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PROFITABILITY AND MARKET DYNAMICS OF PINEAPPLE CULTIVATION IN TRIPURA: AN ECONOMIC ANALYSIS

ABSTRACT

Pineapple is one of the most important and delicious tropical crops in India as well as in Tripura. Tripura, being the 4th largest producer of pineapple in India, plays an important role in the socio-economic status of a farmer's life. Pineapple cultivation provides livelihood opportunities for rural people, including a large number of farmers. In spite of all these opportunities, the pineapple sector still faces lots of challenges. Thus, the current research is about the socio-economic status of pineapple growers in Tripura and also identifies the pineapple growers' consultants and challenges. The study found that all respondents were male, and age skewed more toward the young to middle-aged category. This is a promising sign, as they will be willing to be educated towards better and more innovative pineapple production. Pineapple cultivation was found to be economically feasible in the state, as the BCR ratio was 2.15. The study also revealed various challenges faced by pineapple growers, which include price fluctuation, lack of marketing linkage, distance to market, poor storage facilities, and many more, which lead to wastage and cause loss for pineapple growers.

Key words: pineapple, CACP, marketing channel, price spread, constraints.

JEL Classification: C34, Q22

1. INTRODUCTION

Pineapple is considered one of the most important fruit crops in India and ranks sixth overall in terms of output volume with a 105,000 ha area and 1,729,000 MT produced (National Horticulture Board, 2023). *Ananas comosus*, a perennial plant belonging to the Bromeliaceae family, is known for its palatable fruit. The fruit has grown into a distinctive element of meat, vegetable, fish, and rice dishes in what is colloquially known as Pan-Asian cuisine. In the US and Europe, baked desserts and pastry fillings also use it infrequently. The plant has 30 to 40 stiff, succulent leaves. Fruits from commercial cultivars often weigh between 2 and 4 pounds, or range between 1 and 2 kg. Pineapple is mostly cultivated in the north-eastern regions of India due to suitable agro-ecosystems, and as a result, the state of Tripura's economy is significantly impacted by it as a key source of farmers'

livelihood and financial stability (Roy and Ghosh, 2022). Tripura is the 4th largest producer of pineapple in India after Kerala, West Bengal, and Assam. Tripura's 'Queen', or Queen pineapple, declared 'State Fruit' in 2018, has a GI tag and is regarded as the best quality of pineapple in the world. The pineapple crop has shown a decline in area and productivity, due to which growers have been facing an income slump in India. Due to a market surplus in the months of June and July, pineapple producers claim that business is at an all-time low and that the fruit is sold for less than half of the going rate (Deb, 2019). As a result of government's lack of procurement facilities and storage, Tripuran pineapple growers have complained of significant losses (Panday, 2019).

According to the Indian Express website (2020), Tripura grows an estimated 1.28 lakh MT of pineapples every year, across 8,800-hectare orchards in different districts. Some of these orchards are run by the government, but most are privately owned. Over 4,000 people are directly connected to the cultivation of the fruit here. The ICAR project started in 2018, when around 2,000 pineapple plants were grown on a test plot of 0.20 acres at the government body's complex in Lembucherra village in Tripura. This is likely to help Tripura's pineapple growers, who complain of the small fruit size impacting demand and promise a higher yield. According to officials, the ICAR system ensures 43,000 plants per hectare, while in the traditional method, a maximum of 25,000 plants can be grown on a hectare. In Tripura, Dhalai district has both the highest pineapple area and production, followed by North district, Unakoti district, and South district (MoA& FW, 2021).

Marketability and commodity prices are highly influenced by the quality of pineapples on the shelves. These factors have hindered the smallholder growers from directly marketing their pineapple, which has made them turn to the middleman as an alternative for marketing their products. According to Rahman (2014), most farmers in India depend on wholesalers to market their production. Most farmers are limited in terms of affordability, availability, flexibility, mode of transport for distribution and delivery, access to proper facilities, and access to customers. Consequently, relying on middlemen has caused farmers to lose their maximum profit and income due to marketing costs. In terms of enhancing the livelihoods of smallholder farmers through revenue creation, whether in terms of quantity or marketing system, the pineapple growing business also substantially contributes to the nation's socio-economic growth (Jaji *et al*., 2018). An increase in pineapple production without efficient and good support from the marketing system might reduce the motivation of smallholder farmers to increase their cultivation or yield. So, the marketing system shows a high influence on the preferences of smallholder farmers in selecting marketing channels to increase their income and improve their well-being. Therefore, the present study addresses market access and determines the preferred pineapple marketing channel among smallholders in Tripura.

