

**PINEAPPLE VALUE CHAIN ANALYSIS AND MARKET
ASSESSMENT FOR UNAKOTI & DHALAI DISTRICT
TRIPURA**

Submitted to :

*Mission for Integrated Development of Horticulture
MoA&FW, Govt. of India*



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1 Introduction

1.1 Tripura State- At a Glance

Located in the north-eastern part to the country, Tripura is the third smallest State of the India. The State shares about 84 percent of the border with Bangladesh in the north, south, and west and is connected to rest of India in the east sharing regional borders with Assam and Mizoram (figure1). The total geographical area of the State is about 10,491 km² and is mainly characterised by upland (tilla land) and hilly terrain, valleys and plains. Bestowed with abundant natural resources, forest area accounts about 60% of land area leaving only about 27% of the land for agricultural and other use. Being densely forested, the State is sparsely populated. The total population of the State is about 36.73 lakhs (2011 census), which is the second-highest in the North



Eastern Region, after Assam. Average population density is fairly high, at 350 person per sq km compared to national average of 382 person per sq. km. Majority of the population lives in the plains and rural areas. The literacy rate in the State is 87.2%, which is much higher than national average of 74%.

The State is divided into 8 districts¹. The districts in the west and south (West Tripura, Shepahijala, Gomati, South Tripura & Khowai) fall in plain zones and are densely populated. The districts in north and east of the State are forested and hilly and relatively sparsely populated (accounting only 30% of the total State population). The relative availability of economic infrastructure as road and rail network in the State is very low. The National Highway - 44 is the only link road with rest of the country which passes through neighboring states of Meghalaya and Assam. Although the State capital has recently being connected with broad gauge railway link via Assam. However, the total railway route in the State is only is about 158 km restricting the bulk good carriage.

1.2 Agriculture Sector Overview

Due to limited geographical connectivity with the rest of India, the State economy is characterized by slow industrial development, low per-capita income, inadequate infrastructural facilities, communication bottleneck and high level of unemployment. Agriculture and allied activities, thus, remain an important sector for the socio-economic development of the State. The sector contributes about 33% in the Gross State Domestic Product (2014-15) and 42% of the total employment generated in the State².

Despite being vital for the economy, the growth of agriculture sector in the State is not very encouraging. The sector is faced with several constraints, most important ones being low adoption of improved technology and inadequate infrastructure facilities, particularly for post-harvest operations (including processing) and marketing of produce. Moreover, as the small and marginal farmers constitute about 96% of the farming community, therefore, most of the agricultural activities in the State are confined to subsistence production. As fragmentation of land holding still continues as a part of social phenomenon, the average size of holding has been declined from 1.25 hectares in 1976-1977 to 0.49 hectares in 2010-11¹ (Census 2011). Other factors as less intensive use of agri-input, negligible seed/ varietal replacement, calamities as recurring floods etc are also threatening to sustainability of livelihood from agriculture sector in the State. Lack of post-harvest processing facilities results in high wastages and hardships for farmers during the peak production season. Being land locked, the State has disadvantage of restricted movement of goods, which affects the marketing of agricultural produce, particularly the perishable produce. Due to hilly and forested terrain, the scope for area expansion under agricultural crops is limited. Further, there is increasing pressure on land due to population rise and its requirement for promotion trade and other industrial purposes. There is an immediate need for adopting appropriate strategies for enhancing the per unit agricultural value and output with a focus on increasing per capita income along the value chain.

1.3 Agro-Climatic Suitability

Tripura experiences humid sub-tropical type of climate. The features of climate, however, vary from sub-tropical to temperate conditions in the hilly areas of the State. The temperature ranges 7 to 27°C during winters to 20 to 36°C during summers. Average annual rainfall across the State varies from ranges from 1922 mm to 2855 mm lasting from month April/ May to August/ September. The north-eastern part of the state around Dharamnagar gets maximum rainfall. Soil type is mostly Red & Lateritic with a pH ranging 4.5 to 6.5.3 Owing to such climatic conditions, the State has highly conducive environment for cultivation of various horticultural crop as, Pineapple, litchi, mango, banana, jackfruit, citrus, cashewnut, betel leaf, arecanut, black pepper, coconut, tea, coffee, cucurbits,

¹ Tripura at a Glance 2015 – 16, Directorate of Economics and Statistics, Government of Tripura (<http://ecostat.tripura.gov.in/At-A-Glance-2015-16.pdf> accessed on 28.09.2017)

² Economic Review of Tripura, 2015-16. (http://ecostat.tripura.gov.in/economic_review_15_16.pdf)

³ Agroecological zones in Tripura, Tripura State Pollution Control Board (<http://tspcb.tripura.gov.in/climate.htm> accessed on 07.11.2017)

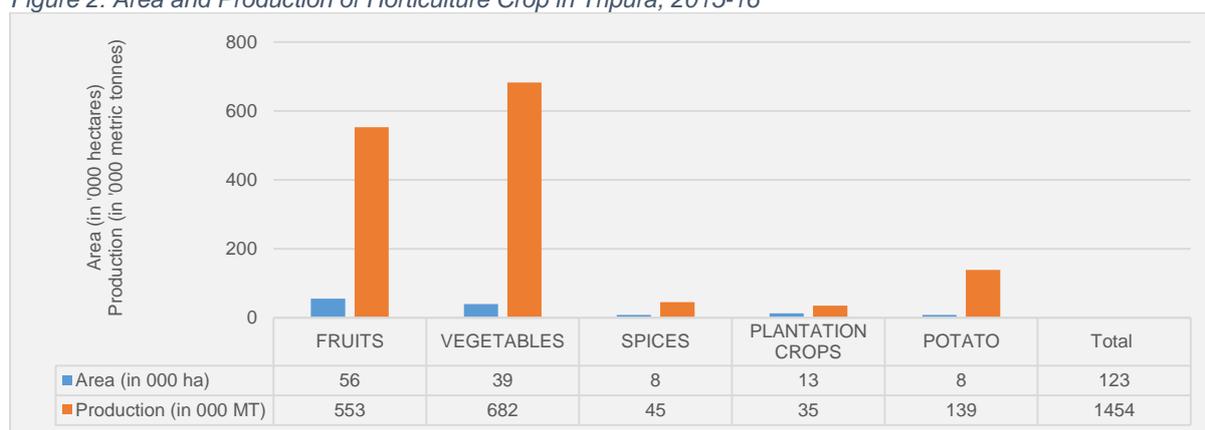
beans, brinjal, sweet potato, potato, gerbera, tuberose and chrysanthemum. The undulating tilla land and lower foothills (which are susceptible to soil erosion) are particularly suitable for pineapple as cultivation on slope helps avoid water stagnation, which is otherwise not suitable for pineapple cultivation. Also growing pineapple on these slopes help check soil erosion.

1.4 Pineapple Production Scenario in the State

1.4.1 Overview of Horticulture Sector

High rainfall and good soil offer considerable scope for agricultural and allied sector activities in the State. State produces wide variety of fruits and vegetables throughout the year. Of the total net sown area of 0.28 million hectare, about 44 percent net sown is reportedly covered by horticultural crop (including fruits and vegetables).

Figure 2: Area and Production of Horticulture Crop in Tripura, 2015-16



Source: Directorate of Horticulture and Soil Conservation, Government of Tripura

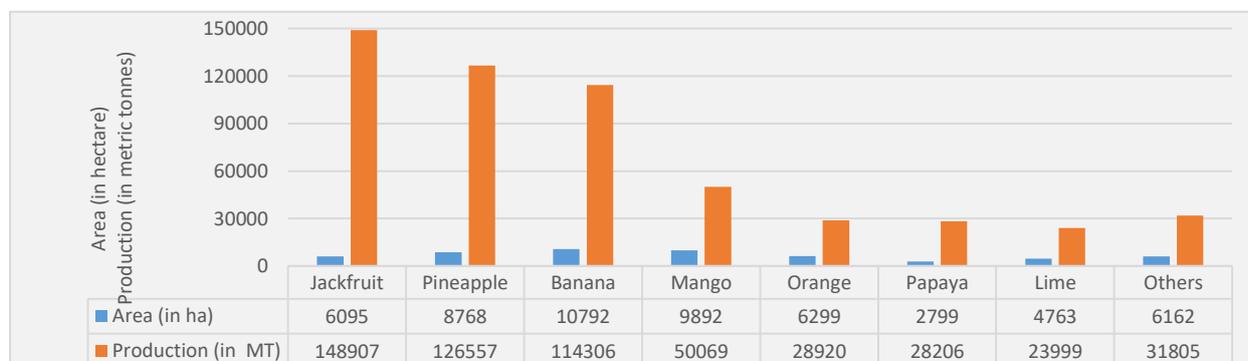
Table 1: Major Horticulture Crops in the State

	Fruits	Vegetable	Spices	Plantation	Others
Tripura	Jackfruit, pineapple, banana, oranges and litchi.	Potato, Off-season vegetables	Ginger, Turmeric & Chillies	Areca nut, Cashew, Coconut, Tea	Medicinal Plants and Flowers

Source: National Horticulture Board

Significant area in the State is reportedly under fruit crops. Fruit production in the State is estimated about 5.53 lakh metric tons per year. Tripura is one of the largest producers of pineapple in the country.

Figure 3: Area and Production of Fruits in Tripura, 2015-16



Source: Directorate of Horticulture and Soil Conservation, Government of Tripura

1.4.2 Area and Production of Pineapple in Tripura

Pineapple is a traditional fruit crop of Tripura. The agro-climatic conditions of Tripura make it suitable for large-scale pineapple cultivation. Tripura pineapple is particularly famous for its quality and aroma. The crop accounts for 16% of the total area under fruit crop cultivation and 23% of the total fruit production in the State. The State is 4th largest producer of pineapple in India after Kerala, West Bengal and Assam, accounting for approximately 9% of the total production in the country. However, the percentage of Tripura pineapple in the India market share is limited due to low adoption of planting and harvest practices that have limited the production potential of the State and absence of post-harvest infrastructure coupled with weak logistic and geographic connectivity with rest of India

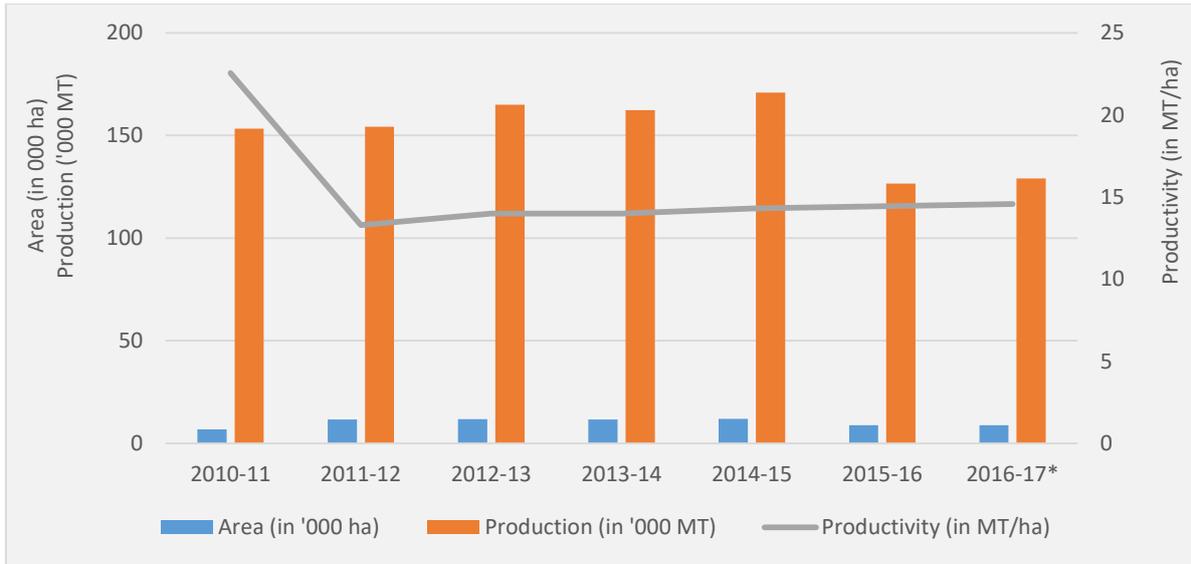
Table 2: State-wise area, production and productivity of Pineapple in India

States/UT	Area (in '000 ha)					Production (In ' 000 MT)					Productivity (In MT/Hectare)				
	2010-11	2011-12	2012-13	2013-14	2014-15	2010-11	2011-12	2012-13	2013-14	2014-15	2010-11	2011-12	2012-13	2013-14	2014-15
Kerala	10.2	9.8	8.5	8.5	10.8	85.5	80.4	72.9	72.9	348.1	8.4	8.2	8.6	8.5	32.4
West Bengal	9.9	10.1	10.5	10.7	10.8	303.7	310.1	310.0	316.0	320.0	30.6	30.7	29.5	29.5	29.5
Assam	14.0	14.8	16.2	16.5	16.0	220.7	230.9	268.8	288.6	281.3	15.8	15.6	16.6	17.4	17.6
Tripura	6.8	11.6	11.8	11.6	11.9	153.3	154.3	165.0	162.3	170.9	22.6	13.3	14.0	14.0	14.3
Karnataka	3.0	2.3	2.7	2.7	2.5	186.1	133.9	169.3	160.3	156.3	62.0	58.2	62.7	58.9	63.3
Nagaland	3.7	8.9	9.0	9.5	9.5	57.5	100.6	85.0	142.5	142.5	15.5	11.3	9.4	15.0	15.0
Manipur	12.2	12.6	13.1	13.7	14.3	104.4	8.8	124.1	136.3	136.8	8.6	0.7	9.5	9.9	9.6
Meghalaya	9.7	10.6	10.8	11.3	11.6	86.0	113.4	109.4	117.8	124.6	8.9	10.7	10.1	10.4	10.8
Bihar	4.9	4.9	5.1	4.2	4.0	129.4	131.8	139.2	113.9	116.0	26.5	26.9	27.3	27.4	29.0
Arunachal Pradesh	10.9	11.9	12.3	12.8	13.0	34.4	66.6	67.6	69.6	70.0	3.2	5.6	5.5	5.4	5.4
Andhra Pradesh	-	-	-	2.3	2.8	-	-	-	86.0	36.0	-	-	-	37.4	12.9
Mizoram	-	2.7	3.0	4.1	4.9	-	19.4	22.0	30.1	32.9	-	7.2	7.3	7.4	6.7
Tamil Nadu	-	0.7	0.7	0.7	0.6	-	28.1	20.8	22.9	20.3	-	40.1	29.7	33.2	33.8
Odisha	-	0.8	0.9	0.8	0.9	-	10.2	11.0	10.4	11.6	-	12.8	12.2	12.4	12.5
Goa	-	0.3	0.3	0.3	0.4	-	5.0	4.8	4.9	6.1	-	16.6	16.0	16.3	16.5
Andaman & Nicobar	-	0.2	0.2	0.1	0.1	-	0.6	0.7	2.3	3.0	-	3.0	3.5	19.2	23.2
India	88.7	102	105	110	116	1415	1387	1570	1737	1984	15.9	14.7	14.9	15.8	17.1

Source: India Horticulture Database, National Horticulture Board (2015-16)

Statistical analysis reveals that during the period 2010-11 to 2014-15, the area under pineapple cultivation in the State almost double from 6800 ha to 12,000 ha. However, during the same period, the crop productivity decreased from 22.6 mt/ha to 14.3 mt/ha and stagnated as against increasing year-on-year productivity in other pineapple producing States in India. The State average productivity of pineapple is infact lower than the national average of 17 mt/ha and almost one-fifth of that in Karnataka, which has the highest yield in the country (53 mt/ha). The productivity is also very low compared to the leading pineapple producing States as Kerala (32.4 mt/ha), West Bengal (29.5 mt/ha) and Assam (17.6 mt/ha). The decline in yield performance of the crop may be attributed to factors as technology gap, high dependence on monsoon, gradually declining soil fertility due to heavy rainfall and erosion and over-cultivation.

Figure 4: Area, Production and Productivity of Pineapple in Tripura (2010-2011 to 2016-17)



*Provisional estimate. **Source:** India Horticulture Database, National Horticulture Board (2015-16) & Directorate of Horticulture and Soil Conservation, Government of Tripura (for 2015-16 & 2016-17 statistics)

It is further observed that during the last three years, area under crop has been decreasing (from about 12,000 hectare in 2014-15 to 8850 hectares in 2016-17) due to extensive expansion of area under rubber and areca nut plantations. This is primarily because of the high perishability nature of pineapple, absence of processing infrastructure, and resulting severe lack of price realization. Contrarily, rubber and areca nut has relatively better established marketing mechanism in the region and thus relatively higher earning potential. However, in recent times, the growers are getting back to pineapple production in response to relatively low prices and reduced profit arising out of rubber plantations.

Considering the voluminous pineapple production in the State, the crop is assessed to have the maximum potential for processing, compared to other fruit crops as banana, mango, orange, litchi etc, which cover relatively lower cultivation area. Replication of best practices from the other high yielding regions, incentives and institutional support to grower and marketing functionaries may help in boosting the declining pineapple production in the State and realizing opportunities in value addition.

1.4.3 District-wise Area and Production of Pineapple in Tripura

Pineapple is cultivated in almost all districts of the State. The district-wise pineapple production in Tripura is represented as below:

Figure 5: District-wise area and production of pineapple in Tripura (2015-16)

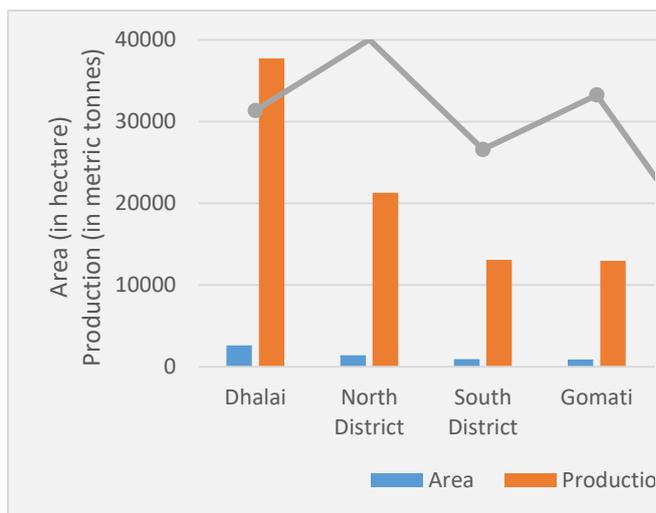


Figure 6. Study Area



Source: Directorate of Horticulture and Soil Conservation, Government of Tripura

The district like Dhalai, Unakoti, North Tripura and Khowai predominantly produce Kew variety of pineapple, which is highly suitable for processing into value added products as canning, concentrate, squash, jam, jelly and juice. Due to lack of processing infrastructure in the region, the production of kew variety is mostly traded outside of the State. Whereas the districts in the west and south i.e Sepahijala, South Tripura, Gomati & West Tripura mostly grow Queen Variety of pineapple, which is suitable for table consumption and primarily used for local consumption. In terms of production, Dhalai is the major contributor accounting about 37730 metric tons i.e. about 30% of the State production of pineapple. Together, with the production in adjoining Unakoti district, the production cluster accounts for about 47000 metric tonnes i.e nearly 40% of the State production of pineapples

2 Approach & Methodology

2.1 Study Area

Pineapple is grown across all blocks of the two selected district under the study - Dhalai & Unakoti. The study area was, thus, finalized in discussion with the District Horticulture Department, so that a representative data may emerge from all the production clusters.

Three Gram Panchayat, one each in Salema (Bilashcherra), Manu (Nalkata) and Ambassa (Ambassa) block were selected for conducting the field study in Dhalai. While Bilascherra Gram panchayat has pineapple orchards bordering Bangladesh, Ambassa is the district headquarter with significant area under pineapple cultivation. Nalkata (in Manu Block) was selected as it is one of the

largest pineapple production cluster in the State. Similarly in Unakoti district, Darchoi (Kumarghat Block), Gournagar and Jamthalbari Gram Panchayat (in Chandipur block) were selected for field survey. Darchoi is one of the major production cluster of Kumarghat block of the district and is known for traditional pineapple cultivation by Darlong tribe. Gournagar and Jamthalbari are the other leading production clusters based near Kailashahar, which is the headquarter for unakoti district.

2.2 Sampling Methods

The stakeholder sample selected for the interview and discussion included pineapple grower, traders (commission agents cum wholesales), local retailers and processors. Discussion and consultations were also carried out with State and district level officials to understand the overall scenario and seek suggestions.

