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FARMERS' PERCEPTION ON PROSPECT OF MANGO CULTIVATION IN NAOGAON DISTRICT

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ABSTRACT

This research examines the perceptions of farmers as far as the future of mango farming in the Naogaon District in Bangladesh is concerned, where the area is increasingly becoming an important source of fertile agro-ecological environments and as a contributor to the national fruit economy. A descriptive-correlational research design was used, whereby 102 mango farmers in five villages within Sapahar Upazila participated in a structured interview and a correlation analysis of the variables by means of descriptive statistics and Pearson correlation tests was done. Findings showed that most farmers (70.59) had moderately positive perceptions of mango cultivation with only 3.92% of them having low perceptions. Out of thirteen socio-economic and informational variables considered in the study, four variables age, education, extension media contact, and knowledge of mango cultivation were significantly correlated with the perceptions of the farmers ($p < 0.05$). The farmers that were younger and better educated, having more exposure to the agricultural media and more technical knowledge were found to be more optimistic about the profitability and sustainability of mango farming in the long term. Economic prospects were seen to be high, but limitations in the form of poor training, lack of provision of post-harvest infrastructure and pests' management issues remained. The results emphasize the importance of policy changes aimed at the specific training, the enhancement of the extension services, and the introduction of the value-added processing units to make the mango growers economically more resilient. Enhancing institutional promotion and implementation of technology have the potential to significantly enhance productivity and boost agribusiness potential in the region.

1.0 INTRODUCTION

The economy is an agrarian economy in which agriculture is the backbone sector, with almost 13.6 percent of the national gross domestic product (GDP), and almost 63 percent of the total population is employed. Being an agro-based country, Bangladesh is geographically subdivided into 30 Agro-Ecological Zones (AEZ), which have different topographic and climatic conditions, which determine the suitability of crops (Nabati et al., 2020). Agricultural productivity is also closely related to the socio-economic stability of the nation, and in this case (Dwomoh et al., 2023), The farmers grow a variety of cereal crops such as rice, wheat, and maize, as well as a variety of fruits, including mango, banana, guava, and litchi, among others. The ecosystem of the Barind tract is productive and, in most cases, a challenge to the conventional field crops in these 30 AEZs (Mahedi et al., 2026), but very favorable to the growth of fruit crops, especially the mangoes, litchi, and jujubes (Sultana et al., 2018). Fruit production is a significant contributor to the national agricultural income of about 10 percent, although the crop only covers 1 percent to 2 percent of the total arable land (Singh et al., 2022). The mango (*Mangifera indica* L.) is one of the fruits that has an aristocratic presence in Bangladesh because of its excellent taste, sweet smell, and rich nutritional value. It has also been called the King of Fruits, and it takes the first place in the list of favorites of the consumers among the fifty varieties of fruits produced in the country (Thorogood et al., 2022). Despite being native to South Asia, mangoes have extended across the world to become an established tropical farm crop (Sacramento & Cañete, 2023). In Bangladesh, the national tree is the mango that was traditionally concentrated in the north. The cultivation has, however, been extended to about 30 districts (Hoque et al., 2025). Statistics also show that production increased considerably; the country manufactured 2.4 million tons in 2017-2018, which is a substantial growth in comparison with 1.25 million tons in 10 years ago. This growth of about 16 percent per annum has increased per capita consumption by two times in a decade, and as per the Food and Agriculture Organization (FAO), Bangladesh has in the recent past been showing one of the highest rates of increase in mango cultivation in the world (Moniruzzaman et al., 2022). Besides being a tasty fruit, the mango is an important source of essential vitamins, minerals, and antioxidants. It contains especially vitamins A and C, dietary fiber, and polyphenolic compounds in abundance. An average mango fruit has a carbohydrate content of approximately 16.9, which is a great source of caloric energy (Vittal et al., 2023). Traditionally, the northern and north-western parts of Bangladesh have been renowned in respect of high production because of good soil and climatic condition (Das et al., 2023). However, with the advent of modern better varieties successful commercial cultivation has been possible in other numerous districts (Mahedi et al., 2025). Mangoes are also gaining popularity among growers in other parts of the country such as Rajshahi and the Barind region due to their low water needs and strong marketability (Islam et al., 2023).