2. STATE OF KNOWLEDGE

The purpose of the study is to analyse the socio-economic status and challenges faced by pineapple growers in a selected district in Tripura. Accordingly, this section reviews related literature. Rymbai *et al*. (2012) studied the "Benefit-Cost Ratio Analysis of Pineapple Orchards in Meghalaya," and it was found to be economically feasible in the state. The benefit-cost ratio was worked out to be 1.61, 1.48, and 1.49 in the small, medium, and large categories, respectively. The break-even point was at 2.33 tonnes in the small category, 2.37 tonnes in the medium category, and 2.86 tonnes in the large category. Chakraborty and Bera (2008) conducted research on "a study on the structure of costs and returns of pineapple cultivation in Darjeeling district of West Bengal" and found that the net return would have been higher if it had been estimated by applying the prime cost concept of the cost of cultivation. Inter-farm size comparison in terms of different cost concepts revealed that there was an increasing trend with the increase in farm size, but the net return over different cost concepts used in the study and return-cost ratios were found to decrease with the increase in farm size at subsequent stages of estimation of those parameters. Baruwa (2013) studied "Profitability and constraints of pineapple production in Inosun State, Nigeria," and the report also identified the most pressing issues facing pineapple growers, including scarcity of high-quality planting materials, high perishability of fruit, low fruit prices, restricted access to loans, and plant diseases. Singh and Sharma (2020) studied "Constraints Faced by the Pineapple Crop Growers at Various Levels of Farms in Selected Districts of Nagaland and Manipur States," and the study reveals that the major constraints faced during the marketing of the major horticultural crop growers in the Manipur state were grading-related issues. The main problems identified by growers were: grading leading to quality deterioration (68%) and manual grading being too costly (42%). In a study by Nahar *et al*. (2020), smallholder pineapple growers in Malaysia were examined with regard to the challenges they faced when choosing a marketing channel for their produce. The study's findings identified five major issues that forced pineapple growers to carefully consider their marketing channel choices, including lack of market information, ineffective transportation, price volatility, market distance, and perishable product concerns. Lack of marketing knowledge on supply and demand marketplaces, possible clients, bartering, and negotiation have made pineapple producers hesitant to take a chance on selling their fruit to other customers. In order to prevent losses within the distribution channel, pineapple producers have been forced to sell their product at farm gate due to lack of transportation infrastructure and high transportation costs. Hasan *et al*. (2010) researched the "Impact of Pineapple Cultivation on the Increased Income of Pineapple Growers," and found that most respondents belonged to the higher income category (54.7%), their average increased income being 146.72 thousand taka per year.

A number of research articles were studied, and it was found that there are very few studies that mainly focus on the economic analysis of pineapple production and marketing in Tripura. Thus, the present investigation was carried out with the following objectives: (1) To study the socioeconomic status of pineapple growers in Tripura; (2) To estimate the cost and return of pineapple production; (3) To study the marketing practices adopted by pineapple growers; and (4) To address the constraints faced by the selected growers.

3. MATERIAL AND METHOD

The present investigation was carried out through descriptive and analytical research based on the characteristics of the population, where primary and secondary data were used. First-hand responses were collected from pineapple cultivators, and secondary data was collected from various trustable organizations such as the Directorate of Horticulture, NABARD, APEDA, etc. The socio-economic characteristics of producers were recorded through the questionnaire method and direct interview. Preliminary identification of different stages (planting, harvesting, and marketing, both at farm level and in the market) in the value chain was made based on secondary sources and information from key informants.

The state consists of 8 districts, and out of these 8 districts, 3 districts were purposefully selected based on the high concentration of pineapple cultivation: Unakoti, Dhalai, and North Tripura district. Simple random sampling techniques were carried out, in which proportionate pineapple producers were selected from each district. The total sample size consisted of 300 pineapple producers and was used to collect the primary data from June to December, 2023[1].