The sample of pineapple growers for field survey were identified and mobilized at different selected locations with assistance of District Horticulture Office. Group discussion were conducted with the farmers in each of the selected clusters using structured questionnaire to collect information on value chain activities undertaken by the farmers, package of production practices, cost of cultivation, value addition at farm level, marketing of produce and associated costs, access to services for procurement of inputs, technical guidance, transport, market information and infrastructure access, constraints in production and marketing etc. A sample of 40 farmers were also interviewed individually to collect general information and data on socio-economic background, scale of production, marketing channels etc. On the market side wholesalers and retailers dealing with marketing of fruit crops and officials from department of agricultural marketing were interviewed to understand the goods movement upto end consumer including marketing cost, margins and efficiency. Primary data was collected using structured questionnaires. Secondary data and information was collected by referring to published reports, information and data base of various relevant sources and their website.

3 Primary Survey: Result & Discussion

3.1 Socio-Economic context of Pineapple Value Chain in Unakoti & Dhalai

Pineapple is one of the most important horticultural crop in the selected district. Based on the field survey it is assessed that a sizable number of farmers are associated with pineapple cultivation in the region. The production clusters of pineapple are spread along the hill slopes of the district. In Dhalai, pineapple production is about 38,000 MT from area of 2600 hectare and Unakoti is about 9000 MT from about 700 hectare. The combined production of the district is approximately 47,000 MT which is about 40% of the State production. Assuming an average weight of 750gm per pineapple and selling price of Rs 5 per piece at farmer level, the production of the cluster is assessed more than worth Rs 30 crores. The value of production would more than quadruple, if calculated at prices paid at the consumer level. However, despite the sizable volume and value of production, the overall price realization at farmer level remains low which may be attributed to multiple factors such as small and marginal landholding, limited application of best practice, distant location of farms, post harvest losses due to poor processing and storage infrastructure and marketing related challenges etc.

An Integrated development of pineapple value chain in the State is important for socio-economic growth of the associated farming community as well as future sustainability of pineapple cultivation in these regions. There is also scope for development and promotion of processing of pineapple that would create higher value for the produce and improve realization at the farm level, promote investments in agribusiness in the region, foster backward and forward linkages. For planning and implementation of sustained interventions along the value chain, it is important to understand the key characteristics of the targeted farmer group, their participation along the value chain, inter-linkages

between various stakeholders, marketing channels and constraints. The results and discussion of the primary survey is detailed in the following section

3.1.1 Pineapple Production Clusters in Selected District

Pineapple is cultivated across all the blocks of the selected two district. Though block-wise statistics was not available, however, in discussion with the State Department of Horticulture, Manu and Ambassa are assessed to be the largest pineapple producing in the Dhalai district. Nalkata in Dhalai is infact the major belt of Kew pineapple production in the State. In Salema district, bordering Bangladesh, a significant stretch of pineapple cultivation of falls between the border fencing area. In Unakoti district, Kumargaht is the major production block contributing 40% of the district production, Gournagar & Chandipur accounting about 25% each. Assuming the average landholding size of 1.03 (cacluated based on average holding of surveyed respondents), and the total land area of about 3300 hectare under pineapple cultivation in the region, more than 3000 farmer families are assessed to be associated with pineapple cultivation in the region. Thus the socio-economic significance of the sector for the region.

3.1.2 Profile Analysis of Apple Growers in the Study Area

In the identified cluster, the farmers were mobilized with the help of the District Horticulture Office. During the field survey, 40 farmers across different villages who are engaged in pineapple cultivation were interviewed individually as well as a part of Focused Group Discussions (FGDs). Of all the farmers surveyed in the cluster, there were 34 male farmers and 5 female farmers. Based on the responses, the socio-economic profile of the respondent farmers is given below. The parameters taken into account are education, land holding size, gender, economic status etc

3.1.2.1 Land Holding Size

The average landholding size of pineapple growers in the study area is estimated to be about 1.03 ha. Of the surveyed farmers, 60% were reportedly marginal farmers (less than 1 ha); 25% small (1-2 ha), 15% are semi-medium (2-4 ha). The average landholding of the pineapple respondents is little more than the average size of land holding in the State which is about 0.97 hectare.

Table 3: Land Holding Distribution of Surveyed Farmers

S.No	Category	Operated Area	% of Farmers from Sample	As per overall State Statistics ⁴
1	Marginal	Less than 1 ha.	60%	86.27%
2	Small	1 - 2 ha.	25%	9.52%
3	Semi-medium	2 - 4 ha.	15%	3.72%
4	Medium & large	More than 4 ha.	-	0.5%

The female respondents interacted during the survey also fall in the marginal to small category. Given the dominance of small and marginal farmers, their smaller outputs, fragmented landholdings and often-distant location limits the farmers to access distant markets.

3.1.2.2 Education Status

It was found that the educational level of the farmers surveyed in the cluster is fairly good. All the respondents had completed primary level education. While only 18% of farmers had primary education, rest had better formal educational qualifications. About 45% of the respondent were educated upto junior high school education and 30% upto senior high school. Only one respondent was found to have completed post-graduate level of education. Moreover, female farmers in the sample have high literacy rate with about 80% of them being literate. However, within the surveyed farmers, sample of female farmers is not statistically very significant.

⁴Source: Agriculture Census 2010-11

Table 4: Education Status

Qualification	Illiterate	Primary School	Junior High School	Senior High School	Graduation
% of Farmers	5%	18%	45%	30%	3%
% Male	3%	17%	46%	31%	3%
% Female	20%	20%	40%	20%	-

3.1.2.3 Annual Income

The farmers in the selected clusters are purely dependent on farming as source of their income. Among the study respondents, a sizable number of farmers particularly in Dhalai district are exclusively dependent on the pineapple for income generation. In selective clusters in Kumarghat and Kailasher bloc of Unakoti district, the farmer have slightly reduced dependence on the pineapple cultivation, as they are gradually moving out of pineapple cultivation into rubber and other plantation crops. However, as the farmers in these regions have relatively larger operational land holding under pineapple cultivation, the average annual income of the pineapple growers was higher in these region. The average annual income of maginal farmers ranges Rs. 18000 – Rs 20000, where as that of small and medium ranges between Rs 30000-45000. As discussion related to income level is a sensitive proxies were used to assess the same.

3.2 Varieties Grown & Seasonality of Production

3.2.1 Varieties grown

There are mainly two varieties of pineapple that are grown in Tripura – Queen & Kew. In the selected study area (Dhalai & Unakoti), the farmers mostly grow Kew variety of pineapple. Kew pineapple is a spineless and large sized fruit weighing between 1.5 Kg. to 2.5 Kg. The fruit is harvested during mid June to mid August. The variety is highly juicy with TSS content 8° to 12° brix. The colour of Juice is light yellow with considerable aroma and flavor. Thus, the variety is highly suitable for canning purpose and/or processing into concentrate, squash, jam, jelly and juice. However, as commercial scale processing of pineapple is found to be absent in the State, therefore, the produce is mostly sold directly to local traders and buyers, who visit the production clusters during production season. North Tripura and Khowai district are the other major producers of Kew pineapple.

The other variety is Queen. Tripura is particularly famous for this variety of pineapple, which is not only distinct from other pineapple varieties but also significantly different in quality of same variety grown in neighbouring districts. Recognizing the exclusivity of Tripura Queen Pineapple has been accorded Geographical Indication tag/registration (2014-15). The average fruit size of Queen Pineapple is relatively smaller than Kew type and ranges between 700 grams to 1.2 Kgs. The fruit is spiny and golden yellow in colour and aromatic. Leaves are brownish-red, shorter and very spiny. The variety is known for its high quality and aroma, but due to high perishability and low fiber content, it is more suitable for table purpose and primarily consumed locally. The variety is harvested earlier than Kew variety during May to mid July. This variety is grown mainly in Sepahijala, South Tripura, Gomati & West Tripura district. Though some of the surveyed plot in Dhalai and Unakoti were observed to be also growing mix of Queen type of variety, however, the number of plants per plot were not very significant.

3.2.2 Seasonality of Production

Pineapple season in Tripura ranges from the month of May to August. Pineapple being a seasonal crop, production in Tripura coincides with the peak production in other pineapple producing States in the north east region as Assam, which is the 3rd largest producer of pineapple (July-August), Nagaland (June), Manipur (July-August), Meghalaya (July) and Mizoram (August). At national level

markets, the production as well coincides with other bulk producer States as Kerala (May-June), West Bengal (July-August). Same time of harvesting period along production clusters during May to August lead to excess supply than seasonal requirement, resulting in huge market glut in almost all regional, State and national level markets reducing the market price and thus, decreased farmer returns.

Figure 7. Seasonality of Pineapple Supply in the State

STATE	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Tripura					L	P	P	L				
• Tripura (Queen)					L	P	L					
• Tripura (Kew)						P	P	L				
Assam							P	P	L			
Nagaland					L	P						
Manipur					L	L	P	P				
Meghalaya						L	P					
Mizoram							L	P				
Karnataka			L	L	L	P	P	P				
West Bengal						L	P	P	L	L	L	
Kerala	L	L	L	L	P	P	L	L	L	L	L	L

P – Peak; L- Lean

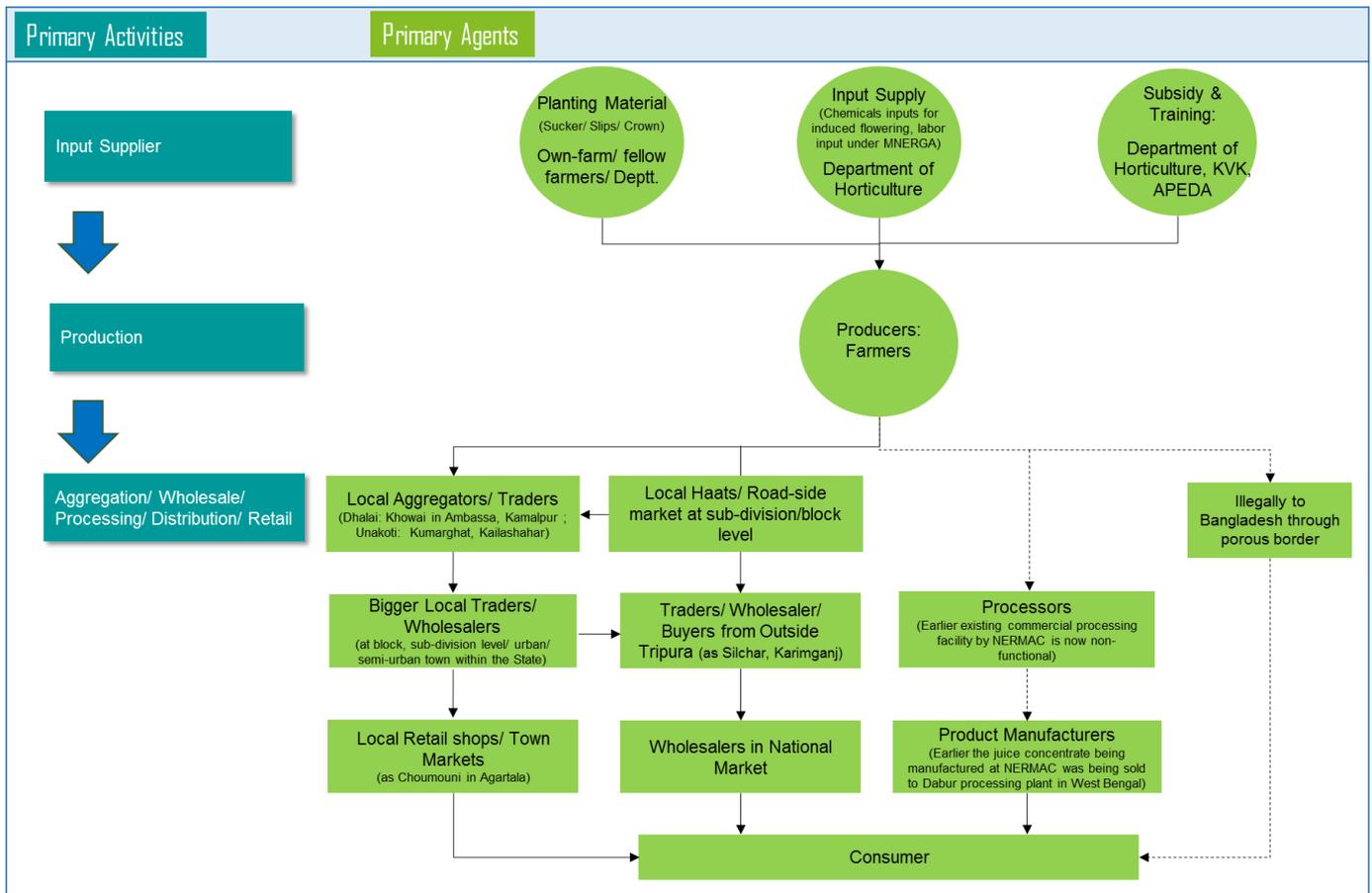
Further, as during the same period the State witnesses heavy rainfall and high relative humidity and temperature, the produce is prone to rapid quality deterioration. In absence of appropriate post harvest storage infrastructure and processing, the farmers are compelled to sell and dispose the produce at very low prices. It was also learnt during the discussion that not all plants in a plot flower during the year; moreover there is lack of uniform flowering even after physiological maturity, resulting in lower productivity than achievable potential. In order to overcome the problem due to seasonality, new techniques as staggered planting during different intervals from April to October month, planting with suckers/crown/slips of different sizes and use of growth regulators (chemical staggering using Ethrel) for induction of off-season flowering and fruiting are being introduced for steady and year round production of pineapple in the State. The adoption of these techniques, however, need to be scaled up extensively for adoption by more number of farmers and for increasing the production period across all pineapple production clusters. Moreover, spreading production into the off-season plays a vital role in significantly improving the productivity, managing production as per market requirement, check market glut, increase farmer income, create livelihood and income opportunity for rural and tribal areas round the year.

3.3 Analysis of Pineapple Value Chain

3.3.1 Structural Analysis

There are different types of functionaries operating in pineapple value chain in Tripura. These involves pre-production input supply (as planting material), production by growers (who produce & harvest the fruit), collection & distribution by local aggregators/traders (who procure the fresh pineapples directly from the farmers near to the farm gate or through local haats/ markets at block and sub-division levels), wholesale purchase and distribution by wholesalers based out of district headquarters, block or sub-division as well as regional markets (who either purchases the produce directly from farmer bringing their produce to the market or through representative local village level trader), retailers, processor and end-consumers.

Figure 8. Structure of Pineapple value chain in the District



3.3.2 Functional Analysis

The role played by various members of the value chain is as follows:

Input supply: As general practice, the main inputs used in pineapple cultivation includes suckers, labour input, land, fertilizer, pesticides, herbicides and fungicides. Owing to high climatic suitability, the farmers in the selected production clusters in Tripura are observed not to be using any chemical inputs (fertilizer, pesticide) for pineapple cultivation. Production is mostly carried out organically. This may also be attributed to factor, that mostly the tribal population in the region had been earlier practicing jhum cultivation, where much emphasis was not given on chemical input application. As for planting material, pineapple is mostly propagated using suckers arising from the underground part of already planted crops or using slips arising from fruiting stem or crown on the top of the fruit. The State department of Horticulture also provides input material to the grower subsidized rates including planting material, chemical input for staggered off-season flowering and fruiting and assistance towards labor input for orchard area management funded under MNEREGA. The department also provides extension services to the farmer including technical guidance,

Grower: The pineapple growers undertake cultivation of orchards throughout the year. The main operation carried out by the farmers includes land preparation, sourcing and planting of planting material (for establishment of new orchards/ replacement of old ones), intercultural operations as weeding, application of growth regulators, removal of suckers, slips, crown pinching and crop harvesting. Post harvest the fruits are loaded onto wooden basket woven with bamboo strips and carried from orchard to nearby roadside aggregation points for sale to middlemen or loaded onto transport vehicles for transport to local haats/ rural/ primary market for sale. Very few farmers tend to grade the produce.

Farmer Producer Groups: It was understood from the interaction with field based stakeholders, that presently there are no farmer producer groups for pineapple in the region. However, based on interaction with department officials, it was learnt in partnership with APEDA the department plan to develop some of the major pineapple producing cluster in the State under which FPOs would be developed and promoted with support from SFAC for purpose of quality production for processing, packing and exports. These clusters are identified as follows:

- North – Kanchanpur, Damchera
- Dhalai – Bilascherra, Nalkata, Karaticherra, Gondacherra, Jumthung, Bagmora
- Unakotu – Darchoi, Jamtailbari, Deocherra
- West – Lefung, Hejamara

Local Aggregator/ Commission Agents/ Small local trader: The aggregators/commission agents/ local traders play a key role in flow of commodity from farm to market. These mostly act as facilitators between the farmers (whose orchards are based in remote locations) and local traders/ wholesalers operating out of urban/semi-urban markets within the State as well as distant buyers. The aggregators mostly collect the produce from the individual farmers at/near the farm gate and are responsible for transportation of the produce to nearby towns or sub-divisions for sale. The aggregators, however, do not store the produce at any point of process flow. Sometimes farmers also sell the produce directly to local traders and distant buyers from Silchar and Karimganj (Assam) by marketing the produce at local haats and town markets in places as Khulai and Chowmanu in Dhalai and Kumarghat and Kailasharah in Unakoti.

Wholesaler: The Wholesalers for pineapple are generally located at block and sub-division level and at Agartala. Whereas the traders/ wholesalers of distant markets such as Silchar and Karimganj (in Assam) either interact with the farmers through local representative agents or procure from markets at Ambassa, Khulai, Kailashahar, Kumarghat, Dharmanagar (in North district). Based on discussion with various fruit wholesalers in the State, it was observed that the pineapple produced in the northern district of Tripura as Dhalai, Unakoti & North districts is mostly being channelized and marketed outside the State either through direct sale to the external buyers or indirectly through traders and agents who act. Whereas the pineapple production from west and south of Tripura is being channelized through the wholesalers/traders of Agartala (Maharajganj and Batala) and sub divisions markets at Bishalgarh, Sonamura, Udaipur etc from where it goes to local retails and local consumers.

Processors: Presently, there are no operational pineapple processing units in the cluster. Earlier there was a government run processing unit in the cluster, NERMAC based out of Nalkata. The unit was set-up in 1988 and was into processing of fresh pineapple into juice concentrate which was onward sold to bigger processing firms as Dabur. The installed capacity of the plant was about 2 tonnes/hour. However, the plant was single line and single product based. In absence infrastructure as that for canning, bottling or manufacturing of other value added products and limitation of seasonality of raw material supply, the operational cost of the unit was very high and as a result the plant had been running under losses and was finally closed in 2006-07. Since then no processing unit. It was learnt from the discussion with official from NERMAC that a proposal for setting-up of multifruit processing unit with added facilities as canning and bottling line, aseptic packing, cold store etc had been prepared and submitted in 2011-12. However, no new development have taken place since and pineapple processing plant at Nalkata remains operational. In discussion with the Department of Horticulture, a small and medium fruit processing unit, Jyotsna Food Products, operating out of Agartala was also interacted with. The unit is however mainly into processing of oranges for manufacturing of orange squash for sale in local market. The enterprise also processes small quantities of other crops as litchi, mango and tomato. The firm is not into processing of pineapple as currently they are manufacturing finished products for sale and distribution of into local market and the local consumer preference for pineapple juice is perceived to be low relative to other fruit based products, besides competition from already available established brand in the market. It

was assessed from the discussion with the processors that while there is significant potential for development of processing infrastructure in the State. However, there is need for encouraging private entrepreneur in the sector not only by providing financial level assistance, but also extending handholding assistance in setting-up of enterprise under single window clearances, constant capacity building and development of backward and forward linkages for assured raw material supply and marketing along with regular monitoring and documentation of such projects.

Table 5: Functional Analysis of Value Chain

Activity	Agent	Output
Input Supply	Own farm Fellow farmers	Planting Material (Suckers/Slips/Crown)
	Department of Horticulture	Planting Material (Suckers/Slips/Crown) Chemical Input (Etheral) for Staggered production using chemical induction Financial assistance for labor input for orchard area management under MNEREGA
Training and Subsidy	KVK Department of Horticulture	Technical guidance on cultivation practice Subsidies on input supply (chemicals, planting material) Pilot scale demonstration of new staggering techniques
Production & Harvesting	Farmers	Fresh Pineapple
Post Harvest Management	Aggregators/ Traders/ Wholesaler	Support Services (Aggregation, Marketing and Distribution)
Processing	Processors	Absence of commercial scale processing. No sorting, grading, packing practiced.
Wholesale & Retail distribution	Local traders Wholesalers (within and outside State) Commission Agents Retailers	Fresh saleable pineapples

3.3.3 Commodity Flow Analysis

Based on the stakeholder interaction four different marketing channels have been identified to be operating in the study area. The selection of marketing channel by the farmer is dependent on factors as scale of production and ability and accessibility to market information by the farmers.