The most major mango-producing centers are Chapai Nawabganj, Rajshahi, Naogaon and Satkhira with Rajshahi alone producing over 250,000 metric tons over the last couple of years (Khatun, 2022). Some of the varieties of the Bangladesh include more than 150 varieties and the elite traditional ones are Fazlee, Langra, Khirshapat, and Gopalbhog, whereas the varieties created by BARI (*BARI-1 up to BARI-4*) are becoming more popular because of the yield and the quality (Kabir et al., 2025). Most especially in Naogaon district, there has been a significant growth, and about 18,000 hectares of land is now under mango orchard. On a nationwide scale, the production level increased to 1.4 million tons in 2017-18 compared to 1.0 million tons in the last fiscal year 2014-15, earning Bangladesh the 7th rank in the world in terms of mango production (Barmon et al., 2025). Along with the local use, the country

sells more than a thousand tons each year, mainly the European markets. The nutritional value of the fruit is also supported by the mineral content of the fruit; an example is that the green mangoes are ranked the highest among the large fruits in terms of iron content (Zhao et al., 2022). Since it has economic and nutritional importance, the mango has rightly been referred to the King Fruit of Bangladesh. Although the practice of mango farming in Bangladesh has a very old history, the majority of farmers are not familiar with the current scientific farming methods and thus they go through unnecessary production challenges (Mahedi et al., 2026). Nevertheless, overall attitude of cultivators is positive which indicates a big chance to continue their growth. To be able to exploit this potential, one has to know how mango growers see the opportunities of their activity. Mango farming is an emerging business in the Naogaon district as a lucrative business (Zhao et al., 2022). This research paper is titled Farmers-perception on prospect of Mango cultivation in Naogaon District and will aim at availing crucial information to the policy makers on the views of the growers. In particular, the study also considers the nature of farmer perceptions, socio-economic traits related to the same, and how the latter relates to their general attitude towards the industry.

Objectives:

- a) Profile farmers' socio-economic & informational characteristics (age, education, farm size, income, training, media contact, knowledge, challenges).
- b) Assess farmers' perceptions of mango cultivation prospects.
- c) Determine how these characteristics influence their perceptions.

Rationale: Mangoes offer high nutrition (74 kcal/100g) and profit margins (~double cultivation costs). Rising domestic/export demand drives shifts to mango farming in northern Bangladesh. However, environmental changes and traditional practices threaten productivity. This study identifies challenges and farmer attitudes to guide productivity enhancement.

In order to have the focus and viability of the investigation, a few limitations were stipulated. The geographical area covered in the study constituted two unions in the Sapahar Upazila in the Naogaon District. The results were obtained on a given sample and not on the whole population because of limited time and resources. Although there are an enormous number of factors that affect agricultural perception, this study restricted its investigation to 13 certain socio-economic features. Also, the researcher admitted the difficulty to receive accurate data with the respondents with low levels of formal education. This was also limited to the heads of households that are actively and regularly involved in land cultivation. Any hesitation by the respondents at the start of the data collection was resolved by the creation of a professional relationship to create a cooperative atmosphere.

To have an appropriate approach to the current research, the following specific objectives were developed: a) To demonstrate the selected prominences of the farmers that are factors related to mango farming, b) To evaluate the perception of the farmers about the prospect of mango farming, c) To determine the contributions level of the selected prominences of the farmers to the level of their perception on the prospect of mango farming. From this viewpoint, the research topic has been assumed to answer the following experimental questions:

RQ1: What are the farmers' perceptions on prospect of mango cultivation?

RQ2: What are the farmers' chosen prominences that are interrelated to their perception of mango cultivation?

RQ3: What is the contribution level of the farmers' chosen prominences to their perception of the prospect of mango cultivation?

2.0 FARMERS' PERCEPTION OF MANGO CULTIVATION IN NAOGAON DISTRICT

The potential of cultivation of mangoes in Bangladesh is huge, especially in areas such Naogaon District where the climate and the soils are favorable to nurture mangoes (Md. S. Islam, 2023). Nonetheless, the economic profitability, environmental suitability, and available resources influence the perception of the farmers about the prospects of mango farming.

2.1 Economic Profitability of Mango Cultivation

The mango farming is economically promising, particularly in comparison with traditional ones (Mulungu et al., 2023). Other mango producing zones like Chapai Nawabganj, Natore, and Rajshahi studies reflect that conversion of cereal to mango orchards have been fruitful to farmers. (Asaduzzaman et al., 2025) discovered that approximately 49 percent of the lands in these regions were already converted to mango production and Chapai Nawabganj recorded the most change at 55 percent. The ratio between the benefits and costs (BCR) of production of the mango in these areas was reported to be 2.89 with the internal rate of return (IRR) at 39 percent, indicating that mango farming is more lucrative than the conventional crops. These financial advantages are becoming apparent in Naogaon, and therefore, a transition to mango production is taking place.

Although there are increased initial expenses incurred in setting up mango orchards, long-term benefits in set ups surpass the initial expenditure. Mango trees grow into profitable ventures as they grow and attract more yield, which makes mango farming a good long term investment to farmers.

