Harvest Practices:

- **Harvesting:** The harvesting of rhizomes is carried out in October and continues up to January. The yield in one ha area is 5-6 MT of ginger rhizomes.
- **Value Addition at Farm Level:** The farmer carries out the cleaning and washing of the rhizomes at the field level which are then packed in gunny bags. A small gunny bag which accommodates 25 kg costs ₹ 10.

- **Marketing & Logistics:**

Table 47: Price Build-up of Ginger from Farm Gate to Gangtok (per kg)

Price Build-up	Amount (in ₹)	Price Markup (₹ Per kg)	% Contribution
Farm gate price	12.00	12.00	38%
Aggregator Margin @20%	2.40	14.40	8%
Loading/unloading	0.40	14.80	1%
Transportation	0.65	15.45	2%
Wastage@ 1%	0.15	15.60	0%
Wholesaler (@30%)	4.68	20.29	15%
Wastage@ 2%	0.41	20.69	1%
Retailer (50%)	10.35	31.04	33%
Wastage@ 2%	0.62	31.66	2%

Source: *ISAP analysis from various stakeholders' interaction*

The farmer either sells the produce to the aggregator at the village level or to the wholesaler or trader from Siliguri or Kolkata. The post-harvest losses during transportation to Gangtok is about 1 percent only, but when transported to distant markets of Siliguri and Kolkata, the handling loss ranges upto 2-3 percent. At the wholesalers and retailers level, this loss is 2 percent.

Glut is also a major issue for ginger. Farmers have to leave the ginger in the field itself due to very low price offered and they use it as seed for the next season.

Conclusion

- At production level:
  - Farmers are using their own seed, which becomes carrier of various seed borne diseases such as rhizome rot (more than 70% farmers use their own seed saved from last seasons' crop).
  - At least 30% of the total ginger gets destroyed at farm level due to rhizome rot of ginger.
  - Low yield due to poor production practices (flat bed method is used by the farmers).
  - Non-availability of labour is also a big problem at field level.
  - Low level of yield leading to high production cost per kg thus making product uncompetitive.
- At Market level:
  - Uneconomical quantity with each farmer, increasing cost of individual farmers to take their produce to the market.
  - Lack of infrastructure for primary cleaning, sorting & grading to make the produce marketable.
  - Farmers have limited option of getting arbitrage.
- At processing level:
  - Absence of any kind of value addition at the farm or primary level.
  - There is lack of entrepreneurship in society in general to take up ginger (or any other fruit) processing activities and establish the brand in the market.

Turmeric

Turmeric is the dried rhizome of *Curcuma Longa* L. which is used as a condiment, flavouring and colouring agent, is a principal ingredient in the Indian kitchens as curry powder. The turmeric derives its taste, aroma and colour from its active ingredient 'curcumin' which is the principal phenol responsible for the yellow colour and medicinal characteristics of turmeric. The higher the curcumin content, the better the turmeric variety.

Assam

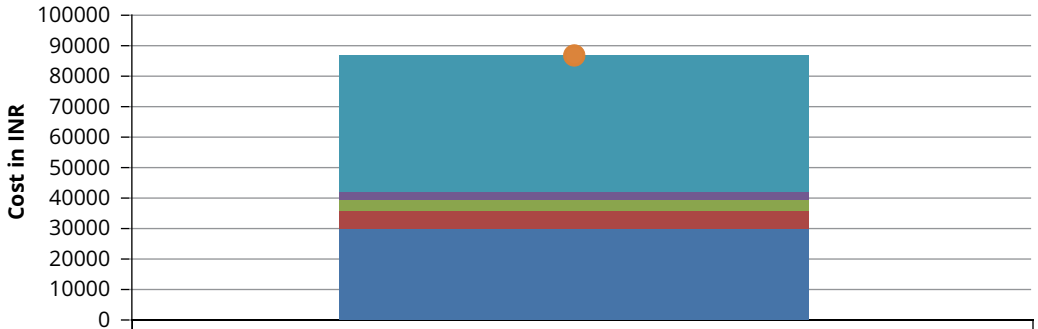
Kamrup, Barpeta, Sonitpur, Nagaon, Baksa, Golaghat, Lakhimpur and Karbi Anglong are major identified production clusters for Assam. Most of the farmers use locally grown varieties which are not recommended by the Agriculture Department but give good yield.

❖ Production Practices

Aamda and Lakadang are the identified varieties grown by the farmers. A seed rate of 12 quintals per ha is used for planting which costs the farmers ₹ 25 per kg seed. The sowing of the seeds is carried out in the months of March-April. Farmers either use their own seed preserved during the last season or buy the seed rhizome from the market. About 300 labour mandays are required for carrying out various farm operations.

As per the discussions with the farmers during FGDs, the following cost of production has been estimated:

Figure 71: Production Cost of Turmeric in Assam



	Turmeric
Labour	45000
Irrigation	2200
Fertilizers	3700
Manures	6000
Seed/Planting Materials	30000
Total	86900

Source: *ISAP analysis from farmers' interaction*

❖ Post-harvest Practices:

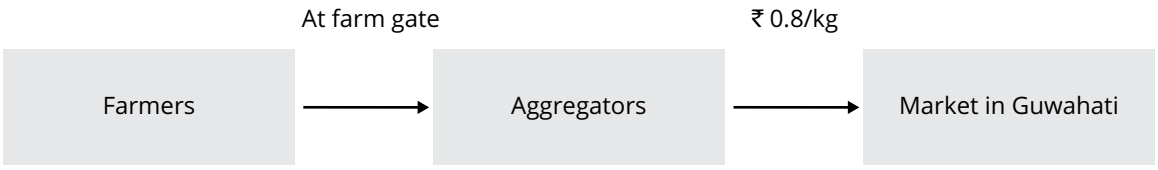
- **Harvesting:** The harvesting begins in the month of November, which extends till January. The yield is 6 -7 MT of rhizome per ha.

- **Value Addition at Farm Level:** Few farmers sell rhizomes after curing it.
- Marketing & Logistics.

The farmers generally sell the rhizomes to the aggregator at the village level. The marketing channel followed by the farmers is:

1. Farmers -------- Aggregators ---------- Wholesalers --------- Retailers -------- Consumers

Figure 72: Marketing Channel of Turmeric in Assam



At the production level, due to insect pests and diseases, the crop loss is nearly 5 -6 percent while during transportation, the loss is 1-2 percent.

Farmers sell the turmeric at field level to aggregators who further carry it to Guwahati market by mini trucks and sell to wholesalers. It is supplied to other markets in Assam also from Guwahati.

Table 48: Price Build-up from Farm Gate Boko to Guwahati

Price Build-up	Amount (in ₹)	Price Markup (₹ Per kg)	% Contribution
Farm gate price	20.00	20.00	41%
Aggregator Margin @25%	5.00	25.00	10%
Loading/unloading	0.40	25.40	1%
Transportation	0.80	26.20	2%
Wastage@ 2%	0.52	26.72	1%
Wholesaler (@30%)	8.02	34.74	16%
Retailer (40%)	13.90	48.64	29%

Source: *ISAP analysis from various stakeholders' interaction*

Meghalaya

The major production clusters that have been identified in Meghalaya are Jaintia Hills and West Garo Hills. Lakadang is main popular variety, which is a much sought after variety by the extraction industry due to its high curcumin content (<5.5%).

❖ Production Practices

The sowing of turmeric is carried out on beds on slopes. Usually farmers use their own seeds (rhizomes) preserved from the previous season's crop for cultivation purpose. The seed rate varies from 0.8 to 1 MT per ha. For sowing, both the mother rhizomes and fingers are used. Sowing in the region is carried out in the month of April-May. Farmers apply only FYM/ Vermicompost @5-8 MT per ha during the entire cropping season. No chemical fertilisers, insecticides/pesticides or weedicides are applied by the farmers in the region. The crop is monsoon-dependent. Weeding is mainly done manually by the farmers.

About 200-250 labour mandays are required for the cultural operations from land preparation to harvesting. The charges for labour are ₹ 200 per day for men labour and ₹ 100 per day for women labour.

❖ Post Harvest Practices:

- **Harvesting:** The harvesting starts in the month of December and extends till March. The average yield of green turmeric in the region is 6-8 MT/ha. The produce is packaged in 50 kg gunny bags. The cost of one gunny bag is ₹ 15-20 per bag.
- **Value Addition at Farm Level:** Some quantity is sold in fresh form while majority of the farmers carry out washing, drying and slicing of the rhizome. From 1 MT of fresh turmeric, only 150 to 200 kg of dry turmeric is obtained (recovery percentage – 15 to 20 percent).

  The selling price of fresh turmeric varies from ₹ 15-18 per kg, while dried rhizome sells at a price of ₹ 150-180 per kg.
- **Marketing & Logistics:** The fresh rhizomes are sold to middlemen or aggregator at the village level itself while the dried and sliced rhizomes are sold to the processor in nearby villages. The aggregator/middlemen take the produce to the market; sell it to the wholesaler who further sells it to the retailer. The logistics cost for transporting one 50 kg bag from village to main market by jeep/bus varies from ₹ 30-40 depending upon the distance. For dried form, the processors carry out the grinding and the powdered spice is sold in the local market and distant markets of Guwahati, Silchar, Kolkata and Bangladesh (through illegal trade practices) at ₹ 250-300 per kg.

There are negligible post-harvest losses due to the nature of the produce which is sold in the dried form.

Figure 73: Marketing Channel of Turmeric in Meghalaya

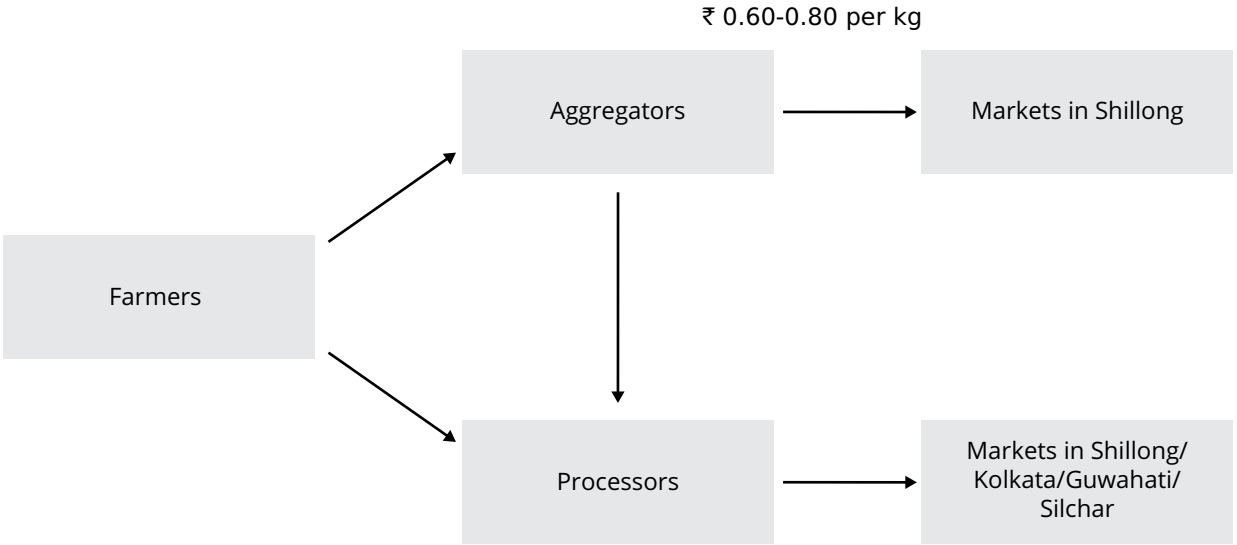


Table 49: Cost-economics of Turmeric Cultivation in Meghalaya

Sl. No.	Particular	Amount (in ₹)
1	Planting Material (0.8-1 MT/ha)	40,000
2	Manures (5-8 MT/ha)	12,000
3	Fertilisers & Pesticides	0
4	Irrigation	0
5	Labour (including family labour)	50,000
6	Total Production cost	102,000
7	Average production cost (₹ Per kg)	12.75
8	Yield (in MT/ha)	8
9	Average Selling price (₹ Per kg)	15 -18
10	Total income per ha (in ₹)	120,000-144,000
11	Net gain (₹ per ha)	18, 000-42,000

Source: *ISAP analysis from farmers' interaction*

Table 50: Cost Build-up of Turmeric (1 kg) from Farm Gate to Consumers

Particular	Amount (in ₹)	Price Markup (₹ Per kg)	% Contribution
Production Cost	12.75	12.75	
Average Selling of Farmers	18.00	18.00	45.45%
Carriage Cost (Gunny Bags ₹ 20 per 50 kg bag)	0.40	18.40	1.01%
Middlemen/Aggregator charges (10-15%)	2.76	21.16	6.97%
Transport to Main Market (₹ 30-40 per 50 kg gunny bag)	0.60	21.76	1.52%
Wholesaler's margin (30%)	6.53	28.29	16.48%
Retailer's Margin (40%)	11.32	39.60	28.57%

Source: *ISAP analysis from various stakeholders' interaction*

Mizoram

In Mizoram, Reiek village in Mamit district is very famous for turmeric cultivation. Mamit is the largest turmeric producing district in Mizoram. Other identified clusters are Saiha, Champhai, Kolasib and Serchhip.

❖ Production Practices

The varieties used are Lakadong and RCT-I. The Horticulture Department is supplying the RCT-I planting material (rhizomes) to few selected farmers. The seed rate used is 6-8 quintals per ha which yields around 4-5 MT of finished product.

Sowing is done in the month of February and March. No fertiliser and other chemical use have been noticed. Labourers are mainly family members. About 150-200 mandays per ha are required for farm operations from field preparation to harvesting. The labour charges are ₹ 200/manday for hired labour.

❖ Post-harvest Practices:

- **Harvesting:** The crop is harvested from December to April; December and January are the peak harvesting months. During the crop production and harvesting, the losses due to shoot borer are nearly 10 percent. The selling price of the fresh rhizomes is ₹ 15 per kg.

- **Value Addition at Farm Level:** Farmers do the cleaning, washing, curing and drying after harvesting and then pack the rhizomes in plastic bags. The plastic bags with small quantities of produce are carried on the roof of the passenger vehicles by the farmers to the nearby city or town.
- **Marketing & Logistics:** The transportation cost for transporting to a distance of 3-40 km is ₹ 30 per 30-40 kg plastic bag. Aggregators and traders carry full truck loads of the cured and dried turmeric in Tata 407 which accommodates 2.5-3 MT, to Aizawl market and other neighbouring markets in Assam. The logistics cost till Aizawl market is ₹ 2500-3000 per truck load and up to Silchar it is ₹ 8000 per truck load. The losses during transit range from 1-2 percent when carrying to Aizawl market and 3-4 percent when carrying to Silchar market. The handling losses at the wholesaler's and retailers' level are approximately 1 percent.

Marketing channels:

1. Farmers-Middleman (village level)-Local wholesale markets in Mizoram-retailers-consumers
2. Farmers-Local wholesale markets in Mizoram-retailers-consumers
3. Farmers-Traders/contractors (from neighbouring districts of Assam, Silchar, Karimganj etc.)-wholesale markets-retailers-consumers

Figure 74: Marketing Channel of Turmeric in Mizoram

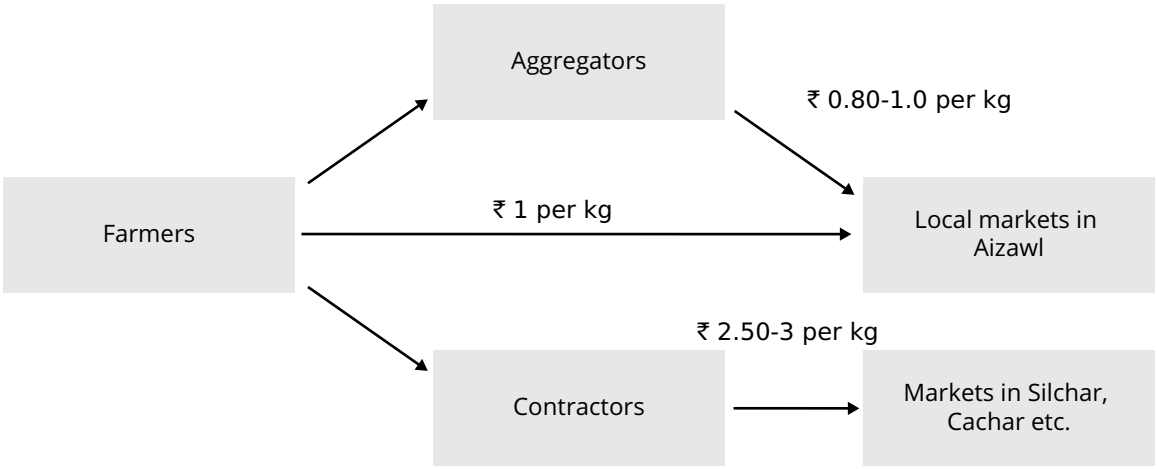


Table 51: Price Build-up of Turmeric from Farm Gate to Aizawl Market (per piece)

Particular	Amount (in ₹)	Price Mark-up (₹ Per Piece)	% Contribution
Average selling price of farmers	15.00	15.00	42%
Aggregator Margin (@20%)	3.00	18.00	8%
Transport to Aizawl	1.00	19.00	3%
Cost of wastage (@ 1% till Main Market)	0.19	19.19	1%
Wholesaler's Margin @ 30%	5.76	24.95	16%
Wastage (@ 1% wholesale level)	0.25	25.20	1%
Retailer's Margin (@40%)	10.08	35.28	28%
Wastage (@ 1% retail level)	0.35	35.63	1%

Source: *ISAP analysis from various stakeholders' interaction*

Naga Chilli

The Naga Chilli is the traditional food item of the Naga community. It is believed to have originated in Nagaland and the State Government has obtained GI rights for the product in 2008. It has a distinct taste and pungency and is used in many forms - fresh, dried, powdered and pickled. Major identified clusters are Kohima, Peren and Dimapur.

Nagaland

Naga Chillii is also known as 'Raja Merja' at local level. The identified major production clusters are Kohima, Peren and Dimapur districts.

❖ Production Practices

The seed rate is 1 kg/ha. The farmers use the seeds preserved from the last season's crop. It is grown as a rain-fed crop in all kind of soils from plains of Dimapur to the high hills. In plains, the sowing of the seed is carried out in August to October and transplanting is done in September–November. In the hills, the sowing time is February to March and transplanting of seedlings is carried out from March to May.

Manual Sorting & Grading of Naga Chilli

About 200-250 mandays are required for carrying out the farm operations. Being a highly perishable product, the crop loss varies from about 5-10 percent at the field level.

❖ Post-harvest Management

- **Harvesting:** The chilli is ready for harvest within 75-90 days after sowing. The yield per ha of fresh chilli is 2-2.5 MT. However, dry chilli fetches better price in the market than fresh chilli, so the farmers prefer to dry them before they sell it to the traders.
- **Value Addition at Farm Level:** Most of the farmers have installed indigenous drying units where the drying and bulk packaging of the chilli is carried out.
- **Marketing & Logistics:**

The following channels are followed for chilli marketing:

1. Farmer-aggregator-Wholesaler-Retailer-Consumer (Local Market)
2. Farmer/s-Trader/Contractor-Wholesaler (in Kolkata, Delhi, Mumbai, Bangalore etc.)-Retailer-Consumer (Dry Chilli)

The farm gate price of dry chilli during lean season or during times of less production may go up to ₹ 1500 per kg. Fresh chilli sells for ₹ 1 to ₹ 5 per piece in the retail market, while a packet of five dry chilli pieces in a retail outlet in Dimapur was being sold at ₹ 50. Fresh chilli is sold locally while dried chilli can be transported to distant places such as Kolkata, Delhi, Mumbai and Bangalore.

Farmers generally carry fresh chilli in very small quantities to local markets in the districts of Nagaland on rooftop of vehicles which costs them ₹ 0.50-1/kg. During transportation of the fresh produce, there are nearly 5 percent post-harvest losses during handling. Due to its highly perishable nature, fresh chilli is not transported to distant markets. At the wholesaler's and retailer's level, the handling wastages account for 2-3 percent of fruit loss. Dry chilli is transported in CFB to distant markets by traders like ICCOA and Shimla Hills for which the transportation cost is ₹ 25 to 100 per box depending upon the distance. The handling and transportation loss for dry chilli is nearly 2-3 percent.

Figure 75: Marketing Channel of Naga Chilli in Nagaland

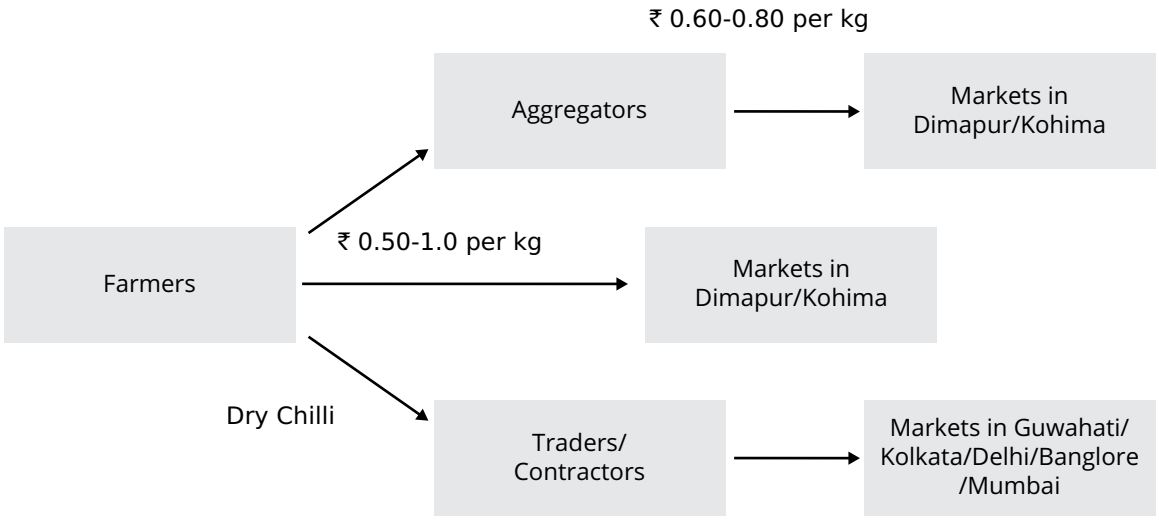


Table 52: Price Build-up of Fresh Naga Chilli from Farm Gate to Dimapur/Kohima (per kg)

Particulars	Amount (in ₹)	Price Mark-up (₹ Per Piece)	% Contribution
Average selling price of farmers	120.00	120.00	63%
Aggregator Margin (@5%)	6.00	126.00	3%
Transport to Dimapur/Kohima	1.00	127.00	1%
Cost of wastage (@ 5% till Main Market)	6.35	133.35	3%
Wholesaler's Margin @10%	13.34	146.69	7%
Wastage (@2% wholesale level)	2.93	149.62	2%
Retailer's Margin (@25%)	37.40	187.02	20%
Wastage (@ 2% retail level)	3.74	190.76	2%

Source: *ISAP analysis from various stakeholders' interaction*

Fresh Naga Chilli cannot be transported to distant markets such as Delhi/Mumbai due to its high perishable nature. There is huge difference between farmer's and consumer's price in dry chilli.

Passion Fruit

Passion fruit is a high value and potentially a foreign exchange earning crop. It is a potential crop in Nagaland which is mainly cultivated from mid-hills to high-hills in the state. The fruit is grown to eat or for its juice, which is often added to other fruit juices to enhance aroma.

Table 53: Price Build-up of Dry Naga Chilli from Farm Gate to Bangalore (per kg)

Particular	Amount (in ₹)	Price Mark-up (₹ Per kg)	% Contribution
Average selling price of farmers	600.00	600.00	40%
Packaging	10	610.00	1%
Transportation to Dimapur	10	620.00	1%
Wastage till Dimapur @ 1%	6.2	626.20	0%
Transportation from Dimapur to Bangalore	100	726.20	7%
Wastage till Bangalore @2%	14.52	740.72	1%
Traders, Margin	250	990.72	17%
Wholesalers, Margin	200	1190.72	13%
Retailers, Margin	300	1490.72	20%

Source: *ISAP analysis from various stakeholders' interaction*

The fruit can be grown in all kinds of soils; however, soils rich in organic matter are most suitable for its cultivation. A temperature range of 16°C to 30°C is most suitable for its cultivation. There are two varieties - the purple passion fruit and yellow passion fruit. Both the varieties are cultivated in the region.

Nagaland

Kohima, Wokha and Mokokchung are major production clusters of passion fruit in Nagaland.

❖ Production Practices

The seed sowing for primary nursery is carried out during the month of September which is then transplanted in the secondary nursery after 30-45 days (October–November). The 8-10 month old seedlings are transplanted in the field in the months of May–June. 1600 to 1700 plants are grown in one ha area.