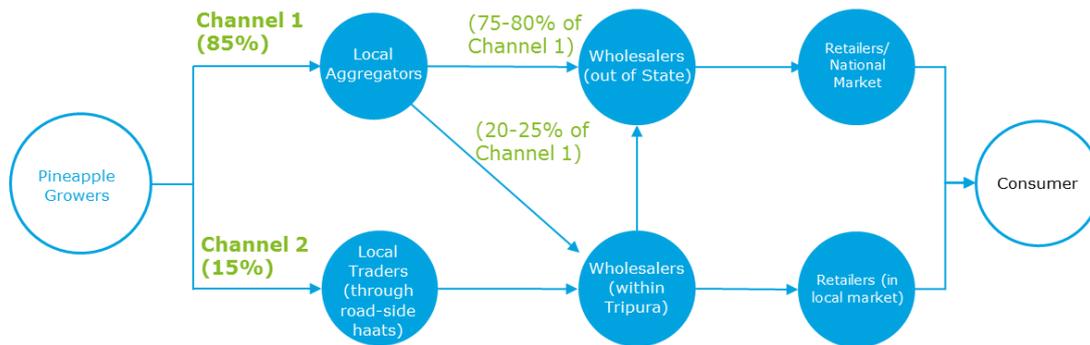
Channel 1.

Farmer → Local Aggregator → Traders / Wholesaler/ Buyers (in local market as well as distant market) → Retailer/ National Market → Consumers

Channel 2.

Farmer → Town Markets (in road side semi-urban/urban markets) → Traders/ Buyers from local as well as distant market → Retailer/ National Market → Consumers

Figure 9. Commodity Flow



Channel 1: The most prevalent supply channel observed in the cluster was sale via local aggregators. It was learnt during the discussion with the farmers that in most cases, the traders/aggregators/middlemen from local area or from regions as Agartala, Dharmanagar, Silchar & Karimganj (in Assam) approach the farmers and directly buy the produce at the farm gate or near to production cluster aggregation points. The farmers harvest the crop and carry them in wooden baskets up to the aggregation point where it is unloaded and aggregated. No sorting, grading or packaging is practiced. The aggregator is responsible for onward transportation of the produce. Price is negotiated at per 100 or 1000 pcs. Single price is paid irrespective of the size or grade. The channel is also preferred by the farmers as most of the growers cannot travel daily to the markets with small quantities of produce and arrange for daily transport at affordable price. Moreover, in this case the sale of produce and payments are immediate. The aggregator/local trader then sometimes sells the produce to bigger local traders or wholesaler through which it goes to local retailers then finally reached the consumer. Mostly the aggregators sell the produce to wholesalers or buyers outside the State (in Assam). The traders in the distant markets then sell it locally or, sometimes, in faraway markets of Delhi, Kolkata etc.

It was assessed based on stakeholder interactions that during the peak production season, the produce from the study cluster (mostly Kew variety) is being channelized to traders in Silchar and Karimganj in Assam. Whereas the produces (mostly Queen variety) from West Tripura, Shephajala, Gomati, South Tripura district are being channelized through trading at regulated markets in Bishalgarh from where it is sent to other regions across State including for retail sale in Paradise Chowmouni (in Agartala).

Channel 2: In some cases, the farmers themselves sell the produce by bring the produce to nearby markets at block or sub-division level and setting up road side haat in open or near the primary markets. This mode of marketing is mostly opted by some farmers who have plantations along the road side, easier access to market area and transport arrangement facilities (as in Darchoi in Unakoti which is located close to market in Kumarghat). In certain case, this happens when there is an immediate cash requirement of the farmer and depending on the requirement, the farmer harvests pineapple and bring the produce to the market in jeep and auto. In such cases, the transport is arranged by the farmer. The produce unsold is left as it is as wastage, which can go up to 10-15%.

None of the farmer in cluster was observed to be directly selling to distant market directly due to high cost of transportation, perishability of produce and high risk of losses in transit. Moreover, they mentioned that due to weak market linkages with wholesales in the distant markets, as well as lack of knowledge on market and price information at distant location, the farmers foresight lack bargaining power in such markets. In either of the channels, the price per ranges Rs 5-7 per piece and can go up to as low as Rs 1-2 per piece during market glut. The need of the hour is to establish strong market linkages within and well outside State for better price realization.

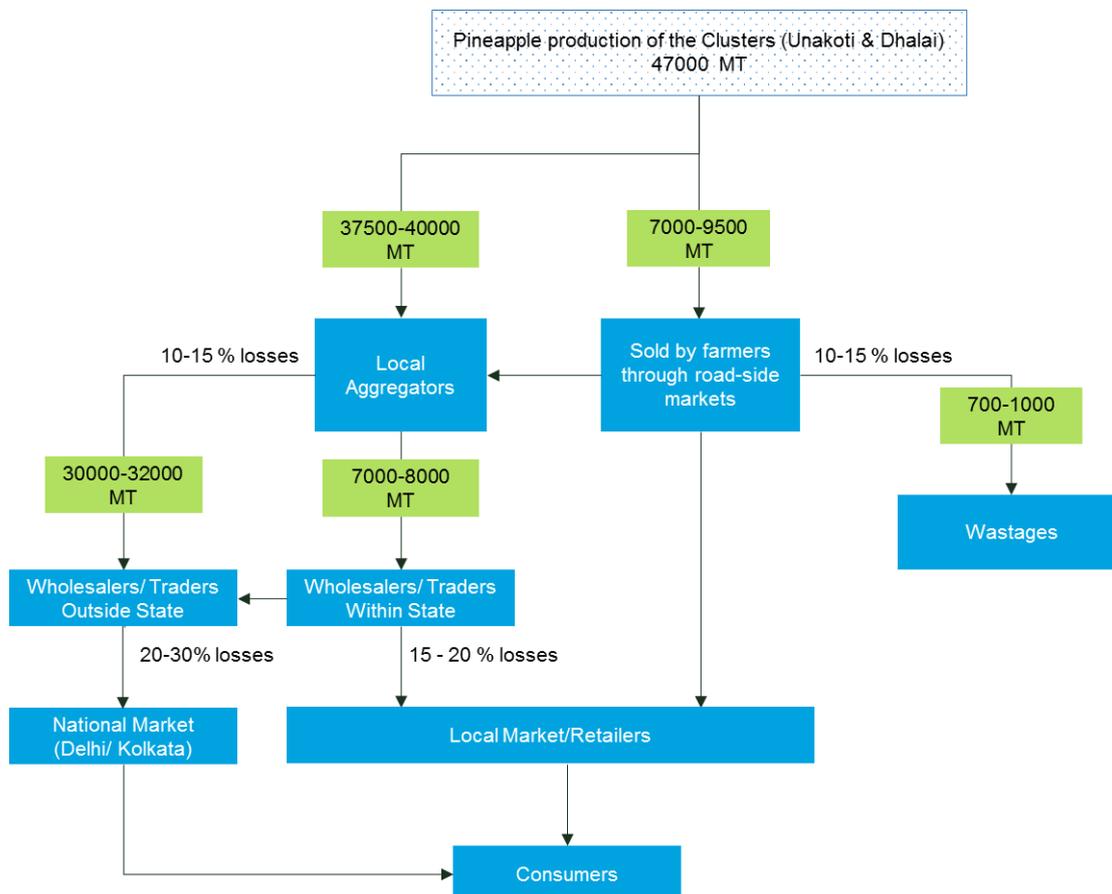
As Tripura shares a long boundary with Bangladesh, a substantial amount of pineapple is also traded across the border between Tripura and Bangladesh. Most of such trades is not legalized and happens through informal channels between traders on both sides of the border. Reportedly, farmer

may fetch price ranging Rs 10-15 per piece through across border sale as compared to Rs 5- 7 and sometime even lower when selling to local/regional market.

3.3.4 Quantification of Physical Flow of Apple along different channels

Based on the commodity flow assessment, the district level physical flow of overall production may be quantified as represented below:

Figure 10. Quantification of Physical Flow of Produce



It is notable that despite significant production potential, there is minimal value addition in terms processing of pineapple into other products. Also there are immense losses due to spoilage in transit from one agent to another, particularly when bringing the fruits from Agartala to distant markets. The fruits with the crown, can be kept without damage for 10–15 days after harvesting. Based on the field survey it is assessed that it usually take 5-7 days for the produce to typically reach from farm to local market. Due to zero storage facilities and absence of any food processing units, wastages goes high up from 10% at farm level to upto 20-30% during transit from farm to market. Due to lack of weak market linkage, a lot of produce thus gets wasted. Thus, there is immense scope for strengthening of marketing of pineapple, particularly outside State and for exports. Also, there is need for vertical integration of producers with downstream industrial processing units (within as well as outside the State).

3.3.5 . Technical Analysis of Various Functions

Production

Most of the pineapple plantation are on hilly slopes which is prone to soil erosion due to heavy rainfall in the region. The average cultivation cycle of the pineapple plantation comprises of various farm management activities.

3.3.5.1 Land Preparation

Initially the farmer prepares the field by clearing of the land for plantations. The fields are not ploughed but uniform rows are demarcated across the slopes in order to restrict the soil and nutrient erosion. The suckers are planted at uniform spacing by digging small pits. In practice, generally no organic compost is added to the soil except in cases where cow dung or other compost materials are available, they may be added it the pits.

3.3.5.2 Planting material

The crop is commonly propagated using suckers. Most of the farmer utilize sucker from their own farm or fellow farmer at rate of Rs.0.8 per sucker. The suckers are generally available from month of July-August and are selected from disease and pest free healthy plant. Department of horticulture also supply suckers to growers under area expansion initiative. As recommended practice the suckers should be stored for few days in shade and then dipped in 0.3% dithan-Z-79 before planting to protect the sucker against disease and pest. However, none of the farmer reported chemical use before planting of the material.

Considering the climatic conditions, the best time for plantation of crop is May to June. However, considering the lean availability of suckers in May-June and avoiding the rainy and winter months, the plantation is usually carried out from August to early October.

3.3.5.3 Spacing and Number of plants per unit hectare

There are two systems of pineapple planting viz, single row system and double row system. Single row system is more common in the region. Generally about 25,000-30,000 plants are planted per hectare i.e. 4000 plants per *kani* (local unit) equivalent to 0.16 hectare. Double row system is recommended in which pineapple is planted across the slope at the spacing of 30 x 45 x 90 cm and can accommodate 43,500 plants per hectare i.e.6960 plants per kani, allowing maximum land usage and more profits due to increased population density and increased yield per hectare. Beside, as added advantage adoption of high-density planting checks weed infestation, protect fruits from sun-burn, increases per unit area production of propagules (suckers and slips) and support non-lodging of plants.

3.3.5.4 Nutrition Management

Pineapple has a high nitrogen and potassium requirement. The optimum recommended dosage of fertilizer input for pineapple cultivation in the region is 20 gm Urea, 25 gm SSP and 16 gm MOP per plant to be applied pre-monsoon period. However, none of the respondent practices application chemical fertilizer due to lack of water, lack of timely availability of fertilizer in market and non-affordability. Although, application of fertilizers and chemical inputs may improve yield potential of the crop. However, since majority of the farmers across the State practice organic cultivation of pineapple, therefore, the practice could be built on as a unique selling proposition for accessing the growing niche market of organic products within India as well as the world market and commanding premium prices.

3.3.5.5 Irrigation

None of the surveyed farmers reported use of irrigation facilities for pineapple cultivation. The total cultivated area is fully dependent on timeliness and adequacy of monsoon rain. With increase dry spells, particularly during winters and rising scarcity of water in the regions, drip and sprinkler irrigation may be promoted

3.3.5.6 Plant Protection

No major disease or pest attack was reported to be prevalent in region. None of the respondent reported use of any plant protection measure being undertaken for pineapple cultivation in the region.

3.3.5.7 Weed control:

The major factor which contributes to the high cost of production of pineapple is manual weeding which accounts for 40 percent of the total cost. High density planting in pineapple is indirectly helpful in suppressing the weed growth considerably. The common practice is hand weeding, but it becomes difficult in close planting, especially in ratoon cropping. Both male and female labors participate in harvesting activity.

3.3.5.8 Removal of suckers, slips and crown:

The fruit weight increases with increasing number of suckers/plant, while the increased number of slips delay fruit maturity. Crown size has no bearing on the fruit weight or quality. Hence desuckering can be delayed as much as possible, while the slips are recommended to be removed as soon as they attain the size required for planting. Removal of crown is not required as it mars the appeal of the fruit. Also the crown act as natural cushion when transporting the produce long distance.

3.3.5.9 Harvesting

Pineapple plants flowers 10–12 months after planting and fruits become ready 15–18 months after planting. Irregular flowering results in the harvesting spread over a long period. The peak season for pineapple harvesting in the region is during May to August. Fruits are harvested manually with the crown. Both male and female labors participate in harvesting activity.

Commercial pineapple crop is harvested two to three years. Only about 40-50% offsets fruit in the first year. At full physiological maturity, 80% offsets fruit. Then onwards, each successive year and prolonged ratooning results in the reduction of flowering plants, fruit size and number of fruits. The economic life of the crop is 5-7 years, although farmers in the region are found to be cultivating the crop up to 12-15 years.

3.3.5.10 Other interculture operations

Mulching: It is essential to conserve soil moisture. It is practiced in south India for pineapple cultivation. Though mulching is not a commonly practiced in the region, however, farmers tend to leave the dry leaves of intercrop plantation trees (if any, as rubber), weeded material on the field covering the soil.

Earthing up: As pineapple has shallow roots, the plant eventually lodges, particularly in heavy rainfall areas and at time of fruit development, resulting in lopsided growth. Earthing up is thus an essential operation in pineapple cultivation which is aimed at providing a good anchorage to the plant, particularly for ratoon crop as it helps to keep the plant upright. Earthing should be done after weeding and harvesting of crops.

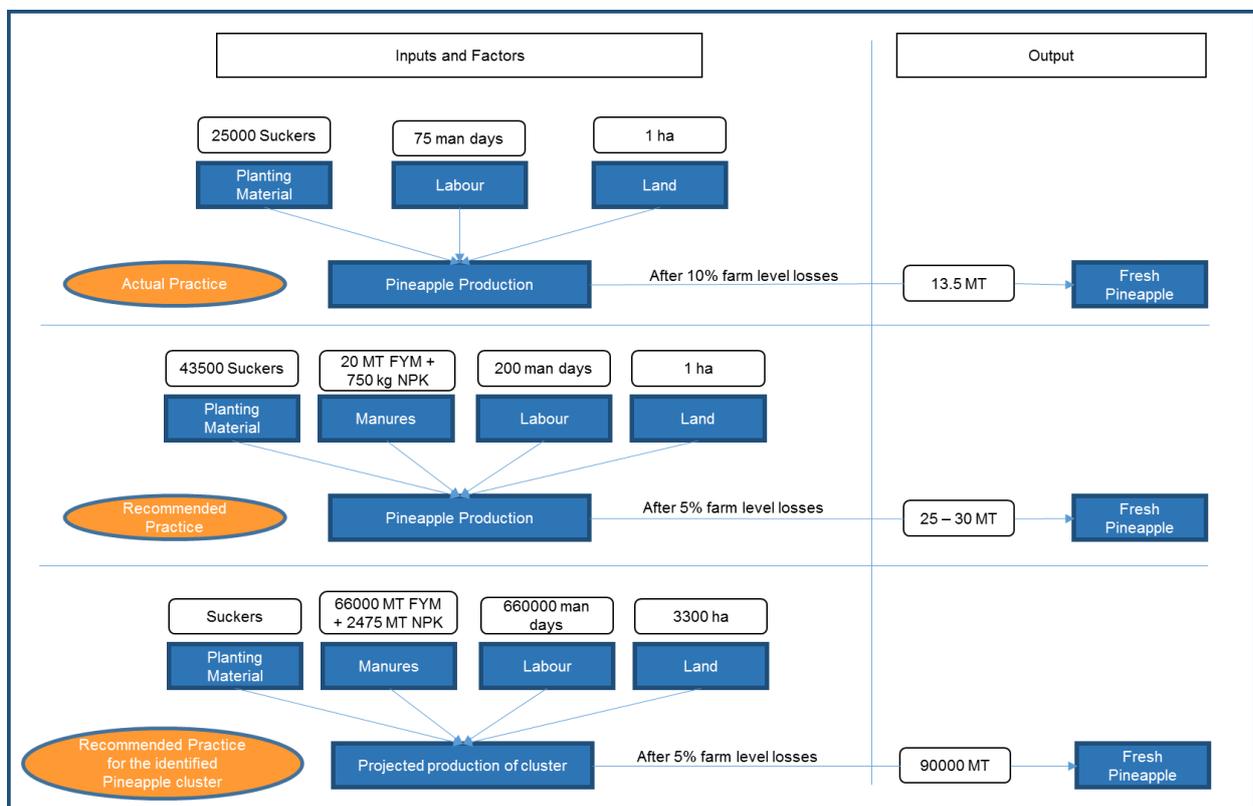
3.3.5.11 Staggering

Aforementioned, pineapple crop is disadvantaged due to irregular flowering. Therefore to increase productivity, flowering is induced in more number of plants through use of various practices such as:

- Chemical Application of Ethereal in Kew variety of pineapple @ 10-25ppm concentration with 2% Urea and 0.04 sodium carbonate.
- Planting at regular intervals
- Planting suckers/slips/crown of different size.

This practice resulting in all around the year availability of pineapple through off-season production. This also helps farmers to fetch premium price during lean production period. Staggering is primarily carried out from August to November, after harvesting of crop. Though farmers have now began to adopt this new improved technique, however, it needs to be promoted in big way not only to significantly improve the productivity, but also to make pineapple cultivation remunerative for the farmers who are now tending to shift from pineapple to rubber and arecanut cultivation in the region.

Figure 11. Physical flow of Input and Output



The above diagram shows the inputs/ factors for pineapple cultivation in the cluster based on actual practices being followed by majority of farmers in the cluster (per Ha), inputs for recommended practices (per Ha) and that of recommended practices for the present total area of cultivation in the identified district (cluster). As it can be seen, there is significant gap between the inputs used in the actual practice and recommended practice.

Post-Harvest Management

To realize potential value of the harvest, it is important to sustain the quality of the pineapple until they are delivered to the consumer. Proper postharvest management and handling of produce is thus important to prolong the duration for which the fruits remain fresh and marketable.

3.3.5.12 Primary Processing (Sorting, Grading & Packing)

Primary processing in case of pineapple consists of sorting, grading (based on size and colour) and appropriate packing. It was noted that no such activity is happening in the selected clusters. During the season, the local aggregators or traders from outside visit the pineapple production cluster 2-3 days before harvesting. They inspect the plantation before harvest and quantity and rates are negotiated according to the quality and size of harvest.

In general, the rates vary between Rs 5 – Rs 1 per piece. The rate is fixed based on visual assessment of average size of the lot of 100 or 1000 pieces. Produce is not sorted or graded. The entire production is sold as a lot. During peak harvesting season, some of trader also visit the aggregation points randomly and prices are negotiated and fixed post-harvest. In case of Queen Variety the prices are even lower (upto Rs 4/ piece).

Post harvest, the farmers load the produce on to wooden baskets of capacity 25-30 pieces which is carried manually and unloaded at the nearest road or common aggregation point. Rarely the farmer practice sorting and grading. From the aggregation point the produce is loaded on to transport vehicles. Even at trader level, no sorting or grading is practiced. In general, there is low awareness about sorting grading practices.

3.3.5.13 Secondary & Tertiary Processing

Based on discussion with major players in the market (farmer, traders and processors) it is learnt that the pineapple has the maximum potential for processing in the State. Yet, there is absence of any form of processing of pineapple in the State.

As mentioned in the earlier section, there were two government owned processing facilities, one operated by NERAMAC (North East Region Agricultural Marketing Corporation) for production of juice concentration based out of Nalkata and other operated by T.S.I.C.(Tripura Small Industries Corporation) for production of canned pineapple slice based out of Agartala. Both the facility have closed and are non-functional. Of the few small processing units operational in the State, the manufacturer is into processing of other fruit crops as orange, mango and litchi for which there is high consumer demand and thus relatively easier to market the value added products. Pineapples are, thus, mostly sold in fresh form except fraction of off-take by the village level cottage units, if any. For instance, in Manu block, a ten-member women self-help group was into homebased processing of pineapple into juice, jam and pickle. These products are usually packed into small plastic pouches or home-use plastic bottle/container and sold at local shops at rate of Rs10-20. There was also one private owned food processing unit in Kumarghat which has been shut down due to heavy losses

In consideration of enormous potential of horticulture and agricultural produce in the State and to curb the issue of lacking infrastructural facilities, a state of art multi fruit processing facility, Sikaria Mega Food Park, is being developed in the State with assistance of Ministry of food processing industries of Government of India. The facility is planned to be equipped with three tier storage and processing facilities at different stages of food processing

Table 6: Grade-wise prices paid (in Rs per piece of pineapple)

Size (inch)	Price Paid (Rs/Pc)
14 inch & above	Rs 5
12 – 14 inch	Rs 3
10 inch & Below	Re. 1

namely – Collection Centers(CCs), Primary Processing Centre (PPCs) and Center processing Centre(CPC). While the Common processing facility is being set-up at West Champamura in Agartala, the primary processing centres are proposed to be set-up across the State at Sonamura (Sipahijala district), Hrishyamukh (South Tripura), Chandipur (North Tripura District), Manu (Dhalai district), Bhodhjunnagar (West Tripura)

There is serious lack of infrastructure facilities at various stages beginning with the raw materials procurement from the farmers to the final food processing in the hands of the producers. To curb these issues, Mega Food Park proposed the 3 tier storage and processing facilities at different stages of food processing namely – Collection Centers(CCs), Primary Processing Centre (PPCs) and Center processing Centre(CPC). These facilities will ensure timely collection, storage and processing of food articles.