2.2 Influence of Farmers' Experience and Education

Experience and education are also another factor that affects how farmers perceive mango cultivation (Asare-Nuamah et al., 2022). Alam et al. (2017) discovered that more established farmers are likely to have high yields and profits made as a result of mango farming (Mulungu et al., 2024). Farmers who have a higher exposure to mango planting are likely to view it as a good and profitable venture in Naogaon.

The other very important way of forming perceptions is through education. Educated farmers tend to be more receptive towards new farming methods that may result in enhanced production methods and increased returns. Training and workshops offered by agricultural extension services also contribute towards the increased level of knowledge on modern farming techniques by the farmers, thus increasing their perceptions of mango farming as a good and sustainable profitable business.

2.3 Environmental Suitability and Pest Management

The climate and soil conditions of Naogaon favor the mango farming and it is one of the reasons why farmers have optimistic thoughts about the future of it. Nevertheless, pests, particularly the fruit flies, may pose serious difficulties in terms of reducing the mango production and quality. (Otieno et al., 2023) suggest that the practice of Integrated Pest Management (IPM) reduces the destruction of fruits by the fruit flies and enhances the overall yields. The adoption of the IPM strategies would make farmers more inclined toward the positive perception of mango farming owing to the enhanced crop and the decreased use of costly chemical pesticides.

The control of pests is an issue that is of serious concern to the business sustainability and profitability of mango farming in Naogaon. Mango growers who know and practice the best practices of controlling pests are in a better position to control the risks of the mango farming and this results in more positive

attitudes.

2.4 Challenges in Marketing and Post-Harvest Handling

Although it may be profitable, mango farmers in Naogaon are confronted with major problems in marketing and after harvesting. Mangoes are very sensitive and unless there are good facilities in the way of storage and transportation then a substantial percentage of the harvest would be lost. (Sivakumar et al., 2011) emphasized the insufficiency of storage and processing facilities as one of the key problems of mango farmers in similar areas. Lack of a well established marketing infrastructure will result in prices changing unpredictably, which will have an impact on the incomes of farmers.

The problem is also compounded by the lack of mango processing plants in Naogaon. The mangoes which are not consumed immediately after harvesting are easily spoilt hence causing great losses. By creating processing plants where excess mangoes are converted to other products like juice, jams and dried mango, not only would the surplus be cut down but also the farmers would have better prices in the market of their surplus mangoes. (Testa et al., 2018) mentioned the significance of creating the mango processing industries to assist mango growers and improve the economic sustainability of the sector.

2.5 Social and Institutional Factors

The mango farming is also perceived by the farmers depending on social and institutional factors. Accessibility of extension services and training on agriculture matters is highly significant in increasing the knowledge and skills of the farmers. The latter can be more readily adopted by the farmers that are members of the agricultural organizations or cooperatives and can think about mango farming as a profitable and sustainable business. These organizations provide the required support and helps farmers to fight out other challenges such as pest control and marketing.

The other reason is cosmopolitaness or exposure to foreign new ideas and innovations utilized by other communities. The farmers that are exposed to the external sources of information such as the agricultural media and field visit are the ones that have adopted the modern practices more and have a positive attitude towards mango farming.

2.6 Conceptual Framework of the Study

The theoretical framework of the research reflects how different aspects affect the perception of Naogaon farmers about mango farming. The dependent variable is the perception of farmers towards mango cultivation that represents the opinion of farmers about the profitability, sustainability and challenges of cultivating mango. These perceptions are influenced by the independent variables such as age, education, size of farm, size of mango plantation, family size, yearly income, experience of training, engagement within organizations, cosmopolitaness, contact with the extension media, familiarity with mango production, and issues concerning mango farming (e.g., pests and market problems). An example would be the fact that a farmer who has a larger farm, possesses greater income, along with a higher level of training and extension services has higher chances of having a positive attitude towards mango farming. On the other hand, negative perceptions can be caused by such challenges as pest management issues and marketing challenges. The interaction of these variables can be used to give a holistic view of the perceptions of farmers in Naogaon towards the potential of mango farming.

Category	Variables
Socio-Economic	Age, Education, Family Volume, Farm Size, Annual Income
Technical/Experience	Training, Knowledge, Duration of Involvement, Plantation Area
Communication/Social	Cosmopoliteness, Extension Media Contact, Organizational Participation
Constraints	Problems related to mango cultivation

Table 2.1: Summary of Key Independent Variables and Their Definitions

3.0 METHODOLOGY

3.1 Study Area

The research was carried out in the mango cultivators in Sapahar Upazila in the Naogaon District of which the study area was to be formed. The total population of this Upazila is 161,791 which covers a total area of 244.49 square kilometers. The Upazila is further divided into six unions, which are administrative. In this study, two unions were selected by random sampling, Sapahar and Shiranti. Five villages (Manikura, Dangapara, Shiranti, Bahapur and Shimultoli) were also purposely chosen within these two unions because they are known to be high-yielding mango-producing regions. The study location is geographically oriented as Figure 3.1 presents Sapahar Upazila in Naogaon District, whereas Figure 3.2 displays the exact places of study within the Upazila.