Data analysis technique:

Economies of Pineapple: The economics of pineapple production have been worked out by using the Cost A, Cost B, and Cost C concepts recommended by CACP. The profitability of crop production cannot be justified completely unless benefit-cost ratios are worked out. This ratio represents the returns obtained per rupee invested. It was worked out by dividing returns by their respective costs.

$$\text{Benefit} - \text{Cost ratio} = \frac{\text{Gross income } Rs \text{ per hectare}}{\text{Respective cost } Rs \text{ per hectare}}$$

Marketing margin: Marketing margin was calculated based on the difference in prevailing price for the selected commodity at the successive stages of marketing at a given point in time.

[1] The currency used is Indian rupee. In June–December 2023, 10,000 rupees where the equivalent of aprox. 110–113 EUR. This exchange rate is also valid for the first semester of 2024. The rupee's currency symbol is ₹, while the code is INR, which has been used in this study.

Absolute Marketing margin of i^{th} stakeholders (Ami)=PRi – (PPi + Cmi)
where, PRi = Total value of receipts per unit (sale price), Ppi = Purchase value of goods per unit (purchase price), Cmi = Cost incurred on marketing per unit.

Marketing cost: It explains the total cost incurred on marketing by producer and by various intermediaries involved in the sale and purchase of selected commodity till the commodity reaches the ultimate consumer, and which may be computed as follows: C = CF + Cmi + Cm2 + Cm3 + …. + Cmn. Where, C = Total cost of marketing of the commodity, CF = Cost paid by the producer from the time the produce leaves the farm until he sells it, and Cmi = Cost incurred by the i^{th} stakeholders in the process of buying and selling the product.

Price spread: It is the difference between the price paid by the consumer and the price received by the producer for the farm product, (Dinesh and Sharma, 2019).

Producers share in consumer's rupees = (Price received by the producer) / (price paid by the consumer) X 100.

Data has been analysed with the help of the percentage method, and interpretation was done with graphical and tabular presentation and statistical analysis. Primary data was collected using various tools (semi-structured interviews, key informant interviews, group discussion, and direct observation). Also, factor analysis and an ANOVA test are performed in the study. From the above-mentioned table, it can be seen that the Cronbach's alpha value is greater than 0.7, *i.e.* 0.735, which means the dataset is reliable for the present study.

4. RESULTS AND DISCUSSIONS

4.1. SOCIO-ECONOMIC STATUS OF PINEAPPLE GROWERS

Age is a determining factor in an individual's physical growth, mental maturity, decision-making, and physical and confidence levels. The distribution of respondents shows that the significantly highest percentage (*i.e.*, 45%) of pineapple growers belong to the middle age group, which is followed by the older age group, *i.e.*, 33%. Significantly, the lowest number of pineapple growers in Tripura belongs to the young age group (22%). It is concluded that the middle-aged group of growers is significantly more engaged in pineapple cultivation. The table below also explains that out of 300 respondents, the significantly highest percentage (*i.e.*, 97%) of pineapple growers are married. The gender-wise distribution of the study reveals that all 300 respondents are male and none female. In this context, in the study group, only males are involved in pineapple cultivation. The educational status of pineapple growers in Tripura shows that the significantly highest percentage (*i.e.*, 45%) of respondents have secondary education, followed by primary education. This study also shows that pineapple growers in Tripura have the lowest percentage of graduates. The present investigation also reveals that the

significantly highest percentage (*i.e.*, 47%) of pineapple growers in Tripura depend on agriculture as the primary source of income, where pineapple cultivation occupies the statistically second position (*i.e.*, 34%) for primary sources of income, is followed by fisheries and livestock (15%). So, it can be noticed that agriculture and pineapple production can be jointly considered key sources of income for pineapple growers in Tripura.

The present study also found that the majority (*i.e.*, 48%) of pineapple growers in Tripura have farming experience ranging from 5 to 10 years, which is significantly the highest ($p<0.01$), followed by less than 5 years. The significantly lowest percentage of respondents having farming experiences is 15–20 years. Queen, the best quality of pineapple in the world, significantly occupied the highest percentage (*i.e.*, 61%) of pineapple growers in Tripura, followed by 39% of pineapple growers using the Kew variety. In the case of source of finance, it was found that the significantly highest percentage, *i.e.*, 77% of respondents, were growing pineapples with help from family members and friends. The significantly lowest percentage, *i.e.*, 3%, was using self-finance for pineapple cultivation. Regarding access to extension services in pineapple cultivation in the study area, it was noticed that the significantly lowest percentage (*i.e.*, 42%) of respondents had access to extension services, and the significantly highest percentage, *i.e.*, 58%, didn't get any access to extension services, so it can be said that the majority of the respondents didn't get any kind of training related to pineapple production. The annual income of the majority of the pineapple growers in Tripura is 50,000–75,000 INR, which is significantly higher, followed by the group earning 75,000–100,000 INR; while the significantly lowest percentage (only 3%) of growers has an annual income of 100,000–150,000 INR. None of the respondents earned more than 150,000 INR per year from pineapple cultivation.

