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Present Status of Pineapple Cultivation in Bangladesh: Case of Madhupur Tract

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ABSTRACT

The main focus of this research was to explore the present status of pineapple cultivation in Madhupur tract of Bangladesh. Primary data were collected using a pre-designed and pre-tested questionnaire by face-to-face interviews from a sample of 300 pineapple growers and two focus group discussions were also carried out from March to May 2022. According to the study findings majority (51%) of the respondents cultivate pineapple in their own land having medium experience (53.3%), followed mixed cropping pattern (89%) where 25.33 percent respondent cultivate banana as companion crop. 'Calendar' is the top most cultivated variety of pineapple in Madhupur tract. Majority of the respondent use balanced pesticide and ripening agent due to increasing demand of chemical free farm fresh pineapple among consumers. Higher profit compared to other crops (82.00 %) was the main reason for producing pineapple in the study area. Majority (26.67%) of the respondent followed (*Grower- Faria- Bepari- Aratdar- Wholesaler- Retailer- Consumers*) channel among the six dominant marketing channels to market their produced pineapple. The results of SWOT analysis revealed that weakness of pineapple cultivation in Madhupur tract have the potential to improve. If the government and other policy making organizations come forward to solve the problems arising in pineapple cultivation, then the position of pineapple as fruit will be consolidated soon in home and abroad.

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Introduction

Pineapple is a very fragrant, delicate and delicious fruit. The scientific name of pineapple is *Ananus comosus* which belongs to the Bromeliaceae family (Baruwa, 2013, Hasan et al., 2022). Pineapple lives proudly sitting on the seat of thorns, with a crown on his head. The fruit of the pineapple is quite short, covered with a large number of densely interspersed thick and long leaves. In our country, pineapple is commonly consumed as a fresh ripe fruit. But most of the world's pineapples are processed (Hossain et al., 2015).

The benefits of pineapple are dignified both medicinally and nutritionally (Uddin et al., 2022). Ripe fruits are tonic, choleretic, digestive and diaphoretic. Raw fruit is abortifacient. The fresh juice of the ripe fruit contains astringent juice called bromelain, which aids in digestion (Afzal, 2019). Mixture of young fruit and leaves juice with honey prevent worm infection. In terms of nutritional value, pineapples are rich in vitamins A, B and C (Joy, 2010 and Kader et al., 2010). Moreover, there are significant amounts of manganese, calcium, iron and phosphorus. That's why it acts as a special food and medicine in fever.

The weather and climate condition of Bangladesh are suitable for pineapple production. Though it is well grown in hilly areas like Moulvibazar, Sylhet, Chittagong, Khagrachari, Bnandarban, Rangamati and also in Tangail, Gazipur, Mymensingh. Among them Pineapple is broadly cultivated in Madhupur tract specially in Madhupur Upazila which is belong to Tangail District (Hasan et al., 2010). According to Farid and Islam (2017), 59% of total production and 49% of total pineapple cultivated area belongs to Tangail district. Pineapple is generally

propagated by lateral cuttings, budding, crown cuttings and stem cuttings. Seedlings are obtained from leaf axils, from leaf axils near the ground, from the sides of resulting buds, from the crown of the head or from the base of old plants. Among them seedlings obtained from leaf cells are better. Pineapple trees usually produce a variety of seedlings. Side sows, bud sows, crown sows, root sows or tamps. All types of seedlings can be planted, but side seedlings and root seedlings are best.

In order to get a good quality yield, as much organic fertilizer as possible should be applied to the pineapple cultivation land. Irrigation is very necessary in pineapple fields during the dry season (Umi et al., 2020). However, the use of irrigation in pineapple cultivation has not been very popular in our country.