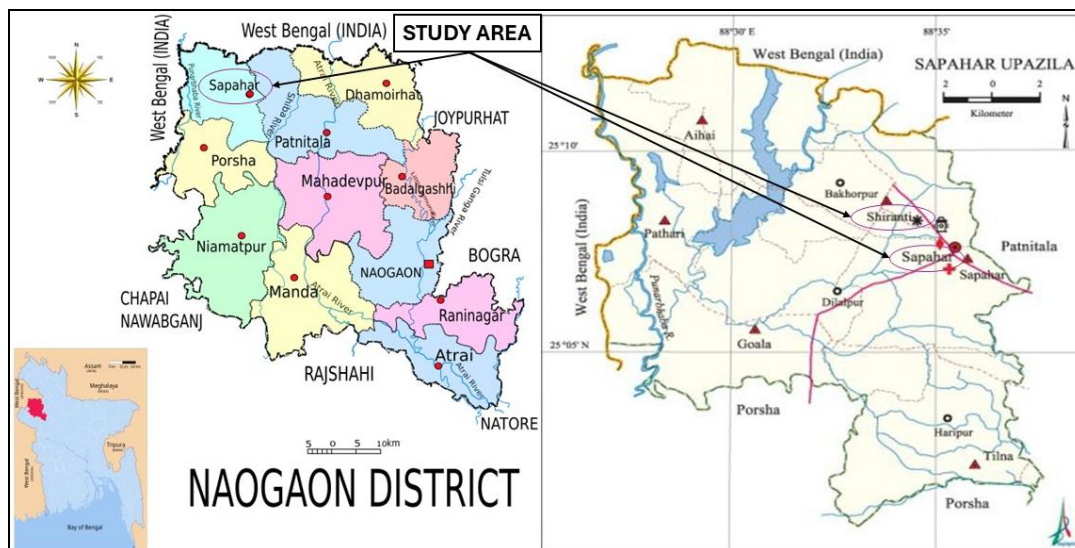


Figure 3.1: Map of the study area.

3.2 Population and Sampling

The study population was comprised of mango growers in the chosen villages of Sapahar Upazila and the total number of mango growers was 1,026. The sample of 102 farmers was made using the formula of Yamane (1967). The proportionate random sampling was used in order to have a representative sample of respondents. In case of possible inconveniences in the availability during the data collection, a corresponding reserve list of the respondents was also developed. The formula used to calculate the final sample size was to take 102 farmers.

The formula is shown below:

$$n = \frac{z^2 P(1-P)N}{z^2 P(1-P) + N(e)^2}$$

Where,

n = sample size

N = population size

e = the level of precision

z = the value of the standard normal variable given the chosen confidence level

p = the proportion or degree of variability

A sample of 102 mango farmers was selected using proportionate random sampling, with an additional reserve list of 10 farmers (10% of the total sample). The reserve list was used only if a respondent from the original list was unavailable during data collection. The distribution is shown in Table 3.1.

Table 3.1: Distribution of population and sample of farmers in the study area.

Name of Villages	Population Size	Sample Size	Reserve List (10%)
Manikura	210	21	2
Dangapara	182	18	2
Shiranti	252	25	2
Bahapur	220	22	2
Shimultoli	162	16	2
Total	1026	102	10

3.3 Development of the Instrument and Data Collection

This social science study involved the use of a structured interview schedule in data collection which involved both open-ended and closed-ended questions. The questions were drafted to be straightforward and focused on the task at hand to obtain the right information on the perception of farmers about the mango farming. The necessary changes in the schedule were made in the case of a pre-test with 10 farmers held between May 15-20, 2020. Face-to-face interviews were used to collect the final data between June 12 and September 10, 2020. The researcher found a rapport with the respondents and interviewed them when they had free time to make prompt and precise answers.

3.4 Data Collection Procedure

To answer the research objectives, a semi-structured interview schedule was utilized and it was constructed based on open and closed questions that are used to collect the data. The researcher engaged in direct interviews where he questioned and explained the questions when the need arose. The interviews were taken when the respondents were at their leisure time in order to get the correct and considerate answers. The researcher engaged in building rapport where the respondents were made to feel quite relaxed and comprehend the questions. Data was collected within the period of three months, between June 12, 2020, and September 10, 2020, and there were no major problems in the process.