Table 1

Socio-economic status of pineapple growers

Variables		**Frequency**	**Percentage**	**Chi-square**
Age (years)	Young (15–35)	66	22	23.820** ($p<0.01$)
	(Middle) (36–45)	**135**	45	
	Old (>45 years)	99	33	
	Total	**300**	**100**	
Marital status	Single	9	3	265.080** **($p<0.01$)**
	Married	291	97	
	Total	300	100	
Gender	Male	300	100	–
	Female	0	0	
	Total	**300**	**100**	
Educational status	Illiterate	21	7	193.800** **($p<0.01$)**
	Primary Education	93	31	
	Secondary Education	135	45	

Table 1 (continued)

	Higher education	48	16	
	Graduate	3	1	
	Total	**300**	**100**	
Primary source of income	Agriculture	141	47	132.720** **(p<0.01)**
	Fishery / livestock	45	15	
	Pineapple	102	34	
	Other	12	4	
	Total	**300**	**100**	
Farming Experience (years)	>5 years	72	24	112.080** **(p<0.01)**
	5-10 years	144	48	
	10-15 years	69	23	
	15-20 years	15	5	
	Total	**300**	**100**	
Pineapple Variety	Kew	117	39	14.520** **(p<0.01)**
	Queen	183	61	
	Total	**300**	**100**	
Source of Finance	Self	231	77	270.420** **(p<0.01)**
	Family/Friends	60	20	
	Bank loan	9	3	
	Total	**300**	**100**	
Access to Extension Service	Yes	126	42	7.680** **(p<0.01)**
	No	174	58	
	Total	**300**	**100**	
Annual income	<50,000	39	13	168.720** **(p<0.01)**
	50,000-75,000	156	52	
	75,000-100,000	96	32	
	100,000-150,000	9	3	
	Total	**300**	**100**	

Source: Author's investigation.

4.2. COST AND RETURN IN PINEAPPLE PRODUCTION

Table 2

Cost and return of pineapple cultivation (INR/ha)

Sl.no.	**Particulars**	**Overall**
1	Hired labour	36,992.00 (25,94 %)
2	Planting material	71,893.33 (50,42%)
3	Working capital @ 6% per annum	6,533.12 (4,58%)
4	Cost "A"	115,418.45 (80,95%)
5	Rental value of land	4,493.84 (3,15%)
6	Cost "B"	119,912.29 (84,10%)

Table 2 (continued)

7	Family Labour	
a	Male	9,333.33 (6,55 %)
b	Female	13,333.33 (9,35 %)
8	Cost "C"	142,578.96 (100 %)
9	Total Production (kg)	15,725.22
10	Average selling price (INR/kg)	19,45
11	Gross return	305,862.50
12	Net return over cost "A"	190,444.05
13	Net return over cost "B"	185,950.21
14	Net return over cost "C"	163,283.54
15	B:C Ratio over cost A	2,65
16	B:C Ratio over cost B	2,55
17	B:C Ratio over cost C	2,15

Note: Working capital-INR108,885.33.

The above table shows that the overall cost "A" of pineapple cultivation amounted to 115,418.45 INR per ha. Adding the rental value of land to Cost "A", it shows Cost "B" amounted to 119,912.29 INR per ha. The pineapple farmers spend on an average about 50.42% of total Cost C on purchase of planting material followed by 25.94% of Cost C spent on hired wages of labourers used for pineapple planting and harvesting. From the above Table 3 it can be noticed that the average main product is 15,725.22 kg per ha. The total average gross return of the study area was 305,862.50 INR per ha and net return was 190,444.05 INR /ha over Cost A, 185,950.21 INR /ha over Cost B and 163,283.54 INR/ha over Cost C. The benefit-cost ratio was 2.65 over Cost A, 2.55 over Cost B and 2.15 over Cost C.