Among other benefits of pineapple cultivation is ratoon crop. Ginger, soyabean, mustard, kalai, kachu etc (Hasan et al., 2010). can be grown as companion crops with pineapple, which make the pineapple cultivation more profitable (Hoque et al., 2019, Balogun et al., 2018). Pineapple is a multi-purpose fruit and the cultivation of pineapple is a lucrative business which become a good source of livelihood and income of the farmers (Akter et al., 2018, Singh et al., 2016, Das et al., 2016, Rymbai et al., 2012). Despite all of this, pineapple farmers are facing various problems while marketing their produced pineapples. In this case the farmers are failing to earn their real profit due to the clutches of middlemen and moneylenders. That's why producer's level price variation become low and their share is also moderate in nature (Das et al., 2016). This is due to the absence of detailed planning for the production and marketing of pineapple (Asem, 2018). So, policy makers should pay attention to this. We have unlimited usable land. If we can ensure the cultivation and processing system with a little more cost, we can feed the world with pineapples. All that is required is proper planning, operational management and implementation strategy. The specific objective of this study was to explore the present status of pineapple cultivation in the study areas.

Methodology

This study followed descriptive and diagnostic research design. Both qualitative and quantitative methods were used to collect data. The study was performed at the selected areas of Madhupur Upazila of Tangail district (Figure 1), situated in between 24°47' and 24°31' north latitudes and in between 90°10' and 89°57' east longitudes (Banglapedia, 2021). The research location was selected purposively because Madhupur Upazila stands first in pineapple cultivation and the area offers easy access to the researcher.

Both ethnic and non-ethnic people who were directly or indirectly dependent on pineapple cultivation in the Madhupur Upazila were the present study population. The population size was 1227. Out of the population, 300 respondents were selected as a sample following a proportionate random sampling technique and utilizing the following formula. Hasan et al. (2010) also followed the similar formula when they selected sample in their study in Tangail district of Bangladesh.

$$n = \left(\frac{Z^2 \times \sigma^2 \times N}{(N-1)e^2 + Z^2.\sigma^2}\right) \quad (1)$$

Where,
n = Size of the sample
N = Size of the population
e = Acceptable error
σ = Population standard deviation
Z = Standard normal variate at a given confidence level

For the initial rapid assessment of the pineapple production, two FGDs were conducted at Kuragacha and Beribaid villages of Madhupur upazila with 10 and 12 pineapple growers respectively. It was ensured that all the participants keenly took part in the discussion session. Well-known and reputed persons in the locality acted as moderators during the sessions. Data were collected through face-to-face interview from the respondents with the help of a semi-structured interview schedule. Questions were focused on the pineapple production trend, problems and prospects.

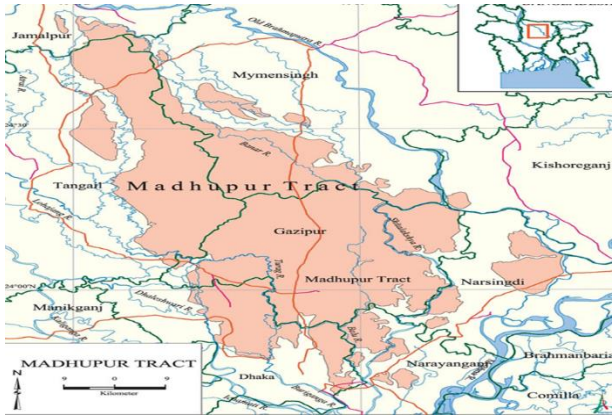

Figure 1. Map of study site

Measurement of variables

A three-point scale consists of stable (score=1), decreasing (score=2), and increasing (score=3) was used to determine the trend of pineapple cultivation status in the last ten years. To calculate the perception of change trend, the overall perceived trend index (Oteros-Rozas et al., 2014) was used.

$$\text{Overall perceived trend} = \left(\frac{I-D}{I+D+M}\right) \quad (2)$$

Where,
I= frequency of increases;
D=frequency of decreases; and
M=frequency of stability

The SPSS/PC + (version 26) computer program (Statistical Package for Social Sciences) was used to perform data analysis (Hasan et al., 2021, Afrad et al., 2021). Descriptive statistical measures like range, mean, number and percent distribution, and standard deviation were used to describe and interpret the data. Qualitative data obtained from interviews were first coded and categorized into themes according to the research questions. To find out the strengths, weaknesses, opportunities, and threats of pineapple production in Madhupur tract SWOT analysis was also performed.