Transportation and Logistic

In the most prevalent marketing channel through local aggregator, the buyer is responsible for arranging for transport of produce from farm to market. In the other marketing channel, the farmers either send the produce in the mini trucks (when in larger quantity) or they use public transport such as jeep and auto to transport in smaller quantities. However, as majority of plantations are located in remote area, the last mile connectivity of farm to market is mostly lacking. Road blocks due to heavy rains and sometime due to social unrest, also adversely affect the outward movement of goods. In absence of proper storage infrastructure and adequate facilities for transporting the produce to distant markets, the farmer undertake distress sale, particularly at time of surplus in the market. Pineapple is mainly transported in trucks (both 5 MT and 10 MT capacities). Transportation cost ranges Rs 7 to 10 per kg of produce. It is notable that a transport subsidy of 15% is available for industrial unit procuring, processing and marketing processed fruits. However, it was unclear if such provision may be availed by the traders and farmers as well. Currently, the transportation costs is borne by themselves without any subsidy from the Government. In addition, the average labour cost for loading unloading into wholesalers truck is about Rs 100 per 1000 pieces

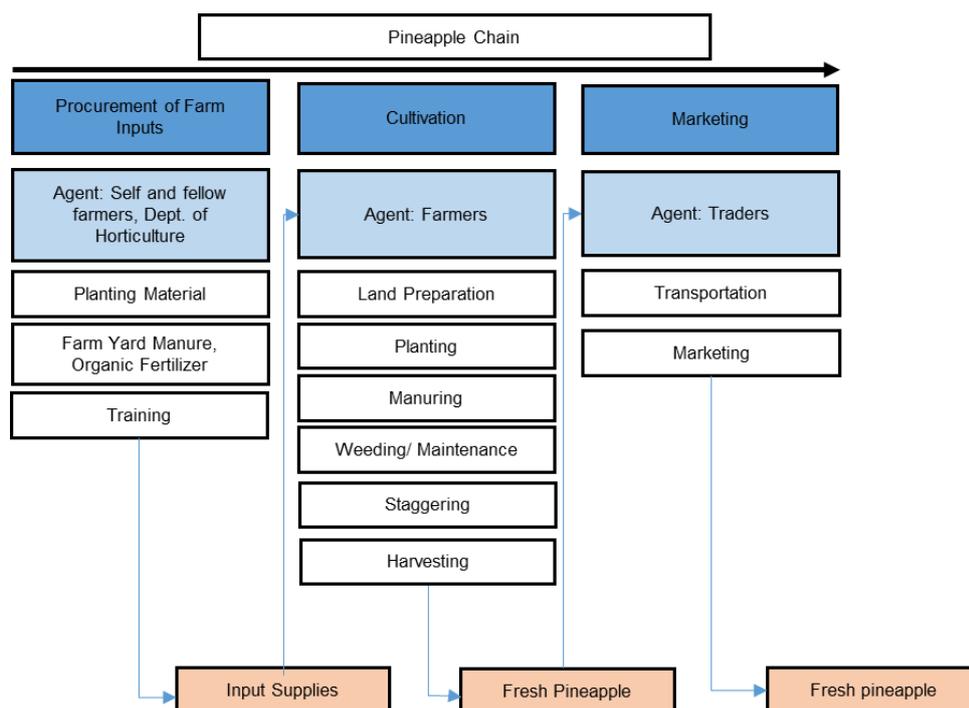
Market Infrastructure & Cold Chain

There are in total 84 markets in the State, out of which 21 are regulated by APMC Act. Bishramganj (which is one of the major markets for pineapple in the State) is reportedly the most developed one in terms of market infrastructure. It is not a regulated market but is a highly organized and controlled through Gram Panchyat. The market is equipped with shed structures and storage facility. Based on interaction with the Department of Agriculture Marketing, it is understood that there are quite a number of Cold Storage infrastructure in accros the State but none of them is used for fruits due to infrastructural limitation.

- Ambassa Cold Storage- multi chambered; capacity 2000 MT (1000 MT for fruits); it's in 3rd year of operation and is completely handled by department. The cold storage is not used for fruits though due to infrastructure limitations
- Dharmanagar Cold Storage- 2 in number and coming up (one of them is handled by a private player)
- Kumarghat Cold Storage- single chamber; potato; established by funds from North Eastern Council. And not used for fruits storage

There is also no refrigerated/ insulated transport available for transportation of pineapple. During the field visit, it was observed that due to prevalent marketing related challenges in case pineapple the farmers are now switching to rubber and arecanut plantations due to continuous earning potential of these crops as it has an established marketing mechanism and a sustained international demand. The crop is highly perishable and harvesting period is also small, so many times there is distress selling of the crop by the farmers.

Figure 12. Technical Analysis of pineapple value chain in Tripura



3.4 Economic Analysis

Pineapple sucker start bearing fruits from 12-15 month onwards. Each plant bear fruit only once during the year. Only about 40-50% offsets fruit in the first year. At full physiological maturity, 80% offsets fruit. Then onwards, each successive year and prolonged ratooning results in the reduction of flowering plants, fruit size and number of fruits. The economic life of the crop is 5-7 years, although farmers in the region are found to be cultivating the crop up to 12-15 years. The initial investment in pineapple plantation (apart from land) consists of clearing of vegetation of hilly slopes for land preparation and sourcing of planting material. The recurring expenditure includes cost towards application of manures/fertilizers (if any), labor for weeding and harvesting. The payback period is 3rd year and IRR is calculated 61%.

Table 7: Cost of initial investment & maintenance of pineapple orchard (in Rs. / ha)

Activity	Assumption	Establishment Year 1	Year			
			2	3	4	5
Land Preparation	125 labours @ Rs. 300	37500	0	0	0	0
Planting material	Rs. 0.8 per plant for 25000 plants/ha	20000	0	0	0	0
Labour Cost (including cost of planting and weeding operation)	75 mandays @ Rs. 300	22500	24806	28716	34905	44548
Total (A)		80000	24806	28716	34905	44548
Total Production (no. of piece)	Assuming 50% offset fruit in first year. 80% at full maturity & then gradual reduction	0	12500	20000	20000	17500
Total Production (in MT equivalent)	Av. Wt of 750 gm	0	9375	15000	15000	13125
Average Price (Rs. Per piece)		5	5	5	5	6
Revenue (B)		0	65025	106121	108243	96607
Earnings (B – A)		-80000	40219	77404	73338	52059

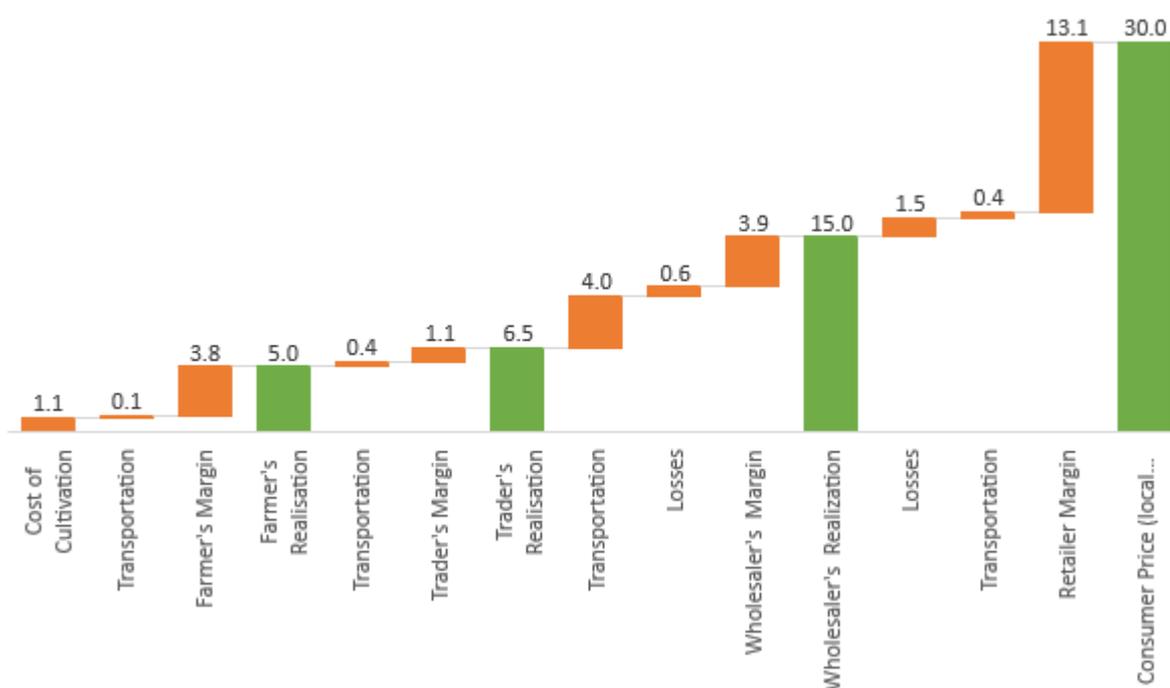
The department of horticulture has also introduced high density plantation double row plantation, which can accommodate 43,500 plants per hectare.

3.5 Analysis of price build up

During the beginning and the end of the season, the wholesale price of pineapple goes up to Rs. 5-10 per piece. However, during these periods the price farmers get is about Rs. 4-7 per piece. Hence, the benefit of the increased price in the lean periods does not reach the farmers in terms of price realization. Moreover, many times (when the sale proceeds are not negotiated upfront by the traders) transportation cost up to the road head is borne by the farmers. There is no farm proximate infrastructure available. The harvested pineapples are heaped on open fields near the road from where they are loaded on trucks. There are no storage facilities which increase the post harvest losses. Sometimes during peak season, post harvesting losses are as high as 10% to 20% during transit from farm to market. No sorting, grading or packaging is done presently. Distress selling by farmers is a regular feature in every season.

A typical cost involved at various stages of pineapple marketing per piece of pineapple in peak season is given below:

Figure 13. Price-build up per piece of pineapple



The farmer's share in the final rupee spent by the consumer is calculated only 16% and that of intermediaries as 60%. However, the net profit margin of farmer is estimate 75%.

3.6 Identified Gaps and Constraints

3.6.1 Production related

- Pineapple farmers in Tripura use dated agricultural practices which lead to lower productivity and higher wastages. In addition, as the farmers are reluctant to invest in use of chemical inputs due to limited timely availability and non-affordability, it leads to low productivity and thus lesser returns. In Tripura, farmers typically plant about 25000 plants/ ha and about. However, ICAR research⁵ in Tripura has shown high density cropping (having 43,750 plants/Ha, 53,000 plants/Ha and 63,700 plants/Ha) is most suitable type of cultivation which can be increased by 50% according to various studies. High-density planting increases yield, production of suckers and slips per unit area, increases protection to fruits from sunburn and reduces weed infestations.
- Farmers use minimum chemical fertilizers in the cultivation mostly because of enhanced growth of weeds with the usage of fertilizers in low density cropping. This may affect the productivity of the land. The emerging boom in the demand for organic food products provides significant opportunities for Tripura.
- Pineapple is primarily a rain fed crop in Tripura. Irrigation during dry months (November to March) may help in off season production of the fruit.
- Farmers suffer huge losses in the peak season because of imbalance in demand-supply scenario and lack of farm level infrastructure for proper storage. Many times there are about 10% loss in between harvesting and loading in trucks. Every year distress selling is done by the farmers.
- The small size of landholding effectively limits the cultivation and marketing. Also farmers lack awareness on value-addition aspect of the produce. The downstream industry being weak and almost absent, there is little scope for higher price realization among small farmers particularly during market glut.

3.6.2 Post Harvest Management

- There is no farm level infrastructure available for pineapple. Farm level pre-processing facilities such as pre-cooling facilities, cooling facilities, collection centers, grading and sorting systems, washing and cleaning facilities and pack houses, etc., are absent. These are critical to preserve quality and prevent temperature shocks immediately after harvest. Storage facilities for pineapple are absent and the entire produce after harvest is immediately transported to the markets within and outside state and some to the processing units.

3.6.3 Road connectivity and transportation

- Transportation infrastructure is thus one of the major concern for marketing of produce in the regions. Most of the pineapple orchards in the district are distantly located and have with poor road connectivity. Poor connectivity not only adds to cost, time and resource but also limits timely farm operations pre and post harvest. Moreover, the remoteness and the difficult road conditions also discourage traders from outside to travel to these clusters.

⁵ Pineapple Cultivation in Tripura, 2005, ICAR

3.6.4 *Marketing Related*

- At present, there are no regulated markets in the cluster. Thus, there is absence of registered wholesalers who deal with pineapple. Farmers have no option but to either sell the produce to the local aggregator who come from outside during peak production season. In other case, the farmer take the produce to nearby rural/semi-urban markets and sale in open along road side. There are also no collection centres, packhouses and other related infrastructure in the cluster for storage of produce. The overall marketing infrastructure in the cluster is insufficient for pineapple produce.
- Majority of farmers market the produce themselves, and hence, many times the farmers have limited bargaining power. Moreover, the information flow from traders to the farmers are generally not transparent. Except few progressive and large farmers, others are yet to develop profound direct linkages and negotiation skills with wholesaler in distant markets. Majority farmers lack market information about price and demand in distant markets resulting in lower value realization for them. Moreover, due to high perishability and lack of infrastructure, the farmer cannot hold the produce for too long after harvesting.
- Despite of the fact that the produce is almost organic in nature, no effort towards brandings has been done by any agency

3.6.5 *Processing*

- At present, there is no processing and value addition in the pineapple cluster. Units as Dabur India, NERMAC, TSIC procured pineapple from grower but discontinued operations in 2008 due to high transaction cost. New proposal has been sent to the government for revival of the NERAMAC operations in the region. However, there hasn't been any much progress since long.
- In absence of sizeable fruit processing units and storage facilities, marketing of produce is one of the most challenging task, as a result many growers have now moving away from pineapple cultivation to rubber and arecanut, which has relatively better prevailing marketing mechanism in the region.
- The short duration of pineapple season was another constraint. But now with introduction of new Staggering technique, all round production has become possible. Thus, the practice needs to be augments across production clusters in a big way and entrepreneurs and farmer groups need to encouraged and supported to set-up viable scale multi-fruit processing facilities There is a need to establish processing facilities like extraction of juice & packing centre in the vegetable and fruit clusters especially in pineapple & lemon clusters for value addition. Mini processing plants may be set-up at Gram panchayat level so that the huge level of wastage can be avoided. These mini processing plants would help in preserving the juice extracted for at least another couple of months. In this way, the high perishability of pineapple can be avoided.
- Sponsorship from private players would be the best plausible option for enhancing the sustainability of such min processing plants. These private players in collaboration with APEDA may undertake capacity building measures for unemployed youth to take up such business opportunities and also at the same time would act as wholesalers and suppliers along the value chain

3.6.6 Others

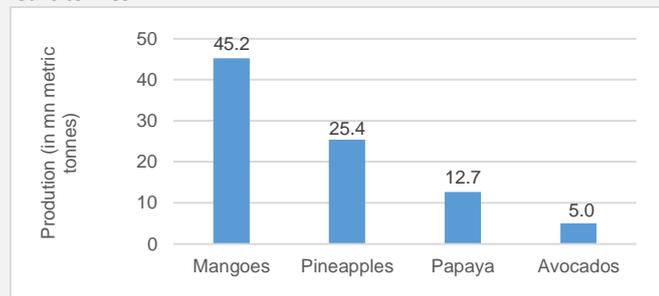
- In view of the above mentioned issues, many pineapple growers are switching over to rubber plantations. Field survey in Dorlong Bosti near Nalkata revealed that in the last 3-4 years about 15-20% pineapple farmers have switched over to rubber plantations. Round the year production of rubber and its international market give a perception of higher profit in the minds of the farmers.
- There is absence of Farmer Groups (including women SHGs). These may be promoted in convergence with various government scheme for collective purchase and supply of inputs, operating common collection centres and pack-houses, which would finally strengthen their bargaining power along the supply chain.
- None of the surveyed farmers have availed agricultural loans for pineapple cultivation. The farmers in the cluster do not insure their crop as well. Limited access to finance acts as a demotivating factor for pineapple cultivation for farmers. It is also one of the reasons for slower increase in area of pineapple cultivation in the district.
- Due to limited geographical connectivity, blockage of roads and social unrest risks marketing of produce and loss of produce without evacuation.

4 Demand Assessment

4.1 Pineapple Products Map

Pineapple is one of the most produced tropical fruits in the world (excluding banana)⁶. These make up about 25% of the world production of tropical fruits. Pineapple is also the most widely traded tropical fruits. Although only a third of the output is utilized for processing, pineapple products account for more than half of the trade in pineapples, by value (figure 16). Pineapple trade all over the world takes place in various forms as follows⁷.

Figure 14: World production of major tropical fruits (2014), in million metric tonnes

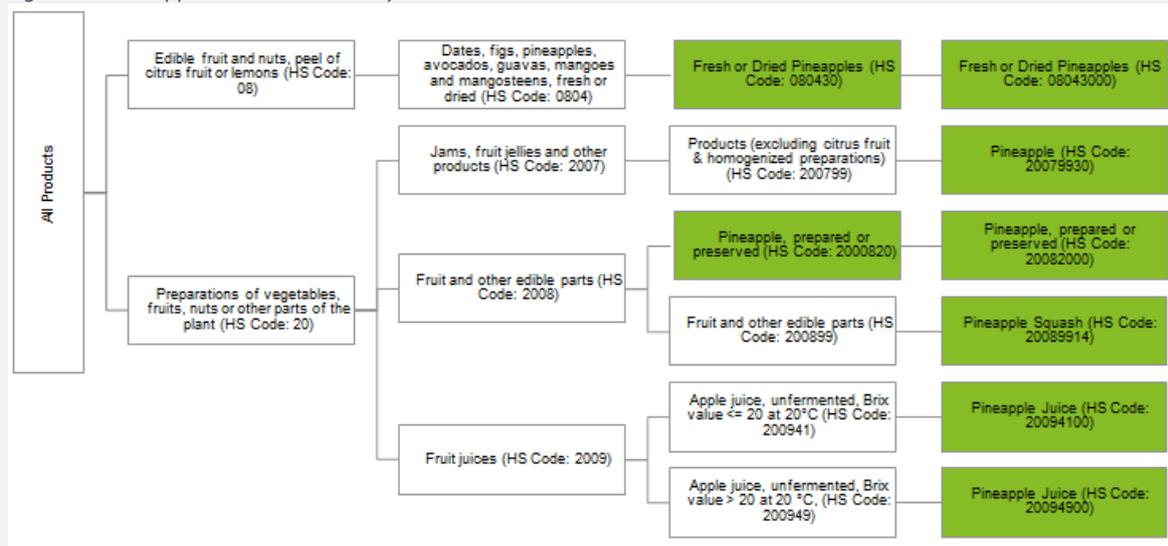


Source: FAOSTAT

⁶ FAOSTAT, <http://www.fao.org/faostat/en/#data/QC> accessed as on 5.12.17

⁷ International Trade in Goods Statistics by Product Group, International Trade Centre (<http://www.intracen.org/itc/market-info-tools/statistics-export-product-country/> accessed on 5.12.17)

Figure 16: Pineapple Products Hierarchy



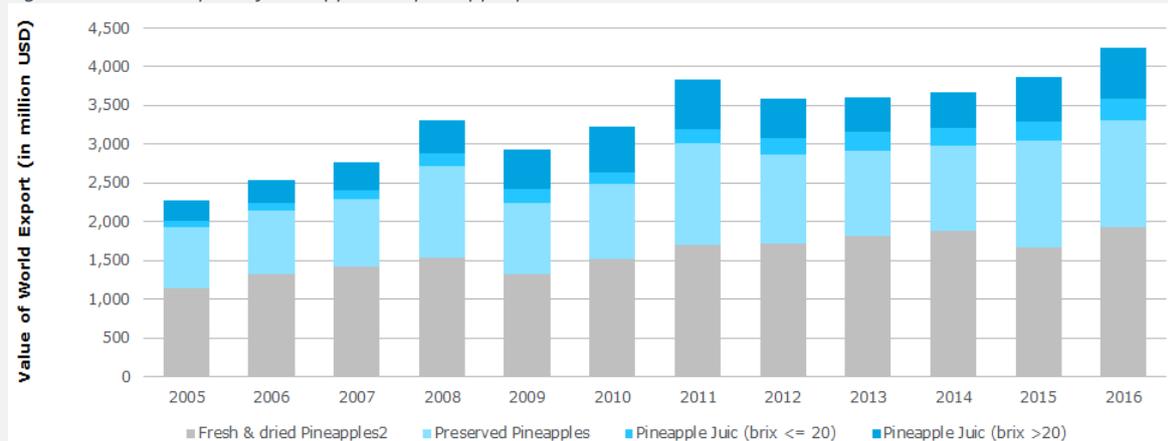
Source: International Trade in Goods Statistics by Product Group, International Trade Centre