3.5 Variables and Their Measurement

According to (Belabed et al., 2024), any aspect that could be varying in varying situations is referred to as a variable. In this study, there was independent and dependent variables. The independent variables were divided into 13 characteristics such as age, level of education, family volume, mango plantation area, annual family income, length of participation in mango growing, training experience, involvement, cosmopolitanism, contact with extension media, problems relating to cultivating mangoes and familiarity with the issue of mango cultivation. In these variables, there were certain scoring systems that measured the variables. Age was measured using the number of years, whereas education was measured using years of formal schooling. Dependent variable, which is the perception of the farmers towards the prospect of mango cultivation, was assessed using a five-point Likert scale, where a score should lie between 0 and 40, and measured using Perception Faced Index (PFI).

3.6 Statement of Hypotheses and Statistical Analysis

(Lund, 2022) defined a hypothesis as a statement, which is testable to prove whether it is valid or otherwise. In this study, research and null hypotheses were used. This research hypothesis was that all the 13 independent variables selected would contribute significantly to the perception of the mango cultivation by the farmers. The null hypothesis on the other hand was that there was no such relationship. The SPSS version 20 was used to analyze the data. The variables were characterized by descriptive statistics such as mean, range and standard deviation. In order to test the association between the independent variables and the dependent variable, Pearson- Product-Moment Correlation (r) was used. The importance of these relationships was checked at the 0.05 and 0.01 level of probability.

3.7 Statistical Procedure

The SPSS (version 20) was used to carry out the data analysis in order to meet the objectives of the study. Descriptive statistics were used to provide a description of the variables, such as the number, range, mean, and standard deviation. Pearson Product Moment Coefficient of Correlation was used to test the association between the two attributes that were selected of mango growers and the perception regarding mango cultivation. The null hypothesis was tested at 0.01 and 0.05 level of probability. A single asterisk shows that significant coefficients are present at the level of 0.05 and two at the level of 0.01.

4.0 RESULTS AND DISCUSSION

4.1 Selected Characteristics (Prominences) of Mango Growers

Table 4.1 shows the sociodemographic features of the mango growers in the chosen villages, where many insights can be made about the different aspects of age, education, family size, farm area, mango plantation area and family per annum income, mango cultivation length, training experience, organizational participation, cosmopolitaness, extension media contact, mango cultivation related issues and mango cultivation knowledge.

In terms of age, most of the farmers (48.04) fall in the middle-aged bracket (36-50 years), and 33.33% of the farmers are in the older bracket (above 50 years). Farmers who are under the young age category (18-35 years) only comprise 18.63%. The educational level of the respondents demonstrates that 51.96 per cent of the respondents have education above secondary level whereas 39.22 per cent have completed secondary education. The level of primary education is very low (5.88%), and only 2.94 can sign despite having no education at all, but not a single respondent is totally illiterate. Regarding the family size, most of the

farmers (63.73) have medium-sized families (4-6 people), and 19.61 are small families (up to 3 people). Big families (more than 6 members) constitute only 16.67%.

The data on farm size shows that most of the respondents (59.80) have large farms (more than 3.0 hectares), whereas 31.37% own medium-size farms (1.01-3.0 hectares). Small farms (0.2-1.0 hectares) comprise only 8.82 and none of the farmers belong to marginal size of a farm (<0.2 ha). Likewise, the area of mango plantation is large too as 55.88% of farmers have over 3.0 hectares of mangoes and 28.43% possessing medium-sized plantation (1.01-3.0 hectares). The smaller proportions (15.69) own plantations that lie between 0.2 to 1.0 hectares with no plantation under 0.2 hectares.

Regarding the annual family income, 36.27% of farmers are the medium income earners (510-1300 BDT), and 23.53% are the low income earners (120-500 BDT). A decreasing percentage (21.57) fall under a high-income group (1310-2100 BDT) and the very high income (2100-4000 BDT) is reported by 18.63%. The time spent in the mango farming depicts that majority of the farmers (50.98) have been in the mango farming business of 7-12 years, the remaining 40.19 are in the business of mango farming of 2-6 years with only 8.82 having a tenure of 12-18 years in mango farming.

Most of the farmers (85.3) are not trained in the field of mango cultivation and 14.7% are of short term training (1-3 days). No mediumly trained (more than 3 days) farmer. In terms of participation in the organization, 54.90 percent of farmers indicate ordinary participation in agricultural organizations, and 43.14 percent of the farmers do not participate at all and only 1.96 percent are actively engaged.

Cosmopoliteness statistics has shown that a majority of farmers (65.69) are highly exposed to external sources of information (21-25 visits and interactions) and 30.39 have a medium exposure and only 3.92 have a low exposure. In extension media contact, medium contact (22-30 interactions) is recorded in 44.12% of the farmers, high contact (40.20) is recorded and low contact (14-21 interactions) is reported in 15.69% of farmers.