Results and Discussion

It was observed that the total pineapple production land of the respondents ranged from 15 to 2310 decimal. Figure 2 showed that highest proportion (51%) of the respondents cultivate pineapple in their own land. 39.33% respondent cultivate pineapple in their own land with leased land. Only 9.67% respondent used leased land for pineapple cultivation.

Respondents' involvement in pineapple cultivation ranged from 3 to 60 years with standard deviation of 13.07. Figure 3 indicated that the highest percentage of the respondents (53.3%) had medium experience (16-35 years) followed by high experience (>36 years) and low experience (<16years) which was 29.5 and 17.1 percent respectively.

Table 1 shows that respondent followed 2 types of cropping pattern in cultivating pineapple. Majority (89%) respondent followed mixed cropping pattern. As pineapple is long duration crop, so they cultivate banana, lemon, jackfruit etc. as companion crops along with pineapple which facilitates their way of additional income (Hasan et al., 2010). But they have to conduct more intercultural operations while practicing mixed cropping pattern. Only (11%) respondent followed single cropping pattern.

All the respondents of the study area produced variety of companion crop along with pineapple. Results showed in Table 2 indicate that majority of them (25.33%) produce banana along with pineapple production. 23 percent of the farmer followed jackfruit-pineapple based agroforestry system. As the weather and edaphic condition of the study area were favorable for this system. Rest of the respondent produce banana and lemon as companion crop. They also try to produce some commercially important crops in the study area such as dragon fruit, coffee etc.

The soil and weather condition of Madhupur tract is favorable for pineapple cultivation. Among many varieties five varieties were commercially cultivated. Table 3 showed that Calendar ranked 1st as highest percentage (35.67%) of respondent cultivate this variety. Joldungi was ranked 2nd as it occupied 27.33 percent respondent followed by Giantkew (15.67) which was ranked 3rd. Ghorashal and local variety were ranked 4th and 5th which occupied 13.67 and 7.67 percent respondent respectively. Those who cultivate Ghorashal and the local varieties mainly use them for their own consumption.

Findings presented in Figure 4 show that all of the issues exhibited pesticide and ripening agent use which showed unchanged or stable situation. According to overall perceived trend index, issues like area under pineapple cultivation, no. of pineapple plants, disease and insect infestation, fertilizer use, hormone use, production during COVID-19 showed increasing trend. These findings indicate the balanced use of pesticide and ripening agent use. It was due to increasing demand of chemical free farm fresh pineapple among consumers.

Pineapple farmers in the study areas were asked to mention the reasons behind pineapple cultivation in all over the area. Respondent farmers mentioned that higher profit compared to other crops (82%) was the main reason for producing pineapple (Figure 5). About 69% farmers mentioned that chance of cultivating two crops at a time (Intercropping) as an important factor of cultivating pineapple. Covid- 19 (49%) was mentioned to be the third reasons. During Covid-19 demand of pineapple increased. In the midst of the lockdown, when all the export import become stopped pineapple growers have been able to market it to a higher rate due to the goodwill of the government. 36 percent farmers mentioned favorable weather condition which also influenced them to cultivate pineapple. No requirement of extra care (24%) and easy cultivation process (17%) were opined as the reasons for cultivating pineapple.

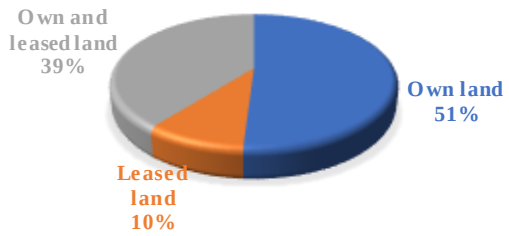

Figure 2. Distribution of respondents according to their land ownership

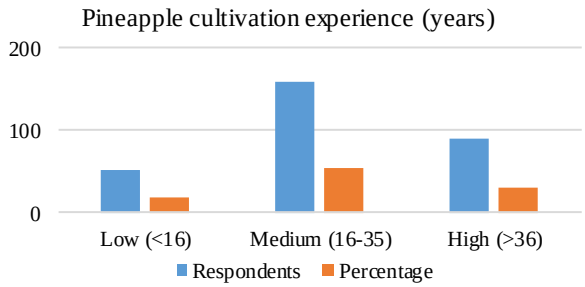

Figure 3. Distribution of the respondents according to their production experience