4.2 World Trade of Pineapples

4.2.1 World production & consumption of pineapple

According to FAO statistic, the world production of pineapple is just over 25 million tonnes (2014), most of which are consumed domestically in the producing countries, either in fresh or processed forms. Over the last decade the production has steadily increased with increasing demand and risen by more than 50 percent between 2004 to 2014. Costa Rica is the largest producer, accounting 11 percent of the global output, followed by the Brazil (10%), Philippines (12%) and Thailand (8%). Other major producing countries include China (7%), Indonesia (7%), India (7 percent), Nigeria (6%), Mexico (3%) and Ghana (3%). These 10 countries contribute over 70% of total global production of pineapple. Philippines, China, Indonesia and India have seen constant production increase in last few years. However, the production in top producers countries as Thailand and Brazil has been irregular, particularly with steep decline by 10% in production of pineapples in Thailand. The graph below

Figure 15: World Export of Pineapple and pineapple products



Source: ITC Calculations based on UN Comtrade Statistics

shows the production statistics of leading producers of pineapple⁸. While pineapple production and processing are based in Latin America and Asia, consumption is concentrated in North America and Europe

Figure 17. World production of Pineapple (in million metric tonnes)



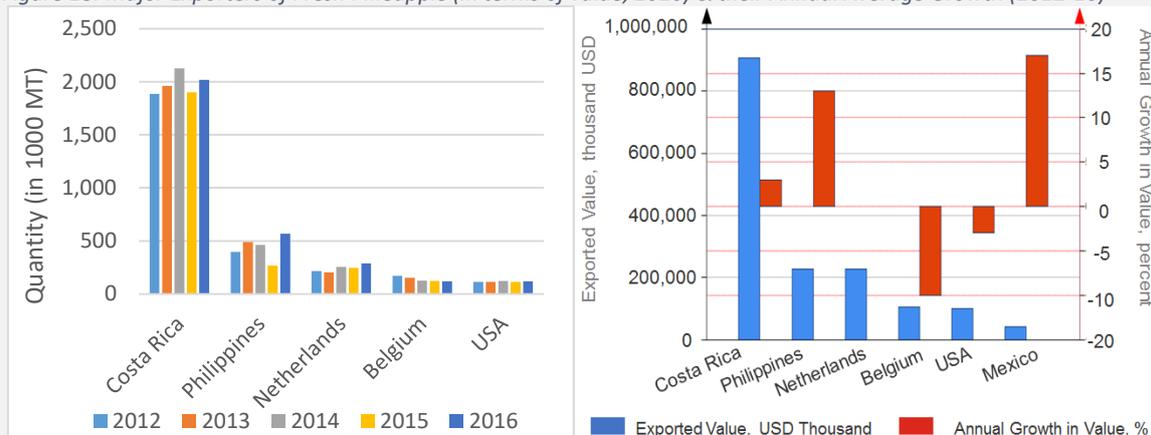
Source: FAOSTAT

4.2.2 Global Import-Export of Pineapples

4.2.2.1 Fresh or dried Pineapples

About 15 percent of the total world production of pineapple, i.e. 3.4 million tonnes is exported in fresh form. Costa Rica is the primary exporter of fresh pineapples in the world, accounting for 50% of global exports. It is notable that the country exports more than 70 percent of the total production as fresh fruit, mostly by Del Monte and Dole. Bulk of country's export (upto 52%) is sent to USA accounting 85% of US import of pineapples. Conversely, Philippines (which is the second largest exporter of fresh pineapple accounting over 11% of world export of fresh pineapple) exports approximately 20% of its fresh production mostly sent to countries as Korea (30%), Japan (30%) and China (20%).

Figure 18: Major Exporters of Fresh Pineapple (in terms of value, 2016) & their Annual Average Growth (2012-16)



Source: ITC Calculations based on UN Comtrade Statistics

⁸FAOSTAT, Food and Agriculture Organization (<http://www.fao.org/faostat/en/#data/QC/visualize> accessed on 24.08.2017)

Netherlands and Belgium are among the other exporters (by trading). It is notable that these countries do not produce pineapple; however, being the principle logistic hubs the two countries are the leading re-exporters of fresh pineapple within Europe (supplying mainly to Germany, France, UK). However, in recent years these re-export figures are declining, which is an indication that trade is becoming more direct.

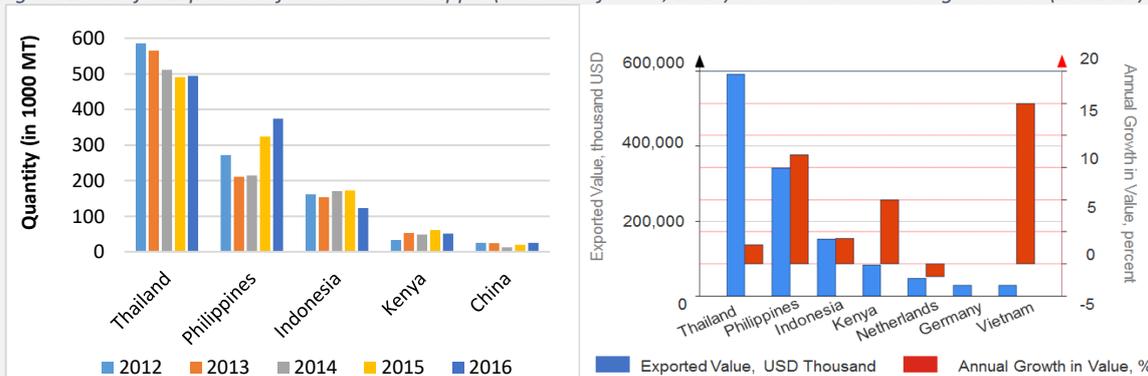
USA is world largest importer of fresh or dried pineapple accounting 30% of global import followed by Netherlands (7%), Germany (6.5%), UK (5%), Japan(5%), Spain(5%) & Italy (5%). China and Korea are among the emerging import markets.

4.2.2.2 Preserved Pineapples

Preserved pineapple is the second largest form of pineapple traded all over the world. While the quantity exported is approximately one-third of fresh pineapple, preserved or prepared pineapple have higher shelf life making it more valuable than fresh pineapples.

Thailand dominates in the global trade of prepared or preserved pineapples. The country accounts for over 40% of the global exports of preserved pineapples. Its primary trading partner on the global pineapple market was the U.S., where it supplied 33% of its total exports of prepared or preserved pineapples in value terms, accounting for 53% of the U.S. total imports. Philippines and Indonesia are among the other main global suppliers of prepared or preserved pineapples. Philippines in particular has significantly strengthened its position in the global export (with annual growth of 17 percent per year). Kenya is emerging as one of the leading exporter of preserved pineapple in European market as Germany, Spain, United Kingdom, Netherland. Kenya is the largest exported of preserved pineapple to Italy. During 2012 to 2016, the country recorded an annual growth rate of 10% in terms of value and quantity of preserved pineapple exports. Similarly, Vietnam has emerged as second largest export of preserved pineapple to Russian Federation (accounting 25% of country import of preserved pineapples). The graph below compares the export quantities and their corresponding values of export of preserved pineapple from leading countries from 2012 to 2016⁹.

Figure 19: Major Exporters of Preserved Pineapple (in terms of value, 2016) & their Annual Average Growth (2012-16)



Source: ITC Calculations based on UN Comtrade Statistics

Countries as USA (32%), Germany (8%), Spain(5%), Netherland(4.4%), United Kingdom(3.5%), Japan (3%), Russian Federation (3%) are the major importer of preserved pineapple across the world

⁹ITC calculations based on UN Comtrade Statistics, International Trade Centre (Quantity: http://www.trademap.org/Country_SelProduct_TS.aspx?nvpm=1||||200820||6|1|1|2|2|1|2|2|1 accessed on 06.12.17)

4.2.2.3 Pineapple Juice

The European Union is the largest market of pineapple juice. The Netherlands is the largest European importer of pineapple juice followed by countries as Spain and France. The major supplier countries are Thailand and Costa Rica. Whereas as Philippines traditionally supplies to the US market. Imports from China showed significant growth at 83 in the last five years (2012-16)¹⁰.

Figure 20: Leading importers of Pineapple Juice in the world (Quantity in thousand metric tonnes)

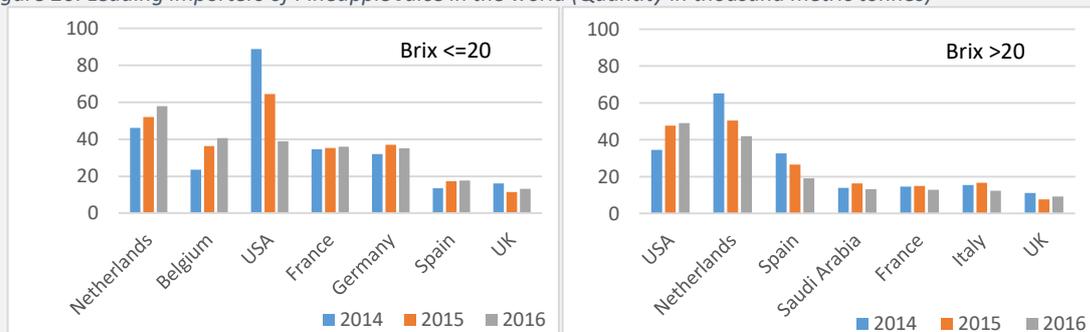
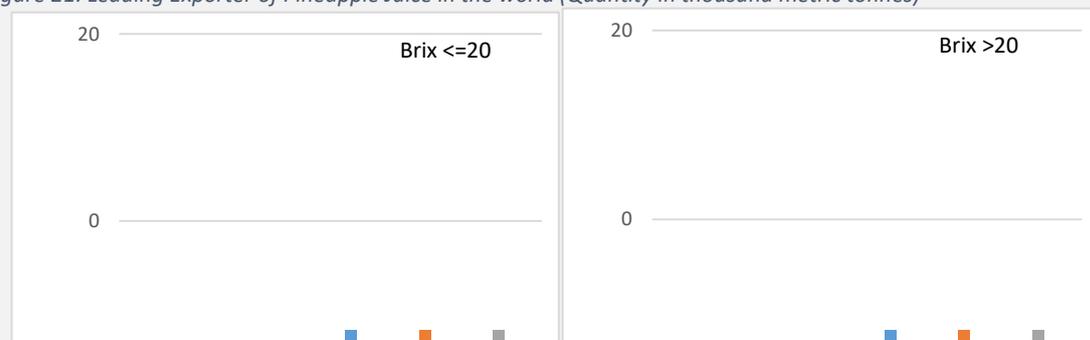


Figure 21: Leading Exporter of Pineapple Juice in the world (Quantity in thousand metric tonnes)



Source: ITC Calculations based on UN Comtrade Statistics

The steadily ascending world pineapple exports and imports is representative of further development potential over the coming years. Non-EU European markets such as Russia, Eastern Europe, East and Middle-East countries are all possible consumption reserves. Furthermore, with purchasing power is increasing in many countries. Conversely, while import volumes have significantly increased over the past decade, prices have collapsed in parallel due to an imbalance between supply and demand, and to deterioration of the quality¹¹. Thus, greater moderation would be required for future export volumes seeking to better match supply to demand and improving fruit quality could reverse the current trend of price deterioration.

4.3 Domestic Demand and Trade

India's annual average production of pineapples is about 2 million tonnes from an area of about 116 thousand hectare. It is notable that while our country has among the highest area under pineapple cultivation in the world, but it ranks 7th in terms of production, mainly due to low density of plantation versus increasing focus on high density planting in key pineapple producing countries¹². The major pineapple producing states in India are Kerala (18%), West Bengal (16%), Assam (14%), Tripura (9%) and Karnataka (8%). It is also cultivated extensively in other north eastern States as Nagaland, Manipur, Meghalaya and Arunachal Pradesh and coastal belts of Tamil Nadu, Odisha and Goa. Though north-eastern States of Assam, Manipur and Tripura have the largest area under pineapple,

¹⁰ ITC calculations based on UN Comtrade Statistics, International Trade Centre http://www.trademap.org/Country_SelProduct.aspx?nvpm=1||||200949|||6|1|1|2|1|1|2|1|1 accessed as on 06.12.17)

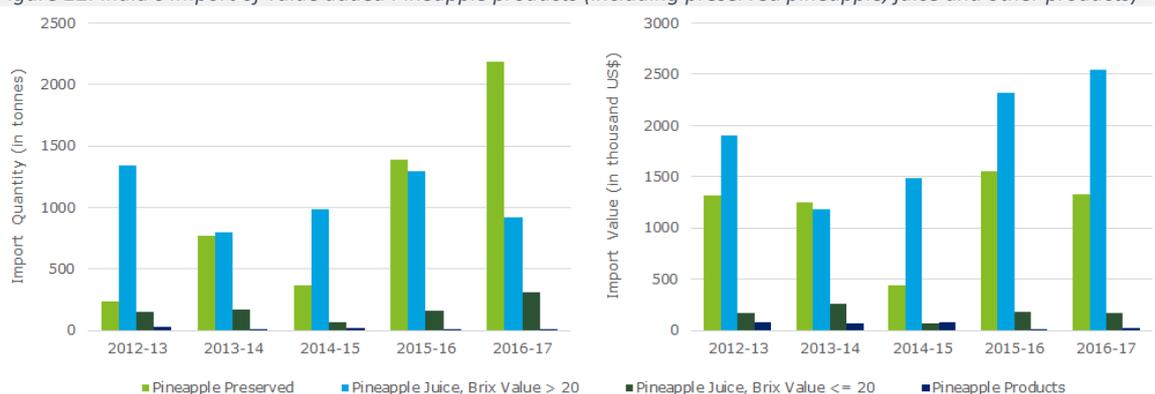
¹¹ UNCTAD INFOCOM. http://unctad.org/en/PublicationsLibrary/INFOCOMM_cp09_Pineapple_en.pdf

¹² International Tropical Fruit Network

Kerala and West Bengal are the leading pineapple producing States. Karnataka has the highest productivity of pineapple in the country (63.3 tons/ha), followed by Kerala (32.4 tons/ha), West Bengal (29.5 tons/ha) & Bihar (29 tons/ha). Overall, India's average productivity of pineapple is 17.1 tonnes/ha compared to the world average of 24.9 tonnes/ha.

India's share in world market for pineapples is negligible. In 2016-17, India exported about 5.2 thousand tonnes of fresh pineapple.¹³ Pineapple exports from India, is mainly to Gulf countries as Qatar, Saudi Arabia and UAE (accounting upto 40%). The other major destinations are Nepal (35%) and Maldives (about 10%). It may be noted that these regions are not major markets of pineapple as such. India imports very low quantum of fresh pineapple due to significant domestic production and low per capita income. Thus, India is rarely considered as a market for other countries.

Figure 22: India's Import of value added Pineapple products (including preserved pineapple, juice and other products)



Source: APEDA

Indian export market for preserved pineapple is not much developed. Conversely, India significantly imports preserved pineapples, majorly from Philippines¹⁴. In recent year, the import of preserved pineapple has gained a significant boost. In 2016-17, Philippines exported 1.84 thousand tonnes of preserved pineapple worth 2.2 million USD to India (accounting less than 2% exports from Philippines). Some quantities were also imported from Thailand.

India also imports significant quantity of Pineapple juice, mostly from Thailand¹⁵. The imports have been increasing yearly at an annual growth of approximately 20% from 2012 to 2016. While a dip was seen in 2013-14, the import boosted significantly in the period of next two years. Hence, increasing imports highlights the increasing demand of pineapple juice in the Indian market asking for value chain development of the indigenous production.

4.4 Potential Opportunity for Tripura

All the North Eastern states produce pineapple. The region produces about 50 percent of pineapple produced in the country. The advantageous position of NER in terms of fertile and organically rich soils, abundant rainfall, water resources and great agroclimatic diversity supports the cultivation of best quality pineapple in the region. 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. Though large quantities of pineapple are produced in NER, exports from the region are minimal. Only small quantities of pineapple are exported even to the neighboring nations of Bangladesh and Myanmar. Tripura has exclusive advantage and potential for development of integrated value added chain for pineapples produced in the State as the Kew and Queen variety produced in the State are both suitable for processing/ canning purpose. The changing consumption patterns and preferences in the country and world are creating a huge demand for processed products. Moreover, 90-95 percent of

¹³Top Destination APEDA, International Trade, APEDA (<http://agriexchange.apeda.gov.in/IntTrade/TopDestinationAPEDA.aspx> accessed on 07.12.17)

¹⁴ APEDA (http://agriexchange.apeda.gov.in/importtoindia/Product_description.aspx?hscod=20082000 accessed on 07.12.17)

¹⁵ APEDA (http://agriexchange.apeda.gov.in/importtoindia/Product_description.aspx?ctrycode=&hscod=20094900) accessed as on 07.12.17

the production being organic, opportunity existing for catering to niche organic product market. The recently accorded Geographic Indication registration of Tripura Queen Pineapple furthers adds to the distinctiveness and assurance of quality of the product's origin and may be leveraged for boosting export of pineapples from the State, besides fetching premium price in international market.

Despite the advantage, the overall level of crop productivity in the State are found to be lower, compared to national and NEER productivity levels. The pineapple growers need to be more extensively encouraged for adopting modern cultivation practices as high-density planting, hormone application for uniformity in flowering, staggering through chemical induction for round the year pineapple production and other management practices. Moreover, if the premium for the GI and organic produce has to be realized by the farmer, the State has to ensure better participation and integration of smallholder pineapple growers along the value chain. The existing marketing and trading system for pineapple in the State also need to be made more vibrant and organized. Processing of pineapple into other value added products is negligible. The main plant established by NERAMAC in Nalkata for the preparation of fruit juice concentrate from pineapples closed its operation way over 10 years back due to issues with respect to procurement and marketing of product. Due to lack of processing capacity for pineapple, there are frequent distress sales of produce by farmers every year. Aforementioned, notably many farmers are shifting to arecanut and rubber plantation in the key pineapple production regions including study district of Unakoti & Dhalai. Conversely, on the import side, Pran Foods which is based out of Bangladesh is exporting fruit juices to Tripura via multiple land custom stations across the Indo Bangladesh border in Tripura.

Whereas farm level cluster interventions may boost the production, there are several infrastructure gaps which needs to be plugged in for seamless flow of produce. Incentives for farm level pre-processing facilities such as pre-cooling facilities, cooling facilities, collection centers, grading and sorting systems and pack houses, etc. may be provided to reduce wastage and ensure proper price realization by the farmers. Development of proper storage facilities will again reduce wastages. Multi fruit processing units with focus of pineapple processing with strong institutional support will boost the demand for pineapple. There is also scope of organizing farmers' cooperatives, Self Help Groups (SHGs) and other community organizations for setting up pineapple processing units. There is also need to provide assistance by Government for market development and brand building of pineapple produced by the State. All these factors are interrelated and cannot be planned and implemented independent each other. Thus, an integrated cluster approach and facilitation of intervention in 'mission mode' is required to achieve holistic growth of the sector in the State including empowering producers with required skills, inputs, credit support and infrastructure for enhancing and improving production, post-harvest management, processing, marketing and export.

5 Recommendations/ Proposed Action Plan

It is evident from the overall sectoral assessment that pineapple is a vital horticulture crop for State, and particularly the focus district due to its importance in terms of livelihoods and income generation for the farmers. In addition, there is huge potential for processing of pineapple in the region, which can give a major boost to the State economy. As elaborated in earlier section of the report, there are plenty of opportunities for interventions right from the farm level to final marketing of the produce.

The Mission for Integrated Development of Horticulture recognizes the important role of developing existing apple value chain in the District. Various centrally and state sponsored schemes have provided the necessary stimulus to the sector, which has enabled the achievement of a healthy growth rate in the past. However, to compete sustainably in global market and under liberalized trade regime, necessity is recognized to focus on both productivity enhancement as well as value chain development for increased profitability and improved market access.

Having studied the challenges and constraints faced by the sector, a holistic approach comprising of combination of both *soft* and *hard* interventions is proposed to be implemented for increasing apple production and productivity in the region and facilitating value addition.

- Soft interventions are proposed to be implemented across the district and would consist of discipline-specific short term training & exposure visit envisaged to enhance the technical skill for growers as well as technician, extension workers, entrepreneurs and other operating in the sector. Such interventions are proposed to be delivered through institutions specialising in the subject area.
- Hard interventions are majorly being proposed to complement cluster specific requirements based on the assessed need. Hard interventions under the programme shall primarily aim at creating tangible developmental assets to support the various node of cotton value chain under participatory approach system.