Regarding issues associated with growing mango, more than half of the respondents (51.96) report moderate level of problems (26-30) and 34.31% report low level of problems (20-25) and 13.73% report the high level of problems (31-36). Lastly, in terms of knowledge on mango farming, a majority of the farmers (61.76) are highly knowledgeable (27-28), a significant proportion of strategies (36.28) are mediumly knowledgeable (21-26), and a minor proportion (1.96) is lowly knowledgeable (18-20).

Overall, the table indicates a high level of sociodemographic diversities amongst the mango growers with a majority of middle-aged, educated, middle-sized family farmers having large areas of mango plantations with large farm sizes. Nevertheless, it has serious training and knowledge gaps that can be eliminated to enhance the practices of mango cultivation.

Table 4.1: Notable specialties of the selected characteristics of mango growers (n = 102).

SL. No.	The Variable and Scoring Technique	Categories	n = 102	%	SD	Mean
1	Age	Young (18-35 years)	19	18.63	12.539	46.51
		Middle-aged (36-50 years)	49	48.04		

		Old (above 50 years)	34	33.33		
2	Education	Illiterate (0)	0	0.00	4.404	12.01
		Can sign only (0.5)	3	2.94		
		Primary education (1-5)	6	5.88		
		Secondary education (6-10)	40	39.22		
		Above secondary education (>10)	53	51.96		
3	Family Volume	Small family (up to 3)	20	19.61	1.931	4.79
		Medium family (4-6)	65	63.73		
		Large family (above 6)	17	16.67		
4	Farm Size	Marginal (< 0.2 ha)	0	0.00	5.007	5.69
		Small (0.2-1.0 ha)	9	8.82		
		Medium (1.01-3.0 ha)	32	31.37		
		Large (>3.0 ha)	61	59.80		
5	Mango Plantation Area	Marginal (< 0.2 ha)	0	0.00	9.106	8.28
		Small (0.2-1.0 ha)	16	15.69		
		Medium (1.01-3.0 ha)	29	28.43		
		Large (>3.0 ha)	57	55.88		
6	Annual Family Income	Low income (120-500)	24	23.53	982.35	1337.18
		Medium income (510-1300)	37	36.27		
		High income (1310-2100)	22	21.57		
		Very high income (2100-4000)	19	18.63		
7	Duration of Involvement with Mango Cultivation	Low duration (2-6 years)	41	40.19	3.74	7.69
		Medium duration (7-12 years)	52	50.98		
		High duration (12-18 years)	9	8.82		
	Training Experience	No training (0 days)	87	85.3	1.06	0.44
		Short training (1-3 days)	15	14.7		
		Medium training (above 3 days)	0	0.00		
8	Organizational Participation	No participation (0)	44	43.14	1.28	1.02
		Ordinary participation (1-5)	56	54.90		
		Active participation (6)	2	1.96		
9	Cosmopoliteness	Low (10-15)	4	3.92	3.06	20.90
		Medium (16-20)	31	30.39		
		High (21-25)	67	65.69		
10	Extension Media Contact	Low contact (14-21)	16	15.69	5.64	27.68
		Medium contact (22-30)	45	44.12		

		High contact (31-36)	41	40.20		
11	Problems Related to Mango Cultivation	Low problems (20-25)	35	34.31	3.10	29.71
		Medium problems (26-30)	53	51.96		
		High problems (31-36)	14	13.73		
13	Knowledge on Mango Cultivation	Low knowledge (18-20)	2	1.96	1.59	26.69
		Medium knowledge (21-26)	37	36.28		
		High knowledge (27-28)	63	61.76		

4.2 Farmers' Perception on the Prospect of Mango Cultivation

Table 4.2 shows the distribution of farmers according to their outlooks of the future of mango farming. The respondents were grouped into three categories according to their perception scores, which were also measured in terms of five-point Likert scale.

Only 4 respondents are in the small segment (3.92) who have a very positive attitude to the mango grown farming. The means of these farmers was 34.22 showing their relatively low level of optimism towards the prospects of mango farming.

Most of the farmers (70.59%) belong to this group, and 72 respondents have a moderately positive attitude towards the mango farming. Probably, these farmers understand that mango farming is a good profitable business, yet they have certain reservations or concerns.

Approximately, 25.49% of the respondents (26 farmers) are having a very favorable perception meaning that they have a strong belief in the possible opportunities and benefits of mango cultivation. This category of farmers appears to be very optimistic on the future of mango farming.

The average perception rate among all the respondents was 34.22 with a standard deviation of 1.57 indicating that majority of the farmers had moderate positive perception towards mango farming with few having a positive or negative perception.