Table 1. Cropping Pattern in pineapple cultivation

Cropping Pattern	Respondents (n=300)	Percentage
Single	33	11
Mixed	267	89

Table 2. Distribution of the respondents according to their companion crop production

Crop Name	Number(n=300)	Percent
Banana	76	25.33
Guava	44	14.66
Lemon	53	17.66
Jackfruit	69	23.00
Banana + Lemon	58	19.33

Table 3. Ranking Status of pineapple varieties of the sample farmer

Pineapple varieties	Respondents (n=300)	Percentage	Ranking Status
Calendar	107	35.67	1st
Joldungi	82	27.33	2nd
Giantkew	47	15.67	3rd
Ghorashal	41	13.67	4th
Local	23	7.67	5th

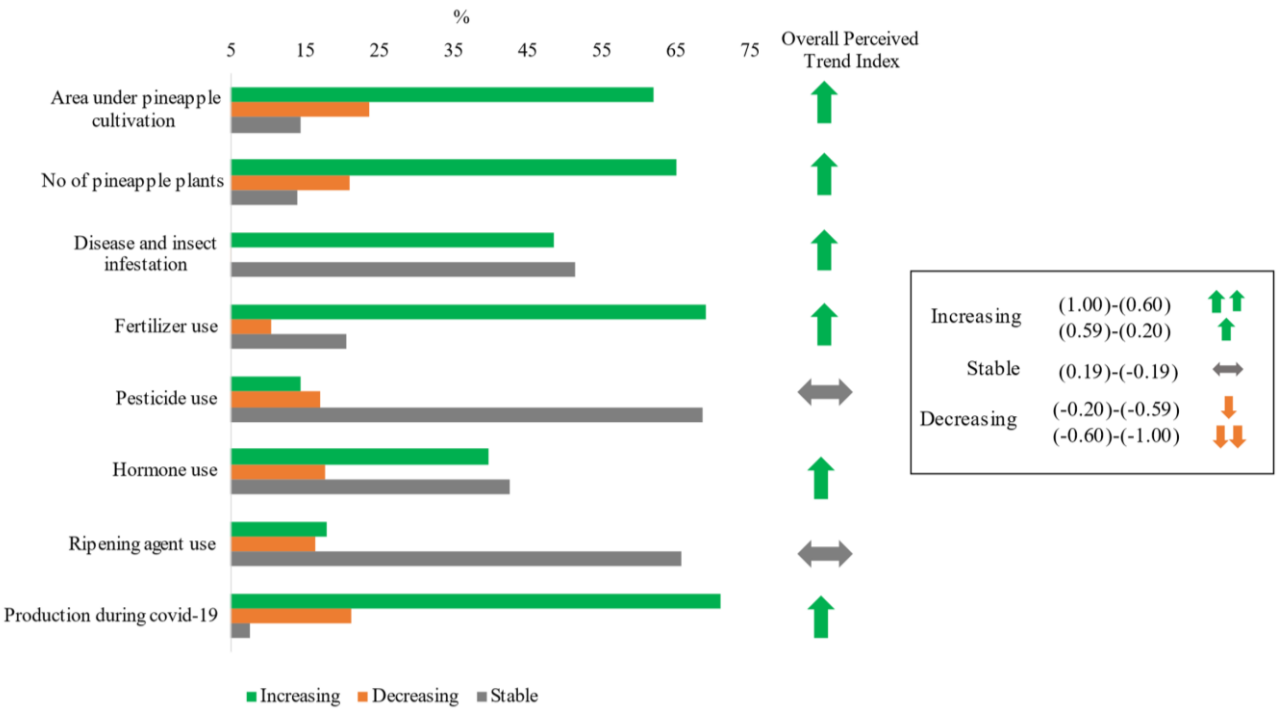

Figure 4. Present status of pineapple cultivation