❖ Post Harvest Practices:

- **Harvesting:** The harvesting starts 2 years after the transplanting in the main field. The fruit ripens in the months between August and December and March and May. At the farmers' level, losses up to 5-6 percent are reported due to powdery mildew. The yield is around 10 MT/ha per year.
- **Value Addition at Farm Level:** Farmers do not carry any kind of value addition at their end.
- **Marketing & Logistics:** Farmers generally carry the passion fruit on the rooftop of private vehicles to nearby markets, the transportation costs for which comes to ₹ 0.5 to 1 per kg. Average farmers' selling price ranges from ₹ 10-15 per kg. However, in cases where processors directly procure from the farmers groups, the farmers get ₹ 10-12 per kg. For distant markets such as Guwahati and Kolkata, the cost is ₹ 2-2.50 and ₹ 3.5 to 4 per kg, respectively. During transportation, post-harvest losses range from to 2-5 percent, while at the retailer's level, the handling losses are nearly 2 percent.

Figure 76: Marketing Channel of Passion Fruit in Nagaland

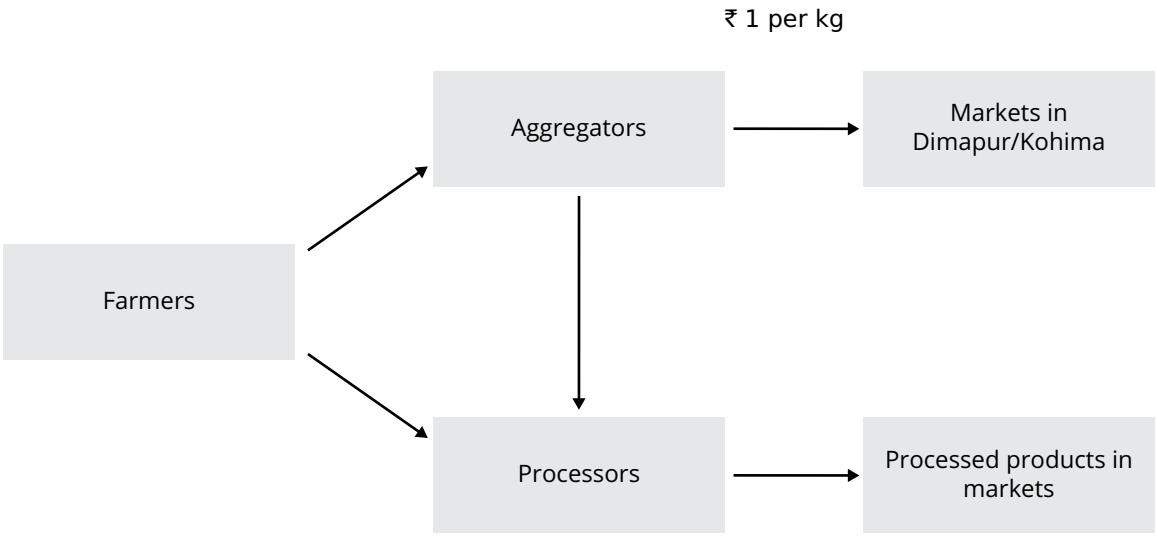


Table 54: Price Build-up of Passion Fruit from Farm Gate to Dimapur/Kohima (per kg)

Particular	Amount (in ₹)	Price Mark-up (₹ Per Piece)	% Contribution
Average selling price of farmers	10.00	10.00	39%
Aggregator Margin (@20%)	2.00	12.00	8%
Loading/Unloading	0.40	12.40	2%
Transport to Dimapur/Kohima	1.00	13.40	4%
Cost of wastage (@ 2%)	0.27	13.67	1%
Wholesaler's Margin @ 30%	4.10	17.77	16%
Wastage (@2% wholesale level)	0.36	18.12	1%
Retailer's Margin (@40%)	7.25	25.37	28%
Wastage (@ 2% retail level)	0.51	25.88	2%

Source: *ISAP analysis from various stakeholders' interaction*

Commercial level cultivation is not taking up further due to poor condition of processing plants, their linkages further with major processed product marketing organisations. Due to lesser demand sometime fruits go wasted at farm level so farmers are discouraged sometime to take the crop in future.

Kiwi Fruit

Kiwi fruit or Chinese gooseberry is one of the best known nutritious fruit among the soft fruits. It is being cultivated in some sizeable area in Arunachal Pradesh in North East, although the other NE states too have a vast potential for the cultivation of Kiwi fruit. The fruit is mainly consumed as a fresh fruit or combined with other fruits, in salads and desserts. The nutritive value and flavour are retained when the fruit is processed to jam, jelly or preserves.

The plant needs a long growing season (at least 240 frost-free days), which will not be hampered by late winter or early autumn freeze. For high yield and quality fruits, it requires 700-800 chilling hours below 7°C to break dormancy period. It prefers somewhat acidic (pH 5 -6.5), well-drained soils that are rich in organic matter.

The fruit grows on vines which require vigorous pruning. Fruit is borne on one-year old and older canes, but production declines with the ageing of the canes.

Arunachal Pradesh

In Arunachal Pradesh, the crop is grown on the sharp hilly terrains, with plantation carried out on slopes. Major growing districts are Tawang, West Kameng and Lower Subansiri.

❖ Production Practices

The most popular varieties grown are Alison and Harvard. The orchards are mixed with old plantations (which are almost 15-20 years old) and new plantations. However, the plantations are generally congested with less plant to plant spacing.

During the crop cycle, the farmers do not apply any kind of chemical fertilisers, insecticides, pesticides and weedicides. Only FYM/Vermicompost are applied at the rate of 5-7 kg per plant. The weeding is carried out manually by the farmers. During discussions with farmers, it emerged that there are losses up to 5-10 percent due to insects and pests such as beetles etc. The orchards are mainly rain-fed; however, few progressive farmers have started using drip irrigation and water tankers also. Nearly 1200 to 1500 labour mandays are required for various farm operations; the farmers usually hires outside labour for the field operations. At the field level, due to fruit drop and insects, pests and diseases, the fruit loss is nearly 5-10 percent.

❖ Post-harvest Practices:

- **Harvesting:** The fruiting period is two months i.e. October and November. The yield in the region is nearly 3-4 MT/ha.
- **Value Addition at Farm Level:** The farmers carry out the manual sorting and grading of the fresh produce on the basis of weight as follows:

Grade	Weight	Market
A Grade	90 gm and Above	Exports
B Grade	60-90 gm	Domestic/Local
C Grade	50-60 gm	Domestic/Local
D Grade	40-50 gm	Processing

- **Marketing & Logistics:** The fruits are transported in mini trucks without any kind of packaging, or packed in gunny bags. The farmers either sell the fresh fruit directly to consumers at the local or main market, in case main market is situated close to the production area. The farmers carry the fruit on head loads to the nearest transport point and from there it is transported by jeep/maxi to the local market. The transportation cost per gunny bag comes to ₹ 20-50 depending upon the distance. During the transit from field to local market, the post-harvest losses during transportation are 0.5 percent.

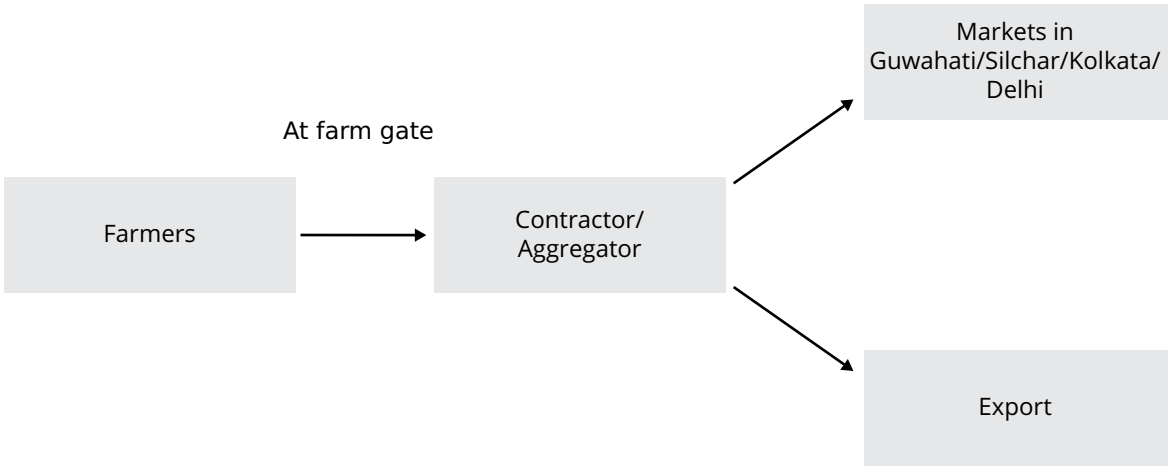
From the local market, the produce moves through mini trucks which accommodates 5 MT due to modified body of the mini truck (the original capacity of the mini truck is 2-3 MT) and buses (bamboo baskets on the rooftop of the bus) to the main market. The logistics cost for transportation to the main market is around ₹ 3500-7000 per mini truck and ₹ 75-100 per bamboo basket. The post-harvest losses during transportation from local market to main market are nearly 8-10 percent due to the perishable nature of the fruit.

The fruit is sold on the basis of grades.

Grade	Weight	Farmers Selling Price	Market	Market Price
A Grade	90 gms and Above	₹ 100/kg	Exports	₹ 150-200/kg
B Grade	60-90 gms	₹ 65/kg	Domestic	₹ 100-125/kg
C Grade	50-60 gms	₹ 50/kg	Local	₹ 75-100/kg
D Grade	40-50 gms	₹ 35/kg	Processing	

In most of the cases, the farmers sell the whole orchard to the contractor before harvesting at a pre-fixed price. However, some farmers do sell the produce to the middlemen/aggregators/ traders from outside places such as Guwahati, Silchar, Kolkata and Delhi.

Figure 77: Marketing Channel of Kiwi Fruit in Arunachal Pradesh



At the wholesaler and retailer's level, the post-harvest losses are to the tune of 3-5 percent due to handling losses.

Table 55: Price Build-up of Kiwi (per kg) from Farm Gate to Consumers in Itanagar

Particular	Amount (in ₹)	Price Markup (₹ Per kg)	% Contribution
Average Selling of Farmers	65.00	65.00	52.11%
Aggregator charges (15-20%)	13.00	78.00	10.42%
Transport to Main Market including loading and unloading	2.00	80.00	1.60%
Cost of wastage (8-10% till Main Market)	8.00	88.00	6.41%
Wholesaler's/Retailer's margin (30-35%)	30.80	118.80	24.69%
Cost of wastage (3-5%)	5.94	124.74	4.76%

Source: *ISAP analysis from various stakeholders' interaction*

Large Cardamom

Large cardamom is a perennial herbaceous plant with subterranean rhizomes that give rise to leafy shoot and panicles. It is believed to be the native crop of Sikkim. The cardamom capsules are categorised as high value spice crops in the country and have multiple domestic uses. India is the largest producer of large cardamom with almost 54 percent share in world production and out of this Sikkim contributes up to 88 percent of India's production.

Large cardamom grows well under the shade of forest trees at altitudes ranging from 1000-2000 metres with rainfall ranging from 3000-3500 mm per annum.

Sikkim

Large cardamom is the main cash crop of Sikkim, being cultivated in an area of 15,020 ha (Directorate of Horticulture, 2010-11) in all the four districts of the state. Two major producing clusters are North and East Sikkim.

❖ Production Practices

There are five popular cultivars being grown in Sikkim i.e, Ramsey, Sawney, Golsey, Varlangey and Seremna. The propagation of large cardamom is through seeds and suckers. Seeds are generally sown in September-October.

However, the existing cardamom orchards in the state are very old thus affecting the yield of the capsules. Viral diseases such as chirkey and foorkey are very common in the old plantations which destroy large number of fields in the region and cause heavy losses to the farmers.

The State Horticulture Department is preparing tissue cultured plants to be supplied to the farmers. These plants would be resistant to viral and bacterial diseases.

The fully grown cardamom plantations require 150-200 mandays per ha for various farm operations such as intercultural operations and harvesting.

❖ Post Harvest Practices:

- **Harvesting:** The yield of the plants is approximately 1.5 to 2.5 MT per ha.
- Value Addition at Farm level.
- Marketing & Logistics.

The main marketing channel being followed by the farmers is as follows:

1. Farmers ----- Aggregators ------- Wholesalers ------- Retailers ------- Consumers
2. Farmers ------ Contractors ------- Wholesalers ------- Retailers ------- Consumers
3. Farmers ------- Bidders ------ Wholesalers ------ Retailers ------- Consumers

The losses in the field vary from 5 to 10 percent which may go up to 80 percent in case of viral diseases.

Figure 78: Marketing Channel of Large Cardamom in Sikkim

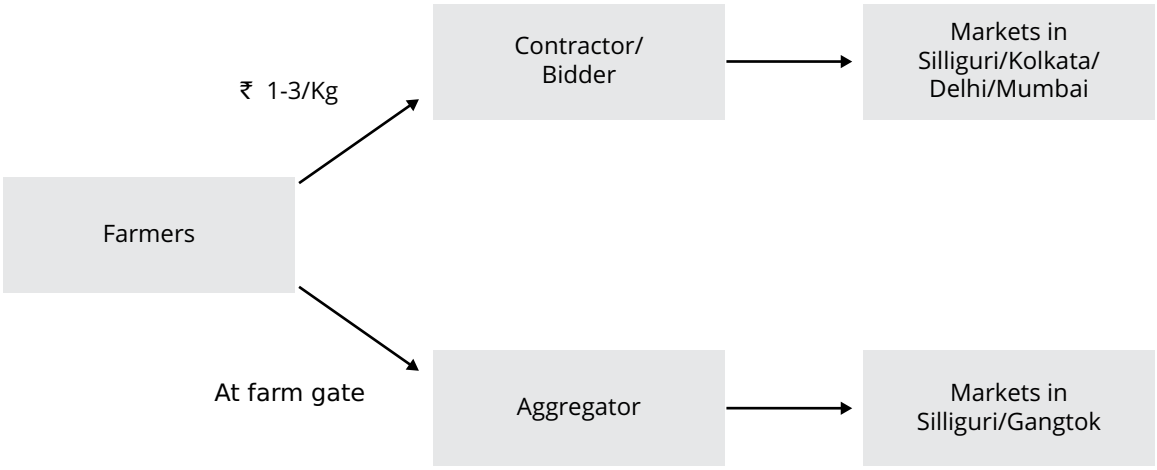


Table 56: Price Build-up of Large Cardamom from Farm Gate to Siliguri Market (per kg)

Particulars	Amount (in ₹)	Price Markup (₹ Per Piece)	% Contribution
Farm gate price	600.00	600.00	60%
Aggregator Margin @10%	60.00	660.00	6%
Transportation	2.00	662.00	0%
wastage@1%	6.62	668.62	1%
Wholesaler (@20%)	133.72	802.34	13%
Retailer (25%)	200.59	1002.93	20%

Source: *ISAP analysis from various stakeholders' interaction*

Average selling price of the farmer ranges from 550-900 depending upon the marketing channel. NERAMAC provides a platform for farmers and bidders from time to time. NERAMAC has an auction centre and warehouse at Rong-Po. Warehouse service is free of cost for farmers. There is direct interaction between farmers and traders and farmers have the option not to sell even to the highest bidder and keep their produce in the warehouse for next auction. During the auction, good quality cardamom fetches ₹ 800-900 per kg to the farmers.

Farmer Interaction with NERAMAC

Vegetables

In the North Eastern Region, vegetables are grown mainly in three seasons – *rabi, kharif* and off season. The vegetables produced in the hills during the summer months of March to June when the production is less in the plains, constitute the off season vegetables. These vegetables are supplied to the plains and fetch good prices. The NE states of Assam, Meghalaya have a huge potential to supply off season vegetables.

Assam

In Assam, the major vegetables cultivated are cabbage, cauliflower, knol-khol, tomato, brinjal, potato, pea, carrot, French bean, cucumber, okra, ridge gourd, cowpea, sponge gourd, spine gourd, pointed gourd and bottle gourd. The four districts of Kamrup, Nalbari, Darrang and Morigaon are the major vegetable clusters in the state.

Table 57: Popular Varieties of Vegetables Cultivated in Assam

Sl. No.	Name of Vegetables	Popular Varieties
Primary (Major)		
1	Potato	1. Kufri Chandra Mukhi 2. Kufri Jyoti 3. Kufri Sindhuri
2	Cabbage	**Early maturity :** 1. Golden Acre 2. Pride of India 3. Pusa Mukta (Sel-8) **Late maturity :** 1. Drum Head 2. Eclipse Drum Head
3	Cauliflower	**Early:** 1. Early kunwari 2. Pusa katki 3. Pusa Deepali **Mid :** 1. Improved Japanese 2. Pusa Synthetic 3. Pusa Snowball 4. Main Crop Patna **Late :** 1. Snowball-16 2. Pusa Snowball 3. K-1 4. Hissar 1
4	Radish	**Early :** 1. Pusa Deshi 2. Pusa Chetki 3. Pusa Himani **Late :** 1. Japanese White 2. Jaunpuri 3. Bombay Red
5	Carrot	1. Nantes 2. Pusa Kesar 3. Chantenay
6	Peas	1. T-136

Sl. No.	Name of Vegetables	Popular Varieties
7	French Beans	1. Pusa Parvaty 2. Contender 3. UPF-203 4. UPF-191
8	Tomato	1. Punjab Chhuhara 2. S-12 3. Punjab Kesri 4. Pusa Early Dwarf 5. Sioux 6. Pusa Ruby 7. VC-48-1 8. Arka Abha (BWR-1) 9. Arka Alok (BWR-5) 10. BT-1 11. Bilahi-1 12. Bilahi-2
9	Ash Gourd	Selected local varieties
10	Lettuce	1. Great Lakes 2. Chinese Yellow 3. Slow Bolt
Secondary (Minor)		
11	Capsicum (Green)	1. California Wonder 2. Elephant Trunkm 3. Arka Mohini 4. Arka Gaurav 5. Selection 16
12	Broccoli	**Early :** 1. Early Danish Giant 2. De Cicco Green Bud 3. Sparton Ealy 4. Coastal 5. Atlantic **Mid :** 1. Green sprouting medium **Late:** 1. Waltham 29 2. Green Mountain 3. Coastal 4. Atlantic **Hybrid :** 1. Southern Comet 2. Premium Crop 3. Clipper 4. Laser (extra early and early)
13	Coriander	**Bold seeded :** 1. UD 21 2. GAUI 3. CSI 4. CIMPO 33 **Small seeded :** 1. UP 41 2. Pusa 360 3. Local selection

Sl. No.	Name of Vegetables	Popular Varieties
14	Pumpkin	1. Arka Suryamukhi 2. Arka Chandan 3. Selected Local cultivar
15	Cucumber	1. Chinese Green 2. Pusa Sanyog 3. Poinsette 4. AAUC-1 5. AAUC-2 6. AAUC-3 7. AAUC-4
16	Knol Khol	**Early maturity:** 1. White Vienna **Late maturity :** 1. Purple Vienna
17	Brinjal	**Long:** 1. Cluster 2. Borbengena 3. JC-1 4. Kuchia 5. BWR-34 6. Pusa Kranti 7. Pusa Purple Long 8. Pusa Purple **Round :** 1. Pusa Purple Round 2. Pusa Vairab 3. JC-2 4. BWR-12 **Oblong :** 1. BB-7 2. Pant Samrat
18	Ladies Finger	1. Pusa Sawani 2. Arka Anamika 3. Parbhdani Kranti 4. Red Wonder (Hill Zone) 5. Panchasira (North Brahmaputra Valley Zone)
19	Bottle Gourd	1. Pusa Summer Prolific 2. Pusa Summer Prolific Round 3. Pusa Meghdoot 4. Pusa Manjiri 5. Keyari Lsao
20	Onion (Green Leaf)	1. Pusa Red 2. Pusa Ratnar 3. Pusa White (Round) 4. Pusa White (Flat) 5. N-53 6. Agrifound Light Red 7. Punjab Red Round 8. Pusa Madhuri 9. Arka Niketan

Sl. No.	Name of Vegetables	Popular Varieties
24	Bitter Gourd	**For spring season :** 1. Earliest of All 2. Long Green 3. Extra Long 4. Pusa Do Mausmi **For summer season :** 1. Monsoon Monarch 2. Long Green Monsoon 3. Coimbatore Long
25	Ridge Gourd	1. Pusa Nasdar 2. AAUJ-1 3. AAUJ-2 4. AAUJ-3

Source: *Discussion with stakeholders, KVKs, District Agriculture Offices*

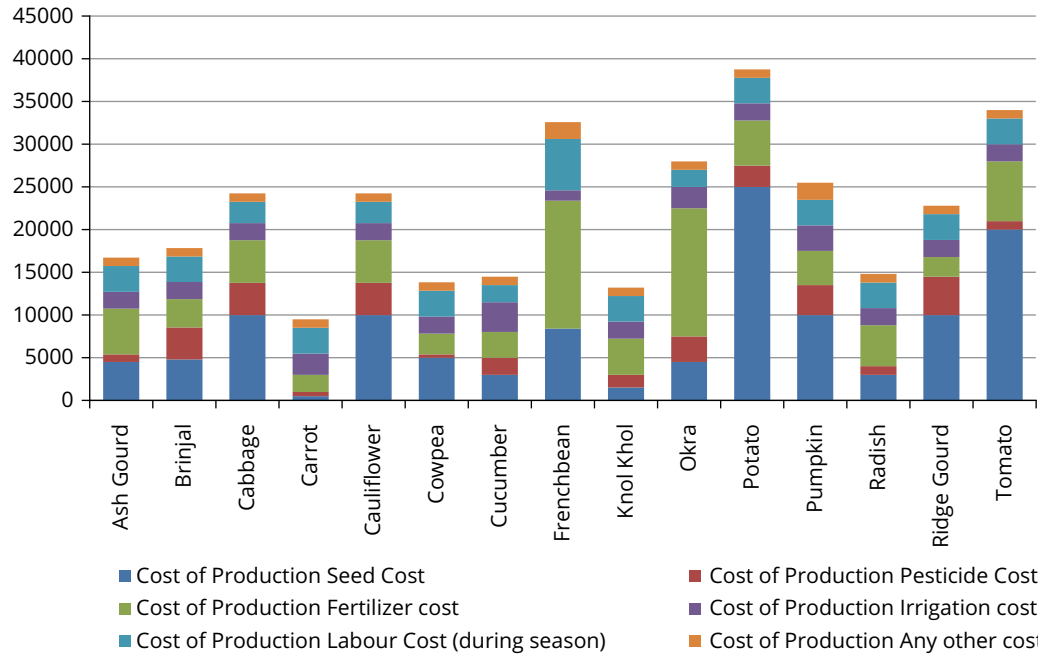
Farmers in most of the vegetable production clusters around Guwahati use hybrid/HYV seeds and also use other inputs for increasing yield and production. However, the production practices for vegetable are non-scientific and therefore there is a huge scope for intensification of vegetable production.