Table 4.2: Allocation of farmers according to their perception on prospect of Mango cultivation

Categories	Respondents		Mean	SD
	No.	%		
Poorly favourable perception (≤ 31)	4	3.92	34.22	1.57
Moderately favourable perception (32-35)	72	70.59		
Highly favourable perception (>35)	26	25.49		
Total	102	100.00		

4.3 Relationship Between Selected Characteristics and Perception on Prospect of Mango Cultivation

Table 4.3 shows the relationship between the chosen characteristics and the perception of the prospects of mango cultivation by farmers. The dependent variable is the perception of the

farmers regarding the possibility of cultivating mangoes, and the independent variables are diverse sociodemographic and farming-related factors. This table contains the values of calculated correlation (r) and the values in the tabulated results at 0.05 and 0.01 levels of significance. These correlation coefficients show the direction and the strength of the relationship existing between individual independent variables and farmers perceptions towards mango cultivation.

Significant Correlations

Age: The relationship between age and the values of farmers on the issue of mango cultivation is -0.261, which is statistically significant at the level of 0.01 (tabulated value = 0.254). This is a negative correlation which implies that the older the farmers, the less they prefer mango cultivation. The experience of older farmers, potential lack of resources, or simply more traditional farming methods may make them see the risks and challenges of mango farming differently. The negative correlation shows that age might be a constraint to the usage of new methods and practices in the mango farming, which results in increasingly negative attitudes regarding its future.

Education Level: The correlation with education level is 0.276 that also has a significant value at the 0.1 level (the tabulated value = 0.254). This positive correlation shows that more educated farmers are the ones who have more positive attitude towards mango farming. Educated farmers will be more informed, better aware of the new and modern methods of agriculture, and probably have a more favorable insight into the economic value of mango farming. With the rise in the education level, there is a possibility that the farmers will be encouraged to be more receptive to new developments and seek the possibilities of mango farming.

Extension Media Contact: The correlation coefficient of extension media contact = 0.244 and the value of the correlation coefficient is significant at the 0.05 level (0.195 tabulated value). This correlation is positive, indicating that, the more the farmers are exposed to agricultural extension media, including training programs, television, radio as well as media outlets, the more likely they are to have a better perception of mango farming. Increased exposure to extension media also boosts the knowledge of the farmers on best practices, pest management and new technologies, which also promotes the farmers perception of viability and profitability of mango cultivation.

Knowledge on Mango Cultivation: The relationship between the knowledge of farmers on mango cultivation and their perception is 0.231 which at the 0.05 level is significant (tabulated value = 0.195). This correlation shows that the better a farmer is informed on the process of planting mango the more positive his view on its future is. Farmers who have a greater knowledge of the techniques of mango cultivation, the means of pest control, the process of irrigation and the principles of the market relations will be more inclined to think about mango farming as a profitable and sustainable business.

Non-significant Correlations

Family Volume: Family volume correlates with the 0.002 coded as NS (Not Significant) meaning that the size of the family of the farmer is not significant in determining the perception of mango cultivation. The family volume has the potential to affect the availability of labor in the farm, however, it does not seem to have a significant role in the formation of attitudes towards mango farming among the farmers used in this research. Probably more

important is the income, education, and access to the resources.

Farm Size: The correlation of the size of the farm is also NS (0.018), which indicates that the size of the farm does not have an important impact on the perception of mango cultivation. The perception of mango farming is not very dependent on whether the farmers are large or small, which could be due to the fact that despite the size of the farm, farmers are likely to be facing common challenges and opportunities, including access to the market, pest problems, and stable incomes.

Mango Plantation Area The association of mango plantation area is -0.011, NS and this implies that the area size of the mango orchard does not matter significantly to the perception of mango farming among farmers. This non-correlation could imply that other factors e.g., market conditions, pests or economic constraints play a bigger role in influencing the perceptions of farmers than the area of mango growing.

Annual Family Income: The correlation of the annual family income is 0.020 with a marked NS indicating that family income does not play any significant role in the perceptions towards mango cultivation. Although income could be a determinant in giving farmers financial freedom, it does not seem to be a strong determinant of the attitude towards mango farming because other factors such as knowledge and exposure in the media probably carry more weight than income.

Duration of participation in Mango Cultivation: The correlation of years of involvement in the agricultural practice of mango cultivation is 0.033, NS, i.e. the years of experience in agricultural practice do not significantly influence the perception of the prospects of mango cultivation. This indicates that experience is not always a more positive perception of the mango farming since there are many other factors (e.g., access to knowledge, training and resources) that can be more effective.