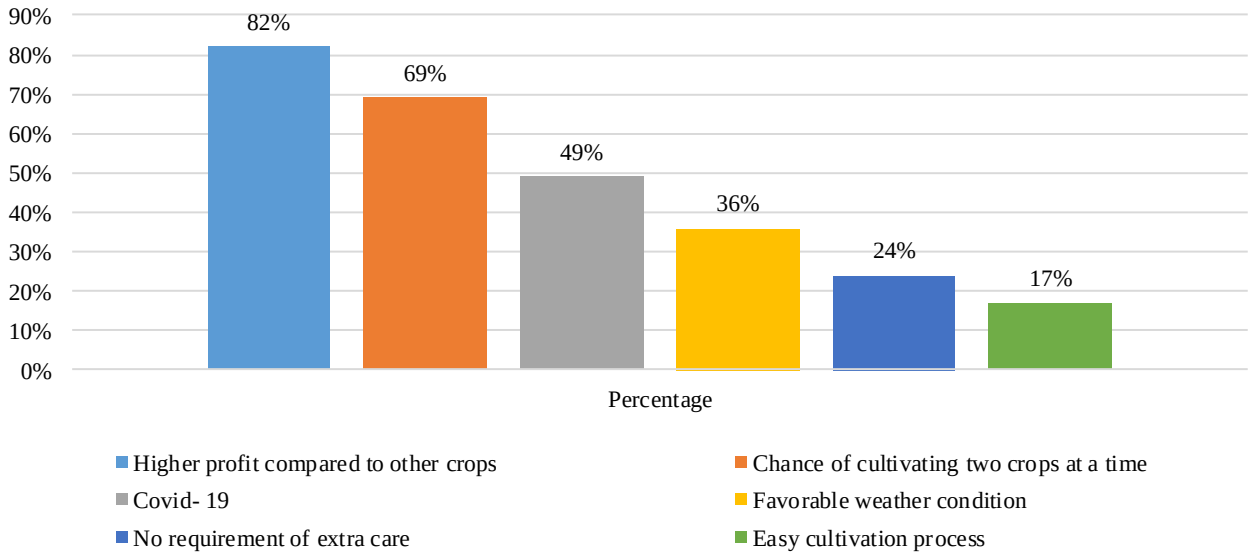

Figure 5. Reasons for pineapple cultivation

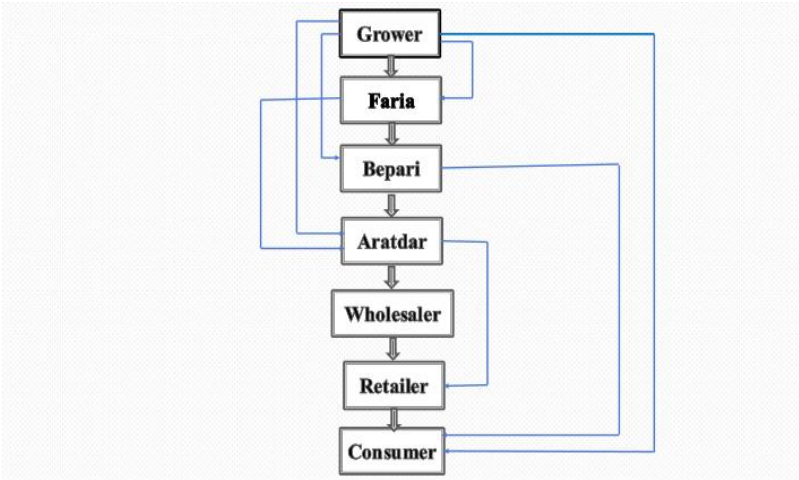

Figure 6. Typical pineapple marketing channel

Table 4. Distribution of the pineapple farmers based on marketing channel use

Sl. No.	Marketing channels	Number (n=300)	Percent	Rank
1	Grower- Faria- Bepari- Aratdar- Wholesaler- Retailer- Consumers	80	26.67	1st
2	Grower- Faria- Aratdar- Wholesaler- Retailer- Consumers	61	20.34	2nd
3	Grower- Aratdar- Wholesaler- Retailer- Consumers	58	19.33	3rd
4	Grower- Aratdar- Retailer- Consumers	43	14.33	4th
5	Grower- Bepari- Consumers	31	10.33	5th
6	Grower- Consumers	27	9.00	6th