4.3. MARKETING STATUS OF PINEAPPLE GROWERS

The present investigation also reveals a significantly highest percentage (*i.e.* 87%) of respondents sell their pineapple as fresh whole fruit, 24% sell it under juice form in local market and a significantly lowest percentage, *i.e.* 5% make pineapple pickle (Table 3). This study also explains that 48% respondents sell their pineapple in village market only due to poor transportation system (significantly highest, **p<0.01)**, 31% respondents sell near roadside because there is a long distance between farm and market and only 21% sell in town market (significantly lowest, **p<0.01)**. It was found that 51% respondents sell their products to direct consumer as there is no proper marketing channel for pineapple (significantly highest, **p<0.01)**, followed by 32% selling through retailer-consumer channel and 17% selling through wholesaler-retailer-consumer channel.

Table 3

Marketing status of pineapple growers

Variables		Frequency	Percentage	Chi-square
Form of pineapple selling	Fresh form	261	87	389.220** (p<0.01)
	Juice Form	24	8	
	Pickle form	15	5	
	Total	**300**	**100**	
Place of pineapple selling	Road side	93	31	33.540** (p<0.01)
	Village market	144	48	
	Town Market	63	21	
	Total	**300**	**100**	
Marketing channel	Channel I: Grower-Consumer	153	51	52.260** (p<0.01)
	Channel II: Grower- Retailer-Consumer	96	32	
	Channel III: Grower- Wholesaler-Retailer-Consumer	51	17	
	Total	**300**	**100**	

Source: Author's investigation.

Table 4

Average quantity of pineapple sold to particulars (kg)

Per customer	4.5
Per day	551.83

Source: Author's investigation.

The present study also found out the average quantity of pineapple sales in the study area (Table 4). They mentioned that around 551.83 kg pineapple is sold per day in total and 4.5 kg pineapple per customer/day. The marketing information of pineapple for growers, wholesalers, and retailers in three different marketing channels (I) grower-consumer; (II) grower-retailer-consumer; (III) grower-wholesaler-retailer-consumer is shown in Table 5. The overall marketing costs incurred by the grower in Channels I, II, and III were 3.82, 3.30, and 3.22 INR/kg, respectively.

Table 5

Marketing of pineapple in Tripura (INR /kg)

Sl. No	Particulars	Channel I	Channel II	Channel III
1	**Marketing cost incurred by grower**			
A	Cost of gunny bags/ plastic bag	0.11	0.21	0.12
B	Cost of loading & unloading	0.39	0.41	0.38
C	Transportation near market	3.00	2.30	2.40
D	Naka /market charge	0.10	0.11	0.11
E	Weighing charge	0.22	0.27	0.21
F	Total marketing cost	3.82	3.30	3.22

Table 5 (continued)

2	Selling price of farmer	19.45	19.11	17.40
3	Net price received by farmer	15.63	15.81	14.18
4	**Marketing cost incurred by wholesaler**			
A	Storing	–	–	0.10
B	Transportation	–	–	3.40
C	Labour charges	–	–	0.23
D	Market fee	–	–	0.25
E	Weighing charges	–	–	0.20
F	Total marketing cost	–	–	4.18
5	Selling price of wholesaler	–	–	23.80
6	Marketing margin of wholesaler		–	2.22
7	**Marketing cost incurred by retailer**			
A	Storing	–	0.49	0.40
B	Transportation	–	1.67	1.20
C	Labour charges	–	0.46	0.46
D	Market fee	–	0.81	0.71
E	Weighing charges	–	0.21	0.23
F	Total marketing cost	–	3.64	3.00
8	Selling price of retailer	–	26.21	29.71
9	Marketing margin of retailer	–	3.46	2.91
10	Price spread	0.00	7.10	12.31
11	Producers share in consumers rupee	100.00	72.91	58.57

Source: Author's investigation.

The marketing expenses that the grower had to incur in all three distinct channels for pineapple were not the same, and they varied at a medium gap. The cost of transportation was higher than other marketing charges, such as the cost of gunny bags/plastic bags, cost of loading & unloading, market charge, weighing charge and so on. Under channel I, II, and III, the growers selling price per kg of pineapple was 19.45 INR, 19.11 INR, and 17.40 INR, respectively. The net price received by the farmer via channel I was 15.63 INR, 15.81 INR under channel II and 14.18 INR under channel III.