Table 58: Cost of Production of Selected Vegetables in Assam

Cost of Production of Selected Vegetable Crops (in ₹)								Total cost
Sl. No.	Crop Name	Seed Cost	Pesticide Cost	Fertilizer Cost	Irrigation Cost	Labour Cost (During Season)	Any Other Cost	
1	Ash Gourd	4500	900	5328	2000	3000	1000	16728
2	Brinjal	4800	3750	3300	2000	3000	1000	17850
3	Cabbage	10000	3750	5000	2000	2500	1000	24250
4	Carrot	500	500	2000	2500	3000	1000	9500
5	Cauliflower	10000	3750	5000	2000	2500	1000	24250
6	Cowpea	5000	400	2432	2000	3000	1000	13832
7	Cucumber	3000	2000	3000	3500	2000	1000	14500
8	French-bean	8400	0	15000	1200	6000	2000	32600
9	Knol –Khol	1500	1500	4220	2000	3000	1000	13220
10	Okra	4500	3000	15000	2500	2000	1000	28000
11	Potato	25000	2500	5270	2000	3000	1000	38770
12	Pumpkin	10000	3500	4000	3000	3000	2000	25500
13	Radish	3000	1000	4800	2000	3000	1000	14800
14	Ridge Gourd	10000	4500	2295	2000	3000	1000	22795
15	Tomato	20000	1000	7000	2000	3000	1000	34000

Source: *Primary Survey by ISAP*

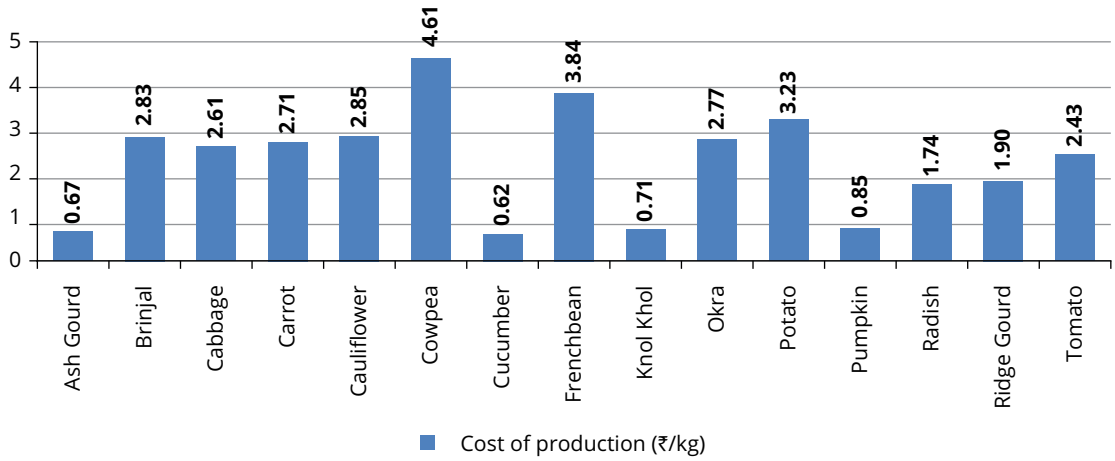
Figure 79: Estimated per ha Cost of Production of Vegetables (in ₹)



Source: *ISAP analysis of primary survey*

The per ha cost of production of potato is highest followed by tomato, French beans and okra. The farmers use hybrid seeds for sowing, thus the cost of seed is one of the major component. The other major cost in vegetable production is fertiliser cost. It is important to note that the cost of irrigation is minimal in total production cost due to rain-fed cultivation of vegetables. Looking at the cost of production of per kg vegetable, production cost of cowpea (₹ 4.60 per kg) is highest, followed by French bean (₹ 3.84 per kg), potato (₹ 3.23 per kg) and cauliflower (₹ 2.85 per kg).

Figure 80: Estimated per kg Cost of Production for Select Vegetables (₹/kg)



Source: *ISAP analysis of primary survey*

Farmers harvest the vegetables in the evening of the first day so that they can reach the market early morning the next day. Farmers either sell their products to local consolidators or take it to the nearest market. In case farmers are taking their products to the market, transportation cost is being paid by the farmers themselves. Mostly vegetables are packed in gunny bags (jute and plastic bags, empty bags of cement, fertiliser, wheat, sugar etc.) and in baskets. Bags are chosen for relatively longer distance and baskets for local selling of products.

Farmers carry their vegetables to the markets in bullock carts, autos, small trucks and matadors etc. Means of transport depends on distance and quantity of vegetables to be carried to the market. Farmers also hire transport vehicles on sharing basis, specifically in production areas such as Kharupetia.

There are various channels by which vegetables are being brought from farm gate to the markets in Guwahati. Some of these channels, as identified during the primary survey are described as below:

1. Farmers – Consumers
2. Farmers – Commission Agents - Wholesalers (Machkhowa market) – Retailers - Consumers
3. Farmers – Aggregators/consolidators/local traders – Commission Agents - Wholesalers (Machkhowa market) – Retailers - Consumers
4. Farmers – Aggregators/consolidators/local traders – Wholesalers at Transit markets – Commission Agents (Machkhowa market) – Wholesalers (Machkhowa market) – Retailers - Consumers

Channels 2 & 3 contribute approximately 80-85% of total vegetables' arrival in the Machkhowa market of Guwahati. Almost 95% of the total vegetables that arrive in Guwahati, comes through organised channel of consolidating, wholesaling and retailing and only 5% of vegetables are being brought directly by the farmers. Though the distances of production centre and market is not much, there are multiple players involved in the supply chain and that adds to the cost of vegetables to consumers.

Cost components in the supply chain, at the market level, includes margin of local consolidators:

- Market fee at primary market level
- Margin of wholesaler in primary market/commission of commission agent at primary market
- Transportation cost to secondary market
- Market fee at secondary market level
- Commission of commission agents
- Margin of wholesalers
- Local transportation cost for transporting it to retail store
- Margin of retailers
- Wastage at various levels

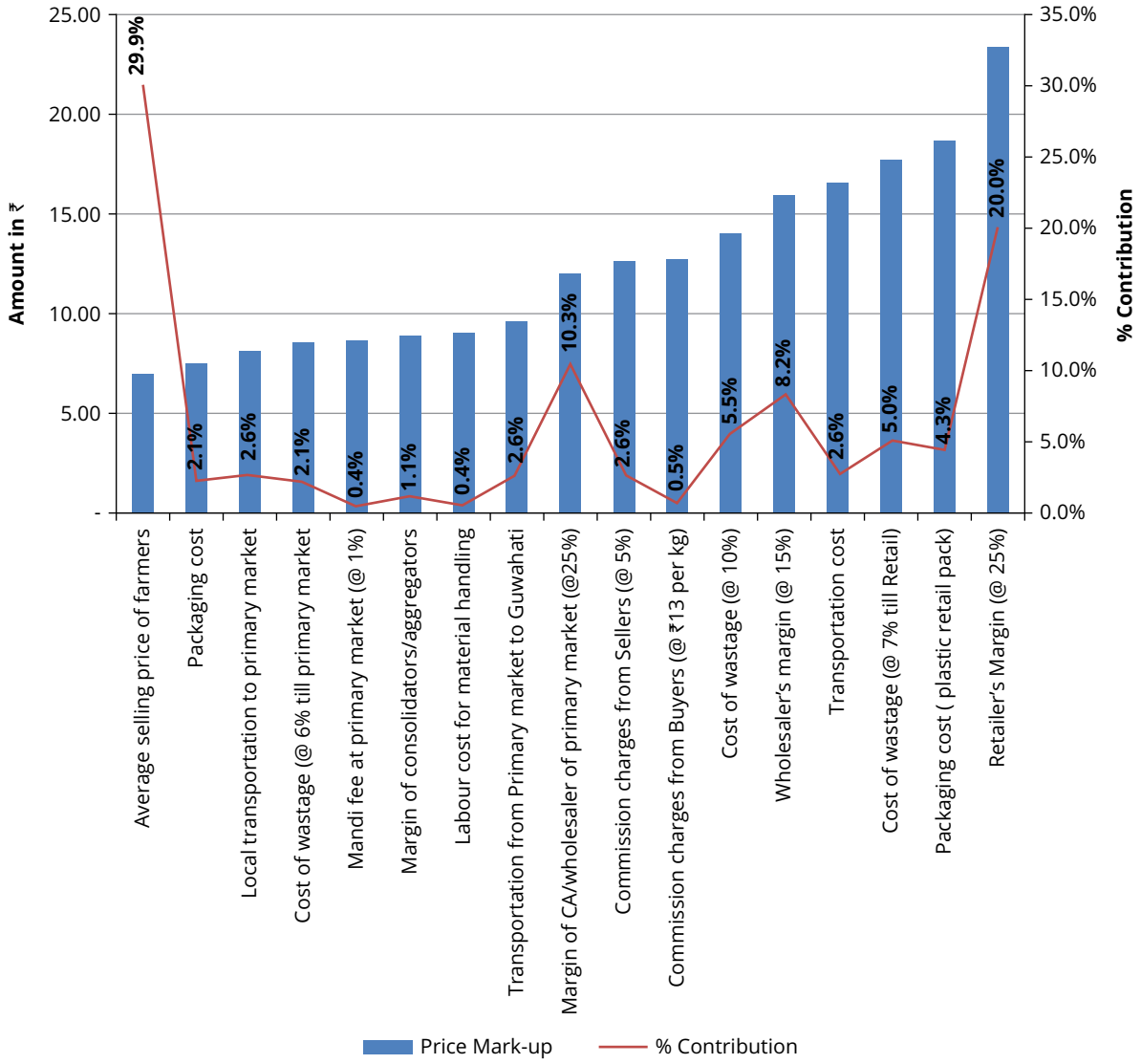
Table 59: Price Build-up for Vegetables from Farm Gate to Consumers

Particular	Amount (in ₹)	Price Markup (in ₹)	% Contribution
Average selling price of farmers	7.00	7.00	29.9%
Packaging cost	0.50	7.50	2.1%
Local transportation to primary market	0.60	8.10	2.6%
Cost of wastage (@ 6% till primary market)	0.49	8.59	2.1%
Mandi fee at primary market (@1%)	0.09	8.67	0.4%
Margin of consolidators/aggregators	0.25	8.92	1.1%
Labour cost for material handling	0.10	9.02	0.4%
Transportation from Primary market to Guwahati	0.60	9.62	2.6%
Margin of CA/wholesaler of primary market (@ 25%)	2.41	12.03	10.3%
Commission charges from Sellers (@ 5%)	0.60	12.63	2.6%
Commission charges from Buyers (@ ₹ 13 per kg)	0.13	12.75	0.5%
Cost of wastage (@ 10%)	1.28	14.03	5.5%
Wholesaler's margin (@15%)	1.91	15.94	8.2%
Transportation cost	0.60	16.54	2.6%
Cost of wastage (@ 7% till Retail)	1.16	17.70	5.0%
Packaging cost (plastic retail pack)	1.00	18.70	4.3%
Retailer's Margin (@25%)	4.68	23.38	20.0%

Source: *ISAP analysis of primary survey*

Cost build-up from farm gate to wholesale market: Average price spread from farm gate to retail market worked out to be ₹ 7.00 per kg to ₹ 23.40 per kg of vegetables on an average in the region. Farmers get only about 30% share of the consumer price in Guwahati. The margins of wholesalers and retailers depend on the produce, perishability, season, demand and supply factors. In case of wholesalers, the margin varies from 15-25% and in case of retailers from 25-35%.

Figure 81: Average Price Markup in the Supply Chain of Major Vegetables to Guwahati



Source: *ISAP analysis of primary survey*

Level of wastages for major vegetable products at field level (post-harvest), wholesale level and till it reaches the consumers has been depicted in Table 60.

Range of wastage is 4-10% at farmers' level, 2-15% at wholesale level and 2-10% at the retail level. The quantum of wastage for different products also depends on the nature of product.

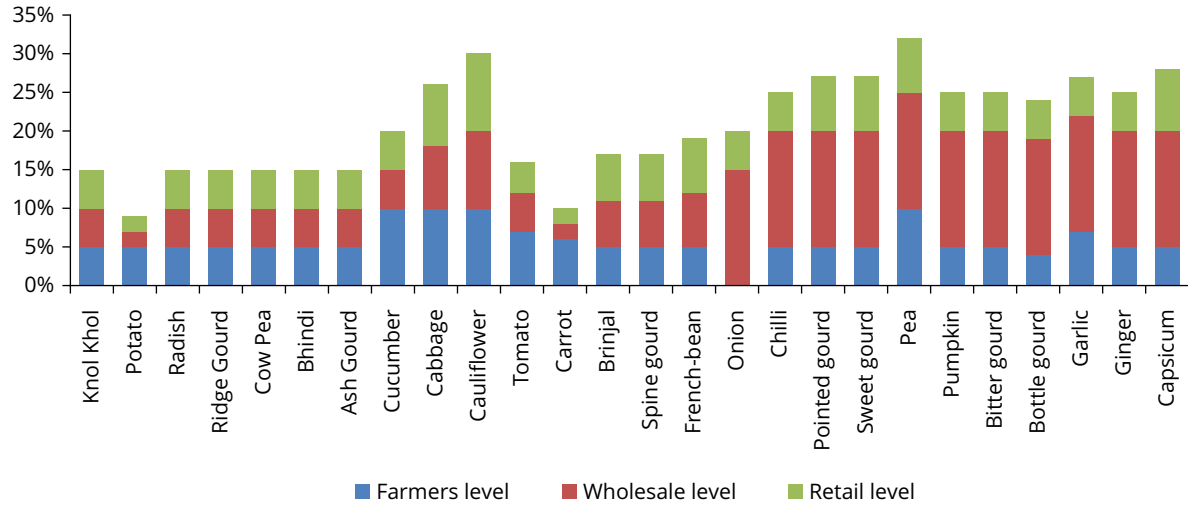
Wastages in whole supply chain of vegetables for Guwahati vary from 9% for some crops to as high as over 32% for crops like pea.

Table 60: Estimated Wastages of Vegetables in Supply Chain

Estimated Wastages of Vegetables in Supply Chain			
Vegetable Name	**Farmers Level**	**Wholesale Level**	**Retail Level**
Knol-Khol	5%	5%	5%
Potato	5%	2%	2%
Radish	5%	5%	5%
Ridge Gourd	5%	5%	5%
Cow Pea	5%	5%	5%
Bhindi	5%	5%	5%
Ash Gourd	5%	5%	5%
Cucumber	10%	5%	5%
Cabbage	10%	8%	8%
Cauliflower	10%	10%	10%
Tomato	7%	5%	4%
Carrot	6%	2%	2%
Brinjal	5%	6%	6%
Spine gourd	5%	6%	6%
French-bean	5%	7%	7%
Onion		15%	5%
Chilli	5%	15%	5%
Pointed gourd	5%	15%	7%
Sweet gourd	5%	15%	7%
Pea	10%	15%	7%
Pumpkin	5%	15%	5%
Bitter gourd	5%	15%	5%
Bottle gourd	4%	15%	5%
Garlic	7%	15%	5%
Ginger	5%	15%	5%
Capsicum	5%	15%	8%

Source: *Primary survey of farmers, wholesalers and retailers by ISAP*

Figure 82: Estimated Percentage Wastage of Vegetables in Supply Chain for Guwahati



Source: *Primary survey of farmers, wholesalers and retailers by ISAP*

Issues Related to Vegetable Marketing

Vegetable marketing in the Kamrup region is not organised due to lack of adequate infrastructure and basic facilities. Farmers don't have any alternate channel than to sell the fresh produce through intermediaries. Two major and adjacent wholesale-cum-retail markets, Machkhowa and Fancy Bazaar have the following situation and concerns:

1. **Machkhowa Market:** Located 9 kms from the National Highway and 3 kms from the railway station, it is the largest vegetable market in the region but it doesn't have the basic facilities to handle the produce and quality management. Market is in an open area, operates in a congested area and unhygienic conditions and there is no shed for protection from sun and rain. This market is under the administration of Guwahati Municipal Corporation (GMC).
2. **Fancy Bazaar Vegetable Market:** One of the oldest fresh produce markets in Kamrup it is less than 500 mts. from Machkhowa market and 9 kms from NH-37 and 2 kms from Guwahati railway station. Fancy Bazaar also deals in other commodities such as fruits, betel nut and flowers etc. It is also under the administration of GMC and traders pay the rent.

Both of the markets are lacking the following basic infrastructure, which is required for fresh fruits and vegetable market:

- Cold store
- Sorting/grading machines
- Auction platforms
- Electronic display
- Weigh bridges
- Garbage disposal system
- Water and sewerage system, etc.

Other vegetable markets in Guwahati city are Paltan Bazaar, Ganeshguri *Subzi* Bazaar and Basistha Chariali vegetable market. All of these markets are lacking basic infrastructure.

3. Rural *Haats* and *Mandis:* At block level, small towns and rural markets, vegetable *mandis* and *haats* are operational. Most of the vegetable markets at block and village level are under *gram panchayats* or are private. Rural markets are very much preferred by the farmers due to proximity to production cluster, less transportation cost and absence of trader's cartel. Rural markets also lack infrastructure such as covered sheds, platforms, plastic crates, sorting/grading machines etc., which are imperative to handle fresh produce.

Meghalaya

East Khasi hills are the major vegetable production cluster identified in Meghalaya. The major vegetables cultivated in this region are potato, cabbage, cauliflower, radish, carrot, peas, French beans, tomato, squash, lettuce and mustard (leaf). However, apart from these, farmers cultivate other minor vegetables such as capsicum, broccoli, coriander, beet root, pumpkin, cucumber, turnip, knol khol, brinjal, okra, onion (green) bitter gourd, bottle gourd and ridge gourd. The protected cultivation of the following crops is undertaken: capsicum, tomato, broccoli, pea, cucumber and mustard leaves.

Table 61: Popular Varieties of Vegetables in Meghalaya

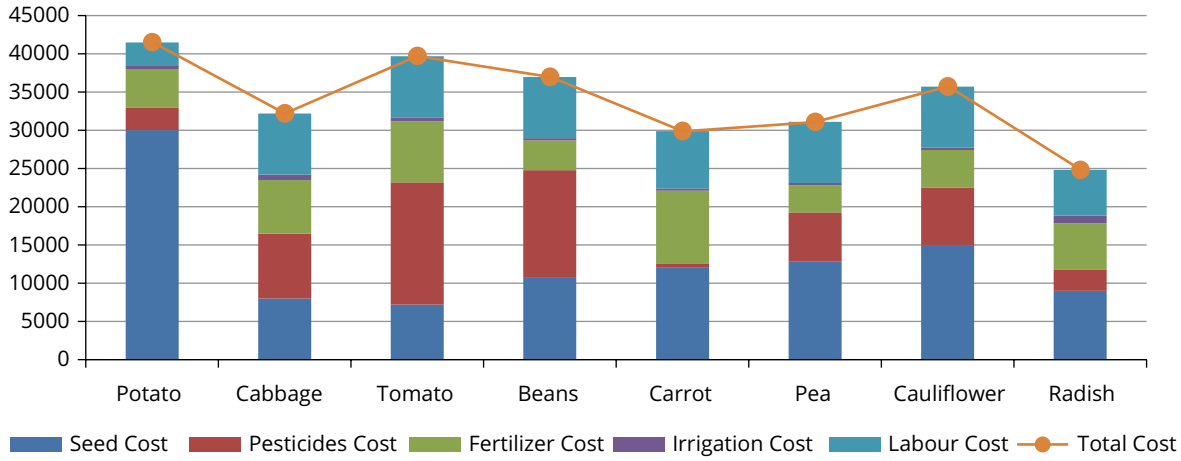
Sl. No.	Name of Vegetables	Popular Varieties
Primary (Major)		
1	Potato	Kufri Jyoti, Kufri Megha, Giri Raj
2	Cabbage	Mahyco 139, Sultan, NS25, 10-15% O.P.V.
3	Cauliflower	Snow Ball (hybrids less than 20%), O.P.V.
4	Radish	100% O.P.V.
5	Carrot	Kuroda (US Agri), New Kuroda (NunHems), 15-20% O.P.V.
6	Peas	Sultan, Azad, 40% O.P.V.
7	French Beans	Sultan, Selection 9, Anupam, 20-30% O.P.V.
8	Tomato	Avinash, 017, NS52 (Namdhari)
9	Squash	100% O.P.V.
10	Lettuce	ICE Berg, General, 50% O.P.V.
11	Mustard (Leaf)	100% O.P.V.
Secondary (Minor)		
12	Capsicum (Green)	California Wonder
13	Broccoli	Pushpa & Aishwarya
14	Coriander	Italian Beauty, US Agri, Namdhari
15	Beet Root	Ruby Queen
16	Pumpkin	100% O.P.V.
17	Cucumber	Malini, 50% O.P.V.
18	Turnip	100% O.P.V.
19	Knol Khol	Purple Top, Early White Viena (100% Hybrid)
20	Brinjal	Puple Long, 50% O.P.V.
21	Ladies Finger	100% O.P.V.
22	Bottle Gourd	100% O.P.V.
23	Onion (Green Leaf)	N53, Pusa Nashik Red
24	Bitter Gourd	70% O.P.V. & 30% Hybrid
25	Ridge Gourd	100% O.P.V.

Source: *Discussion with stakeholders, KVKs, District Agriculture Offices*

The agro-climatic conditions in the region favour the cultivation of vegetables round the year. During the summer season, when no vegetable is produced in the neighbouring states of Assam, Nagaland, Tripura, Mizoram and Manipur, the produce from Meghalaya is regularly sent to these markets as off season vegetables and fetch good prices.

Crop-wise, per ha cost of production has been observed to be highest in case of potato (₹ 41,500 per ha) due to higher seed cost, followed by tomato (₹ 39,700 per ha), beans (₹ 36,900 per ha), cauliflower (₹ 35,700 per ha), cabbage (₹ 32,200 per ha), pea (₹ 31,000 per ha), carrot (₹ 29,900) and radish (₹ 24,800 per ha). Contribution of hybrid seeds to the cost of cultivation is observed to be maximum in all the crops except for tomato and beans in which pesticide cost is found to be maximum. Due to rain-fed vegetable cultivation, irrigation cost is observed to be minimum.

Figure 83: Estimated per ha Cost of Production of Vegetables in Meghalaya



Source: *Primary survey of farmers by ISAP*

Vegetable Market in Meghalaya

Mostly traditional practices are followed for post-harvest handling of vegetables and only washing is carried out by few farmers in case of potato, radish. Few farmers also revealed adoption of sorting activity in case of potato, cabbage, cauliflower, tomato. The farmers generally harvest the produce in the evening of the previous day to be taken to the market the next day. After harvesting, the vegetables are kept in gunny/jute bags (potato/ radish) and bamboo baskets (cabbage, cauliflower, tomato, French beans etc.), which are carried to the market the next day. There are no separate storage facilities for vegetables at the field level.

The movement of produce to urban markets is through bus/mini trucks/jeeps in the region. The head loads are carried to a distance of 1-5 kilometres on an average, to reach the rural market or a point from where motor transport is available for transporting the produce to Shillong markets. Farmers travel upto 50-60 kms to Shillong to dispose off their produce. The cost of transportation varies for:

- Tata 407/truck ₹ 0.50 to ₹ 1 per kg.
- Bus: ₹ 1 to ₹ 1.20 per kg.

The packaging of the vegetable crops at the farm level is conventional and suffers from quality deterioration and transit loss. Mostly vegetables are packed in gunny/jute bags (potato/radish) and bamboo baskets (cabbage, cauliflower, tomato, French beans etc.) for transporting to the market. The cost of packaging varies for:

- Gunny bag - ₹ 20-30 per bag, jute bag
- Jute bag - ₹ 10-20 per bag
- Bamboo basket - ₹ 40-60 per basket.

Average post-harvest loss at the farm gate is estimated around 5%. Farmers revealed higher post-harvest losses in case of tomato, beans, leafy vegetables, brinjal, carrot and gourds.

Transportation of their produce to the nearest urban markets for sale at remunerative prices is a major problem faced by farmers. Harvested vegetables are transported to markets either manually, by bus or autos as per convenience and distance. The following marketing channels are followed by the farmers:

1. **Farmers – Consumers:** Most of the farmers prefer to sell their produce in the rural market (held periodically) or nearest urban market which are largely unorganised directly to consumers or agents of traders. The farmers also feel convenient to dispose off their produce at the village as it saves their time and energy in transporting the produce to the urban markets.
2. **Farmers – Village level aggregators (agents/big farmers/SHG/farmer Club/producer organisation) or Agents of traders – Consumers:** It is also observed that a large number of farmers sell their vegetable produce to the village level aggregators or agents of the traders who collect it either from their conventional storage at home or from the field and sell produce to consumers.
3. **Farmers – Wholesalers – Retailers – Consumers:** Farmers of nearby production clusters visit the nearest market and sell their produce to the wholesaler who offers maximum price for it. Wholesaler in turn sells the produce to retailers as well as consumers.
4. **Farmers – Agents/Traders/wholesalers (from Assam, Tripura, Mizoram, Manipur, Nagaland) – Traders at respective local markets – Wholesalers – Retailers – Consumers:** It has also been found agents of traders from nearby states (Assam, Tripura, Mizoram, Manipur and Nagaland) procure the vegetables at the village.

The farmers sell their produce to the available channels in the village (farm gate) at comparatively lower prices than the urban markets in order to avoid the problems of transport. Secondly, in case of urban market, trading cost of transportation is higher and the farmer is more dependent on the wholesaler. Wholesalers adopt unfair trade practices in the procurement and raise issues on quality to pay less to the farmers. Thirdly, in few cases, the wholesalers/traders purchase vegetable produce against the money advanced to the farmer for operations. Under such circumstances, the farmer is at a disadvantage as he has to compromise for the lower pre-harvest price and adjust more volume of the produce towards the interest of the debt availed.

Post-harvest losses of fresh vegetables in the region at wholesalers' level are estimated to range from 3% for peas to 15% in tomato crop, with an overall average loss of 8% at wholesaler's level. Losses at the retail levels are estimated to be 4% in the region, as volumes handled by retailers are small for day to day consumer demand. Majority of this wastage is due to sorting and daily surplus, which needs to be discarded at the end of day.

Conclusion

- The above discussed value chains are truncated value chains.
- Around 20–30% of the produce gets wasted at field level.
- Entire produce is not sold at market level.
- Due to low volume, farmers sell directly to consumers also at village level or at nearby markets.
- Marketing and post-harvest infrastructure is yet to be scaled-up to improve the overall value chain.
- Existing markets are not very supportive to the farmers due to traditional system of procurement.
- Markets are found to be lacking in basic facilities.
- In most of the states either there is no regulated market or most of the trade is being practiced in non-regulated/traditional markets.