An effort has been made to align the activities with the overall objective of horticulture mission and initiatives being undertaken by other agencies.

Integral with the objective of the interventions, the proposed soft & hard interventions are focused on forging the vertical as well as horizontal linkage along the apple value chain. Placing the proposed interventions in the value chain context, the soft & hard interventions have been categorized into 4 components viz.

- a) Production related
- b) Post-harvest
- c) Processing (transformational)
- d) Overarching (horizontal linkage).

Table 8: Summary - Rationale of proposed action plan

Component	Objective	Constrains	Required Intervention	Recommended Action Points
Production Related	Increasing production as well as productivity through area expansion and adherence to recommended package of practice	<p>Planting Material</p> <ul style="list-style-type: none"> • Use of planting material of standard quality • Unavailability of nurseries both in public and private domain <p>Cultivation Practice</p> <ul style="list-style-type: none"> • Low density cultivation • Non-adherence to recommended packages of practices especially related to weeding, mulching and nutrition management <p>Other constraints</p> <ul style="list-style-type: none"> • Low scale of production at individual level • Difficulty in evacuation due to the geographic conditions including inaccessibility 	<ul style="list-style-type: none"> • Increased promotion of best practices for pineapple cultivation • Training of existing as well as new farmers (to be brought in under area expansion) on packages of practices • Distribution of input kits which may provide required nutritional support/mulching material to farmers 	<p>Hard Interventions (Infrastructural Assistance):</p> <ul style="list-style-type: none"> • Setting-up cluster of 10 model farms of 5-10 ha plot sizes i.e. 4 to 5 per district or atleast 1 per administrative block • Area Expansion through establishment of 600 ha new orchards and rejuvenation of 400 ha under replantation/ replacement of senile/ old orchard • Establishment of 1 mobile soil testing lab • Development of 100 ha under organic production pilot including assistance in certification and setting up of 10 community based vermicomposting units <p>Soft Interventions:</p> <p>Training</p> <ul style="list-style-type: none"> • Training of 100 beneficiary associated with 10 model farm (assuming 10 beneficiary per farm) • Training of 100 farmers on organic cultivation and marketing • Training of 1000 farmers (including women) beneficiary under Area expansion • Training of FPO members (assuming 150 members per FPO) • Training of 10 Facilitator (ToF) including the extension officers, dept. field functionaries, village agent or progressive farmers (5 per district) • Exposure tours within & outside State for growers/ technical staff/ field functionaries
Post-Harvest Management & Value Addition	<p>Creation of appropriate infrastructure to aid in smooth evacuation of the produce and arrest value loss</p> <p>To enhance the market for the produce and</p>	<p>Evacuation</p> <ul style="list-style-type: none"> • Timely evacuation is not possible due to unfriendly terrain and inadequate labour coupled with inaccessibility • Lack of farm level infrastructure to support evacuation <p>Primary Processing</p>	<ul style="list-style-type: none"> • Development of farm level collection centers (in close proximity to pineapple farms) • Development of sorting, grading yards integrated with alternate energy (solar/bio-mass based)air cooled transit storage facilities • Training of farmers on 	<p>Hard Interventions (Infrastructural Assistance):</p> <ul style="list-style-type: none"> • Setting up of 10 Farm Level Collection centers at Major Panchayats (5 per district) • Promotion of 2 Farmer Interest Groups/ Producer Organization (1 per district) • One (1) Integrated Pack house (60 MT/ day capacity) supported with 5 insulated vans and 1 minimal processing unit. Additionally support services to be provided in terms of training of associated beneficiary; add-on fund for promotion

Component	Objective	Constraints	Required Intervention	Recommended Action Points
	initiate further value addition	<ul style="list-style-type: none"> • Produce is being sold without any sorting, grading or proper packaging resulting in value loss • Farmers are not aware about various processing activities • Transit storage facility is not available leading to wastage in case there are no takers of the produce • Quantum of processing is very low in the cluster and is confined to cottage and small scale industries • In the absence of processing industries farmers do not have enough market to sell their produce and during the glut are resorting to distress sale 	<p>various aspects of post-harvest management</p> <ul style="list-style-type: none"> • Development of processing infrastructure 	<p>of export and other business development assistance</p> <ul style="list-style-type: none"> • Setting-up multi fruit processing unit by either encouraging new and existing entrepreneurs or supporting FPO. Leveraging the existing Food Park infrastructure.
Overarching	To address the cross-cutting sectoral issues in all nodes of the value chain	<ul style="list-style-type: none"> • Scope for policy level assistance to encourage greater farmer integration in downstream value chain • Absence of overall governing body to oversee marketing and processing of horticulture produce • Absence/ Limited branding of Tripura pineapples as products 	<p>Drawing learnings from best policies in other States for development of apple value chain</p> <p>Establish of governing body to undertake marketing and processing related interventions</p> <p>Branding of produce through sustained campaigns</p>	<p>Soft Interventions</p> <ul style="list-style-type: none"> • Interventions to develop support infrastructure • Increasing Branding Recognition • Establishment of State level Mission/ Board of pineapple • Development of Project Management & Monitoring Framework

5.1 Production Related

Those activities focussing on increased productivity by way ensuring quality planting material supply, transferring best practices, facilitating use of appropriate inputs are covered under this category. The activities would include training / capacity building & setting up of infrastructure facilities related to dissemination of production technologies, supply of planting material, etc.

5.1.1.1 Promoting area expansion under pineapple

Setting-up cluster of community-based model production farms

It was notable from the field survey that majority of pineapple growers in the selected districts are small and marginal and use traditional agronomic practices for cultivation of pineapple. It was also observed that though pineapple crop has economic life of about 4-5 year, however, the growers tend to cultivate it beyond 10-15 years. Low-density plantation and seasonality of the crop further affects the economic returns to the farmers. Due to lower economic returns many farmers in the study region are already shifting away from pineapple to other cash crops. It is clearly notable that technology as high density cultivation and staggering techniques can significantly increase the production, besides, enabling round the year production of pineapple. This would help the processing industry in the State and thereby help the farmers to get a better price for the produce. Thus, it is crucial to promote induction best practices for pineapple cultivation and its adoption at farm level for increased productivity and to improved returns.

It is suggested that a cluster of 'model production farm' in form of around 5 ha of plots may be developed across each blocks of the two selected districts. For the purpose, a group of 8-10 progressive farmers in selected block including women may be mobilized into informal groups (which may later be formalized into registered groups). The contiguous land resource either may be encouraged to be contributed by the beneficiary group or may be identified in collaboration with the local land authority / forest department to be given on long-term lease basis or patta to selected group of farmer. Besides, demonstrating the best production practices, the model farms would operate on commercial terms. In this context, it may be notable here that as the pineapple is a low value and low input crop, it is mostly promoted using suckers. Thus, a hi-tech nursery infrastructure is not being recommended. Rather the model farm centres may also be developed to support the requirement of planting material supply with in the production cluster.

It is suggested that the State should strive to set-up atleast 10 such farms (of contiguous area of upto 5 ha) with an objective to serve the dual purpose of demonstrating better economics of mono cultivation of pineapple through technology induction and group/ community based entrepreneurial management of pineapple orchard and its marketing. Financial assistance may be extended under MIDH sub-component of Technology dissemination through front line demonstration. Considering district focus approach, 75% of cost assistance for total estimated cost of Rs 25 lakhs (per district) may be provided under MIDH for development of model farms including meeting the expenditure on planting material, cost of IPM/INM and adoption of best practice. The cost of labour for land resource development and management, in either of the case, may be supported under MGNERGA and remaining cost may be supported either through State government or through CSR funding, beneficiary or gram panchayats may contribute in terms of land.

Area expansion through new plantation and intercrop with replanted/new rubber plantation

While productivity enhancement can address the issue of increasing production to some extent, it may also be aimed to increase the area under pineapple cultivation by 30% in next 3 years. This would mean bringing in approximately a total of 1000 hectares of more land under pineapple in the two selected district (combined). For the purpose, either the farmers who are already practising pineapple cultivation may be encouraged further to increase the area. Suitable forestland may also be identified for area expansion.

However, as it is noted that in context of Tripura supply of cultivable land is limited. Therefore, for expansion of area under pineapple may require diversion from other crops which are comparatively less remunerative than pineapple. Alternatively, there is also scope to increase the area under pineapple in Tripura by growing it as catch crop in rubber plantations that have 6-7 years of gestation before they are ready for tapping. In this context, it is notable that Tripura is the second largest producer of natural rubber after Kerala. In 2015-16, the total area under rubber plantation in the State was reportedly 74,334.95 hectares¹⁶. It was learnt during the stakeholder interactions, that although majority of rubber plantation in the State are located in south and south west Tripura (i.e. West district, Sepahijala, South and Gomati), increasing number of farmers in Dhalai and Unakoti are also setting up rubber orchards. Besides, a significant area under old rubber plantation is also ought to be replanted every year under replantation subsidy scheme. Such area under replantation may be targeted each year and pineapple should be promoted as catch crop for the first three years in rubber at the time of replanting or new plantation.

Table 9: Area under rubber plantation

District	Immature Area (ha)	Mature Area (ha)	Total Area (ha)
Dhalai	2091	2139	4230
Unakoti	1105	1520	2625
State Total	34185	40149	74335

Box 1. Intercropping of pineapple with Rubber plantation in Vazhakkum region of Ernakulam district, Kerala

In Kerala, more than 80 per cent of pineapple cultivation is done as intercrop in rubber plantations and in a limited area in coconut gardens and converted paddy land. Rubbers trees take seven years to grow old enough to be tapped. Also the initial 3-4 years of the crop require intensive round-the-year care, which is very labour-intensive and not cost-effective as there are no income returns. Conversely, under the intercropping model, the pineapple farmers take the rubber plantations on lease for three-and-a-half years. Apart from growing their own crop, the pineapple farmers buy rubber saplings, prepare the pits and plant them as per guidelines of the Rubber Board and the grower. It is the responsibility of the pineapple farmer to take care of the rubber plants for the next three years until the tree forms a canopy. This result in a win-win situation for both rubber and pineapple growers. As at the same time, the owners of rubber plantation get income as lease rent if the land leased out and the pineapple cultivators get access to large tracts of land for economic scale production of pineapple. Besides, the model has also emerged as a source of livelihood for thousands of landless farmers who are interested in agricultural activities.

Source: Rubber Board Tripura

In view of the above it is suggested that of the targeted 1000 ha, area expansion of 600 ha i.e. 200 ha per year may be targeted in new area with support under MIDH out of which 150 ha may be targeted in Dhalai and 50 ha in Unakoti district. And another 400 ha may be targeted under replantation as with rubber or replacement of old and senile orchards.

As per MIDH norms, grant assistance of 50% of total estimated cost of Rs.87,500 per ha i.e. maximum of Rs.43750 per ha may be provided to the farmer for establishment of new pineapple gardens (without drip-irrigation). Considering the socio-economic vulnerability of the marginal and small farmers of the cluster, remaining 50% of the cost may be borne by State Govt. or through CSR funding.

5.1.1.2 Establishment of Soil Testing Lab (STL)

Majority farmers do not apply fertilizer inputs for pineapple crop cultivation. Production is subject to natural replenishment of soil. It is proposed to set-up mobile soil testing facilities near to farm, which would encourage the farmer to adopt to this important practice and judiciously apply the nutrients in a

¹⁶ Economic Review of Tripura 2015-16 (http://ecostat.tripura.gov.in/economic_review_15_16.pdf)

balanced and efficient manner. Promotion of this activity would also benefit growers cultivating other agricultural crops in the region

For the purpose, 100% assistance to be provided to public sector agency under the Soil Health Management (SHM) Scheme of National Mission For Sustainable Agriculture (NMSA). Involvement of private sector participants as agri-clinics, NGOs, Cooperative Societies and agri-entrepreneurs may also be encouraged for setting-up of Static or mobile soil testing facilities. In accordance with the NMSA norms for assistance - in case of static STLs 60% of the project cost, subject to a limit of Rs.45 lakh, to be provided as subsidy for purchase of machinery & equipment, chemicals & glass wares, miscellaneous laboratory articles and contingencies. . In case of mobile STLs, financial assistance from DAC shall be 60% of the project cost subject to a maximum of Rs. 45 lakh per Mobile STL. One such facility may be set-up to cater the requirement of the two selected districts. The utilization of facility of mobile soil testing would also be relevant for other agriculture.

5.1.1.3 Promoting Public Private Partnership for Organic Production and its Marketing

Aforementioned, majority growers do not use chemical inputs in pineapple cultivation and is organic by default. With the increasing demand for organic products in the international markets and the premium that is paid for the organic products in these markets will certainly improve the scope increasing the exports provided there is adherence to international standards and certifications. Pilot project may be undertaken in partnership between the horticulture department/ organic mission with a technical agency, non-government organization and/ or private certification agency (accredited under APEDA) to develop clusters of organic pineapple cultivation in the selected district through awareness

Box 2. Organic Pineapple cultivation

A Case of Biovillage Model in Nagaland

ICCOA is implementing Organic Cluster Project (OCP) in Molvom (Dimapur) in North-eastern State of Nagaland for pineapple. As part of pilot project, Molvom is being fostered as bio-village. The project is being implemented by ICCOA and the Department of Horticulture, Nagaland with funding from North East Council, Government of India. ICCOA helps in training of farmers on organic farming of pineapple. They are also working towards making farmer groups in the production cluster villages. Along with government bodies they are working to improve the post-harvest practices and certification of organic farming. ICCOA, then directly procure 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. Out of 600 ha proposed to be brought under organic cultivation, 250 ha of area has already been brought under organic pineapple cultivation

Promoting Organic pineapple cultivation in Kerala

Vazhakkulam Pineapple Growers and Processors Pvt Ltd, popularly known as Agro Park, is an association of over 500 large pineapple growers based out of Kochi in Kerala that accumulatively own over 13,000 ha of land. Recently, Agro-Park signed a memorandum of understanding (MoU) Biotech company Camson Bio Technologies for cultivating pineapple using bio fertilizer or natural fertiliser developed by Camson to produce organic pineapple for better realisation. Following the MoU, the Agro Park advised all its members to shift towards using secondary metabolites based input for practicing "zero residue" pineapple cultivation in the state.

Case of organic pineapple export to Europe from Zimbabwe

ZIMTRADE, the national trade development and promotion organisation, is a joint venture partnership between the Private Sector and the Government of Zimbabwe. In collaboration with three international organisations, ZIMTRADE has embarked on a project to capacitate small-scale farmers to produce organic pineapples for export to the Netherlands, one world's largest pineapple consumer and logistic hub for distribution to other European countries. The three organisations are Eosta BV, a European market leader in the trade of organic fruits and vegetables, the Netherlands Enterprise Agency and Topsector. The Netherlands Enterprise Agency will provide the funding for smallholder farmers to get their products certified while Eosta BV will be the leading buyer of the pineapples, with ZimTrade and MadeTop as the local partners. The main objective of the project is to assist farmers who are producing the Queen Victoria variety of pineapples to attain organic certification which will enable them to access the niche market in the European Union (EU)

creation, training and capacity building of the farmers and support marketing of organic pineapple being product the State. Since APEDA is an overarching body for certification under the National Programme for Organic Production (NPOP), it can assume a leadership role in engaging with respective stakeholders for participation in the mission. It is suggested than an area of 100 hectare may be developed on pilot basis.

- *Promoting Organic Farming:* As per MIDH norms, grant assistance of 50% of cost limited to Rs.10000/ha for a maximum area of 4 ha. per beneficiary may be provided. Considering the socio-economic vulnerability of the marginal and small farmers of the cluster, remaining 50% of the cost may be borne by State Govt. or through CSR funding.
- *Certification:* For further linking programme with certification, Rs. 5 lakh per a cluster of 50 ha may be budgeted which will include Rs.1.50 lakh in first year, Rs. 1.50 lakh in second year and Rs. 2.00 lakh in third year. Besides, as the farmers would need to use farm yard manure and bio-fertilizers therefore construction of rural composting pits or vermicomposting units may be encouraged by providing subsidies to the farmers.
- *Vermi-composting:* Assistance may be granted under Paramparagat Krishi Vikas Yojana, at rate of Rs.5,000 per cluster member (for cluster of 50 acres of land) for procurement of earth worms, preparation of pits, construction of brick wall, labour charges and other raw materials required for construction of vermi-compost units.

5.1.1.4 Training-cum-exposure programme

The yield of pineapple can be significantly improved by training of farmers on scientific package of practices including disease & pest management, application of FYM & vermicomposting, scheduling of harvest at the appropriate maturity level, harvesting and post-harvest practices, staggering techniques etc. Moreover, 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. It is suggested for a detailed and phased schedule to be developed by the State for capacity building of farmers (including women) and training facilitators (including extension officers, dept. field functionaries, village agent or progressive farmers).

- Training of farmers (including women) undertaking model farm operation/ organic plantation/ FPO formation:
 - The farmers proposed to be associated with the model farm and organic farms need to be provided specialized training on proper management of plant material in their orchards by adopting improved package of practices for achieving highest productivity level.
 - In general, farmer associated with area expansion initiative also need to be provided training on productivity enhancement techniques like high density plantation, IPM, INM, water management, pollination practices, canopy management, organic practices (vermi-composting), rejuvenation of old orchards, maturity indices, and post-harvest handling to extend shelf life and maintaining quality
 - Also, as a group based approach is being proposed for management of the farms, therefore, the beneficiary should also be provided leadership training. Besides, training on business and marketing skills (costing, pricing, accounting, sales and marketing, negotiation, market analysis) to be conducted for members using participatory techniques. Similar training to
- Training of Facilitator (ToF) including the extension officers, dept. field functionaries, village agent or progressive farmers on the latest horticultural practices, nursery production, canopy management of high density orchards and other productivity enhancement technologies

In accordance with MIDH norms, cost assistance of upto Rs 1000/day per farmers to be provided for trainings conducted within the State (including transport). Cost assistance on actuals to be provided

for trainings that would be conducted outside State. For purpose of training a minimum of 15 training days per participant have been budgeted for training to be implemented over a period of three years at various critical stages of production, post harvest and marketing of the crop. For training of technical staff/ field functionaries, assistance of Rs 300/ day per participant is being budgeted (TA/DA would be additional as admissible).. Possibility of convergence under scheme for Agri Sector Skill Development initiative may also considered.

Regular exposure visit/ study tours to be organized within & outside State for growers/ technical staff/ field functionaries to the apex research institutes, university farms, farms of the ICAR, model private farms to study best practices. To begin with, study tour outside the State may be organized to pineapple production clusters as in Assam, Molvom village in Nagaland, Vazhakkulam in Kerala for farmers to understand about the handling and packing of fruits. The exposure visit may also include visit to processing facilities especially the Mega Food Park/Food Parks being established in the region. This would help the farmers in appreciating the need of the industry. Also the most progressive farmers should also be nominated at State level for participating in exposure visits/ study tours outside the country to study the best horticulture production technologies. Under MIDH 100% cost assistance to be provided for exposure programme as per actuals to maximum of Rs 4 lakh per participant for study tour outside India (including air fare). Tour/ Course related fee charges (If applicable) are to be also borne under Mission Management cost norms of MIDH.

5.2 Post Harvest Related

Steps like integration of production, post-harvest handling and processing activities needs immediate attention as to improve the marketing and export potential of the crop for assuring better returns to farmers. As observed from the study due to absence of post-harvest facilities for primary processing (such as grading and sorting) the quality of marketable surplus produced in the State gets hampered and also results in excessive wastages. Moreover, it is also important that farmers understand the importance of appropriate post harvest management activities and learns to undertake the same at individual as well as group levels. It is thus suggested to augment near to farm post-harvest infrastructure and build capacity of pineapple growers as user of such facilities. In this context, it is also important that there is collective action among the farmers so that the post-harvest related activities become economically remunerative.

5.2.1.1 *Setting up near to farm Collection centres/ Aggregation points*

Whereas the small-holder farmers face difficulties in accessing markets and in acquiring market, the distant and widely spread location of pineapple farms limits direct procurement linkage between the growers and the buyers. Because of the inability to find viable markets, particularly during glut, results in high post-harvest wastages. In addressing the needs of both producers and buyers, collection centres may be set-up across the production belt that would provide a central and local place for farmers to take their crops, enable traders to source large volume from many farmers, store the produce in good conditions until it is marketed and reduce costs in logistics by consolidation of produce. Initially the collections centres should focus on aggregation of the produce and act as a reliable supply centre to meet the market demand. Gradually, these centres can be upgraded as common centre for value added services for providing end-to-end services to the farmers including extension and market information services, introducing standardization in cleaning, sorting, grading activities for optimizing marketing of produce and price realization at farmers level. With a formal structure would also improve weighing and payment practices. These collection centres may be owned and operated by the farmer association in the identified production cluster on revenue sharing or rental basis. It is envisaged that participation of individual growers in a farmer association-owned collection centre would also strengthens their bargaining power through collective marketing.