Table 5. SWOT analysis of Pineapple production in Madhupur Tract

Strengths	Weaknesses
Favorable soil and weather condition Need less intercultural operation to other crops Remnants are useful as fodder	Ineffective extension services No modern varieties Shortage of processing industries Long Life cycle
Opportunities	**Threats**
Possibility of making yarn from leaves Online market Facilities Nutritional quality Increasing demand due to Covid-19	Violence of middleman Perishable nature of pineapple Labor and input crisis Excessive use of hormones and ripening agent

A marketing channel is the set of people, organizations, and activities that work together to transfer products and services from the point of production to the point of consumption. As Madhupur upazila being the first in pineapple cultivation, produced pineapple from here were exported to other parts of the country through different channels, such as Faria, Aratdar, Wholesaler and Retailers. Grower's market their pineapples through various channels. Figure 6 shows a typical pineapple marketing channel which is followed by the pineapple growers of Madhupur tract.

Among them six dominant channels were ascertained which is shown in Table 4. Among the different channels 26.67 percent *Growers* sell their pineapple to *Faria* which reached to consumers through *Bepari, Aratdar, Wholesaler* and *Retailer*. This channel was ranked first. Which did not help the farmers to make much profit. Growers of pineapples are compelled to advertise their products and rely on the intermediary because of the pineapples' quick perishability (Jengka,2020). However, they use this channel more due to lack of time and to avoid trouble. Only 09 percent sold their pineapple directly to the consumer which is very low in percentage. In this case, pineapple growers could have benefited more if some area-based processing units were created where they can directly supply their pineapple and get the actual price. However, the hope is that, with the introduction of the online market, there are some educated local entrepreneurs who are selling their produced pineapple directly to the consumers and are profiting.

SWOT analysis is the situational assessment or situational analysis. It is used to ascertain Strengths, Weaknesses, Opportunities, and Threats related to a production technology. In this study two focus group discussion consists of 10 and 12 participants were performed. Respondents identified 3 strengths and 4 weakness (Table 5). The results have led us to conclude that there is much to improve upon including development of modern varieties and processing industries. Okal, (2017), also suggests the development of new, high-yielding pineapple varieties in their study. Furthermore, 4 opportunities and 4 threats create equilibrium for production of pineapple in Madhupur tract. The analysis revealed that if those certain weaknesses can be reduced than the pineapple production will be increased radically which ultimately change the socio-economic status of the respondents.

Conclusion

Based on the findings of the study, it can be concluded that majority of the respondents cultivate pineapple in their own land having medium experience. Highest proportion of the respondent followed mixed cropping pattern where one fourth of the respondent cultivate banana as companion crop along with pineapple cultivation. Highest percentage of the respondent cultivate 'Calendar' among the five commercially cultivated varieties in Madhupur. Majority of the respondent followed balanced use of pesticide and ripening agent due to increasing demand of chemical free farm fresh pineapple among consumers. Higher profit compared to other crops was the main reason for producing pineapple in the study area. Among the six dominant marketing channels majority of the respondent followed (Grower- Faria- Bepari- Aratdar- Wholesaler- Retailer- Consumers) channel to market their produced pineapple. The results of SWOT analysis revealed that weakness of pineapple cultivation in Madhupur tract have the potential to improve.

Recommendation

Government should induce effective extension services to spread out modern technologies related to pineapple cultivation.

Different Private industries may establish processing plants so that violence of middleman can be reduced.

The present study was conducted in Madhupur tract. Further study may be replicated in Chattogram, Rangamati, Bandarban to generalize the findings.

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Conflict of interest

The authors declare that they do not have any conflict of interest.

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