6

CHAPTER

BENCHMARKING WITH EXISTING BEST PRACTICES

To improve the cultivation practices, technological interventions, supply chain and marketing, it is essential to map out the best practices in the region and disseminate the same in identified clusters. There are locations in the North East itself which have success stories of higher production, better marketing linkages and good income from the venture. These success stories would be helpful to improve the value chain of potential horticulture in the clusters as well as in other production areas. Benchmarking study of the identified crops is as below:

Pineapple

Productivity of pineapple in the identified states for study

State	Productivity (MT/ha)
Arunachal Pradesh	5.7
Assam	15.8
Meghalaya	8.9
Nagaland	15.5
Tripura	22.6

Source: *NHB and State Horticulture Departments*

From the productivity point of view, Tripura, Assam and Nagaland are the top three states. Average farm gate prices are also lesser in Tripura (₹ 7), Assam (₹ 10) and Nagaland (₹ 8) than Arunachal Pradesh (₹ 15) and Meghalaya (₹ 15). For a pineapple of 1-1.5 kg, ₹ 8 is modal price for the farmers. When the farm gate price goes down below ₹ 8, it creates stress among the farmers.

Molvom in Dimapur (Nagaland) will be an ideal village for benchmarking study. Average yield is 30-35 MT per hectare. Farmers have started applying improved production technologies after training from Horticulture Department and Central Institute of Horticulture (CIH). Cost of production is low due to group farming where farmers work in one another's field and they don't have to pay for labour.

Farmers have good income from pineapple fields due to direct linkages with traders. Guwahati is the nearest main market for the pineapple produced in Molvom. Traders from Guwahati contacts directly to the farmers groups and visit the farms for procurement and transports the produce to Guwahati. Most of the crop is sold at farm gate only so farmers don't have any burden of loading, packaging, transportation and logistics etc. Farmers' group use the collection centre constructed in the village when there is big order either from Guwahati traders or when they have to supply to Delhi, Bangalore etc. Harvesting of pineapple is done at different stages of green colour based on the distance of markets and farm gate. Farmers in Molvom are well aware about the harvesting stages.

Packing of pineapple is done at farm gate level for distant markets. Labour charges are provided by the traders to the farmers. Pineapples are wrapped in paper and kept the crown downside in CFBs which reduces the chance of damage due to jerk during transportation. It is carried in open, only by keeping crown downside, in mini trucks to Guwahati.

Thus, the Molvom village model can be implemented to other pineapple farming clusters in North East for better marketing linkages and to improve the overall value chain.

Guwahati can be identified as focus market for the pineapple produced in Nagaland and in nearby districts in Assam (Kamrup and Karbi Anglong) and Silchar for the pineapple produced in Tripura and North Cachar Hills and Cachar districts of Assam. Products can be moved easily to other parts of country from Assam due to better connectivity.

Mandarin

Productivity of mandarin in the identified states for study

State	Productivity (MT/ha)
Arunachal Pradesh	4.3
Assam	10.59
Manipur	5.89
Meghalaya	3.99
Mizoram	3.2
Sikkim	1.73
Tripura	7.03

Source: *NHB and State Horticulture Departments*

Assam, Tripura and Manipur have higher productivity of Khasi mandarin. In Assam it is 10.59 MT/ha. Farmers in Kamrup (rural) district, especially in Boko sub-division are reaping the profit from mandarin orchards. Although most of the orchards are very old, however, due to appropriate plant management practices, they are getting a satisfactory yield of 7-8 MT/ha. Traders from Guwahati approach them directly and procure produce from the farm gate. During the time of peak demand in major markets, these farmers are able to get a farm gate price as high as ₹ 5 per piece. The connectivity from Boko to Guwahati is also good which provides an extra edge as the produce can be taken to the market quickly. The Govt. has provided a small pack house for common use so that some farmers can sell fruits of different grades to the traders at good rates instead of selling the whole orchard as per pre-decided low rates.

Khasi mandarin produced in Tinsukia, which is better known as Tinsukia variety, is of good quality. Area under mandarin was reduced in past due to diversification towards tea cultivation but due to Agriculture Department's intervention and assistance under NHB Scheme for rejuvenation, it has started resuming and now farmers are benefitting from it. Farmers are being trained by KVK and Agriculture Department for application of protection chemicals, nutrients and weed management. They have been given training on 'Prophylactic Rejuvenation' also which prevents the shoot borer attack. Tinsukia mandarin is in demand in the major markets in Assam. Now farmers are getting 25,000-50,000 oranges per ha of orange orchard. Mandarin reaches directly from farm gates to the markets in Guwahati, Dibrugarh, Golaghat and Jorhat etc.

Farmers in the other North Eastern region can also get the good returns by direct contact with traders, availability of market at farm gate and by establishing the common facility centre for sorting and grading.

Ginger

Productivity of ginger in the identified states for study

State	Productivity (MT/ha)
Arunachal Pradesh	5.5
Assam	6.88
Manipur	11.57
Meghalaya	5.79
Mizoram	4.92
Nagaland	6.9
Sikkim	5.39

Source: *NHB and State Horticulture Departments*

Ginger is widely grown spice all over North Eastern Region and supplied to other major markets in the country. Assam is the largest producer and trader of ginger from NER. Ginger productivity in Assam is better than other states also. One of the two hill districts of Assam, Karbi Anglong has set new dimensions in ginger production and trading. A group of more than 1500 small and marginal tribal farmers are the part of Ginger Growers' Co-operative Marketing Federation (Gin-Fed), an initiative of Rashtriya Sam Vikas Yojana. Gin-Fed supplies directly to Azadpur Mandi, New Delhi. Farmers through middlemen were getting as low as ₹ 3-4 per kg but Gin-Fed minimised the distress selling and facilitated fair price. Farmer price ranges from ₹ 6-35/kg comparable to National *mandis*. It also arranges the procurement, primary processing, marketing information, obtaining order and shipment.

Farmers under Gin-Fed have been provided 'G-card' who doesn't sell the produce anywhere else except Gin-Fed (but they are not bound to sell only to Gin-Fed). G-card assists in credit facility from public sector banks. Gin-Fed charges only for handling at ₹ 1.50 per kg and administrative cost at ₹ 0.30-1.00 per kg. Whatever extra profit is earned from the business goes to the shareholders' (farmers) pocket. Gin-Fed has tie-ups with major traders in India such as ITC, Sresta Bio Products, NAFED, Stacon, RayFarm and Ace Agro. They are approached by leading firms in Japan and South Korea for organic ginger export as it has more oil content. Though ginger is grown in naturally organic condition but Gin-Fed is in the process of certification of the fields to facilitate direct export to European countries.

Railway has provided one parcel van facility to Gin-Fed to transport directly to New Delhi with charges as low as 50 paisa per kg. While transporting a 20 MT load by truck, costs ₹ 4-5 per kg (₹ 45,000-50,000 transportation cost plus other illegal taxes).

Turmeric

Productivity of turmeric in the identified states for study

State	Productivity (MT/ha)
Assam	0.7
Manipur	11.34
Meghalaya	5.06
Mizoram	5.1
Sikkim	5.37

Source: *NHB and State Horticulture Departments*

Turmeric is the second major spice crop in NER which is also grown in all eight NE States. In Mizoram, Mamit District is largest turmeric producer. Area under turmeric is more than any other spice crop. Reiek village in Reiek block of Mamit (12 km from Aizawl) is famous for turmeric cultivation. In Reiek, they have 'Turmeric growing farmers' society' which sells turmeric rhizome to State Horticulture Department and the Department further supplies the rhizome all over state as seed material to farmers. Farmers generally grow Megha and Lakadong varieties. Local turmeric rhizome productivity is 10 MT/ha. Turmeric grown here is organic by nature as farmers don't use any chemical input. Farmers are very laborious and cultivate as per training provided by the District Horticulture Department. Farmers in the Reiek village sell rhizomes, cured ginger and ginger powder as well. Traders from Aizawl and outside Mizoram visit the village for procurement of spices such as ginger, turmeric and Bird's Eye chilli. There is small scale grinding machine where a group of farmers do the grinding. By forming the growers' society, farmers of the village have acquired the ability to negotiate the price with traders. Turmeric rhizome is procured by Horticulture Department at ₹ 20-25 per kg, while cured turmeric is sold by the farmers at ₹ 60-80 per kg and powder at ₹ 100-150 per kg.

Traders from Assam (mainly from Cachar and Karimganj) buy from here and sell to markets in Assam. But more than 50% of produced turmeric is procured by the Horticulture Department.

7

CHAPTER

CONCLUSION & RECOMMENDATIONS

The value chain study has been carried out to examine the supply and demand dimensions of identified FCGs from North East Region, which can be sold in raw or processed form along with certain specialty crops such as passion fruit, kiwi, naga chilli, large cardamom etc. which are grown only in this region of the country have considerable domestic and international market potential which is yet to be exploited.

The value chain study has analysed the stages that these crops pass through, (FCGs) from production to end-consumer, identify the gaps and devise strategies to overcome these shortcomings. It has also been observed that the average productivity, production, technology, logistics, post-harvest and marketing infrastructure need to be upgraded for identified FCGs so that the potential of the region can be fully realised.

The major concerns that have emerged of the value chain study are:

Land Tenure and Ownership System

Land ownership and laws are uneven and unclear in the entire NE Region. The entire system falls under the following three broad categories:

- Land owned collectively by the villagers
- Land owned by the tribal chiefs, who allot land among the individual households for shifting cultivation purposes, and
- Individually-owned land.

Most of the horticultural crops have elongated conception periods and preliminary cost of establishment of orchard or plantation is high, which makes it almost impractical for the small and marginal farmers to go for such propositions without taking long-term credits from financial institutions such as banks. However, banks do not find it a very encouraging venture and are not sure about the recovery of loans because of the peculiar land tenure system, particularly in the tribal belts. Apart from this, the small farmers are not tuned to the idea of commercial horticulture cultivation and are not familiar with the formalities of acquiring bank loans.

Poor Cultivation Practices and Low Productivity

Small land holdings, poor investment capacity, general neglect and non-adoption of scientific cultivation practices are the major constraints for poor return from most of the horticultural crops in the NE Region and despite the favourable agro-climatic conditions, the rate of production and growth of all horticultural crops is far below the all India average.

In most of the cases, the fruit orchards are very old and senile and the yields are very low. The high capital cost involved in establishing orchard/plantation and setting up of required infrastructure is a serious constraint in the expansion of area under fruit crops in the NE Region. Due to high altitudes, water runoff is rapid and therefore the region lacks water during the winter season despite having abundant rainfall in summer. Therefore, lack of irrigation facilities and the absence of water retention practices severely limits possibilities of multiple cropping, resulting in low land productivity.

In case of vegetables, by planting HYVs which take nearly 3.5 to 4 months from sowing to harvesting, instead of the traditional crops, which take nearly 5 to 6 months, it is possible to increase crop intensity without changing the irrigation facilities. However, these crops require large investments in terms of fertilisers, seeds and pesticides, which poor farmers (due to the small land holdings) are not able to afford.

Shifting cultivation *(jhum)* is widely prevalent in NE Region of India. Though the cycle has now been shortened to 2-3 years because of increased population pressure on land and decrease in productivity, leading to utilisation of more area under jhuming. This system has caused large-scale deforestation, soil degradation/erosion (it removes nutrient-rich top soil) and depletion of resource base.

Poor and Weak Extension System

Despite high potential, difficult terrain with poor connectivity, lack of trained & dedicated human resources and poor coordination among departments are some of the key factors responsible for ineffective and poor extension programme in the NE Region as compared to other states of India where the extension services are very efficient. However, the NE Region is lagging far behind in this aspect. Due to an inadequacy in the extension support staff and information dissemination system at the grass root level, farmers remained unaware of the latest technologies, govt. schemes and programmes pertaining to horticulture cultivation and promotion.

Poor Logistics and Connectivity

Poor infrastructure in terms of roads and railways are the main constraints in the development of NE Region. From the trade point of view, existing rail infrastructure is mainly limited to Assam (broad gauge track). Due to hilly terrain, most of the farmers transport their saleables on head loads (in case of periodic markets), as the public transport in the region is expensive and mostly inaccessible from the production zones or villages. The head loads are carried to a distance of 1-5 kilometres on an average to reach the primary or rural markets or a point from where the motor transport is available for transporting the produce to the main markets. The movement of produce to main (urban) markets is through buses/mini trucks/jeeps that add up transportation costs. The estimated transportation loss from production zone to distant markets is approximately 15-20 percent and the farmer is able to get the price only for better quality produce. Transportation of perishable produce is perhaps the most serious constraint in the development of horticulture in this region.

Poor Marketing and Post-harvest Infrastructure

Due to lack of organised and alternative marketing structure in the region, farmers are getting low return compared to the other parts of India, whereas the middlemen get the profit at their expense. Farmers in the existing market are cheated by middlemen (wholesalers/ retailers) and the share (margin) which the farmers should be getting ends up with these middlemen. Except the organised tea industry, producers of almost all the commodities including specialised products such as kiwi and passion fruit, face considerable marketing problems. Due to poor markets and the perishable nature of the products the farmers sell their produce at a throwaway prices to the middlemen without even getting the opportunity to display them in the open market. Rural markets are much preferred by the farmers due to proximity to production cluster, less transportation cost and absence of trader's cartel. However, rural markets lack the infrastructure such as covered sheds, platforms, plastic crates, sorting/grading machines etc., which is crucial to handle fresh produce.

Lack of primary processing, logistics, marketing and post-harvest infrastructure across various levels of the value chain, are the major factors for quality detoriation and value loss of the perishable produce in the region. For e.g., in case of pineapple, due to lack of assured market in NER, about 20-30 percent of the produce gets wasted and during the period of glut, when abundant produce is being taken to the markets, the farmers are not even able to recover the logistics cost and are forced to distress sell as they do not have any other option.

In the absence of plastic crates, farmers use gunny/jute bags, bamboo baskets for packaging of fresh produce which leads to post-harvest losses due to physical injury to the vegetables. Also, the shelf life of packaging material is very less and farmers need to spend frequently to purchase packaging material.

Lack of Processing Industries

For NE Region, the success of growing perishables is closely linked to the success of fruit processing units. The processing industry can help in sorting out the problem of proper disposal of perishable commodities. To date, there are hardly any cold storage facilities available; few processing units exist and those too are not functioning up to the desired capacity. Use of appropriate pre and post-harvest practices is vital for the success of the crops and to provide good return to the growers. Unfortunately, this is a major lacuna in the entire region. Value addition should be given top priority for crops such as pineapple, citrus, chilli, ginger and turmeric.

From the value chain analysis, it seems that the farmers are getting around 50 percent of the consumers' price but in reality they get this price only for the high quality produce which fetches premium price in the market and the produce which reaches the market; so although farmers are getting good returns per unit produce, but the actual returns per unit area are very low. About 20-30 percent of the produce gets wasted at the farm level for which the farmers get nothing.

RECOMMENDATIONS

Pineapple

State	Production Practices	Harvesting	Post-harvest	Marketing Systems	Market infrastructure	Any Other
Assam, Meghalaya, Tripura and Nagaland	a. Training of farmers to follow clean cultivation practices. By following the scientific package of practices, the yields can be significantly improved. Farmers need to be trained about the economic life of the crop and the need to replant the crop when the plants become very old which reduces the yield significantly. b. Training & capacity building of farmers for better field management practices including disease & pest management. c. Appropriate application of FYM and vermicompost. d. Exposure visit of farmers to progressive farmers' field within or outside the state.	a. Training farmers' in timing the harvest at the appropriate maturity level and addition to good harvesting practices. b. Identification of colour development to schedule the harvesting for targeted markets (based on distance). c. Scheduling of harvesting as per market demand by following the technique of staggered planting.	a. Promotion of size grading practices at farm level. b. Farmers and traders training on post-harvest management especially handling during loading/unloading, logistics and supply chain. c. Keeping the crown downside during loose transportation by vehicles to avoid physical damage to the fruit. d. Use of scientifically developed packaging material for distant transport. **State-specific** Nagaland: a. Exposure visit of farmers to Molvom village to become aware about handling and packaging of fruits.	a. Trade linkages with traders in Markets in Assam and WB. b. Promoting local entrepreneurs to participate in the trade of horticultural products. c. Farmers training on marketing, logistics and price negotiation for the markets in NER. d. Networking with the processors in the region to supply them directly from farm gate. **State-specific** Meghalaya: a. Formation of farmers group to supply in bulk to Guwahati and Kolkata.	a. Training of farmers on quality management, price negotiation and marketing tie ups. b. Set up of collection centres at the farm gate of major production belts. c. Setting up of pineapple processing units near major production clusters to avoid wastage during glut so that unsold fruits can be used for value added products. d. Upgradation of existing processing units and strong marketing linkages.	a. Development of a model pineapple village for bulk production and supply. b. Creation of entrepreneurship interests and skill development of youth for the employment in pineapple industry from production to marketing. c. Pineapple from the NE region is organic by default as the farmers do not apply any kind of chemicals, the produce can be positioned as organic and sold at a premium. d. Scope exists for exporting the organic pineapple to various other countries.

State	Production Practices	Harvesting	Post-harvest	Marketing Systems	Market infrastructure	Any Other
	State-specific Assam & Meghalaya: a. Training of the farmers to adopt the technique of staggered planting, as being followed in the state of Tripura. Nagaland: a. Farmers training on double row planting and avoid single row planting wherever it is noticed. b. Avoid the production of oversized fruits which fetches a comparatively low price.			Tripura: a. There is a need to set up formal tie-ups with Bangladesh. b. Promotion of Tripura pineapple as a brand in horticulture exhibition and trade shows, pan India basis. Nagaland: a. Promotion of marketing in New Delhi and Kolkata market as there is direct rail connectivity from Dimapur.	**State-specific** Tripura: a. Regular markets should be organised for the farmers to sell the produce in the market.	

Citrus

States	Production Practices	Harvesting	Post-harvest	Marketing Systems	Market infrastructure	Any Other
Assam, Manipur, Meghalaya and Sikkim	a. Rejuvenation of old orchards by training farmers. b. Promotion of quality rootstock planting. c. Optimum and recommended use of inputs. d. Training & capacity building of farmers for better orchard management practices including disease & pest management. e. Promotion of biopesticides and insecticides as there is significant loss due to insect and pest. f. Identification of few progressive farmers who can establish small scale plant propagation units with govt support and supply good quality planting material.	a. Training farmers' in timing the harvest at the appropriate maturity level and addition to good harvesting practices. b. Scheduling of harvesting as per market demand. c. Group formation of farmers for aggregation of produce and collective marketing. **State-specific** Sikkim: a. Harvesting at proper time targeting the distant markets of Siliguri, Kolkata and Bangladesh.	a. Promotion of primary grading & sorting practices at farm level. b. Sorting & grading of fruits as per size & colour. c. Distribution and promotion of plastic crates instead of bamboo baskets. d. Establishment of collection centres with waxing facility in the production zones. e. Establishment of small citrus packhouses for dispatch to markets.	a. Minimum price fixation during the time of glut/peak production. b. Strengthening of forward linkages by encouraging retail chains for direct procurement and distribution. c. Facilitation of buyers-sellers meet, before harvesting season to ensure quality, supply and price. d. Promoting local entrepreneurs to participate in the trade of horticultural products in general and citrus in specific. **State-specific** Manipur: a. Promotion of fruit collection near farm gate to access distant markets directly from field (as of now citrus is not going to markets out of Manipur, although there is good demand).	a. Better logistic infrastructure. b. Promotion through NERAMAC outlets. c. Establishment of govt. promoted outlets in major fruits & vegetable markets. d. Developing citrus collection cum packaging cum waxing centre near production clusters for targeting distant markets instead of restricting movement of citrus only to nearby markets. **State-specific** Sikkim: a. Implementation of proposed packhouse projects without delay.	Assam: a. Though citrus is grown in every district but majority of production is concentrated in 4-5 districts only. Production should be promoted to other districts also which have suitable climate. Manipur: a. There is need to make Manipur citrus competitive in the market and that can be done only by doing two key things, one – by improving productivity of citrus and secondly by reducing transportation cost (which have been kept artificially very high by transporters in Manipur compare to any other part of the country).

States	Production Practices	Harvesting	Post-harvest	Marketing Systems	Market infrastructure	Any Other
	g. Field demonstration of integrated cultivation package including nutrient management by extension workers in the farmers orchard.			b. Facilitating trade with traders from distant markets such as Guwahati, Kolkata and from Myanmar by introduction to producers and organising buyer-seller meets. Meghalaya: a. Formation of farmers' groups and tie-ups with traders in markets of Shillong and Guwahati. Sikkim: a. Better policies to promote export trade with Bangladesh and to place produce competitively against Bhutan Mandarin price-wise. b. Introduction of a wide number of farmers with SIMFED and NERAMAC for direct selling and better price realisation.	b. Strengthen the marketing division of Directorate of Horticulture and Cash Crop Development department to improve the horticulture marketing from farm gate to markets.	b. Involving local youth and entrepreneurs in business of horticultural trade, as outsiders have a lot of apprehension in doing business in Manipur due to law and order situation. Meghalaya: a. Set up of farm gate logistic services will be helpful to collect the fruits from scattered orchards as it is time consuming to carry the head loads from field to connecting road and then to local markets and finally main markets. Sikkim: a. Formation of more farmers groups to avail the existing subsidy provided by state govt. to transport in Siliguri/Kolkata markets.

Ginger

State	Production Practices	Harvesting	Post Harvest	Marketing Systems	Market infrastructure	Any Other
Assam, Meghalaya and Sikkim	a. KVK recommended package of practices should be followed especially for seed rate and nutrient requirement. b. Improved seed varieties to be used. c. Certification of purely organic fields. **State-specific** Sikkim: a. Selection of farmers for seed distribution should not be politically influenced. b. Weed management should be done during the critical stages.	a. Ginger should be harvested as per requirement/ target of fresh and dry ginger and harvesting should not be delayed.	a. Proper cleaning and washing. b. Drying in hygienic condition. c. Training on post-harvest handling and packaging. d. Use of cold stores wherever available.	a. Intervention of govt. agencies is necessary to minimise the involvement of various stakeholder by direct procurement from farmers/farmers' groups. b. Effort should be made so that farmers can get a greater pie of profit compared to various stakeholders involved in ginger trading. c. Ensure the availability of logistic services at farm gate so that farmers can come directly to main markets. d. Exposure of farmers to GIN-FED in Karbi Anglong for improvement in trading & marketing. e. Ginger farmers should be supported during steep fall of price by govt. Interference.	a. Indigenous cleaning and washing facilities at the production clusters. b. Co-operative model like GIN-FED should be implemented in other clusters also for better marketing linkages. **State-specific** Assam: a. Already established integrated ginger pack house in Kamrup should run smoothly. Meghalaya: a. Efficient utilisation of existing processing units. b. Setting up of procurement centres in the clusters during harvesting season.	a. GIN-FED model should be studied as they are supplying directly to Azadpur mandi in New Delhi. b. Promotion of ginger-based bakery products can be done by use of organic ginger and the products can be sold with organic branding in major cities. **State-specific** Sikkim: a. Ginger growing farmers who are not realising satisfactory profit from the venture may be trained in floriculture which is very promising in Sikkim currently.

State	Production Practices	Harvesting	Post Harvest	Marketing Systems	Market infrastructure	Any Other
				f. Marketing linkages with processors to supply for oil extraction. **State-specific** Meghalaya: a. Market linkages of farmers' group with traders in Shillong and Guwahati to realise better share of consumer price. b. Better procurement system by attachment with NERAMAC Processing Centre at Ri Bhoi and organisations trading in spices nationwide. Sikkim: a. GIN-FED like model can be implemented to integrate the production, supply chain, marketing tie-up as ginger shares 1/4th of total horticulture production in region.	Sikkim: a. Ginger pack house built in Birdang should be used efficiently. b. Simfed should promote the value added ginger products manufactured at Birdang pack house by targeting the major cities and export markets. c. Certified organic ginger should be promoted in retail outlets in major cities by business tie-ups.	