The wholesaler was only active in channel III, *i.e.* grower-wholesaler-retailer-consumer, and the overall marketing cost was 4.81 INR per kg, with transportation costs (3.40 INR) being higher than other connected costs, followed by market fees and storing costs. The pineapple selling price per kg was 23.80 INR, and the marketing margin per kg obtained was 2.22 INR.

Retailers spent a total of 3.64 INR and 3.00 INR on marketing through channels II and III, respectively. In channel II, the retailer's pineapple selling price per kg was 26.21 INR, whereas in channel III, it was 29.71 INR. The marketing margin for pineapple received by the retailer in channel II was higher, (3.46 INR), than in channel III (2.91 INR).

4.4. RELATIONSHIP BETWEEN THE CONSTRAINTS FACED BY PINEAPPLE GROWERS

Table 6

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.762
Bartlett's Test of Sphericity	Approx. Chi-Square	3526.597
	Df	231
	Sig.	0.000

Source: Author's investigation

KMO test is conducted to examine the strength of the partial correlation (how factors explain each other) between variables. KMO values closer to 1.0 are considered ideal, while values less than 0.5 are unacceptable. Here KMO value is higher than 0.5, that is 0.762, this indicates the degree of information among the variables overlap greatly the presence of strong partial correlation. Hence it is plausible to conduct factor analysis. Bartlett's test for sphericity is used for comparing correlation matrix to the identity matrix. A significant statistical test ($p < 0.05$) shows that the correlation matrix is indeed not an identity matrix, which means there is relation between constraints faced by pineapple growers.

Table 7

Descriptive Statistics of constraints faced by pineapple growers

	Constraints	**Mean**	**Std. Deviation**	**Analysis N**
1	Lack of credit facilities	3.58	0.931	300
2	Erratic rainfall pattern	3.74	0.896	300
3	High cost of input	3.53	1.064	300
4	Poor agronomic practice	3.55	1.032	300
5	Pests and diseases	3.54	1.035	300
6	Unfavourable weather conditions	3.52	0.959	300
7	Lack of planting material	3.27	3.147	300
8	Lack of access to current market information	3.11	0.984	300
9	Seasonal price fluctuations	3.17	0.931	300
10	Low access to improved variety	3.76	0.935	300
11	Distance to market	3.97	0.760	300
12	Low access to extension services	3.67	0.818	300
13	Product quality	3.59	0.737	300
15	Post-harvest handling	3.66	0.779	300
16	Customers taste and preferences	3.47	0.803	300
17	Theft	3.40	0.703	300
18	Poor pricing of pineapple	3.47	0.773	300
19	Poor handling	3.45	0.826	300
20	Packaging system	3.64	0.730	300
21	Market channels	3.61	0.758	300
22	Poor storage system	3.54	0.695	300
23	Fruit perishability	3.54	0.790	300

Source: Author's investigation

The pineapple growers shared their own experiences when asked about the challenges they faced in this field. The above-mentioned table shows the mean and standard deviation of constraints faced by the selected pineapple farmers. As it can be seen from the table, the mean of almost all the constraints is greater than 3, so all the constraints are crucial for respondents.

The scree plot is a graph of the eigenvalues against all the factors. The graph is useful for determining how many factors to retain. The point of interest is where the curve starts to flatten. It can be seen that the curve starts to flatten between factors 6 and 7. Also, factor 7 onwards has an eigenvalue of less than 1, so only six factors have been retained.