Ideally, the collections centres should be located within 15-20 km periphery of the production clusters. However, it is suggested that initially these centres may be established at those panchayats which have higher production level. Initially 10 such assembling points may be identified per district with per day handling capacity of 10-15 MT/ day. Creation of such common centre may reduce the burden on the farmers to bring the produce to the road-side markets immediately after harvesting. The centre will act as aggregation points and thus may attract buyers. In accordance with MIDH cost norms, an assistance of 55% (on a unit cost of Rs.15 lakh) may be extended for development of farm level collection centers. The remaining amount could come from private investments or State Government. Land for the collection centers may be arranged from the community land.

For movement of produce from farm to collection centres to pack houses and from pack houses to airport, would require desirable transport infrastructure. Apart from primary collection, provision for transportation of produce from assembly point to collection centre also need to be facilitated. For the purpose, assistance may be provided under MIDH for facilitating each collection point to be integrated with facility of pick-up van. Alternatively, arrangements may also be outsourced to service providers. Subsidy from APEDA may also be explored

Box 3. Better value realisation through Primary Processing: A case of Apple in Himachal Pradesh

The apples of Himachal Pradesh have a higher value proposition, in the market because they are properly sorted, graded and packed. This has been possible because both the producers and the state are able to realise the importance of primary processing.

This has resulted in a number of primary processing centers developed both by private sector (including big farmers) and Govt. of Himachal Pradesh. Govt. of Himachal Pradesh through HPMC has established a number of Primary Processing Centers in the fruit growing areas of Himachal. These primary processing centers offer sorting, grading and packing facilities to farmers on payment of required service charge. The average current charge is between Rs.6-7 per Kg of apple. The centers are manned by well-trained resources.

Use of sorting, grading and packing facilities is resulting incremental revenue of approximately Rs.12-15 when compared to the price realised by apples of Jammu and Kashmir (which is its competitor). This implies that even after incurring the extra cost on sorting, grading and packing the farmers of Himachal Pradesh are able to get an incremental net benefit.

5.2.1.2 Promotion of Farmer Interest Groups (FIGs) and Farmer Producer Organization (FPO)

The sustainability of the common infrastructures to a large extent depends on the ownership of the community and their ability to ensure smooth operation. While in Tripura the social cohesiveness is quite high, it is important that the same is translated to collective action to derive economic benefit. One of the ways to achieve the same is formation of Farmer Interest Groups of Producer Groups. Presently, farmers rarely operate as farmer groups and endure high production costs due to lack of scale of economies. Further transporting of produce in small quantities to urban markets is not very viable, so the farmer end up selling their price at lower margins in local markets and suffer low remuneration. Thus, absence of collectivization, small scale of operations significantly reduces the bargaining power in procurement of inputs as well as sale of output.

Considering that small scale of operations is an important aspect of the problems associated with pineapple growers in the State, it is more so important that the farmers join hands and achieve certain scale of production so as to initiate value chain development related activities. In view of this, it is suggested that to begin with atleast two (2) Farmer Interest Group/ Producer Organization/ Company of 100-150 member should be promoted in each of the two district. As collective, these Farmer Group(s) would estimate the requirement of the various inputs, determine the estimated production flow during the season and accordingly schedule the work operations for the season. On the market side, the members of farmer groups are expected to benefit by realizing higher prices for respective

produce as aggregated sale of produce would create a larger critical mass providing economies of scale, savings in transaction costs, and strengthened negotiation positions

The required financial assistance for mobilization and formation of Farmer Groups and for their capacity building to be availed as per norms of SFAC. Creation of farmer-linked and operated value added centres in the district is anticipated to encourage increased number farmers to associate with the established FIGs to avail services of common centre, which in turn would feed into its increased economic viability. For successful implementation of this model, the FIGs created under assistance from MIDH/SFAC would require continued handholding in development of the required infrastructure. It is therefore suggested that a suitably qualified technical agency should be engaged via bid process to assist the department in integrated development of this activity including - mobilization of producer groups into FPO, facilitating setting up of required infrastructure and procurement of machinery, capacity building of FPOs for managing and operating the facility, handholding assistance for period of about two years.

Box 4. Pineapple Farmer Association, Kerala

Box 5. Pineapple Farmer Association, Kerala

Farmers face many problems in the cultivation and marketing of pineapple. So a group of farmers decided to form an association of Pineapple farmers in 1990 and registered the Pineapple Farmers' Association, Vazhakulam under the Charitable Societies Act. Initially, there were 120 members when the Association started. Now more than 500 members associated with the Association. The main objectives of PFA is to unite and strengthen the pineapple farmers, spread awareness about best practice for pineapple cultivation, promote marketing and processing and help farmers to avail financial and technical assistance from govt. and non govt. organizations and banks. The PFA is distributing good quality planting materials, fertilizers, pesticides, herbicides, growth regulators etc in subsidised rates to the members. PFA also offer technical advisory to farmer. They conduct Agricultural Seminars and meetings for farmers where experts guide the farmer in diseases and pest control, post harvest management, access to finance etc. Every year PFA conducts a three day Agriculture Fair at Vazhakulam. This is a festival of Pineapple farmers. The association presents the 'Pineapple Sree' Award to the best Pineapple Farmer. The best Pineapple Farmer in Kerala is selected by a team of Experts from Kerala Agricultural University and the Department of Agriculture.

5.2.1.3 Augmenting export oriented post harvest infrastructure

High cost of transportation in North east is a major constrain for shipment of perishable cargo. Due to the logistic challenges, the regional horticulture production finds it difficult to compete with similar produce coming from other parts of India. Moreover in case of pineapple there is stiff domestic competition from round the year available pineapples from other leading pineapple producing States as Kerala and Karnataka, which have well established distribution network for supplying to urban markets in Delhi, Mumbai, Ahmedabad, Karnataka, Kolkata etc. The trade of pineapple produced in the State is, thus, mostly restricted to regional and local markets and limited quantities are being traded mostly through illegal channels into bordering States in Bangladesh. These result in lower remuneration and higher wastages due to seasonal glut and limited market access.

In view of the above, it is suggested that an export-oriented approach may be adopted for directly trading the produce into international markets such as in Middle East and North African (MENA) and ASEAN countries. In this direction, APEDA in collaboration with the Delhi International Airport Limited has already initiated significant steps. Recently during month of October 2017, an export consignment of 1.2 MT of Kew variety of pineapple was air transported from Agartala to Dubai via Delhi as trial shipment. Besides APEDA, the initiative involved coordinated efforts of various other stakeholders including M/s Kreamy Craft (an export oriented based out Kolkata), Spicejet Airlines (that provided competitive freight rates for air transport), DAIL (a GMR Group led consortium) which supported logistic at Delhi Airport. APEDA has also announced delegation visits to Bangladesh and Myanmar to boost export of products from north eastern region. It is notable that such export oriented interventions also fall in line with central government's Act East policy, which focuses to promote

economic cooperation with countries in Asia Pacific with particular focus to develop and strengthen connectivity of the States of North Eastern Region with the ASEAN region through trade.

In context to export orient approach, it would be important to simultaneously encourage investment in development of specialized market infrastructure to handle produce and to retain its quality attribute at each point of value chain. Thus, the earlier suggest aggregation models for produce (setting-up of collection centres) should be systematically further developed and networked/integrated with modern pack house and processing facilities. In addition, a proper institutional mechanism needs to be put in place to manage the flow of produce. Besides, extensive capacity building of producers and stakeholders would be required on market led production to achieve efficiency in supply chain.

Following interventions are suggested in this context:

Setting up of Modern Integrated Pack house and Minimal Processing Unit

Infrastructural Assistance

- a) *Integrated Pack-house:* There is no pack house infrastructure in the State. It is suggested that atleast one (1) modern pack house facility should be set-up in the region that could be used to prepare export consignments. The pack house will provide facilities for pre-cooling, grading and sorting, washing, pre-treatment and packing as per international standards. Moreover, to give an extra edge in the international market the facilities envisaged in the pack house should be as per the pre- and post-harvest protocol for export of fresh pineapple. The pack house infrastructure. It is envisaged that the operations like sorting grading, washing etc. will not only improve the appearance of the produce but will also enhance the shelf life. It will also gives an opportunity to establish direct linkages with big retail chains for penetrate into high-end urban markets apart from the traditional local markets. Presently the combined pineapple production in the two-selected district is about 45000 MT. Targeting to cater atleast 20% of the production, it is proposed that the integrated pack-house of 60 MT per day installed capacity may be set up. Considering the seasonality of the crop and introduction of staggering techniques, it is being assumed that produce may be made available for period of six months during year and that the actual capacity utilization of the facility would be 75%. It is suggested that the proposed facility should be created in Dhalai block of the district as the production volume of the district exceeds 35000 MT.
- b) *Insulated Vans for Transport:* For hassle free transport three (3) insulated transport vehicles for 9 MT capacity may be integrated with the facility
- c) *Minimal Processing infrastructure:* As a part of phased development an add-on facility for multiple fruit processing may be set-up for minimal processing of pineapple may be set-up. To begin with, initially marketing and distribution of fresh cut pineapple may be piloted for supply in both domestic and export market.

In accordance with MIDH cost norms, the cost assistance for the activity sub-components to be provided as follows:

- Setting-up of integrated pack house: Credit linked back-ended subsidy @ 50% for estimated cost of Rs. 50.00 lakh per unit with size of 9Mx18M equivalent to assistance of upto Rs 25 lakhs may be provided for the activity sub-components.
- Insulated vans: Under credit linked back-ended subsidy @ 50% of total cost estimated Rs. 26.00 lak for 9 MT
- Minimal Processing Credit linked back-ended subsidy @ 50% of capital cost of Rs 25.00 lakh/unit i.e. equivalent to Rs. 12.5 lakhs.

Alternatively, proposed intervention may be supported under Scheme for Creation of Backward and Forward Linkage by Ministry of Food Processing that extends maximum grant of Rs 5.00 crore @

50% of the eligible project cost for North East States covering technical civil work and eligible plant & machinery for following:

- Backward Linkage: Integrated Pack-house(s) (with mechanized sorting & grading line/ packing line/ staging cold rooms/cold storage, etc.), Pre Cooling Unit(s)/ Chillers, Machinery & equipment for minimal processing and/or value addition such as cutting, dicing, slicing, pickling, drying, pulping, canning, waxing, etc., Machinery & equipment for packing/ packaging.
- Forward Linkage: Retail chain of outlets including facilities such as frozen storage/ deep freezers/ refrigerated display cabinets/cold room/ chillers/ packing/ packaging, etc., Distribution center associated with the retail chain of outlets with facilities like cold room/ cold storage/ ripening chamber.

- Transport: Refrigerated/ Insulated transport / Reefer Vans in conjunction with backward and forward linkages.

Institutional Service Support for Export

Box 6. Vertical integration of Ghanaian Pineapple Industry – Case of Blue Skies Holding Ltd.

In Ghana the case of Blue Skies Limited is a successful example of functional and product upgrading in an agricultural value chain directly involving smallholder farmers. Established in 1998, the Blue Skies Holding exports **freshly cut fruits** such as pineapples, mangos, papayas, pomegranates, coconuts, melons, grapes and berries, which are sold primarily in European supermarkets through high-quality retailers such as Marks & Spencer and Sainsbury's. While pineapples are traditionally exported unripe to be processed and packaged abroad, the Blue Skies business model increases value added in Ghana by having local suppliers cut and package the ripe fruit. The Blue Skies value chain is highly integrated, having incorporated operations from buying and transporting raw pineapples to delivering certified, cleaned, cut, packaged, and branded pineapple pieces to UK distribution networks, reaching the consumer within 48 hours of harvesting.

Thursday	
9:00 AM	Pineapples are harvested in Akwapim Mountains (100 km west of Accra)
10:00 AM	Men cut pineapples and women deliver them to collection point
10:30 AM	Pineapples are sorted by class at collection point
12:00 noon	Fruit is loaded onto trucks and heads to Blue Skies factory, 100 km away (2,000 pineapples per truck)
2:00 PM	Pineapples arrive at factory and are processed
2:45 PM	Pineapples roll off assembly line and are cleaned; "topped and tailed"; have their skin trimmed; weighed; sealed in Sainsbury-labeled (UK supermarket) tubs; put in holding chillers; and packed into cardboard boxes
7:00PM	Refrigerated load of pineapples leaves factory for 100 km journey to Accra
10:00 PM	Boxes of pineapples are packed onto British Airways flight and take off for the United Kingdom
Friday	
5:45 AM	Pineapples arrive in London and go through customs
8:45 AM	Pineapples are taken to British Airways perishables-handling center outside of London
9:30 AM	Pineapples are taken out of cold storage and quality is inspected again
11:00 AM	Sainsbury truck picks up pineapples and takes them to the supermarket's distribution center 58 km away
12:00 PM	Fruit is sorted according to Sainsbury store orders
Saturday	
4:00 AM	Delivery to Sainsbury stores made
5:00 AM	Fruit goes on sale in organic section
7:00 AM	Pineapples are available for European shoppers begin to purchase

Currently, Blue Skies employs over 1200-2000 people in Ghana, making it one of the country's biggest private sector employers (McMillan, 2012). It is responsible for 30% of pineapple export from Ghana. The company also sells to local markets in Ghana, where its fresh pineapple juice has been particularly successful. To comply with standards in Europe, Blue Skies must be selective about its suppliers. A team of agronomists pays weekly visits to Blue Skies farmers in order to ensure the farmers' capacity to adhere to international safety standards and produce high quality fruits. Blue Skies farmers are certified in GLOBALGAP and EUREPGAP requirements. GLOBALGAP consists of four main areas: Integrated Farm Assurance; Plant Propagation Material; Risk Assessment on Social Practice and Chain of Custody. The traceability of each piece of fruit is of paramount importance (McMillan, 2012). The strong commitment of management, staff and farmers has contributed significantly to Blue Skies' success. Strong managerial skills and social security benefits for employees contribute to a friendly, favourable working environment. Prompt payments on receipt of fruit provide a strong incentive to farmers to maintain regular supplies. **As Blue Skies specialises in cut fruit, the size of the fruit does not matter and rejection rates are lower.** Dedicated farmers receive interest-free loans which encourages good performance. An education in EUREPGAP and GLOBALGAP standards also fosters commitment among farmers (Dannson et al., 2004).

Source: Building Competitiveness in Africa's Agriculture, World Bank; Blue Skies corporate Web site,

Technical assistance in managing product flow: It is suggested that either such facility may be operated through private entrepreneur or existing small scale fruit processing enterprises in the State may also be encouraged to set-up such facility as add-on to existing infrastructure. Either the farmer beneficiary groups proposed to be developed as part of proposed intervention may be linked up with the entrepreneurs/ private firm operating the facility for supply of produce. Alternatively, the

beneficiary farmer groups may be integrated to register as public limited company, with part share from State Government/North Eastern Council/ NERMAC. In either of the case, rigours technical support and assistance would be required to be extended to the operating agents in terms of obtaining necessary certifications and accreditations such as:

- Approvals from pollution control board, registration and approval from the relevant department for industries
- APEDA approved status of horticulture pack house/ as merchant exporter
- AGMARK certification, Certificate of Import/ Export Code
- Identification and development of prospective overseas buyer. Negotiation of prices and other terms. Test marketing/ trial export marketing. Documentation related to export, forex regulation as GR forms
- Technical advice and training on meeting standards and market access requirement (including packaging and sourcing of packing material)
- Obtaining necessary phytosanitary certificate including Global GAP, organic certification (in case of marketing of organic produce)

Add-on funding assistance to export of air-freighted pineapples: It is suggested Agricultural and Processed Food Products Export Development Authority (APEDA) may be approached for earmarking certain funds that can be utilized for addressing supply chain challenges and to promote the export of air-freighted pineapples to the Middle East and into a niche market in the European Union.

Training and Capacity building of Growers and associated Stakeholder

Besides training assistance under MIDH, alternatively funding assistance may also be explored such as under World Bank funded Skill India Mission Operation (SIMO), which is a six-year program in support of the Government of India's skill development strategy as outlined in the National Policy for Skill Development and Entrepreneurship (2017–2023). Under the programme, the World Bank to support skill development at National and State Level have approved a grant of US\$ 250 million with a focus on providing skill-training opportunities for workforce in partnership with industry/ employers for increasing their engagement in skills programs and scale up their delivery. Particular to the agriculture sector SIMO aims to support the Agriculture Sector Skill Council of India in planning, designing, and rolling out formal short-term training packages that are in line with the requirements supporting of food processing industry and the transportation and logistics industry¹⁷. In order to encourage the private, Corporate Social Responsibility (CSR) funding options may also be leveraged

Box 7. World Bank's Skill Development Fund helps to address skill and technology need of Pineapple Enterprise in Ghana

Gold Coast Fruits is a limited liability company engaged in commercial production and export of pineapples to Europe since 2006. In spite of its prospects the company was facing significant challenges occasioned by change in international consumption and demand for pineapple from traditional smooth cayenne to MD2 variety in recent times. Due to the switch in international demand, Ghana's share in international export market plummeted to 6% due to the fact that the pineapple growers in Ghana, lacked the necessary skills and technology to grow MD2 variety in Ghana. In a bid to innovate, Gold Coast Fruits introduced MD2 pineapple cultivars but were challenged with low yield of 20 MT per ha. This led to drastic reduction in output of the company, increasing the production cost, reducing export volumes, and earning.

In 2012, Gold Coast applied to World bank funded Skill Development Fund (SDF), which was a five year project being implemented by the Government of Ghana with US\$ 50 million grant from World Bank. With assistance under SDF, Gold Coast was able to engage an MD 2 expert to provide year long training to associated farmers in agronomic practise for cultivating MD2 pineapple in Ghana. With newly acquired skills, the company has been able to harvest about 80 MT yield per ha increasing their export capacity to about 80,000 tonnes

Source: The Skill Development Fund, Ghana. Council for Technical and Vocational Education and Training (COTVET) Project Support Unit.

Strengthening of India Bangladesh Trade Corridor for increased legal trade

¹⁷ Skill India Mission Operation, Program Appraisal Document (<https://www.gtai.de/GTAI/Content/DE/Trade/Fachdaten/PRO/2017/07/Anlagen/PRO201707035006.pdf?v=1>)

Kolkata is 1,700 km from Agartala, while Dhaka and Chittagong are about 150 km from Tripura. As all the eight districts of Tripura share boundaries with Bangladesh, thus there is huge scope for trade. In this context, it is notable that while there is a huge trade imbalance between the India and Bangladesh in favour of India. However, in case of trade between Tripura and Bangladesh the scenario is absolute opposite. Reportedly, last year in 2016 Bangladesh exported goods worth Rs 342.65 crore to Tripura, while it imported goods worth just Rs 0.41 crores from Tripura¹⁸.

As such formal trade mostly take place through seven land custom centres (LCS) which are based at gartala, Srimantapur (Sonamura), Khowaighat (Khowai), Manu (Kailashahar), Old Ragnabazar (Dharmanagar), Belonia (South Tripura) and Sabroom (South Tripura). However, there are many area along the border that have limited access to LCS and thus the trade is mostly informal. There is a need a. to set up formal tie-ups with Bangladesh. Whereas there is significant scope and requirement of improving the existing infrastructure facility at the Land custom centres, setting-up of border haats along the international border may particularly boost the trade of agricultural and horticultural products. The Bangladesh government has already agreed to allow India to use Chittagong international port, which is about 75 km from southern Tripura. Also, a 15 km railway track is being built between Agatala and Akhaura (in Chittagong district in Bangladesh). These developments can significantly boost trade from north east region, particularly Tripura. However, initiatives need to be taken at highest level to expedite these developments.

In context to pineapple fruit crop, it is notable that Bangladesh has huge market demand for pineapple as it ranks 4th in terms of total area and production of fruits in Bangladesh. In addition, in terms of agro processing, there are various reputed nationally and internationally known enterprises. PRAN group, which is one of the most significant private sector food and beverage brand in Bangladesh, is known to extensively supply processed food products including litchi fruit juice, into Tripura market which is indicative of clear demand for processed products within the State. Tie-ups/ Joint venture may be forged for encouraging setting-up of manufacturing units within Tripura to cater to both domestic as well as foreign market needs.

5.2.1.4 Setting-up Multi-fruit Processing Infrastructure (with focus on pineapple)

In crops like pineapple, the possibility of processing a diversified range of products is enormous - products such as pineapple, crisps, jams, juice powder, tidbits besides the usual juice concentrates have good market and will add to the viability and optimal resource utilization. It is worthwhile noting that currently pineapple juice is the one of the largest traded juice in the global markets after orange and apple juice¹⁹.