Turmeric

State	Production Practices	Harvesting	Post-harvest	Marketing Systems	Market infrastructure	Any Other
Assam, Meghalaya and Mizoram	a. Proper application of package of practices to improve the overall yield in the state. b. Treatment of rhizomes before sowing to avoid rhizome-borne diseases. **State-specific** Assam: a. Improve the seed rate upto 2 MT/ha b. Exposure visit of turmeric farmers to leading belts in South India/ Mizoram. Meghalaya: a. Use of healthy rhizomes of Lakadong variety as planting material. Mizoram: a. Increase the production area in Aizawl district. b. Implementation of Reiek model of farmers group in other producing belts.	a. Turmeric should not be left in the field for a long time after maturity as it affects the quality. Hence, it should be done at proper time of maturity.	a. Proper training should be imparted in washing, grading, slicing and drying to match the quality in national markets. b. Large level curing at the farmers place should be promoted for better price realisation of finished product. c. Value addition activities such as powder-making and curcumin extraction should be promoted under agro-based industry.	a. Farmers should be encouraged to sell finished turmeric. b. Direct procurement system should be implemented through NERAMAC and renowned private organisations. c. Linkage of farmers groups with traders in the cities. **State-specific** Meghalaya: a. Marketing linkage with national as well as international processors where Lakadong variety is in demand due to high curcumin content. b. Branding of Lakadong turmeric such as Erode. Mizoram: a. Marketing linkages with spice industry instead of middlemen for better price realisation.	a. Set up of scientific/ indigenous slicing, drying and grinding unit at major production belts. b. Set up of value addition & processing unit to procure directly from farmers and market further to major locations. c. Common procurement infrastructure to sell in the markets outside the state.	a. Formation of turmeric village in major production districts and training on scientific cultivation to improve the productivity. b. Direct linkage with regional and distant markets. **State Specific** Meghalaya: a. G.I. registration of Lakadong variety. Mizoram: a. Exposure visit of low production districts to Mamit to adopt better production and marketing practices.

Vegetables

State	Production Practices	Harvesting	Post-harvest	Marketing Systems	Market infrastructure
Assam and Meghalaya	a. Vegetable farmers should be trained properly for systematic cultivation techniques. b. Availa bility of good quality seeds should be ensured. c. Seeds and other input material should be procured easily by farmers. d. Visit of VLEWs to vegetable farmers at regular intervals. **State-specific** Meghalaya: a. Promotion of exotic vegetables can be done at commercial level as the agro-climatic condition is favourable. b. Organised cultivation of off season vegetables.	a. Training of farmers on harvesting practices, seasons and as per market demand is essential. **State-specific** Meghalaya: a. Harvesting of off season vegetables should be managed as per the demand in other states where it is to be supplied.	a. Proper handling of vegetables after harvesting and during loading and unloading is necessary. b. Use of crates during long distance transportation to avoid physical damage. c. Packaging of vegetables as per market requirement and to avoid damage during transportation should be followed. d. Use of existing cold stores for vegetable storage can be promoted to avoid wastage and to facilitate efficient utilisation of cold stores.	a. Training of farmers on marketing of vegetables is necessary as they are not able to negotiate with the aggregators/ consolidators. b. Involvement of various stakeholders should be minimised by establishing organised procurement system. c. Group of farmers can be introduced to wholesalers in the main markets for direct supply. **State-specific** Meghalaya: a. Networking of farmers groups directly with the traders in distant market to improve the share of profit should be encouraged. b. Vegetables should be notified in the regulated markets for organised trading.	a. Establishment of vegetable packhouse is done on urgent basis. b. Infrastructure in the regulated markets should be upgraded. c. Formation of collection centres at major production belts is necessary. d. Logistic system from farm gate to consumer markets should be strengthen. e. Basic facilities such as office, sheds, hygienicity, toilets, weighing facilities, grading and cold stores should be provided in the wholesale markets. f. Wastage should be minimized by use of proper methods, tools and facilities from production till end consumers.

Naga Chilli

State	Production Practices	Harvesting	Post-harvest	Marketing Systems
Nagaland	a. Seed availability should be ensured. b. Organised farming by making farmers' group. c. Field exposure to Jalukie (Peren) for improved cultivation practices.	None	a. Proper packaging of fresh and dry chilli to avoid quality degradation. b. Big chillies can be graded and sold at higher price as they sell on a per piece basis in the retail markets.	a. Dry chilli can be sold on a pan India basis through spice traders. b. Brand can be promoted through agri-fairs/trade exhibitions and other events.

Passion Fruit

State	Production Practices	Harvesting	Post-harvest	Marketing systems	Marketing Infrastructures
Nagaland	a. Integrated management of orchards especially nutrient and disease/ pests management. b. Certification of organically managed orchards.	a. For commercial use, fruit should be harvested when it is 90% yellow and 10% green. b. Fruit should be picked from vine rather than being allowed to fall on the ground. c. Secateurs/sharp knife should be used to prevent water loss and development of fungus. d. Use of crates at field level to collect the fruits.	a. Forced air pre-cooling, washing, sorting and grading should be done to realise a good price. b. Time between harvesting and packing should be kept at a minimum to avoid water loss. c. Plastic bag packing should be avoided which causes skin shrinking. d. Packing in one or two layer cell packs or punnets should be done to market in distant as well as export markets. e. Fruits of uniform size and stage of ripeness should be packed together.	a. Direct contacts of orchardists with processors in Nagaland and other states. b. Linkage of farmers groups or local trader with traders in Guwahati, Kolkata, New Delhi and other promising markets will help trade.	a. Organised procurement system should be formed during harvesting season. b. Availability of logistic facility in production clusters to reduce the time between farm gates and consumer markets. c. Efficient utilisation of existing processing units in Nagaland and promotion of value added products in domestic and export markets.

Kiwi Fruit

State	Production Practices	Harvesting	Post-harvest	Marketing Systems	Marketing Infrastructure
Arunachal Pradesh	a. Integrated disease and pest management especially passion vine hopper. b. Pruning should be done at proper intervals. c. Very dense planting should be avoided (6 X 6 sq ft is acceptable). d. Old trees should be replaced with new plants. e. Certification of organically managed orchards.	a. Hard berries should be harvested for targeted distant markets. b. Secateurs/sharp knife should be used for harvesting. c. Use of crates at field level to collect the fruits.	a. The fruits can be stored for about one month at room temperature and 4-5 months in the cold storage at 10°C to extend the marketing period. b. Glut can be avoided by keeping in cold storage for the time-being. c. Attractive packaging to fetch better price in prime markets of major cities of India as well as export markets. d. Crates should be used for transportation instead of loose or gunny bag packaging to avoid physical damage.	a. Formation of kiwi farmers' groups for efficient marketing practices and price negotiation. b. Marketing through organised channel by direct procurement from farm gate by NERAMAC and other corporate groups involved in fruits and vegetable ventures.	a. Logistic system should be upgraded to access the major markets in India as it is seen that kiwi from New Zealand can access the Indian markets easily but kiwi produced in Arunachal Pradesh is facing difficulties in reaching the markets. b. Integrated pack house should be installed to grade high quality kiwi to target the export markets and prime Indian markets.

Large Cardamom

State	Production Practices	Harvest	Post-harvest	Marketing systems	Marketing Infrastructures
Sikkim	a. Use of healthy and micro-propagated planting materials. b. Replacement of old plants with new ones to increase the productivity. c. Proper weed management in the fields.	a. Fields should be cleaned of dried plants, leaves and stubbles. b. Harvesting is done when top capsules of the spike attain dark grey colour. c. Pseudostems should be removed during harvesting.	a. Harvested spikes should not be left for longer duration because it is highly perishable. b. Fuel pipe system should be adopted instead of open BHATTI to maintain the colour and flavour and avoid the burning of capsules.	a. A wide number of farmers can be encouraged to sell through NERAMAC-organised auctioning system.	a. Logistic support should be provided to farmers living at distance places to reach the auction centre at Rong Po.

ANNEXURE 1

Identification of Production Clusters in the States for the Selected FCGs

In order to identify the production clusters in the states for identified crops, district-wise production data has been analysed. Due to non-availability of current year data (2010-11) with few state departments, previous year data has been used.

Sl. No.	Crops/ Districts	Arunachal Pradesh (2010-11)																
		Tawang	West Kameng	East Kameng	Papum Pare	Lower Subansiri	Upper Subansiri	Kurung Valley	West Siang	East Siang	Upper Siang	Dibang Valley	Roing	Lohit	Anjaw	Changlang	Tirap	Total Production (MT)
A	**Fruits**																	
1	Apple	9.21%	84.93%	0.00%	0.00%	1.76%	0.00%	0.00%	0.00%	0.00%	0.00%	3.89%	0.00%	0.00%	0.21%	0.00%	0.00%	28,363
2	Walnut	11.33%	88.67%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	609
3	Kiwi	7.51%	60.31%	0.00%	0.00%	24.33%	0.00%	0.00%	1.17%	0.00%	0.00%	3.82%	0.89%	0.00%	1.98%	0.00%	0.00%	3,930
4	Citrus	0.01%	0.35%	0.71%	1.63%	1.27%	3.60%	1.21%	13.85%	12.70%	15.11%	0.49%	16.46%	28.53%	2.13%	1.26%	0.68%	164,673
5	Pineapple	0.00%	0.00%	5.37%	7.21%	5.06%	5.98%	1.67%	19.98%	21.33%	6.44%	0.44%	9.17%	8.13%	1.84%	4.45%	2.92%	65,180
6	Banana	0.00%	0.00%	6.02%	8.33%	8.24%	6.94%	5.51%	8.80%	8.56%	8.29%	1.85%	6.85%	10.65%	0.00%	10.15%	9.81%	21,603
7	Other Fruits	1.49%	10.43%	3.48%	2.94%	5.95%	7.23%	6.78%	6.85%	7.81%	7.27%	3.39%	7.71%	7.53%	7.50%	7.45%	6.18%	13,276
	Total Fruits	**1.07%**	**9.73%**	**2.16%**	**3.22%**	**3.16%**	**4.13%**	**1.74%**	**13.00%**	**12.66%**	**10.70%**	**1.08%**	**11.97%**	**18.68%**	**1.96%**	**2.74%**	**2.00%**	**297,634**
B	**Vegetables**	**0.00%**	**30.89%**	**0.00%**	**17.27%**	**0.00%**	**0.00%**	**0.00%**	**0.00%**	**0.00%**	**0.00%**	**0.00%**	**22.11%**	**29.73%**	**0.00%**	**0.00%**	**0.00%**	**7,087**
C	**MAPs**	**11.31%**	**13.46%**	**4.50%**	**3.46%**	**6.98%**	**4.23%**	**4.02%**	**8.10%**	**10.62%**	**11.00%**	**3.37%**	**3.29%**	**5.17%**	**4.19%**	**3.11%**	**3.18%**	**108,108**
D	**Spices**																	
1	L. Cardamom	0.00%	0.00%	3.09%	3.53%	9.85%	9.12%	3.97%	7.35%	8.82%	6.18%	2.06%	6.03%	5.44%	20.29%	8.53%	5.74%	680
2	Ginger	0.00%	0.00%	0.00%	0.00%	12.90%	0.00%	0.00%	3.23%	8.06%	5.99%	0.00%	31.68%	19.01%	12.90%	6.22%	0.00%	4,340
	Total Spices	**0.00%**	**0.00%**	**0.42%**	**0.48%**	**12.49%**	**1.24%**	**0.54%**	**3.78%**	**8.17%**	**6.02%**	**0.28%**	**28.21%**	**17.17%**	**13.90%**	**6.53%**	**0.78%**	**5,020**
Grand Total		**3.69%**	**10.94%**	**2.71%**	**3.48%**	**4.21%**	**4.05%**	**2.29%**	**11.40%**	**11.87%**	**10.54%**	**1.64%**	**10.09%**	**15.35%**	**2.65%**	**2.83%**	**2.26%**	**417,849**

Sl. No.	Crops /Districts	Assam (2009-10)													
		Cachar	Haila-kandi	Karim-ganj	Goalpara	Dhubri	Kokra-jhar	Bongaig-aon	Kamrup (R)	Nalbari	Barpeta	Darrang	Sonitpur	Nagaon	Moriga-on
A	**Fruits**														
1	Banana	6.02%	3.34%	2.39%	6.77%	2.10%	3.23%	1.28%	5.32%	2.96%	5.63%	3.20%	7.22%	7.17%	2.51%
2	Pineapple	11.35%	4.76%	1.82%	1.95%	0.27%	2.16%	2.21%	14.62%	0.48%	1.88%	0.95%	5.56%	3.17%	0.51%
3	Jackfruit	6.35%	1.62%	4.79%	7.39%	2.17%	2.75%	3.29%	3.65%	4.43%	3.74%	6.80%	4.64%	8.48%	3.26%
4	Citrus	2.61%	1.44%	1.27%	2.65%	0.85%	1.69%	1.26%	10.99%	1.53%	1.57%	1.43%	2.45%	3.17%	1.90%
5	Papaya	2.76%	1.29%	0.78%	3.42%	0.98%	4.59%	1.96%	5.35%	3.27%	4.70%	1.47%	3.78%	5.57%	1.38%
6	Other Fruits	5.48%	2.79%	3.91%	3.73%	3.69%	3.60%	4.03%	3.59%	3.75%	3.65%	4.76%	5.52%	4.12%	4.71%
	Total Fruits	**5.98%**	**2.84%**	**2.50%**	**4.96%**	**1.79%**	**2.97%**	**2.03%**	**6.97%**	**2.72%**	**4.01%**	**3.12%**	**5.54%**	**5.71%**	**2.43%**
B	**Vegetables**														
1	Cabbage	5.86%	1.52%	2.60%	1.85%	6.88%	3.16%	2.78%	2.28%	5.07%	14.61%	3.03%	2.50%	7.36%	1.28%
2	Potato	2.55%	0.66%	1.30%	1.51%	4.87%	5.55%	3.28%	6.23%	2.27%	6.69%	6.33%	12.72%	4.72%	1.09%
3	Tomato	5.82%	1.50%	1.56%	2.55%	7.17%	2.24%	3.16%	3.82%	4.76%	5.31%	4.21%	3.95%	8.38%	4.88%
4	Cauliflower	3.49%	1.16%	5.04%	2.24%	6.69%	3.70%	2.21%	6.37%	3.65%	7.22%	2.92%	2.86%	9.16%	1.83%
5	Brinjal	4.86%	1.75%	2.53%	7.20%	5.37%	4.32%	4.73%	3.79%	3.13%	3.97%	3.78%	6.18%	5.39%	3.15%
6	Radish	4.33%	1.01%	1.59%	2.14%	44.23%	2.14%	1.89%	4.64%	2.64%	2.55%	2.72%	1.34%	4.54%	0.98%
7	Okra	5.96%	1.96%	2.10%	2.90%	7.83%	3.41%	3.05%	6.28%	1.99%	5.49%	5.13%	3.27%	8.10%	2.39%
8	Ginger	1.35%	1.01%	0.79%	2.71%	0.79%	2.08%	0.98%	2.64%	1.07%	3.13%	2.47%	5.77%	4.56%	1.81%
9	Turmeric	5.20%	1.08%	1.41%	2.12%	2.50%	4.40%	1.47%	6.44%	3.00%	8.45%	3.29%	7.89%	11.59%	1.78%
10	Other Veg.	1.40%	3.53%	3.45%	3.64%	2.34%	3.24%	3.78%	3.86%	2.06%	5.38%	4.95%	8.87%	5.87%	1.93%
	Total Veg.	**2.91%**	**2.40%**	**2.88%**	**3.04%**	**5.37%**	**3.37%**	**3.36%**	**4.20%**	**2.80%**	**6.58%**	**4.55%**	**7.22%**	**6.31%**	**2.00%**

Sl. No.	Crops/ Districts	Assam (2009-10)													
		Baksa	Chirang	Kamrup (M)	Udalguri	Jorhat	Golaghat	Sivasa-gar	Lakhim-pur	Dhemaji	Dibru-garh	Tinsukia	K. Anglong	N.C.Hills	Total Prod. (MT)
A	**Fruits**														
1	Banana	4.08%	1.16%	1.07%	1.15%	5.32%	6.59%	3.24%	3.56%	3.24%	1.14%	4.09%	4.39%	1.84%	621,747
2	Pineapple	1.46%	3.22%	1.69%	4.42%	0.78%	1.28%	1.17%	2.57%	1.06%	0.51%	2.19%	14.18%	13.77%	210,241
3	Jackfruit	2.54%	2.68%	4.65%	0.45%	4.14%	1.32%	3.23%	3.93%	2.31%	2.25%	3.22%	3.51%	2.42%	178,076
4	Citrus	2.67%	3.45%	6.74%	4.35%	2.69%	2.87%	1.09%	2.17%	1.31%	2.26%	9.21%	6.73%	19.65%	215,365
5	Papaya	3.83%	2.29%	0.57%	4.71%	3.79%	3.15%	1.80%	2.64%	0.81%	1.10%	2.15%	6.68%	25.19%	122,445
6	Other Fruits	1.95%	2.42%	3.61%	3.17%	3.56%	4.32%	3.86%	3.08%	4.31%	2.67%	3.14%	2.98%	3.60%	194,240
	Total Fruits	**3.06%**	**2.18%**	**2.64%**	**2.50%**	**3.85%**	**4.18%**	**2.62%**	**3.14%**	**2.51%**	**1.53%**	**4.17%**	**5.96%**	**8.10%**	**154,2114**
B	**Vegetables**														
1	Cabbage	3.50%	2.95%	2.33%	2.49%	3.56%	4.35%	3.09%	4.17%	2.48%	2.76%	4.47%	1.18%	1.90%	605,515
2	Potato	4.67%	3.02%	0.57%	8.41%	1.26%	3.58%	0.96%	4.66%	4.16%	0.87%	1.38%	1.53%	5.17%	600,153
3	Tomato	3.67%	4.32%	5.56%	4.05%	3.23%	3.85%	4.60%	1.52%	3.39%	1.26%	1.52%	2.17%	1.52%	375,417
4	Cauliflower	2.15%	2.99%	7.72%	2.86%	2.86%	6.18%	1.97%	3.26%	2.65%	2.61%	3.10%	1.37%	1.74%	347,678
5	Brinjal	3.59%	3.64%	3.30%	2.45%	2.63%	3.94%	1.23%	5.81%	2.20%	3.35%	4.29%	2.22%	1.19%	219,787
6	Radish	2.25%	3.85%	2.64%	1.74%	1.11%	1.31%	1.78%	2.28%	0.84%	1.46%	1.94%	1.54%	0.53%	167,551
7	Okra	4.43%	6.73%	4.46%	4.29%	1.75%	2.76%	2.47%	2.89%	1.54%	1.92%	3.16%	2.42%	1.30%	137,139
8	Ginger	3.51%	1.37%	0.56%	5.65%	1.20%	7.29%	1.03%	2.98%	3.06%	0.08%	5.66%	16.17%	20.26%	107,893
9	Turmeric	5.60%	2.09%	1.03%	3.81%	2.44%	6.92%	2.02%	5.77%	0.00%	0.61%	1.45%	6.02%	1.63%	97,19
10	Other Veg	2.95%	4.18%	2.89%	4.01%	3.42%	2.94%	3.28%	4.78%	2.39%	4.57%	4.07%	2.71%	3.54%	252,3318
	Total Veg.	**3.24%**	**3.80%**	**3.10%**	**4.17%**	**2.94%**	**3.57%**	**2.80%**	**4.25%**	**2.65%**	**3.23%**	**3.50%**	**2.42%**	**3.32%**	**503,7720**

Sl. No.	Crops/ Districts	Manipur (2010-11)									
		Imphal (E)	Imphal (W)	Bishunupur	Thoubal	Tameng-long	Senapati	Ukhrul	Chandel	C. Cpur	Total Prod. (MT)
A	**Fruits**										
1	Pineapple	8.59%	4.16%	12.23%	19.60%	6.66%	25.24%	1.55%	6.08%	15.89%	110,598
2	Banana	11.59%	11.54%	11.11%	9.32%	15.31%	8.78%	7.07%	11.37%	13.91%	76,422
3	Lime/Lemon	3.60%	3.91%	4.37%	6.04%	5.89%	9.63%	32.82%	10.24%	23.50%	29,405
4	Orange	0.00%	0.00%	0.00%	0.00%	62.42%	2.85%	6.54%	3.50%	24.69%	25,990
5	Passion Fruit	1.28%	1.24%	1.88%	1.02%	7.73%	36.65%	20.13%	5.79%	24.28%	72,581
6	Other Fruits	6.34%	5.00%	13.99%	13.16%	13.48%	9.92%	10.80%	13.84%	13.46%	56,605
	Total Fruits	**6.44%**	**4.92%**	**8.77%**	**10.43%**	**13.53%**	**18.95%**	**10.55%**	**8.44%**	**17.97%**	**371,601**
B	**Vegetables**										
1	Cauliflower	20.85%	18.00%	20.29%	22.67%	2.18%	4.46%	2.30%	3.54%	5.72%	22,935
2	Cabbage	17.19%	14.93%	17.73%	17.06%	3.65%	12.52%	8.59%	4.34%	3.99%	57,624
3	Tomato	21.43%	12.62%	23.42%	18.49%	3.24%	4.66%	3.84%	4.61%	7.69%	20,156
4	Peas	17.83%	16.79%	16.17%	15.85%	4.34%	7.51%	9.53%	5.08%	6.91%	45,502
5	Other Veg.	15.21%	14.38%	10.30%	18.04%	8.11%	7.36%	9.39%	8.63%	8.58%	46,738
	Total Veg.	**17.74%**	**15.36%**	**16.46%**	**17.83%**	**4.68%**	**8.31%**	**7.76%**	**5.48%**	**6.38%**	**192,955**
C	**Spices**										
1	Chillies	17.76%	13.32%	10.15%	15.35%	7.61%	11.71%	3.45%	5.12%	15.53%	61,661
2	Ginger	9.24%	7.53%	8.47%	6.32%	6.50%	6.29%	4.54%	8.47%	42.65%	25,443
3	Turmeric	10.87%	11.55%	9.54%	9.20%	5.75%	12.94%	10.54%	7.12%	22.47%	16,323
4	Others Spices	11.62%	13.38%	12.94%	13.51%	11.31%	6.43%	9.07%	11.00%	10.72%	3,871
	Total Spices	**14.47%**	**11.68%**	**9.76%**	**12.21%**	**7.20%**	**10.42%**	**4.99%**	**6.43%**	**22.84%**	**107,298**
	Grand Total	**10.97%**	**9.00%**	**11.14%**	**12.84%**	**9.97%**	**14.53%**	**8.86%**	**7.27%**	**15.42%**	**671,854**

Sl. No.	Crops/ Districts	Meghalaya (2009-10)							
		Ri-Bhoi	East Khasi Hills	West Khasi Hills	Jaintia Hills	East Garo Hills	West Garo Hills	South Garo Hills	Total Prod. (MT)
A	**Fruits**								
1	Pineapple	38.89%	6.01%	3.96%	0.54%	19.93%	23.48%	7.17%	103,432
2	Banana	18.74%	10.14%	5.25%	2.28%	29.95%	28.98%	4.66%	78,822
3	Citrus	4.39%	51.65%	12.67%	13.63%	6.48%	9.70%	1.46%	39,070
4	Papaya	25.26%	14.07%	4.07%	0.90%	28.08%	25.66%	1.96%	4,541
	Total Fruits	**25.62%**	**15.51%**	**5.92%**	**3.42%**	**21.26%**	**23.06%**	**5.21%**	**225,865**
B	**Vegetables**								
1	Potato	0.10%	68.07%	27.88%	0.56%	0.62%	2.50%	0.27%	162,445
2	Cabbage	0.44%	76.77%	2.92%	3.00%	10.24%	5.38%	1.25%	36,022
3	Cauliflower	0.46%	54.02%	1.67%	35.27%	2.68%	4.64%	1.26%	35,271
4	Tomato	5.77%	24.77%	1.38%	49.39%	4.84%	10.24%	3.61%	27,522
5	Pumpkin	1.12%	7.92%	14.59%	3.58%	41.16%	11.75%	19.88%	12,191
6	Brinjal	1.31%	5.97%	1.18%	2.10%	50.55%	30.99%	7.91%	11,641
7	Peas	6.15%	24.58%	4.94%	10.38%	18.62%	31.90%	3.43%	4,780
8	Onion	17.71%	12.93%	7.24%	1.17%	18.16%	31.35%	11.44%	3,078
9	Other Veg.	6.24%	22.49%	10.92%	8.08%	21.99%	21.45%	8.84%	106,307
	Total Veg.	**4.28%**	**37.60%**	**4.23%**	**16.35%**	**16.16%**	**14.87%**	**6.52%**	**399,257**
C	**Spices**								
1	Ginger	14.16%	6.64%	3.67%	5.49%	40.78%	27.08%	2.19%	54,009
2	Turmeric Green	3.97%	4.97%	2.87%	59.46%	5.66%	19.44%	3.62%	9,895
3	Chillies Green	10.47%	15.35%	3.30%	2.80%	14.42%	42.04%	11.62%	1,394
4	Black Pepper	18.87%	22.78%	14.75%	3.47%	3.47%	32.10%	4.56%	461
	Total Spices	**12.58%**	**6.69%**	**3.62%**	**13.54%**	**34.67%**	**26.28%**	**2.62%**	**65,759**