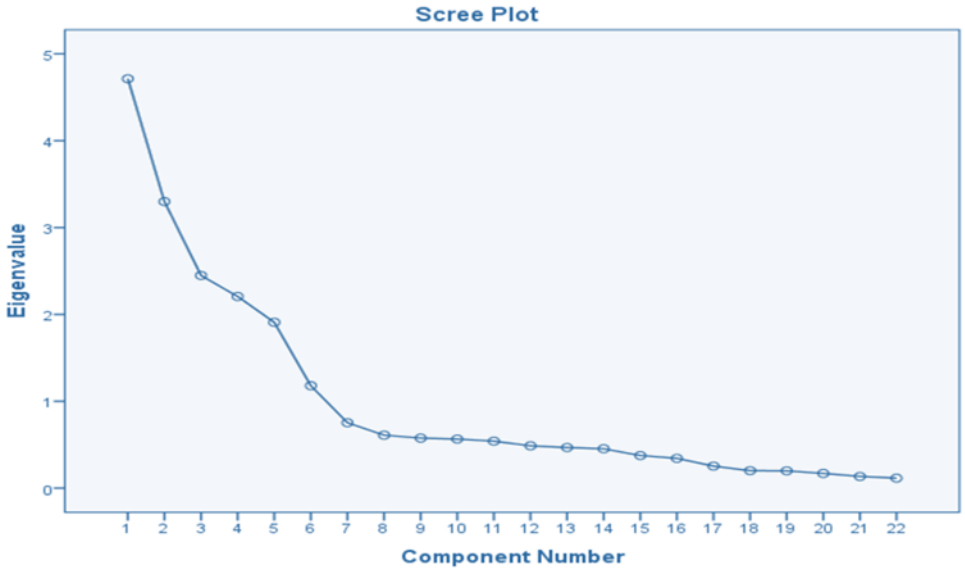

Figure 1. Scree plot.

Table 8 indicates the component-wise distribution of different constraints faced by pineapple growers in the study area. It shows that there are 5 main constraints under post-harvest handling: poor handling, packaging system, post-harvest handling, poor storage system, and fruit perishability. Under the production techniques component, there are eight factors: lack of credit facilities, erratic rainfall patterns, high input costs, poor agronomic practises, pests and diseases, unfavourable weather conditions, lack of planting material, and theft.

Under Satisfaction component there are 2 factors vis-a-vis customers taste and preferences and product quality. Under the price constraints component, there are two factors: poor pricing of pineapple and seasonal price fluctuations. Under lack of marketing functions and infrastructure component, there are two factors: distance to market and marketing channel. Under the accessibility component,

three factors are present: low access to improved variety, low access to extension services and lack of access to current market information.

Table 8

Rotated Component Matrix of constraints faced by pineapple growers

Particulars	Component					
	Post-harvest handling	**Production techniques**	**Satisfaction**	**Price constraints**	**Lack of marketing functions & infrastructure**	**Accessibility**
Lack of credit facilities		0.850				
Erratic rainfall pattern		0.609				
High cost of input		0.723				
Poor agronomic practice		0.751				
Pests and diseases		0.758				
Unfavourable weather conditions		0.769				
Lack of planting material		0.748				
Theft		0.779				
Seasonal price fluctuations				0.940		
Poor pricing of pineapple				0.935		
Low access to extension services						0.878
Lack of access to current market information						0.860
Low access to improved variety						0.856
Distance to market					0.827	
Market channels					0.810	
Customers taste and preferences			0.919			
Product quality			0.919			
Poor handling	0.847					
Packaging system	0.744					
Post-harvest handling	0.786					
Poor storage system	0.883					
Fruit perishability	0.899					

Note: Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser normalisation. Rotation converged in 6 iterations.

5. CONCLUSIONS

The present study revealed the economic and marketing analysis of pineapple growers in Tripura. The study found that all respondents were male, and age skewed more towards the young to middle-aged category. This is a promising sign,

as they will be willing to be educated towards better and more innovative pineapple production practices. The present investigation also reveals that most pineapple growers in Tripura engage only in farming as an occupation because their primary source of income is mainly agriculture and they have farming experience of 5–10 years. They are interested in growing queen varieties on their own land and family land, while very few respondents were using rented land. Most of them used the self-financing system, taking help from family and friends, and a few of them took bank loans. The annual income of respondents from pineapple cultivation is unfortunately not very promising, as more than half of respondents still earn less than 75,000 INR per annum. The B-C ratio analysis over cost C indicates that the investment in pineapple orchards is economically viable, and on average, a INR = 1, investment brings 2.15 INR in returns. Pineapple cultivation is capital-intensive. So, the present study reveals that pineapple cultivation in Tripura is economically feasible. Most of respondents sell their pineapple in fresh form in the village, as the cost of transportation is high. On average, 551.83 kg of pineapple are sold per day, and 4.5 kg of pineapple are sold per customer on average. Low access to extension services is also one of the important problems that respondents are facing. Lack of credit facility, seasonal price fluctuation, poor packaging system, and poor post-harvest handling are also very prominent issues faced by respondents. From the present study a conclusion can be drawn, mainly that the main problem faced by pineapple growers in Tripura is the lack of security of their farms due to which they do not get the yield that they expect, and unavailability of, or the inability of farmers to get substantial credit in order to tackle that problem. Lack of proper pineapple storage facilities is also one of the important problems, as it leads to wastage, causing losses for pineapple growers.

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