With an objective to increasing the level of processing and value addition to reduce wastages, it is suggested that simultaneous with development of production clusters, a centralized multi-fruit processing plant should be set up. The ownership of this arrangement can be private ownership led, who will have contractual agreement with farmers for production and supply of the fruits. Alternatively, the facility can be owned in partnership with the farmer producer groups and State Government (as in case of NAPCL in Kerala). This would however, require extensive capacity building and handholding assistance to be provided for credit access as well as facility operation and maintenance. Gradually, the institutional arrangements can be leveraged for providing extension services.

It is notable that a Mega Food Park is being set up near to Agartala. Such processing infrastructure may ideally be developed within the Food Park. This would bring down the cost of common infrastructure needed and also help in utilization of the existing facilities. In this context, the value chain linkages outside the food park also need to be forged so that the common infrastructure

¹⁸ As per Ministry of Commerce Data, News Article Business Standard. http://www.business-standard.com/article/pti-stories/border-trade-comes-as-boon-for-land-locked-tripura-114081800101_1.html

¹⁹ ITC Comtrade Analysis http://www.trademap.org/Product_SelProduct_TS.aspx?nvpm=1|||||200989|||6|1|1|2|2|1|1|1|1

facilities available at the park as including Hi-Tech cold storage (2500 MT), warehouse (5000 MT), Quality control laboratory, etc. may be leveraged for the benefit of the farming community.

Box 8. Case of Pineapple Processing

Nadukkara Agro Processing Company Limited (NAPCL), Kerala

Under the Kerala Horticulture Development Programme, Nadukkara Agro Processing Company Limited (NAPCL), a modern fruit processing factory, for the commercial processing of pineapple, mango and other fruits was established in the heart of Kerala's Pineapple growing area Nadukkara, Avoly panchayat near Muvattupuzha in 2000 at a cost of Rs.21.5 crores. NAPCL was established as a public limited company with 582 farmers holding 70% share and the Government of Kerala 30% share. The plant has a state of the art technology and the latest equipment because of the support from the European Union during the initial period. The factory has aseptic packaging as well as canning units. NAPCL has ISO 9002/HACCP certifications and its own brand of pineapple juice called "JIVE" and can process 70 MT of pineapple per day. The company initially produced 200 ml Jive tetra-pack, 256 kg dump bag juice concentrate, besides ginger candy. Today, company markets seven different types of natural cool drinks under Jive brand without using any preservatives.

The Dole Pineapple

Dole Pineapple is leading producer as well as processing industry of pineapples spread across eight different nations. The canned pineapple industry of Dole requires pineapple round the year. In order to maintain streamlined flow of raw pineapples, the company manages self-cultivated large plantations as well as contract farming. Contract farming is majorly practiced in Thailand and Philippines. Dole contract with farmers for supply of pineapples while managing the processing and marketing by itself. In contract farming business, the firm also provides technical guidance, credit, and other services to peasant in return for their pledged production to the firm. Interaction of farmers with the companies also made them aware regarding cultivation practices as per GAP to make their products marketable in the world market. The farmers have reported stable income, market certainty, credit schemes and learning new technologies under contract farming. Philippines is a leading exporter of fresh pineapple as well as canned pineapples. The modern production techniques have open the export market of Philippines. Moreover, EU granted Philippines duty free access to its market for various products including pineapples giving the country a comparative advantage as well as support to increase exports and investments to diversify its industry.

Dole food manages pineapple industry from production to marketing. The use of modern techniques such as timely and uniform application of fertilizers using machines enables good quality pineapple production. Moreover, pineapples are further treated with water and wax before packaging. The major importing market is in the EU. The raw pineapple after packaging are properly placed in refrigerated containers at stable temperature preventing further ripening of the fruit. Each pineapple is labelled with a barcode to track its shipment right from factory to the

Central & State PSUs/ Joint Ventures/ Farmer Producers Organization (FPOs)/ NGOs/ Cooperatives/ SHG's/ Pvt. Ltd companies/ individuals proprietorship firms engaged in establishment/ upgradation/ modernization of food processing units in the State should be sensitized and encouraged to take-up the initiative. Required finance assistance should be availed under the Scheme for Creation/Expansion of Food Processing/Preservation Capacities by Ministry of Food Processing Industries (MoFPI). In accordance with the norms of the Scheme, 50% of the eligible project cost subject to a maximum of Rs.5.00 crore to be provided as financial assistance i.e. upto Rs 2.5 crores. Alternatively, the existing small-scale fruit processing units in the State may also be encouraged for expansion of existing facility for processing of apple fruit crop. Moreover as a part of integrated initiative, the proposed collection centres and integrated pack house facilities may be linked up with such initiative. The required financial assistance may be made available under Micro and Small Enterprises Cluster Development Programme (MSE-CDP) of Ministry of Micro, Small and Medium Enterprises (MSME), Government of India (GoI). As per scheme guidelines, the GoI grant is 90% for CFCs in NE, Clusters with more than 50% (a) micro/ village (b) women owned (c) SC/ST unit

5.3 Overarching

It is understood that there would be a set of interventions which would run parallel to the value chain development related activities. Such interventions would include

5.3.1.1 Interventions for Supporting Infrastructure

Supporting infrastructures like power, logistics, packaging, quality control and branding are expected to play a major role in successful realisation of the value chain development objectives. In this context, it is proposed that the following interventions may be considered

- **Procurement Subsidy:** The Tripura Government, can on the line of similar practice adopted for apple in Himachal Pradesh and Jammu & Kashmir, consider undertaking Market Intervention Operations in Pineapple to procure unmarketable surplus at a fixed price (declared annually by the Corporation) for supply to processing plants.
- **Transport Subsidy:** The state may leverage the available transport subsidy and develop a mechanism wherein the farmers derive benefit out of this. To encourage direct market linkages and support farmers to explore alternative markets, it is suggested that State government should provide transport subsidy to the Farmer Group(s). This would encourage non-member farmers to mobilize into groups, besides farmer would be able to derive direct benefit out of the scheme.
- **Air Freight:** Currently the State extends 90% subsidy on Air Freight from Agartala to Guwahati/ Kolkata, on transport of fruits/fruit products for export. This may be extended for transport upto other city with international air cargo facilities as Delhi, Mumbai, Bangalore
- **Electricity:** As supply of electricity is constrained in the state, alternative sources such as solar power, etc may be brought in to the villages so that common infrastructures run smoothly
- **Last mile road connectivity:** As most of the farm lands are located in remote areas and do not have proper access roads, the state may consider constructing all weather roads to facilitate input supply as well as evacuation of the produce.

5.3.1.2 Increasing Branding Recognition

A 'geographical indicator' of Tripura pineapple may be leveraged as a branding tool. Brand building based on GI would help state apple to gain increased and distinct shelf space in both domestic and international market. However, to use it as an effective marketing tool, it is important that consumers in export/ domestic markets should have some awareness on the product origin and positive associate with it. For instance, in case of Darjeeling tea. Thus brand building of Tripura Pineapples will still require an on-going professional management to remain commercially relevant and sustainable in long term.

As a preliminary measure, emphasis to be laid on electronic, print media, hoardings, creating awareness along the distribution network through buyer seller meets, organizing annual festival/exhibitions/ road shows to sensitize the consumers about the goodness and taste of Tripura Pineapple. Creation of direct marketing linkages with private FMCG companies, food retail chain and e-commerce companies should also be promoted.

5.3.1.3 Establishment of State level Mission/ Board for pineapple

It is suggested that in line with existing pattern of assistance as in case of Kerala or as in case of rubber, Pineapple Mission may be established in the State for integrated development of pineapple value chain and to promote value added products from pineapple. To begin, the interventions proposed herewith may be implemented as comprehensive project to establish the supply chain of fresh and minimally processed pineapples. The objective of the mission would be to achieve holistic growth of the sector through enhancing and improving production, post-harvest, processing,

marketing and export of produce by the growth by facilitating development and access to market infrastructure, skill development, input supply, credit etc

Box 9. Kerala Pineapple mission for strengthening the sector and speedy action

Launched in 2013, Kerala Pineapple Mission is established by the Government of Kerala as per GO (MS) 168/2013/Agri. Dated 20.05.2013. Kerala Pineapple Mission is registered as Society under Travancore Cochin Literary, Scientific & Charitable Societies Registration Act 1955 with District Registrar, Ernakulam.

The control, administration and management of the mission vest with the Government Council consisting of 19 members. The Honorable Minister for Agriculture, Government of Kerala is the Chairman and the Honorable MLA, Muvattupuzha is Vice Chairman of the Governing Council of the Kerala Pineapple Mission. Director/ Special Officer of the Mission is the Additional Director of Agriculture (CP). Officials from various Departments of Government, Financial Institution, Industry, Trade and other related institutions and Farmers comprise other members of the Governing Councils. The Mission also has Executive Committee and District Level Committees with the Chairmanship of District Collectors.

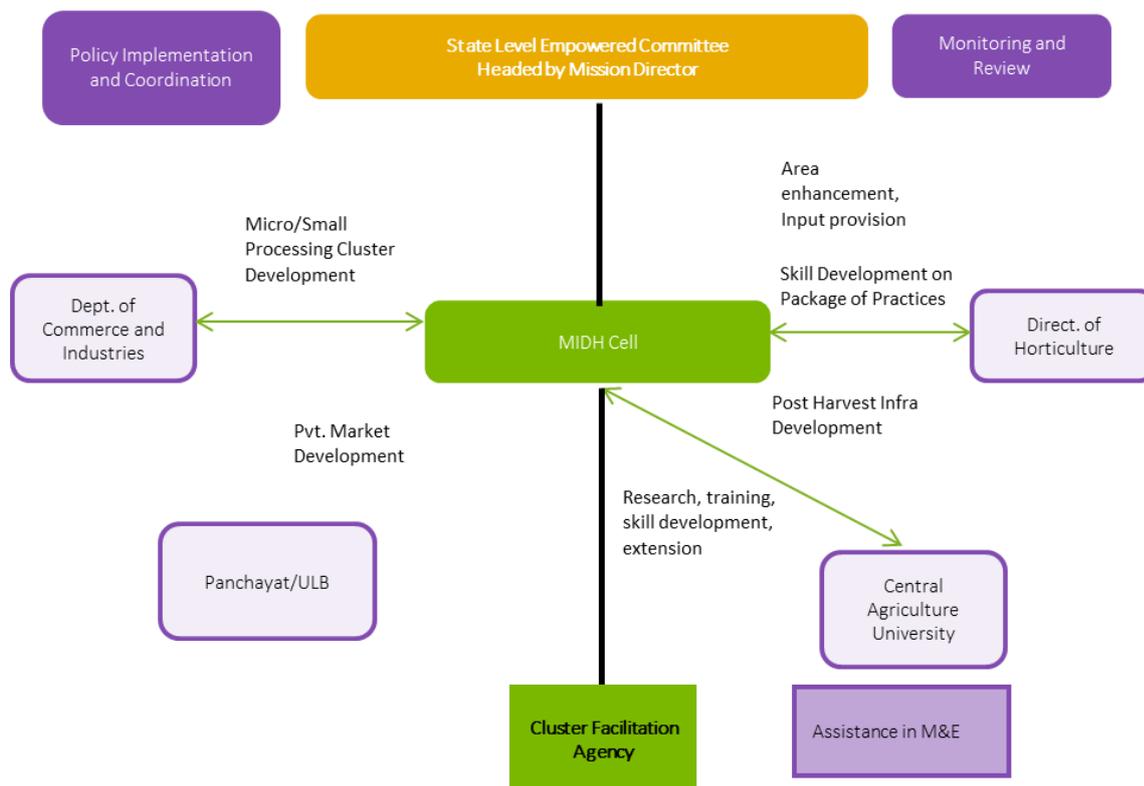
The objective of Kerala Pineapple Mission is to promote value addition along the pineapple value chain and coordinate for holistic development of the supply chain

5.3.1.4 Development of Project Management & Monitoring Framework

In order to develop the pineapple value chain in the selected two districts, it is essential to create a strong, responsible, and responsive institutional structure. This is more so important when we consider the fact the core value chain actors (pineapple farmers) do not have adequate resources both in terms of finance and knowledge to improve their current situation. Thus, in the absence of a dedicated institutional structure the core objective of value chain development in the cluster may not be achieved.

As can be seen from the diagram below successful realisation of the cluster development objective shall, to a large extent, be dependent on the successful co-ordination among relevant departments and use of existing institutions like Central Agriculture Universities, Panchayats/Urban Local Bodies. While it is expected that the entire implementation shall be driven by MIDH cell as the nodal agency, in view of the involvement of multiple agencies, it is proposed that a state level steering committee headed by Mission Director, MIDH be formed to ensure timely project execution and co-ordination among all concerned stakeholders.

Proposed Institutional Structure



The committee may have representatives from different line departments such as Commerce and Industries, Agriculture and other agencies such as Agriculture University, Lead Bank, Panchayat/ULB Chairperson from the cluster area. It may also include some farmer representatives. The major tasks of the committee may include:

- Facilitating inter-departmental co-ordination
- Finding out/suggesting points of convergence
- Appointment of Cluster Facilitation Agency
- Monitoring and periodic review of the progress
- Setting or re-aligning strategic goals as per the requirement

Considering the fact that the proposed value chain development project adopting a cluster approach is complex in nature (considering both the involvement of multiple stakeholders and the quantum of cross-cutting activities), it is also proposed that a professional Cluster Facilitation Agency (CFA) be appointed to assist the nodal agency MIDH Cell in overall implementation of the value chain development activities. The CFA is expected to bring in required technical inputs, knowledge and market interface to assist the state. Specifically, the functions of the CFA may include:

- Organising the farmers into Farmer Interest Groups/Producer Groups so as to bring in collective action in production as well as marketing. This common action may also lead to economies of scale during post harvest management activities.
- Assess the Capacity Building/Skill Development requirement of the farmer members
- Organising and delivering Skill Development related activities
- Assisting the Farmer Interest Groups/Producer Groups in procurement of required inputs either through direct linkage with the suppliers or through leveraging available schemes of Govt. of Manipur or both
- Assessing the requirement of common post-harvest/processing infrastructure for the pineapple farmers; developing a business case for the infrastructure so as to mobilize commercial funding, wherever available
- Assessment of the requirement for private markets including space and other infrastructure; Co-ordinating with Panchayats/ULBs and Nodal agency for development of private markets;

development of a operation and maintenance mechanism for such markets; development of a business case for mobilizing commercial finance, wherever required

- Identify and develop sustainable market linkages for the produce
- Analyse Identify points of convergence among various schemes and suggest the nodal agency appropriate mechanism to leverage the convergence points
- Identify technologies/best practices which can be replicated in the cluster for overall value chain development
- Assisting the nodal agency in input/grant disbursement
- Assisting the nodal agency in monitoring the progress of the projects
- Represent the nodal agency in different forums, wherever required

6 Financial Outlay

The state being remote with limited connectivity and various infirmities, there is a need to provide adequate level of finance and technical support to promote pineapple value chain development in the State. The proposed strategy calls for an integrated approach adopting a program mode for developed of various production clusters in the State. Along with the enhanced levels of assistance, the state may also have to build physical infrastructure along the value chain as also supplement the efforts/assistance to strengthen value chain activities.

The total cost of suggested interventions is estimated Rs 2163 Lakhs. Out of which 52% of budgetary support of Rs 1125 lakhs may be sought under various Central Government Scheme. Whereas as of the remaining 25% of the cost of Rs 546 Lakhs is proposed to be facilitated under support from the State Government or alternatively, this may also be facilitated through international multilateral developmental agencies or industry association in public private partnership mode. The remaining 23% of the cost of Rs 493 lakhs would be the beneficiary's share of the total cost. Accordingly, the total financial outlay for the intervention is estimated Rs. 1670 Lakhs with the Centre to State share of 67:33 i.e. $\frac{2}{3}$ rd contribution from centre and $\frac{1}{3}$ from the State. In terms, value chain intervention 70% of the financial outlay is budget for production related intervention and 30% for development of post harvest and processing infrastructure. It is envisaged that the proposed intervention would be implemented in phased manner over duration of 3 years and total proposed financial outlay would be utilized accordingly.

Details of the financial outlay is provided below:

Project components	No. of Units	Cost per Unit (Rs. In Lakhs)	Estimated Total Cost (Rs. In lakhs)	Gol (MIDH/other schemes)		Proposed Outlay from State Government	Remark
				Patter of Assistance	Financial Assistance (in lakhs Rs)		
A. Production Related							
Infrastructural Assistance							
a . Setting-up of community based model production farms	10 No. (5 per district)	Rs. 25 lakhs per district	50.0	@75 % of cost in farmers field	37.5	12.5	
b Area expansion through establishment of new orchards and replacement of Senile plantations							
1. Establishment of New Orchards with assistance for meeting the expenditure on planting material, integrated drip system, INM/IPM, canopy management etc	600 ha	Rs 1.5 lakhs/ ha		@40% of cost in 3 instalments of 60:20:20	360	360	To rigorously promote high density plantation of pineapple across the State, it is important that more and more number of farmers should adopt this technology. It is suggested for the State to provide additional assistance of 40% to the farmer for taking up high density plantation. Remaining 20% cost to be borne by the farmer
2. Rejuvenation/ Replacement of Senile Plantation, Canopy Management	400ha	Rs 0.4 lakhs/ ha		@ 50% of the cost for maximum of upto 2 hectare per beneficiary		48	It order to promoted high density plantation in the region, it is suggested for the State to provide 30% add-on assistance to the farmers for high density cultivation. Remaining 20% cost to be borne by the farmer
c Establishment of Mobile Soil Testing Lab (STL)	1 No.	Rs.45 lakh	45.0	100% assistance to be provided to public sector (under NMSA)	90.0	-	
d Organic Production and Marketing							
1. Promoting organic farming	100 ha	Rs 0.2 lakhs per ha	20	@50% of cost	10	10	Considering the socio-economic vulnerability of the marginal and small farmers of the cluster, remaining 50% of the cost may be borne by State Govt. or through CSR funding.
2. Certification	100 ha	Rs 5 lakh per cluster of 50 ha	10.0	100% assistance	10		
3. Vermicomposting unit	100 beneficiary	Rs. 0.05	5	100% assistance	5	-	It is suggested that as these would be community based unit, remaining 50% assistance may be provided by State Govt.
Capacity building Intervention							

Project components	No. of Units	Cost per Unit (Rs. In Lakhs)	Estimated Total Cost (Rs. In lakhs)	GoI (MIDH/other schemes)		Proposed Outlay from State Government	Remark
				Patter of Assistance	Financial Assistance (in lakhs Rs)		
a . Training programme							
1. Training of farmers/ farmer groups (10 training days per participant)	1500 No.	Rs 1000/day per farmers	150	100% assistance	150	-	
2. Training of Facilitator (15 training days per participant)	10 No.	Rs 300/ day per participant	0.45	100% assistance	0.45	-	
b . Exposure visit							
1. Study tours within State	As per actual	As per actual		100% cost assistance		-	
2. Study tours outside	As per actual	As per actual		100% cost assistance		-	
B. Post Harvest & Processing Related Infrastructure							
a . Creation of Farmer-linked and operated Value Added Centre							
1. Promotion of Pineapple Grower Group/ Trust/ Association/ FPOs	2	As per norms issued by SFAC/		As per norms issued by SFAC/		-	
2. Setting up of common collection centres	10	Rs 15 lakhs/ unit	150.0	@ 55% of total cost	82.5	67.5	As majority pineapple growers in the State are small and marginal, collectivization into farmer groups can play a vital role in improving economies of scale of production and post production management of produce. Presently, there are very few Farmer Groups in the State. In order to encourage more number of farmer to mobilize into group(s) and for Farmer group(s) to own, operate and manage minimal processing and value addition at their own level, it is suggested that additional assistance from State must be extended for these intervention for

Project components	No. of Units	Cost per Unit (Rs. In Lakhs)	Estimated Total Cost (Rs. In lakhs)	GoI (MIDH/other schemes)		Proposed Outlay from State Government	Remark	
				Patter of Assistance	Financial Assistance (in lakhs Rs)			
							sharing cost in ratio of 70: 30, where Farmer Groups contribute 30% of the total project cost	
b .	Augmenting export oriented post harvest infrastructure							
	1. Setting up Modern Integrated Pack House (60 MT / day capacity)	1	Rs 50.00 lakh per unit	50.0	at 50% of cost	25.0	15	It is suggested that if the facility is out to be operated and managed through farmer group additional assistance from State must be extended for these intervention for sharing cost in ratio of 70: 30, where Farmer Groups contribute 30% of the total project cost
	2. Insulated Transport Van	3	Rs. 26.00 lakh for 9 MT	78	50% of cost	39	23.4	
	3. Minimal Processing units (1 unit)	1	Rs 25.00 lakh/unit	25.0	@50% of total cost	25.0	7.5	
c .	Setting-up Multi-fruit Processing Infrastructure (with focus on pineapple)	1	Rs 5 crores	500	at 50% of eligible project cost	250	-	
SUB-TOTAL (Rs. In Lakhs)						1125 (52%)	546 (25%)	492 (cost to be borne by beneficiary) (23%)
GRAND TOTAL (Rs. In Lakhs)						1670		