Sl. No.	Crops/ Districts	Mizoram (2010-11)								
		Aizawl	Lunglei	Saiha	Champhai	Mamit	Kolasib	Serchhip	Lawngtai	Total Prod. (MT)
A	**Fruits**									
1	Mandarin	17.44%	9.85%	6.30%	13.35%	15.56%	16.20%	18.27%	3.04%	19,701
2	Banana	24.85%	9.62%	4.97%	6.76%	6.01%	6.18%	37.31%	4.28%	118,600
3	Lime/Lemon	13.32%	11.96%	9.32%	9.75%	14.91%	13.62%	14.83%	12.30%	24,150
4	Pineapple	12.55%	11.17%	9.95%	10.55%	9.71%	19.09%	17.95%	9.04%	13,590
5	Grape	8.02%	5.79%	4.74%	55.09%	4.10%	5.04%	11.53%	5.69%	20,400
6	Passion Fruit	18.82%	6.53%	1.03%	61.88%	1.12%	5.94%	2.31%	2.37%	5,910
7	Papaya	21.30%	2.85%	1.75%	7.86%	57.73%	3.16%	2.75%	2.60%	6,750
8	Mango	19.75%	10.70%	9.05%	13.61%	15.02%	11.23%	12.56%	8.07%	2,850
9	Other Fruits	19.88%	12.20%	8.56%	14.79%	12.69%	11.97%	12.77%	7.14%	6,219
	Total Fruits	**20.08%**	**9.43%**	**5.81%**	**14.29%**	**9.69%**	**8.74%**	**26.45%**	**5.51%**	**218,170**
B	**Vegetables**									
1	Brinjal	25.33%	8.63%	3.42%	19.45%	1.23%	13.67%	21.93%	6.35%	12,108
2	Bitter Gourd	16.94%	13.11%	12.77%	12.83%	3.07%	15.18%	16.51%	9.59%	16,889
3	Cabbage	30.25%	8.42%	3.82%	7.04%	9.57%	9.57%	27.30%	4.04%	33,569
4	Chayote	36.70%	12.07%	4.95%	7.71%	8.23%	7.38%	15.64%	7.32%	56,849
5	Bean	34.58%	11.50%	6.91%	6.03%	11.57%	7.38%	16.73%	5.29%	4,956
6	Okra	19.91%	8.86%	9.60%	9.95%	12.91%	13.43%	19.16%	6.18%	18,710
7	Cucumber	21.08%	7.76%	6.76%	7.62%	1.78%	14.01%	32.95%	8.03%	3,651
8	Tomato	54.90%	13.60%	2.08%	4.72%	9.92%	9.92%	3.85%	1.00%	6,180
9	Pea	32.07%	15.60%	6.78%	7.76%	1.55%	9.11%	20.43%	6.70%	1,933
10	Other Veg.	26.97%	13.09%	8.41%	16.97%	5.81%	12.78%	10.90%	5.06%	14,064
	Total Veg.	**30.17%**	**10.92%**	**6.21%**	**9.79%**	**7.74%**	**10.42%**	**18.52%**	**6.23%**	**168,909**
C	**Spices**									
1	Black Pepper	33.98%	0.00%	0.00%	0.00%	0.00%	66.02%	0.00%	0.00%	88
2	Ginger	16.33%	5.07%	6.63%	15.55%	14.92%	16.02%	17.27%	8.20%	31,950
3	Turmeric	5.36%	5.77%	11.20%	11.61%	31.22%	12.45%	15.37%	7.02%	23,970
4	Bird Eye Chilli	12.13%	15.52%	9.77%	14.37%	13.22%	11.72%	11.67%	11.61%	47,850
	Total Spices	**11.88%**	**10.04%**	**9.12%**	**14.08%**	**17.89%**	**13.26%**	**14.24%**	**9.49%**	**103,858**

Sl. No.	Crops/ Districts	Nagaland (2008-09)											
		Kohima	Wokha	Mokokc-hung	Zunhe-boto	Tuenn-sang	Phek	Mon	Dimapur	Kiphere	Longleng	Peren	Total Prod. (MT)
A	**Fruits**												
1	Banana	10.00%	11.67%	10.83%	8.33%	8.33%	8.33%	8.33%	8.33%	8.33%	8.33%	9.17%	60,000
2	Pineapple	10.43%	10.43%	10.43%	5.22%	5.22%	6.09%	5.22%	20.87%	5.22%	3.48%	17.39%	57,500
3	Citrus	13.66%	17.69%	23.83%	3.23%	6.55%	6.46%	3.23%	5.05%	9.80%	3.23%	7.27%	30,970
4	Passion Fruit	15.87%	15.87%	12.70%	9.52%	9.52%	9.52%	6.35%	0.00%	6.35%	6.35%	7.94%	6,300
5	Papaya	13.79%	13.79%	13.79%	5.17%	6.90%	5.17%	6.90%	6.90%	6.90%	6.90%	13.79%	5,800
6	Guava	10.20%	10.20%	10.20%	8.16%	6.80%	6.80%	12.59%	6.46%	8.16%	6.80%	13.61%	1,470
7	Other Fruits	12.76%	11.57%	13.85%	6.53%	8.51%	6.82%	5.93%	9.00%	8.51%	7.02%	9.50%	5,055
	Total Fruits	**11.27%**	**12.58%**	**13.36%**	**6.19%**	**6.92%**	**7.09%**	**6.16%**	**11.68%**	**7.41%**	**5.54%**	**11.81%**	**167,095**
B	MAPs	9.09%	9.09%	9.09%	0.00%	9.09%	0.00%	10.91%	21.82%	9.09%	0.00%	21.82%	550
C	**Vegetables**												
1	Ginger	10.00%	10.00%	10.00%	10.00%	10.00%	6.67%	10.00%	3.33%	6.67%	6.67%	16.67%	30,000
2	Chillies	13.04%	13.04%	8.70%	8.70%	8.70%	8.70%	8.70%	4.35%	8.70%	8.70%	8.70%	23,000
3	Colocasia	15.00%	15.00%	7.50%	7.50%	10.00%	12.50%	12.50%	5.00%	5.00%	5.00%	5.00%	20,000
4	Cabbage	8.55%	8.55%	8.55%	4.27%	4.27%	42.74%	4.27%	8.55%	4.27%	4.27%	1.71%	11,700
5	Chowchow	12.05%	12.05%	12.05%	8.43%	8.43%	15.66%	10.84%	0.00%	7.23%	7.23%	6.02%	8,300
6	Bean	8.86%	8.86%	8.86%	5.70%	35.44%	5.70%	4.43%	8.86%	4.43%	4.43%	4.43%	7,900
7	Tapioca	11.67%	11.67%	16.67%	10.00%	10.00%	10.00%	6.67%	6.67%	6.67%	6.67%	3.33%	6,000
8	Leafy Veg.	10.00%	10.00%	10.00%	10.00%	10.00%	10.00%	10.00%	10.00%	5.00%	5.00%	10.00%	5,000
9	Tomato	18.75%	7.50%	7.50%	7.50%	10.00%	7.50%	5.00%	6.25%	7.50%	10.00%	12.50%	4,000
10	Other Veg.	12.07%	12.03%	10.89%	7.03%	6.70%	7.40%	6.99%	11.99%	6.22%	6.34%	12.35%	12,305
	Total Veg.	**11.81%**	**11.45%**	**9.63%**	**8.12%**	**10.39%**	**12.14%**	**8.74%**	**5.71%**	**6.37%**	**6.46%**	**9.18%**	**128,205**

Sl. No.	Crops/ Districts	Sikkim (2006-07)				
		North	East	South	West	Total Prod. (MT)
A	**Fruits**					
1	Orange	0.81%	46.18%	18.87%	34.14%	9,300
2	Passion Fruit	7.11%	44.66%	22.92%	25.30%	2,53
3	Other Fruits	2.71%	37.56%	24.40%	35.33%	3,946
	Total Fruits	**1.48%**	**43.63%**	**20.56%**	**34.32%**	**13,499**
B	**Vegetables**					
1	Kharif Veg.	10.51%	32.52%	31.93%	25.04%	14,199
2	Rabi Veg.	5.99%	32.52%	34.91%	26.58%	17,101
3	Off season Veg.	9.41%	30.16%	32.39%	28.05%	12,900
	Total Veg.	**8.44%**	**31.83%**	**33.22%**	**26.52%**	**44,200**
C	**Total Root & Tuber Crops**	**6.70%**	**27.97%**	**26.62%**	**38.70%**	**36,598**
D	**Spices**					
1	L. Cardamom	31.93%	30.61%	19.89%	17.57%	3,182
2	Ginger	1.82%	34.08%	36.54%	27.57%	36,001
3	Turmeric	4.55%	25.64%	47.03%	22.77%	2,020
	Total Spices	**4.28%**	**33.40%**	**35.76%**	**26.56%**	**41,203**

Sl. No.	Crops/ Districts	Tripura (2009-10)				
		South	West	Dhalai	North	Total Prod. (MT)
A	**Fruits**					
1	Jackfruit	30.01%	28.37%	22.10%	19.52%	251,569.00
2	Pineapple	23.41%	24.47%	18.11%	34.00%	117,531.00
3	Banana	18.59%	53.83%	13.37%	14.21%	105,615.00
4	Orange	7.76%	0.19%	11.13%	80.91%	22,230.00
5	Papaya	27.19%	24.73%	22.17%	25.91%	18,455.00
6	Litchi	38.52%	20.72%	16.59%	24.17%	16,972.00
7	Mango	51.07%	25.98%	7.68%	15.28%	13,170.00
8	Lime/Lemon	26.23%	39.48%	23.32%	10.98%	11,716.00
9	Other Fruits	22.77%	35.06%	13.10%	29.07%	16,567.00
	Total Fruits	**26.05%**	**31.19%**	**18.53%**	**24.23%**	**573,825.00**
B	**Vegetables**					
1	Potato	45.12%	26.63%	10.69%	17.56%	99,416.00
2	Tomato	32.55%	43.04%	9.47%	14.94%	29,550.00
3	Brinjal	22.53%	63.18%	6.01%	8.27%	22,651.00
4	Radish	22.02%	55.81%	3.73%	18.44%	19,068.00
5	Colacasia	24.01%	30.82%	4.87%	40.30%	18,426.00
6	Other Vegetables	24.10%	49.86%	10.82%	15.22%	133,886.70
	Total Vegetables	**25.91%**	**49.54%**	**8.63%**	**15.92%**	**347,527.70**
C	**Spices**					
1	Ginger	61.01%	11.30%	12.42%	15.28%	7,932.00
2	Turmeric	40.49%	28.80%	6.82%	23.89%	5,965.00
3	Chilly	52.86%	30.47%	7.10%	9.57%	3,042.00
4	Black Pepper	16.04%	41.51%	2.83%	39.62%	106.00
5	**Total Spices**	**52.45%**	**21.18%**	**8.83%**	**17.54%**	**16,929.40**

ANNEXURE 2

Agriculture Marketing and Post-Harvest Infrastructure

Arunachal Pradesh

Scenario of Agricultural Marketing in Arunachal Pradesh

The Government of Arunachal Pradesh has enacted the **Arunachal Pradesh Marketing (Regulation) Act, 1989** to provide for a legal mechanism to establish and regulate markets in Arunachal Pradesh with a view to remove the handicaps from which a farmer was suffering. This will be done by ensuring fair and remunerative prices of their produce by rationalising/ standardising various activities and practices in the markets through legislation.

In accordance with the provision of the said Act, 14 agricultural produce marketing committees have been established to facilitate and regulate transaction of agricultural and allied produces. So far 14 Agricultural Produce Marketing Committees are functioning in the state. The Arunachal Pradesh Agriculture Marketing Board is to oversee the functioning of Agricultural Produce Marketing Committees and to provide necessary assistance in establishment of infrastructural facilities such as market sheds, storage, godowns out of the grants released by the state government.

The efforts of the state government and Agricultural Produce Marketing Board (APAMB) have been supplemented to some extent by the Directorate of Marketing and Inspection, Government of India, under Mini Mission III of the Technology Mission for Development of Horticulture in the North East and Macro Management Programme. The facilities created under various financial supports at different locations are given in **Table A, B** and **C.** In order to promote better marketing access to the enterprising farmers, Arunachal Pradesh Agriculture Marketing (Regulation) Act, 1989 was amended during 2006, by incorporating contract farming and establishment of private market yards to facilitate private investment in agricultural marketing. This amendment will encourage the entrepreneurs in establishment of private market and facilitate the farmers to sell their products to the purchasers, which will considerably enhance the farmers' income.

Table 'A': Statement Showing the Marketing Infrastructure Created in the Different APMCs under Marketing Board Against Grant-in-Aid

Sl. No.	Name of APMC	Infrastructure Created	Location
1	Khonsa	Fish Market (12 seated Platform)	Khonsa
		Meat Market (6 seated Platform	
		Two Shoes Market	
		One store for fish traders	
		Slaughter House	
		One Market shed	Rangluas
		Extension of Market	Khonsa
		Market shed with CGI roofing	Deomali
		OBT shed for Fish Market	Deomali
		MIBT double unit cloth shed	Deomali
		Repairing/Renovation of Market shed	Longding
		MIBT single unit Market shed (3)	Longding
		Open platform CC flooring	Longding
		5 room transit camp at Tinsukia	Tinsukia
		SPT type Market shed (2)	Khonsa
		Construction of Cattle Market shed	Kanubari

Sl. No.	Name of APMC	Infrastructure Created	Location
2	Miao	Godown	Miao
		Auction Platform	Miao
		Shop	Miao/Kharsang
		Cont. of check gate	Bordumsa
		Cont. of check gate	Diyun
3	Tezu	Establishment of one closed Market yard	Tezu
		One Small SPT store (10 MT capacity)	Tezu
		Guest House (2 rooms)	Tezu
		Cont. Check post and rest camp	Tezu
4	Roing	Two hectares of land allotted to APMC, Roing for market yard (security fencing with barbed wire)	Jia
		Two unit barrack type Quarter	Jia
		Two Market sheds	Jia
		One Market Godown	Jia
		One weekly Market shed	Jia
5	Pasighat	3 Unit Bachelor Barrack	Pasighat
		16 Unit Fish Market shed	Pasighat
		Open Market shed	Nari
		12 Unit Vegetable Market shed	Pasighat
		Cont. of Godown	Jampani
6	Along	Cont. of Primary Market shed	Mechuka
7	Ziro	One Market shed	Yechuli
		One Market shed	Koloriang
		Improvement of Gandhi Market	Hapoli
8	Papum Pare	Market Godwon (Cap. 125 MT)	Balijan
		Market yard at Gohpur Tinali and Chandan Nagar	Gohpur and Chandan Nagar
		One Truck for transportation of Agri/Horti.Produces	Yupia
		Construction of Boundary	Kimin
		Renovation of SGL	Naharlagun
		Cont.of Market shed	Lower Subansiri
		Cont. of Office-cum-sale counter	Tarasso
		Cont. of Market shed	Nirjuli
9	Bombdila	One sale counter (RCC)	Bombdila
		0.7 Room SPT type Market shed	Rupa
		9 Room RCC Market shed	Bombdila
		Garage with Timber/CGI Sheet roofing	Bombdila
		Installation of 63 KVA power station of cold storage	Tippi
10	Tawang	Daily Market shed	Near Bus Stand
		Repairing of Potato Godown	Lemberdung
		Construction of Potato Godown	Seru
11	Seppa	Cont. Market shed	Sejiosa
12	Daporijo	Cont. of Market sheds	Daporijo, Siyung, Taliha Radding
13	Yingkiong	Cont. of Market sheds	Yingkiong

Table 'B': Statement Showing the Infrastructure Creation Under Macro Management Scheme at different Location/District

Sl. No.	Particulars	Quantity	District/Location
1	Establishment of Primary Market	3	1. Singchung, West Kameng District 2. Neri, East Siang Distict 3. Aalo, West Siang District
2	a. Establishment of Primary Market	6	1. Raga, L/Subansiri Distict 2. Ziro, L/Subansiri District 3. Longding, Tirap District. 4. Mirmir, East Siang District 5. Ganga Market, Papumpare District 6. Nari/Pam, East Siang District.
	b. Establishment of Secondary Market	6	1. Tenga, West Kameng District
	c. Tata Truck – 709	6	1. Roing, L/Dibang valley District.
3	a. Establishment of Primary Market	3	1. Yazali, L/Subansiri District 2. Hija, L/Subansiri District. 3. Nyapin, Kurung Kumey District
	b. Rice Houller	15	4. Pasighat, East Siang District - 6 5. Aalo, West Siang District - 4 6. Papumre District - 2. 7. Kurung Kumey District - 1 8. Lohit District - 2.
	c. Tata Truck – 709	2	1. Aalo, West Siang District - 1. 2. Kurung Kumey District - 1
4	a. Mustard Oil Mill	4	1. East Siang District - 1 2. Lohit District -1 3. L/Dibang valley District - 1 4. Changlang District - 1
	b. Spices grading unit	3	1. Changlang District - 1 2. West Siang District - 1 3. West Kameng District - 1
	c. Cattle food production unit	1	1. Papumpare District - 1.
	d. Rice Mill	10	1. East Siang District - 3 2. West Siang District - 3 3. East Kameng District - 1 4. Tirap District - 1 5. Upper Siang District - 2
	e. Gur Making Machine	2 Nos	1. Tirap District - 1 2. Upper Subansiri District - 1.
	f. Tata Truck-709	1	1. Lower Subansiri District -1
	g. Construction of Transit Godown	1	1. Tirap Distict -1
5	a. Establishement of Primary Market	2	Bordumsa, Changlang District -1 Dolungmukh,L/Subansiri District - 1
	b. Mini Rice Mill	10	1. East Siang District -2 2. West Siang District - 2 3. Lower District -2 4. Changlang District - 2. 5. Ziro, L/Subansiri District - 2

Table 'C': Statement Showing the Marketing Infrastructure Created in the Different APMCs under Technology Mission of Mini Mission - III

Wholesale Markets - 6
Rural Primary Markets - 24
State Grading Laboratories - 2

Sl. No.	Name of APMC	Infrastructure Created	Location
1	Khonsa	One Rural Primary Market	Kanubari
2	Miao	One Rural Primary Market	Miao
3	Tezu	One Wholesale Market	Tezu
		5 nos. Rural Primary Market	Tezu/Chowkham/Hayuliang/ Lathao/and Piyong
4	Roing	One whole sale Market	Roing
		2. One Rural Primary Market	Roing
5	Pasighat	One Wholesale Market	Pasighat
		5 nos. Rural Primary Market	Koyu/Bolong/Nari/Koreng/Mebo
		State Grading Laboratory	Pasighat
6	Along	One Rural Primary Market	Likabali
7	Ziro	One Wholesale Market	Hapoli
		Two Rural Primary Market	Hapoli/Boushimla
8	Papum Pare	One Wholesale Market at Gohpur Tinali	Itanagar
		3 Rural Primary Market	Chandan Nagar/Sagalee/Kimin
		State Grading Laboratory	Naharlagun
9	Bomdila	One Wholesale Market	Tenga
		5 Rural Primary Market	Lui Kalaktang/Dirang/Kaspi/ Thrizino & Bhalukpogn

Till 2010-11, Arunachal Pradesh Agriculture Marketing Board (APAMB) under Dept. of Agriculture was responsible for establishment of infrastructure and promotion of marketing activities. For the purpose, 3 cold storages in the region (West Kameng, Passighat and Lohit) are established but have remained unoperational/unutilised till date, 6 regulated markets (West Kameng, Papum Pare, Ziro, Passighat, Roing, Khonsa) are established by the Arunachal Pradesh Agriculture Marketing Board but due to lack of proper infrastructure facilities in the markets such as sheds, storages, boundary walls, weigh bridges, auction platforms etc. traders and farmers are not interested to operate and utilise the same.

Horticulture perspectives and future Policy

From the point of view of horticulture produce (perishables), the infrastructural facilities created so far are inadequate and traders & farmers are not keen on utilising the markets because of lack of basic infrastructure such as auction sheds, cold storages, boundary walls, weigh bridges, auction platforms, electricity, water, rest rooms and also due to location disadvantages. Therefore, there is a need for creation of market infrastructure facilities within the reasonable limit enabling traders and farmers to utilise the same.

The following infrastructural facilities are to be created:

- Adequate marketing infrastructure at village/circle/district and state level such as rural primary market, storage godowns, grading, sorting and packing facilities.
- Transport facilities to be strengthened.

- APMCs are to be equipped with modern amenities.
- Appropriate linkage between producers and sellers.
- Wholesale and terminal market.
- Pre-cooling and cold storage facilities.
- Availability of manpower with proper market orientation.
- Credit support.
- Market intelligence.
- Processing and value addition.
- Rural road connectivity.

Conclusion

In spite of all the efforts taken by the Dept. of Agriculture, Government of Arunachal Pradesh, the desired result could not be achieved with regard to agricultural marketing. This may be possibly due to dependence of marketing activities with the existing paraphernalia of the department as well as inadequate fund position.

In order to boost marketing of horticulture produce in the state, a separate Horticulture Marketing Board was established in 2011, under the Directorate of Horticulture which is solely responsible for horticulture produce marketing activities for speedy development and regulation but due to lack of funds, it is yet to take up these activities.

Therefore, in view of the vast potential and resources in horticulture sector including aromatic and medicinal plants in the state, there is an urgent need for adequate infrastructural support as per suitability to streamline the Horticulture Marketing in the state to attract private investors and sponsor for contract farming.

Assam

Post-harvest and marketing infrastructure status in Assam

Market yards are a long felt need of the farming community of Assam as they go a long way in ensuring optimum if not higher remuneration to them through proper weighing, cleaning, grading and better price realisation of their produce. The farmers look forward to a regulated market yard as a dependable infrastructure for furtherance of their economic goal. The advantages of a regulated market yard system are immense and wherever such a system exists, it has been widely appreciated. Today, the farmers consider it a boon to be in a place where they can confidently sell their produce and get an appropriate return for the quantity and quality they produce year after year. The state has 20 Regulated Market Committees, 20 Primary Market Yards and 206 Secondary Market Yards.

Markets established under Technology Mission

- **Uparhali Market** under Guwahati Sub-Divisional Market Committee in Kamrup district.
- **Gauripur Market** under Gauripur Regulated Market Committee in Dhubri district.
- **Mandia Market** under Baharihat Regulated Market Committee in Barpeta district.

- **Hojai Market** under Lanka Regulated Market Committee in Nagaon district.
- **Dhubri Market** under Gauripur Regulated Market Committee in Dhubri district.

Markets established under NEC Scheme of 10th Five Year Plan

- **Singimari market** under Guwahati Sub-Divisional Market Committee in Kamrup district.
- **Darrangiri market** under Goalpara District Regulated Market Committee in Goalpara district.
- **Sapekhati market** under Sibsagar District Regulated Market Committee in Sibsagar district.
- **Gamariguri market** under Golaghat District Regulated Market Committee in Golaghat district.
- **Nagabat market** under Jorhat District Regulated Market Committee in Jorhat district.

Details of Infrastructure under the Regulated Market Committees

RMC	No. of Auction Plat-form/ Retailer Shed	No. of Godown	No. of Selling Com-plex/ Trader's Shop	No. of Cattle Market Shed	No. of Drying Platform	No. of Health Care Unit	No. of Guest House/ Krishak Bhawan	No. of Cold Storage	Others (Bank/ Canteen Bldg. etc.)
Baharihat RMC	4	2			2				
Bongaigaon DRMC	6				1				
Cachar DRMC	8			6			1		
Darrang DRMC	36	3	2		1		1		
Dhemaji DRMC	6	2		1	2		1		
Dhing RMC	33	5	1						
Dhubri DRMC	35	13	2		4	1	1		1
Dibrugarh DRMC	13			1	1				
Goalpara DRMC	19	2							
Golaghat RMC	35	3		3	3	4			
GSMC	51	6	3	3	6		1	2	1
Hailakandi DRMC	6				1				
Howly RMC	14	2	1						
Jorhat DRMC	60	4		2	4	2	1		
Karimganj DRMC	2			1	1				
Kokrajhar DRMC	21				1			1	
Lanka RMC	13	1	3	1		1			
Morigaon DRMC	15				2				
N/Lakhimpur RMC	16	1							
Nalbari DRMC	11	1		3	2	1	3		
Rangia SDRMC	5	1							
Sivasagar DRMC	16			1	1				
Sonitpur DRMC	9				1		1		
Tinsukia DRMC	11	2							
Total	445	48	12	22	33	6	10	3	2

Source: *http://asamb.in/html/?u=infra*

Guwahati Sub-Divisional Market Committee (Kamrup)

This is the one of the oldest market committees in the state and has total 8 market yards. In the following tables important features of each market have been discussed:

Sl. No.	Name of the Market Yards	Features
1	Bijoynagar Market	❖ Daily primary market, total arrival of green vegetables about 1000 Tons per annum and 70% of this is sent to Guwahati, not qualified market related infrastructure.
2	Boko Market	❖ Weekly market but not a F&V market
3	Chhayagaon Market	❖ Biweekly market but not a F&V market
4	Fancy Bazar	❖ One of the oldest market in the heart of the city for fruits, vegetable and spices
5	Hahim Market	❖ Biweekly market
6	Machkhowa market	❖ Machkhowa daily vegetable wholesale mandi was established in 1989 and located at 9 kms. From NH-37 in Guwahati. It is one of the largest vegetable markets in Assam, spread over two bigha area. Almost all the vegetables are traded in this market. Produces arrives from the markets as near as Singimari (16 kms) and as far as from Karbi Anglang (350 kms). There are 25 traders, 85 commission agents (commodity wise), 145 Faria and 60 *hamal (Coolie)* involved in this wholesale *mandi.* Produce is sent to Greater Guwahati and Shillong from Machkhowa *mandi.* ❖ Activities such as cleaning, filling, weighing, grading and standardisation is done manually in the market. Though Machkhowa is major vegetable *mandi* in Guwahati but it is lacking in basic facilities and post-harvest infrastructure. This *mandi* does not even have the facility of a board to display market price. It is lacking in post-harvest facilities such as sorting grading, washing, packaging and cold storage. It also does not have office building, auction platform, drying platform, godown, drinking water, sanitation and parking. Garbage disposal is very poor and the place is very much congested. Internal road in the market is very narrow. ❖ Due to lack of above facilities, condition of Machkhowa market is very poor and traders have to sell their produce on a daily basis. By providing post-harvest infrastructure wastage can be checked to a major extent. Sorting, grading facilities, cold store and godowns should be availed to improve the market condition and for business of quality product.
7	Nagabera Market	❖ Weekly market but not a vegetable market
8	Singimari Market	❖ Daily market and annual arrival of vegetables is about 700 tons and act as a feeder market for Machkhowa market.

Manipur

Post-harvest and marketing infrastructure status in Manipur

Sl. No.	Processing Unit	Sector	Type	Capacity MT/Annum	Type of Products
1	MAGFRUIT	Hort. & Soil Conservation, Govt. of Manipur	SSI Unit	240	Canned fruits and vegetables, fruit syrups, pickles, jam jellies, RTS (Lime-ginger) cordials, squashes, candies, etc.
2	HEIRANG	Co-operative	SSI Unit	240	Canned fruits and vegetables, fruit syrups, pickles, jam jellies, RTS (Lime-ginger) cordials, squashes, candies, etc.
3	WAIFRU	N.G.O.	SSI Unit	240	Canned fruits and vegetables, fruit syrups, pickles, jam jellies, RTS (Lime-ginger) cordials, squashes, candies, etc.
4	RATNA FRUITS	PRIVATE	Cottage Scale	50	Squashes, jam
5	LIKLA	PRIVATE	Cottage Scale	50	Squashes, RTS, jam, jelly (Fruit based)
6	SANA	PRIVATE	Cottage Scale	50	Squashes, pickle, jelly, jam
7	MANIFRU	PRIVATE	Cottage Scale	50	Squashes, pickle, jelly, jam
8	HILL FRUITS	PRIVATE	Cottage Scale	50	Squashes, jam, etc.

Proposed/upcoming processing projects in Manipur

Sl. No.	Proposed Project	Production Capacity
1	Fruits & vegetables processing	80 MT/Day
2	Ginger dehydration and oleoresin	33 MT/Day
3	Spices processing plant	5 MT/Day
4	Integrated mushroom processing plant	15 MT/Day
5	Lime Ginger (RTS) Plant	100 lakh bottles of 200 ml per annum
6	Agri export zone for passion fruit	2 MT/Hour
7	Manipuri traditional liquor plant (distillery)	9 lakh lt./annum
8	Integrated pineapple concentration plant	50 MT/day

Meghalaya

Post-harvest and marketing infrastructure status in Meghalaya

Existing horticulture processing units in Meghalaya

Sl. No.	Name of Processing Unit with Address	Crops Processed	Production Capacity	Remarks
1	Fruit Preservation Centre, Fruit Garden, Shillong	Orange, Pineapple, Lemon, Sohiong, Carambola, Plum, Guava, Litchi, Chilli, Passion fruit and some indigenous fruits of the state.	60 MT	Public sector
2	Fruit Preservation Centre, Dainadubi, East Garo Hills.	Orange, Pineapple, Lemon, Litchi, Carambola, Mango, Passion fruit, Amla, Chilli,	40 MT	-Do-
3	M/s Mansan Fruit Products, Umiam,Ri-Bhoi District	Orange, Pineapple, Lemon, Sohiong, Carambola, Plum, Strawberry, Passion Fruit and some indigenous fruits of the state.	400 MT	Private sector
4	M/s Megha Cashew, Byrnihat, Ri-Bhoi District	Cashewnuts	1200 MT	-Do-
5	M/s Kara Fruit Processing, Pokseh, Shillong	Orange, Pineapple, Lemon, Sohiong, Carambola, Plum, Guava, Litchi, chilli, passion fruit and some indigenous fruits	10-15 MT	-Do-
6	Wahkdait Pashun Ropeway transport fruit, vegetable and livestock Co-operative Society, Wahkdait, Pynursla Block, East Khasi hills	Orange, Pineapple, Lemon, Sohiong, Carambola, Plum, Guava, Litchi, Chilli, Passion fruit and some indigenous fruits	60-80 MT	-Do-
7	NERAMAC Ginger Processing Unit, Byrnihat, Ri-Bhoi District	Ginger	5 MT/Day (Seasonal)	Public sector
8	M/s K.D. Agro Chibinang, West Garo hills	Pineapple, tomato etc.	7 MT/Day (Seasonal)	Private sector
9	M/s B.R. Industries Phulbari, West Garo Hills	Cashewnuts	380 MT/Year	-Do-
10	Meghalaya Ginning Mill Phulbari, West Garo Hills	-do-	145 MT/Year	-Do-
11	M/s O. Sangma Sansanggiri, West Garo Hills	-do-	175 MT/Year	-Do-
12	M/s Aminul Islam Phulbari, West Garo Hills	-do-	110 MT/Year	-Do-
13	M/s Binay Ghosh Phulbari, West Garo Hills	-do-	165 MT/Year	-Do-
14	M/s Pradip Saha Phulbari, West Garo Hills	-do-	195 MT/Year	-Do-
15	M/s Uttam Kothari Monabari, West Garo Hills	-do-	196 MT/Year	-Do-
16	M/s Kazi Zaman Bhaitbari, West Garo Hills	-do-	170 MT/Year	-Do-
17	M/s Khalil Miya Bhaitbari, West Garo Hills	-do-	355 MT/Year	-Do-
18	M/s Hunbit Spices Shangpung, Jaintia Hills	Turmeric, Black pepper and other spices	150 MT/Year	-Do-
19	M/s Dkhiah Processing unit Khliehriat, Jaintia Hills	-do-	50-80 MT/Year	-Do-
20	M/s Three Leaves Consumer Products Pvt. Ltd. Baridua, Ri-Bhoi District	-do-	0.15 MT/Day	-Do-

Marketing Infrastructure in Meghalaya

1. **Regulated Markets:** Two regulated markets in Meghalaya viz. Mawoing Regulated Market in East Khasi Hills and Garobadha Regulated Market in West Garo Hills. Only potatoes and ginger are notified in fruits and vegetables for trading. One cold storage in each market has been established but remained unoperational till date. Both markets lack basic marketing infrastructure such as auction platforms, weigh bridges, covered sheds, electricity, water, toilets, sorting grading machines, poor roads.

Infrastructural Development

Mawiong Wholesale Regulated Market

1. 1000 MT capacity godowns - 2
2. Auction platform – 1
3. Grading & assorting shed - 1
4. Farmers' rest house - 1
5. Traders' store - 51
6. Office building of the Market Committee - No
7. Internal roads
8. Compound Fencing
9. Drainage facility
10. Electricity
11. Water supply & sanitary arrangement

Garobadha Wholesale Regulated Market

1. 1000 MT capacity godowns – 2
2. Auction platform - 1
3. Grading & sorting shed - 1
4. Open trading sheds - 8
5. Piggery and Goat sheds - 2
6. Water supply & sanitary arrangement Electricity
7. Internal roads

Iewduh -Bara Bazaar (Non-regulated): To cater to the vegetable needs of the population of Shillong city, Iewduh-Bara Bazaar (non-regulated) market is the major market. Located within the Shillong city; Iewduh market is the only preferred market for trading all kinds of vegetable produce in the region (due to absence of regulated market for vegetables in the region & distance). Farmers of nearby production belts/blocks (within 60 kms radius of Shillong city) used to sell their produce in the market. In the market, approximately 300-400 small and big traders are operating. Discussions with the traders in the market revealed, that on an average 500-800 quintal of vegetable produce arrives daily in the market. Besides vegetables, other commodities such as fish, spices, general grocery items are also traded in the same market place.

The market serves both wholesale and retailing point for trading of vegetable produce. Farmers from nearby production belts bring their produce in wooden baskets/jute bags and sell it to traders who offer the maximum price. Traders in turn sell their produce to retailers as well as to consumers.

The market operates in a very congested area and unhygienic conditions and lacks basic infrastructure amenities for vegetable trading such as parking, even roads, clean and regular supply of water, irregular electricity, auction platforms/sheds, weigh bridges, sorting & grading machines, cold stores, godowns, market information system, garbage disposal system etc.

Iewduh is run and managed by the Syiem of Mylliem, head of the traditional democratic institution of Syiemship. The most distinctive feature of this ancient market is the total domination of its retail trade by the Khasi women, who are everywhere, all over Iewduh. Though the market is non-regulated, but discussions with the traders and farmers revealed payment of money to person deputed on behalf of the King for provision of facilities in the market such as sanitation, parking etc.

By and large, trading in horticulture produce is done in markets yet to be 'regulated'. In fact, there is a resistance to transactions taking place in APMCs yards and the trading associations have moved the Hon'ble High Court for redressal of this matter.

In the interest of the future growth of the city, the need of the hour is to shift the Iewduh (Bara Bazaar) to Farmers Market at Upper Shillong (under construction) which has hygienic conditions, sufficient parking space, *pucca* roads, auction platforms, sorting, grading and packing machines, electronic display system, ripening chamber & multipurpose cold storage facility in addition to small godowns etc.

1. **Farmers Market at Upper Shillong (Under Construction):** To provide marketing facility for these farmers, to enable them to market their produce, the Government of Meghalaya through the State Agricultural Marketing Board set out to establish a farmers' market under ACA (Additional Central Assistance) at a cost of ₹ 47,18,731.00. The construction of this farmers' market has been completed and it is likely to be inaugurated soon.

The main objectives of establishing the farmers' market is (a) to provide a place which is equipped with infrastructure and facilities for the farmers to sell their produce in a transparent and fair manner to buyers and sellers alike, (b) to enable farmers to come together and manage the facility, (c) to provide a platform to farmers for exchanging information and for the Department of Agriculture to meet with farmers with a view to providing technical information and advisories, (d) to facilitate direct seller and trader interaction and trading between farmers and traders which eliminates the operation of superfluous middlemen to a great extent.

Infrastructural details of the Upper Shillong – Farmers' Market

The Upper Shillong Farmers' Market is built on land belonging to the State Agriculture Department at 5th Mile Upper Shillong, on the road to Shillong peak. It consists of the structures as shown in the table given on page 144.

Collection and Forwarding Centre: To improve the marketability and add value to the produce brought by the farmers to the market, the State Government has proposed to set up a Collection and Forwarding Centre at Upper-Shillong adjacent to the farmers' market. At the Collection and Forwarding Centre, the produce will be properly graded stored and packed, before being transported to the larger markets outside Shillong and even outside the state. This will provide a better market and better price for their marketable surplus produce and enable the farmers to enhance their income from their cultivation.

Sl. No.	Infrastructure	Size (in m)	Area/Unit	Specifications
1	Open stall – 6	3.65 x 3.00	10.95m^2	With tabular trusses & C.G.I. sheet
2	Auction platform – 1	20.00 x 8.00	160.00 m^2	
3	Go-down – 1	15.00 x 5.00	75.00 m^2	
4	Grading & Sorting Hall – 1	8.00 x 6.00	48.00 m^2	
5	Farmers Meeting Hall – 1	8.00 x 4.00	32.00 m^2	
6	Septic Tank – 1	50 users		
7	Approach Road	L = 125.00 Rm	768.50 m^2	Black Topped
8	Foot path from motorable road	L = 53.24 Rm	106.48 m^2	Cement concrete
9	Garbage disposal/Dustbin	2.00 x 2.00 x 1.2	4.80 m^2	
10	Toilet	3.00 x 1.50	4.50 m^2	
11	Deep tube well			
12	Over head RCC staging			
13	Footpath & drain a) Drain b) Footpath	 346.00 Rm 23.93 Rm		Cement concrete
14	Electrification			

The intended purpose and activity of the Collection and Forwarding Centre is meant to be as follows:

Fresh harvested vegetables and fruits are brought to the centre for:

1. Cleaning, sorting, grading and packing in appropriate packets.
2. To enhance shelf life of fresh produce by pre-cooling.
3. To keep the produce in cold rooms for short term, prior to dispatch to markets.

The facility which should be created should be able to handle 20 Metric Tons of fruits & vegetables arriving daily in 10 working hours per day. The proposed building of the facility will have the following components:

Main building size

L30 x W18 x H5 m. The building shall be constructed as a civil structure, with a standard shed with 1 mtr raised platform with steel structure and roof profile sheeting – end coverings etc and shall be divided so as to cater to definite purpose as follows:

i. 2 cold stores of 10 MT storage capacity each and 1 pre-cooling chamber of capacity 3MT/batch will be provided along the width side of the main building. The technical specification of the cold store and pre-cooler will be as per revised specification as i) & ii) given above except for generator size/MCC should be suitable & common to both.

ii. Work Hall size L20 x W18 x H4.5 m will be at the centre portion, the 2 side walls along the length of the work hall will be of 40 mm thick PUF sandwich panels and will also have a false ceiling of 40 mm thick PUF sandwich panels. 2 sliding doors of size 2 x 2 shall be provided for movement of fresh arrivals and despatch of packed produce. On both side walls high level fixed glazed windows of size 500 x 1000 mm shall be provided, along with 6 exhaust fans of 300 mm diameter.

iii. The remaining side of the building will house supervisor's office size L4 x W4 x H3 m, Laboratory L4 x W3 x H3 m, ladies and gents toilets each L4 x W4 x H3 m with a middle corridor of size L4 x W2 x H3 m. This portion of the building will have all end walls and partition walls of brick plaster finished and painted. False ceiling either with wood or acoustic tiles shall be provided in this area. Toilets shall be fitted with WC/urinal/wash basin fittings appropriate for use by 40 persons. Suitable septic tank shall be provided for the toilet waste disposal.

iv. The lean to portion of the building will be a covered veranda to enable truck unloading/ loading and at the cold store end will be separated with brick wall (6 x 6 m area) for the utility equipment such as water filtration plant, EPT, DG set, electrical panels etc.

v. Electrification of the building shall be as follows: lighting 2 in cold store, 10 in the work hall, 2 each in office, lab and toilets. 15 amp power sockets-12 in the work hall, 4 at the office, 2 in each toilet. Sufficient external lighting is to be provided as required.

vi. Two compost pits of size L6 x W6 x D3 m are to be provided at least 100 m away from the building for disposal of vegetable waste.

Plant and Machinery

i. Refrigeration equipment for cold stores and pre-cooler and the specs of PUF insulated panels, cold store doors etc will be same as given in the revised specs given as item i and ii above.

ii. Sorting and grading tables size 1 x 2 m, qty. 10, SS304 sheet covered top, G.I. frame and legs.

iii. 4 trolleys with raised handle for moving plastic crates, painted MS construction with 200 mm diameter rubber wheels, size 1 x 2 m.

iv. 4 pallets trucks-hydraulic hand-operated, to move PVC pallets of size 1.2 x 1 m and weight carrying capacity of 1,000 kg.

v. 500 perforated plastic crates size 600 x 400 x 300 mm.

vi. 2 hand tools for strapping cartons.

vii. 6 electronic table top weighing scales of 0-30 kg range.

viii. 10 fly/insect killer for wall mounting/hanger type.

ix. One platform type electronic weighing scale range upto 1,000 kg.

x. One silent diesel generator 85 KVA, 415V/3ph, 50 Hz. Complete with 500 Litre diesel tank, accessory electrical switch gear and monitoring panel.

xi. One water filtration to produce clean water at the rate of 1m³/hr complete with 5000 Litre storage tank.

2. **Rural Markets (Non-Regulated):** Besides Bara Bazar (Iewduh Market), Mawiong (East Khasi Hills) and Garobadha (West Garo Hills) Regulated Market, each district has traditional non-regulated rural markets established at the block level. The periodicity of these markets is bi-weekly and ownership of management is mainly by local authorities. The small and marginal farmers of nearby villages mainly sell their produce in the local markets at block level. Being traditional establishments, all rural markets lack basic infrastructure facilities to handle fresh produce.

Block-wise Listing of Markets in the State

Block	Markets
Amlarem	Dawki
Baghmara	Emangiri
	Sibbari
Betasing	Ampati
Chokpot	Chokpot
Dadenggiri	Dadenggiri
	Romagal
Dalu	Dalu
	Purakhasia
Dambo Rongjeng	Rongjeng
Jirang	Jirang
	Patharkhmah
Kharkuta	Adokgiri
	Kharkutta
Khliehriat	Khliehriat
	Umkiang
Laitkroh	Laitlyngkot
Laskein	Raliang
	Shangpung
Mairang	Kynshi
	Mairang
Mawkyrwat	Mawkyrwat
Mawphlang	Mawngap
	Sohiong
Mawryngkneng	Mawryngkneng
	Smit
Mawshynrut	Riangdo
	Shallang
Mawsynram	Mawsynram
	Tyrsad
Mylliem	Iewduh(Shillong)
	Mawiong Regulated Market
Nongstoin	Nongstoin
	Rambrai
Pynursla	Pynursla
Ranikor	Balat
Resubelpara	Bajengdoba
	Mendipathar
Ronggara	Maheshkhola
	Ronggara
Rongram	Rongram
	Tura
Samanda	Rongsak
	Samanda
Samanda	Williamnagar
Selsella	Garobadha Regulated Market
Shella-Bholaganj	Shella

Block	Markets
Songsak	Songsak
Thadlaskein	Jowai
	Khanduli
Thadlaskein	Nartiang
	Wahiajer
Tikrikilla	Raksamgiri
	Tikrikilla
Umling	20th Mile
	Byrnihat
Umling	Nongpoh
	Umden
Umsning	Umroi
	Umsning
Zikzak	Kalaichar
	Mahendraganj

Post-harvest and Marketing Infrastructure Status in Mizoram

1. Food Processing Plant, Sairang, Aizawl

Input	Annual Input Capacity (Quintals)	Product
Pineapple	1200	Squash
Orange	2500	Squash
Passion Fruit	2300	Squash
Bamboo Shoots	2000	Canned
Others	1200	Tidbits, RTS, beverages
Total	9200	

2. Fruit Juice Concentrate Plant, Chhingchhip

Input	Annual Input Capacity (TPA)
Pineapple	250
Orange	400
Passion Fruit	1120
Total	1770

Both of the above facilities are underperforming currently, they are underutilised and in huge monetary loss. They are not able to pay the farmers in full for the procured raw materials.

3. Multipurpose Pack house at Horticulture Complex
   - Cold store (40MT)
   - Sorting grading (2.5 MT/hr)
   - Washing, crushing, waxing and packaging facility

This was constructed last year and has been now leased out to Shimla Hills Pvt. Ltd. @ a rent of ₹ 50,000 per month.

4. Small cold storage at
   - Champhai
   - Serchhip
   - Aizawl

These cold stores are meant for spice storage but are not being used optimally.

5. Wholesale and rural primary markets

There are 10 wholesale and 85 rural primary markets constructed by MAMCO. MAMCO charges nominal rent from the tenants.

Wholesale Markets

Sl. No.	Name of the Wholesale Market	Location with District
1	Variengte	Vairengte, Kolasib District
2	Kanhmun	Kanhmun, Mamit District
3	Bairabi	Bairabi, Kolasib District
4	Champhai	Champhai, Champhai District
5	Hunthar	Aizawl, Aizawl District
6	Ngaizel	Ngaizel, Aizawl District
7	New Market Dawrpui	Dawrpui, Aizawl District
8	Mission Vengthlang	Mission Vengthlang, Aizawl District
9	Zemabawk North	Zemabawk, Aizawl District
10	Farkawn	Farkawn, Champhai District

Rural Primary Markets

Sl. No.	Name of the Rural Primary Market	Location with District
1	Khumtung	Khumtung, Serchhip
2	Chhingchhip	Chhingchhip, Aizawl District
3	Tlungvel	Tlungvel, Aizawl District
4	Saitual	Saitul, Aizawl District
5	Zawlnuam	Zawlnuam, Mamit District
6	Khawzawl Dinthar	Khawzawl, Champhai District
7	Kamalanagar	Kamalanagar, Lunglei District
8	Khawzawl Hermon	Khawzawl, Champhai District
9	Mamit	Mamit, Mamit Dist.
10	Tlabung	Tlabung, Aizawl Dist.
11	Khanpui	Khanpui, Aizawl Dist.
12	Darlawn	Darlawn, Aizawl Dist.
13	Bilkhawthlir	Bilkhawthlir, Kolasib Dist.
14	Serchhip	Serchhip, Serchhip Dist.
15	Saiha	Saiha, Saiha Dist.
16	Lawngtlai	Lawngtlai, Lawngtlai Dist.
17	Zokhawthar	Zokhawthar, Champhai Dist.
18	Bukpui	Bukpui, Kolasib Dist.

Sl. No.	Name of the Rural Primary Market	Location with District
19	Baktawng Vengpui	Baktawng, Serchhip Dist.
20	Seling	Seling, Aizawl Dist.
21	Zanlawn	Zanlawn, Aizawl Dist.
22	Sairang	Sairang, Aizawl Dist.
23	Kawnpui	Kawnpui 'N' Kolasib Dist.
24	Luangmual	Luangmual, Aizawl Dist.
25	Aibawk	Aibawk, Aizawl Dist.
26	Khabung 'S'	Khaaabung 'S' Chamhai Dist.
27	Chawlhhmun	Chawlhhmun, Aizawl Dist.
28	Pukpui	Pukpui (Lunglei)
29	Haulawng	Haulawng, Lunglie
30	Kawlkulh	Kawlkulh, Champhai Dist.
31	West Phaileng	W. Phaileng, Mamit Dist.
32	Thenzawl	Thenzawl, Serchhip Dist.
33	Khuangleng	Khuangleng, Champhai Dist.
34	Keifang	Keifang, Aizawl Dist.
35	Tuikual 'N'	Tuikual 'N', Aizawl Dist.
36	Tuipang	Tuipang, Saiha Dist.
37	Bualpui 'NG'	Bualpui 'NG', Lawntlati Dist.
38	Pangzawl	Pangzawl, Lunglei Dist.
39	Chawngtlai	Chawngtlai, Champhai Dist.
40	Durtlang	Durtlang, Aizawl Dist.
41	Sihphir Vengthar	Shiphir Vengthar, Aizawl Dist.
42	Durtlang	Durtlang, Aizawl Dist.
43	Sialhawk	Sialhawk, Champhai Dist.
44	N.Vanlaiphai	N.Vanlaiphai, Serchhip Dist.
45	Darlak	Darlak, Mamit Dist.
46	Tlangsam	Tlangsam, Champhai Dist.
47	Tawipui 'S'	Tawipui 'S', Lunglei Dist.
48	Sawleng	Sawleng, Aizawl Dist.
49	Sangau	Sangau, Lawntlai Dist.
50	Reiek	Reiek, Mamit Dist.
51	Zotlang	Zotlang, Aizawl Dist.
52	Nursery Veng	Nursery, Aizawl Dist.
53	Republic Veng	Republic, Aizawl Dist.
54	Chawnpui Veng	Chawnpui veng, Aizawl Dist.
55	Dinthar	Dinthar, Aizwla Dist.
56	Khawruhlian	Khawruhlian, Aizawl Dist.
57	Zobawk	Zobawk, Lunglei Dist.
58	Hrangchalkawn	Hrangchalkawn, Lunglei Dist.
59	Thualthu	Thualthu, Lunglei Dist.
60	Thingsai	Thingsai, Lunglei Dist.
61	S. Vanlaiphai	S.Vanlaiphai, Lunglei District
62	Lungsen	Lungsen Lunglei Dist.
63	Diltlang 'S'	Diltlang 'S', Lawngtlai Dist.

Sl. No.	Name of the Rural Primary Market	Location with District
64	M.Kawnpui	M.Kawnpui, Lawngtlai Dist.
65	Ngopa	Ngopa, Champhai Dist.
66	Vaphai	Vaphai, Champhai Dist.
67	Hnahlan	Hnahlan, Champhai Dist.
68	Biate	Biate, Champhai Dist.
69	Khawhai	Khawhai, Champhai Dist.
70	N.E. Khawdungsei	N.E Khawdungsei, Champhai Dist.
71	Keitum	Keitum, Serchhip Dist.
72	Khawlailung,	Khawlailung, Serchhip, Dist.
73	Sihhmui, Sairang	Sihhmui Sairang, Aizawl Dist.
74	Muallungthu	Muallungthu, Aizawl Dist.
75	Sateek	Sateek, Aizawl Dist.
76	Ratu	Ratu, Aizawl Dist.
77	Buarpui	Buarpui, Lunglei Dist.
78	Vanhne	Vanhne, Lunglei Dist.
79	Zawngling	Zawngling, Saiha Dist.
80	Kawlchaw 'W'	Kawlchaw 'W' Laungttai Dist.
81	Rawpuichhip	Rawpuichhip, Mamit Dist.
82	Mualkawi	Mualkawi, Champhai Dist.
83	Chhawruit	Chhawrtui, Champhai Dist.
84	Suangpuilawn	Suangpuilawn, Aizawl Dist.
85	Bilkhawthir 'W'	Bilkhawthir 'W' Kolasib Dist.
86	Dulte	Dulte, Champhai Dist.
87	Bungtlang	Bungtlang, Serchhip Dist.

6. Turmeric processing facility in Khopai village, Saiha District: 400 kg turmeric per month is being processed here.

Farmers are not getting the full benefit due to poor market accessibility. Transportation facilities are also limited and there are difficulties due to hilly terrain. It takes longer duration to reach the destination. Transportation costs are also very high. Connectivity with the major markets like Guwahati and Kolkata is also limited. Farmers are getting a larger pie of good purchasing power parity of people in Aizawl town.

Traders and contractors from Cachar, Silchar and Karinganj in Assam visit the farmers and negotiate with them to buy the produce. Farmers don't have control on the price offered to them. Most of the farmers grow ginger but in the current season, prices went as low as ₹ 5/ kg for them and they are in a difficult situation. There is no growers' group as such for the major crops such as mandarin, pineapple, banana, grape, passion fruit etc.

MIFCO has no forward linkage with renowned groups such as Coca-Cola, Pepsi or Dabur etc. so that they can supply the finished products to them. Marketing strategy and promotional activities of MIFCO are very poor. Due to this their produce keeps lying at the store for long duration and they are not able to pay the farmers.

Nagaland

Post-harvest and Marketing Infrastructure Status in Nagaland

The total cold storage capacity is 6150 MT with two multipurpose cold storages in Nagaland, one co-operative and the other privately owned. Following are the details:

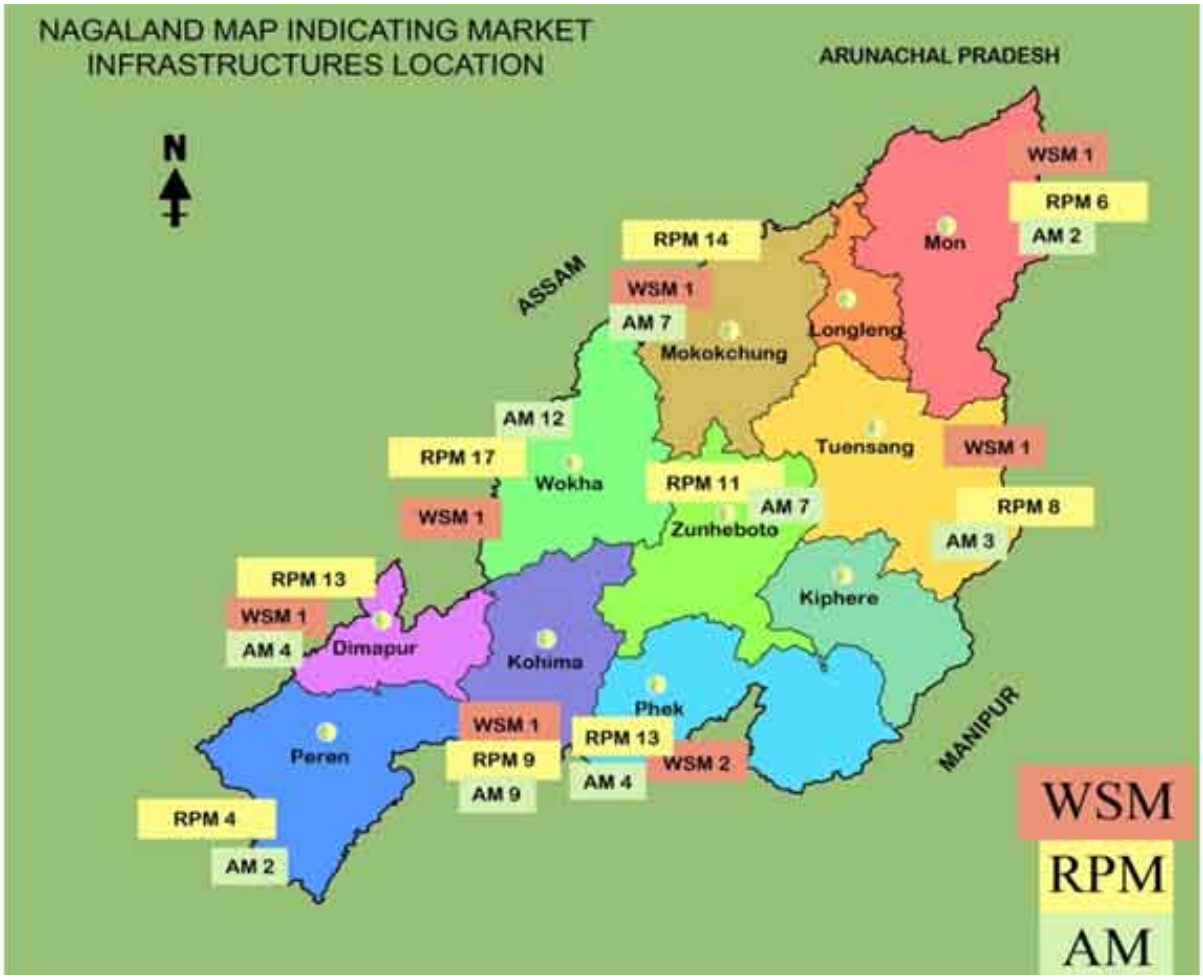
1. Marcofed Cold Storage in Dimapur – Capacity 1150 MT
2. Private Cold Storage in Dimapur- Capacity 5000 MT

Since pineapple is a major crop of the region, a collection centre to collect the fruit from nearby villages has been set up by the Government at Jharnapani (in Dimapur).

There are two pineapple processing units which carry out pineapple slicing and canning and sell in the nearby markets:

- Naandi foundation has one pineapple processing centre in Medziphema run by women members of SHGs.
- Zhimoni food processing centre in Dimapur.

List of Existing Markets in Nagaland



WSM: Wholesale Market RPM: Rural Primary Market AM: Apni Mandi

APMC Wholesale Markets in Nagaland

Dimapur NSAMB Market Complex

Facilities available:

1. Godowns – 6
2. Traders Chambers – 6
3. Auctions plat forms with tin roofing – 1 unit
4. Shops – 2 units
5. Canteen – 1 unit
6. Market Yard 15,000 sq ft (Cemented)
7. Bath room cum latrine – for publics – 4 units
8. Conference room, 30 x 60 ft fully air condition – 1
9. Office complex separate
10. Spices drying unit – 1
11. Animal feed block making – 1 unit
12. Waste disposal unit – 10 x 60 x 8 ft – 1 unit
13. Electronic Weight bridge – 20 MT capacity – 1 unit
14. Water supply available
15. Electricity available

Wokha APMC Market complex

Facilities available:

1. Godown – 3 (20 x 30) capacity
2. Drying Yard – 4
3. Auctions platforms with tin roofing – 1 unit
4. Trader chamber – 1
5. Vehicle parking yard available
6. Electronic weight bridge – 20 MT capacity available
7. Spices drying machine – available
8. Office complex separate
9. Conference room available
10. Electricity available
11. Public latrine – available
12. Water facilities available

Mokokchung APMC Complex

Facilities available:

1. Godown – 3
2. Auction Yard – 1
3. Drying Yard – 2
4. Trader chamber 2

5. Shops – 2 units
6. Vehicle parking yard available
7. Water facilities available
8. Conference room available
9. Spices drying machine – available
10. Electronic weight bridge – 20 MT capacity - 1 available
11. Electricity available.

Mon APMC Complex

Facilities available:

1. Godown – 3
2. Conference room available
3. Traders chamber – 2
4. Auction Yard available
5. Drying Yard – 2
6. Vehicle parking yard available
7. Public sanitation available
8. Electricity available.
9. Spices drying unit – 1
10. Office complex separate.

Tuensang APMC Complex

Facilities available:

1. Godown – 2
2. Traders chambers – 1
3. Drying Yard – 2
4. Auction Yard – 1
5. Electronic Weight Bridge – 20 MT capacity- 1
6. Public sanitation available
7. Water facilities available
8. Vehicle parking yard available
9. Conference room available
10. Spices drying machine – available
11. Office complex separate

Kohobuto APMC Complex, Dimapur

Facilities available

1. Godown – 2
2. Conference room available
3. Drying Yard – 2
4. Auction platform – 1

5. Electronic Weight Bridge – 20 MT capacity available
6. Conference room available
7. Vehicle parking yard available
8. Public sanitation available
9. Water facilities available
10. Traders' chambers – 2
11. Spices drying machine – available
12. Waste disposal facility – available

Rural Primary Market Yards in Nagaland

Rural Primary Market Yards are there in each district of Nagaland. Following facilities are available in Rural Primary Market Yards in Nagaland:

1. Office-cum-Godown
2. Drying Yard
3. Public sanitation facilities

List of Rural Primary Market Yards are as below:

i. Kohima District

1. Chedema
2. Tsemenyu
3. Chiphobouzo
4. Thongsu
5. Tesophenyu
6. Botsa
7. Khonoma
8. Khuzama
9. Zhadima
10. Peducha

ii. Dimapur District

1. Khubuto
2. Nuiland
3. Kacharigaon
4. Zutovi
5. Shikito
6. Aqhuhuto
7. Alosa
8. Suhoi
9. Domokhia
10. Bade

iii. Peren District

1. Punglwa
2. Samzuiram
3. New Jaluki
4. Mhainmanth

iv. Wokha District

1. Merapani
2. Ralan
3. Longtsung
4. Yamhon
5. Baghty
6. Bhandari
7. Pangti
8. Lotsu
9. Yikhum
10. Yimpang
11. Yanthamo
12. Lakhuti
13. Changsu Old
14. N. Longidang
15. Okotso
16. Liphi
17. Liphanyan

v. Phek District

1. Meluri
2. Chozuba
3. Porba
4. Seidzu
5. Zukitsa
6. Chizami
7. Chetheba
8. Dzulhami
9. Khuza
10. Dupazhu
11. Pholami
12. Tsupfume

vi. Zunhebuto District

1. Saptiga
2. Ighanomi
3. Hebolumi
4. Kitsakita
5. Asukhomi
6. Kitami
7. Akaito
8. Mudutsughu
9. Sapotomi

vii. Kiphiri District

1. Kiphiri Town
2. Amahator

viii. Longleng District

1. Pungo

ix. Mokokchung District

1. Asangma
2. Longjang
3. Tsutsung
4. Longkhum
5. Aliba (New camp)
6. Tuli
7. Mokokchung village
8. Sungkumen
9. Tsurang valley
10. Waromong
11. Chungtia
12. Merangkong
13. Mopongchukit
14. Chuchuyimpang

x. Mon District

1. Aboi
2. Tobu
3. Wakching
4. Yongkong
5. Tanhai

xi. Tuensang District

1. Mangakhi
2. Shamator

3. Chesore
4. Panso
5. Yakhur

Apni Mandi in Nagaland

i. Kohima District

1. Mountain View College Colony
2. Lerie colony
3. Kigwema Village
4. Viswema Village
5. Kezikia (Kohima Town)

ii. Dimapur District

1. Pughato
2. Piphema
3. Tsuma
4. Chekiye
5. Aghunaqa
6. Nikhekhu

iii. Peren District

1. Peren Town

iv. Wokha District

1. Mungya
2. Rachan
3. Sanis Town
4. Sungro
5. Wozhuro
6. Yanpha
7. Longpvu
8. Dotang
9. Helipad
10. Pyochu bridge point
11. Molonsu
12. Wokha Village

v. Phek District

1. Phek Town
2. Sekruzu
3. Losami junction
4. Sakraba

vi. Zunhebuto District

1. Naghutomi
2. Naltoqa
3. Zaphu
4. Doyang bridge Mkg. Road
5. Surohuto

vii. Longleng District

1. Longlen Town
2. Tamlu Town

viii. Mokokchung District

1. Puniboto
2. Alichen
3. Changtongya
4. Yajang
5. Yisemyong
6. Chuchuyimlang

ix. Mon District

1. Ukha junction
2. Naganimora

x. Tuensang District

1. Noklak Town
2. Longkhim Town

Post-harvest and Marketing infrastructure Status in Sikkim

Following post-harvest infrastructure facilities are available in Sikkim

1. Ginger Pack house at Birdang, West Sikkim
   - Capacity: 7.5 MT/day
   - Washing, draying, grading and waxing facilities
   - Ginger crushing, separation of cake & liquid/drying and powder-making
   - Ginger oil extraction
2. Government Fruit Preservation Factory, Singtam, East Sikkim

Established in 1956, manufactures orange squash, lemon squash, passion fruit squash, tomato ketchup, tomato puree, orange, marmalade, mixed fruit jam, synthetic vinegar, mango pickle, Dallae chilly (hot balls) pickle, Dallae chilly with bamboo shoot pickle, mixed pickle, pineapple squash, orange juice, mango juice, pineapple juice, litchi juice, guava juice and canned fruits and jams under the brand name of 'Sikkim Supreme'.

Installed plant and machineries are very old and need overhauling. It is not a very profit-making venture. Marketing linkages are not very strong. NERAMAC sold GFPF products under its outlets all over NER.

Apart from these, there is one cold store in Rong Po, used for potato storage, flowers pack houses and agriculture check posts (Rong Po & Melli) to record the inflow and outflow of produce.

Agriculture marketing is not regulated in the states so the marketing of fruits and vegetables are also unorganised. Largest fruits and vegetable market in Kanchanjungha Complex in Gangtok is occupied by wholesalers/retailers. NERAMAC, SIMFED and few farmers' groups and individuals have outlets in the complex. There is no other facility available as per the APMC guideline. Government made effort to organise horticulture trade by locating it under one regulated market in East Sikkim but due to non-interest of traders it could not be implemented.

Post-harvest and Marketing Infrastructure Status in Tripura

The state lacks post-harvest infrastructure for handling, however, there is sufficient cold storage capacity in the state. Total of 14 cold storages are there in Tripura with total capacity of 31,450 MT.

District-wise Cold Storage Capacity in Tripura			
District	**No. of Cold Storage**	**Capacity**	**Remark**
North Tripura	3	5200	Multipurpose
West Tripura	7	16250	Multipurpose
Dhalai	1	2000	Multipurpose
South Tripura	3	8000	Multipurpose
Total	**14**	**31450**	

Source: *Directorate of Marketing and Inspection, MoA, GoI*

Out of total cold storage capacity, approximately 9750 MT of capacity has been created by private sector and 2000 MT by cooperatives, rest cold storage capacity has been developed by the public sector. Most of the capacity is used for storage of potato.

At present, there are 21 regulated markets in Tripura, of which 9 are in West Tripura district, 6 in South Tripura and 3 each in Dhalai and North districts.

Sl. No.	District	No. of Regulated Markets	Locations
1	West	9	Mohanpur, Bishalgarh, Champaknagar, Teliamura, Bechaibari, Melagar, Sonamura, Kalyanpur, Jumpuijala
2	South	6	Garjee, Santirbazar, Barpathari, Kalashi, Nutanbazar, Silachari
3	Dhalai	3	Chawmanu, Gandachara, Kulai
4	North	3	Dasda, Pabiachhara, Panisagar

Although a sufficient number of regulated markets are present in Tripura, these markets are not functioning properly due to the various shortcomings like inefficient management systems, lack of infrastructure for the perishable products in the market etc. In addition to the regulated markets, there is large number of non-regulated markets in the state.

The regulated markets in the state do not have specific infrastructure for handling horticultural products. In addition to these regulated markets, there are 554 listed rural primary markets and 84 wholesale assembling markets.

For fruits and vegetables, biggest wholesale markets in the state are Golbazar and Battala markets in Agartala. Both of these markets are non-regulated markets. These two markets serve to Agartala as well as distribution centre for whole of Tripura for products coming from other states. There are around 30-35 commission agents and wholesalers in the Golbazar market and around 15 Traders in Battala market.

Stakeholders Met During the Field Visits

Arunachal Pradesh

- Director Horticulture, Itanagar
- Deputy Director Horticulture (HQ), Itanagar
- Asst. Director Horticulture (R&D), Itanagar
- Horticulture Marketing Officers, Itanagar
- Director, AP Agriculture Marketing Board (APAMB), Itanagar
- District Horticulture Officer, Papum Pare District
- Horticulture Development Officers, Yupia, Papum Pare District
- District Horticulture Officer, Lower Subansiri District
- Horticulture Development Officers, Lower Subansiri District
- Wholesaler's/Retailer's (10), Papum Pare Regulated Market, Itanagar
- Farmers' FGDs (2) at Yupia (Papum Pare) & Ziro- Lower Subansiri

Assam

- Director – Horticulture and Food Processing
- Deputy Director – Horticulture and Food Processing
- K K Choudhary – Superintendent Engineer, Agriculture Engineering Department
- Horticulture Statistics Inspector – Directorate of Horticulture
- Ashok Kr. Sharma – Executive Engineer – Cold Storage, Agriculture Engineering Department
- G. Baishya – Packhouse Division, Assam Industrial Development Corporation
- Dilip Bora, District Agriculture Officer, Kamrup
- Agriculture Development Officers of Boko, Khetri, Bongaon, Goroimari and Rani
- Agriculture Information Officer, Kamrup
- Secretary, APMC Bijoynagar, Kamrup
- Wholesalers, retailers and commission agents (15), Machkhowa and Fancy Bazar, Guwahati
- Farmers' FGD (2) in Bongaon and Boko (Kamrup)

Meghalaya

- Director Horticulture, Shillong
- Deputy Director Horticulture, Shillong
- Horticulture Development Officer (Marketing), Shillong
- Secretary, Meg. State Agriculture Marketing Board, Shillong
- District Horticulture Officer, East Khasi Hills
- Asst. Director of Horticulture (Fruit Preservation Unit), Shillong

- Supervisor (Fruit Preservation Unit), Shillong
- Block Development Officer (Horticulture), Sohara Block, East Khasi Hills
- Horticulture Development Officer, Sohara Block, East Khasi Hills
- Block Development Officer (Horticulture), Pynursala Block, East Khasi Hills
- Asst. Director Horticulture, Jaintia Hills
- Horticulture Development Officer, Jaintia Hills
- District Horticulture Officer, Ri Bhoi District
- Horticulture Development Officer, Ri Bhoi District
- Traders (5), Mawoing Regulated Market, Shillong
- Wholesaler's/Retailer's (10), Bara Bazar (Iewduh), Shillong
- Farmers' FGDs (5) at Sohara & Pynursala (East Khasi Hills), Jowai (Jaintia Hills) and Ri Bhoi

Manipur

- Mr. K. Ngaciken, Director – Horticulture, Government of Manipur (Mb. 09436021887)
- Mr. Ratan Kumar – Head, Horticulture Technology Mission, Manipur
- Mr. Kipchen (Joint Director & Incharge NVI, Government of Manipur) (for further information – Mr. Iboton PA to joint director – 09436603076)
- Dr. Suresh Kumar Methi – KVK Programme Coordinator, Tamenglong (Mb. 09206176715)
- Tawa Fruits – Lemon processors
- Mrs. Rehma – KVK Programme Coordinator, Imphal
- Mr. R. K. Darendrajit Singh (Superintendent – Custom Preventive Force & LCS, Moreh) – (Landline 038722 264238, Mb. 09436025417)
- Mr. Holichand, Inspector, LCS Moreh (Mb. 09402757179)
- Dr. S. S. Roy, Horticulture expert, KVK, Imphal (09436891040)

Nagaland

Sl. No.	Name	Post	Address	Contact No.
1	Dr. N. Benjong Aier	Joint Director	Kohima	9436002381
2	Mr. Pawan Kumar	Deputy Director - Planning	Kohima	9436437806
3	Ms. Mesetuonuo	Deputy Director	Kohima	9856162465
4	Mr. Jerry Patton	Divisional Horticulture Officer	Kohima	9436009026
5	Mr. Engyol	Divisional Horticulture Officer	Dimapur	9856051130
6	Mr. Temsu Longkumer	Area Horticulture Officer	Dimapur	9436004486
7	Mr. Mishento	Divisional Horticulture Officer	Peren	9436422004
8	Dr. Akali Sema	Director - CIH	Medziphema	03862-247707
9	Mr. Prabin Kumar	Marketing Officer - CIH	Medziphema	03862-247707
10	Mr. Gimzie	Secretary-APMC	Jalukie, Peren	9436018340
11	Mr. Loanry	Horticulture Extension Officer	Gaili, Peren	9856537260
12	Mr. Kishor	Marketing Officer - ICCOA	Dimapur	9401169719
13	Ms. Abea Mero	MD, Naga Spices Pvt. Ltd.	Dimapur	9856125529
14	Mr. Duolo	Director - Kuda Cold Storage	Dimapur	9436008303
15	Mr. Velsete	Manager - Kuda Cold Storage	Dimapur	9612836651
16	Wholesalers and retailers (10) at wholesale and retail markets in Dimapur			
17	FGD with farmers at Molvom, Dimapur (1); Kohima (1) and Gaili, Peren (1)			

Mizoram

Sl. No.	Name	Post	Address	Contact No.
1	Mr. Samuel Rosanglura	Principal Director	Aizawl	9436140587
2	Mr. R Zotawna	Joint Director	Aizawl	9436149232
3	Mr. T. Llankunga	HDO HMNEH Deputy Director - Planning	Aizawl	9436151320
4	Mr. Moantya	Divisional Horticulture Officer	Aizawl	9436144012
5	B. Lalchariliana	AHEO	Aizawl	8575567779
6	H. Lalpiaumama	HDO	Aizawl	8014529618
7	Mana Samto	Field Consultant	Aizawl	9856681789
8	Sangzuala	Manager-Project	Aizawl	2322180
9	Wholesellers/retailers (8) in Aizawl			
10	FGD with farmers (1) at Thiak village in Aizawl			

Sikkim

- Principle Director, Horticulture & Cash Crop Development Department, Sikkim
- Deputy Director (Projects), Horticulture & Cash Crop Development Department, Sikkim
- Deputy Director (Project M&E), Horticulture & Cash Crop Development Department, Sikkim
- Deputy Director (Plasticulture & Mrktg.), Horticulture & Cash Crop Development Department, Sikkim
- Pack-House Incharge, Tadong, Gangtok
- District Government official (East District & South District)
- SIMFED, Gangtok
- NERAMAC, Gangtok
- Wholesalers and retailers in Gangtok
- Farmers FGD (2) in East and South Districts

Tripura

- Mr. P. B. Jamatia, Joint Director, Department of Horticulture, GoT (Mb. 09436455259)
- Dr. S. P. Das, In-charge-Horticulture, ICAR Research Complex, Agartala
- Mr. N. S. Das, Agriculture Section Officer, Bishanganj Agri Sector (Mb. 09436126731)
- Mr. Chandra Mohan Deb, Agriculture Inspector, Bishanganj Agri Sector (Mb. 9612283641)
- Mr. R. P. Malik, Managing Director, Tripura Horticulture Corporation Ltd.
- Dr. Deepak Vaidya, Superintendent of Horticulture, South Tripura & Food Technologist
- Mr. M. L. Devnath, President, Tripura Chamber of Commerce and Industries
- Mr. Gautam Roy, Export-Import business
- Farmers meeting at field (Bastuli ADC village)
- Wholsalers and retailers meeting at Agartala

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Note for Readers

This study has been conducted on behalf of SFAC by Indian Society of Agribusiness Professionals (ISAP). Due diligence has been exercised by the consultant to obtain authentic secondary data and conduct field studies and interviews in a professional manner. The analysis and conclusions drawn are also made in an objective and fair manner. All original records related to the study are available with ISAP.

SFAC encourages all readers to bring any factual errors in this publication to our attention.

YEAR of HORTICULTURE 2012



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