Training Experience: The correlation value on training experience is 0.102, NS, which implies that training received by a farmer does not have significant impact on their perception of mango cultivation. Although training can be used to enhance farming practices, training might not succeed to change the perceptions independently when other variables, including financial constraints or accessing the market, are not considered.

Organizational Participation: The correlation between organizational participation and it is 0.032, NS, indicating that the membership of agricultural organizations does not have a significant effect on the perceptions of farmers towards mango farming. Even though the organizational participation can be supportive and resourceful, it appears that the effect of the factor on the perceptions is not powerful enough in comparison to other factors like education or media contact.

Cosmopolitanism: Cosmopolitanism has a correlation of 0.136, NS, which means that, exposure to foreign ideas and experiences do not have a significant effect on the way farmers perceive mango growing. Cosmopolitanism arguably can expose farmers to greater practices relating to farming and market trends yet it does not seem to be a significant factor determining perceptions.

Issues of Mango Cultivation: The correlation here is -0.139, NS, and this implies that the issues being encountered in the cultivation of mango by the farmers do not have a significant impact on their perception of its future. This can be interpreted to mean that though there are

threats like pests or sometimes changes in the market, they do not always cause more negative perceptions about mango farming which may be because of resilience of farmers or hope that they will manage such problems.

Overall, as can be seen, there are strong correlations in the table between age, educational level, contact with the media of extension and knowledge on the mango cultivation with the perceptions of the farmers towards mango farming. These aspects seem to affect the optimism of farmers towards the prospects of growing mangoes. Nevertheless, other socialdemographic and farm-related attributes, including family size, farm area, the size of mango plantation, and farm income per year, have no significant influence on the perceptions, revealing that other factors, especially the education and information accessibility, are much more important in influencing the opinions of farmers regarding mango farming. The results put significance on education, knowledge, and media exposure as a way of instilling positive perceptions towards mango cultivation.

Table 4.3: Correlation between farmers' selected characteristics and perceptions of mango cultivation prospects.

Dependent Variable	Independent variables	Calculated value of "r"	Tabulated value of "r"	
			at 0.05 level	at 0.01 level
Farmers' perception on prospect of mango cultivation	Age	-0.261**	0.195	0.254
	Educational level	0.276**		
	Family volume	0.002 ^{NS}		
	Farm size	0.018 ^{NS}		
	Mango plantation area	-0.011 ^{NS}		
	Annual family income	0.020 ^{NS}		
	Duration of involvement with mango cultivation	0.033 ^{NS}		
	Training experience	0.102 ^{NS}		
	Organizational participation	0.032 ^{NS}		
	Cosmopoliteness	0.136 ^{NS}		
	Extension media contact	0.244*		
	Problems related to mango cultivation	-0.139 ^{NS}		
	Knowledge on mango cultivation	0.231*		

NS = Not significant

* Significant at 0.05 level of probability

** Significant at 0.01 level of probability

4.4 Comparative Severity of Perception on Prospect of Mango Cultivation

The Perception Faced Index (PFI) is a stark view on the state of perception the growers have

of the future of mango growing. The overall most rated statement was the one regarding the potential of growing mango production in your neighborhood, which received almost unanimous strong consensus (PFI 401), indicating that the most popular prospect is spatial expansion. Next in line was the attitude that government facilities and business oriented assistance may also push production up (PFI 394), exposing the desire of farmers to have the institutional support instead of simply dwelling on the resources available to them.

Better types and new technical expertise came in third and fourth positions (PFI 380 and 376), indicating that innovation is well placed in the mind map of farmers. These are cultivators who believe in science and technology to open up the doors, not tradition alone. There were also the marketing development (PFI 354), and industrial demand (PFI 361) high ranking thus depicting that farmers are aware of how markets influence production incentives. The current conditions of storage and plantation expansion were mid-level (PFI 303308), accompanied by a middle level of confidence and realism when it comes to constraints.

There were blurred perceptions at the bottom. The farmers were not sure of their high production within a short period (PFI 253), and most of them were sceptical that the mango trees could grow in unfavourable environmental conditions (PFI 81). The unromantic spoil in an otherwise positive image is climate stress. To put it in a nutshell, farmers are sure that mango farming can be expanded, provided that the policy, science and markets are pulled towards the same direction.

Table 4.4: Perception Faced Index (PFI) with rank order

Sl. No	Statements	Extent of perception					PFI	Rank Order
		Strongly agreed (4)	Agreed (3)	No opinion (2)	Disagreed (1)	Strongly Disagreed (0)		
1	Possibility of increasing mango cultivation in your locality	95	7	0	0	0	401	1
2	Possibility of rising mango production by providing government amenities for business intention	88	14	0	0	0	394	2
3	Possibility of increasing mango production by growing disease resistant variety	74	28	0	0	0	380	3
4	Possibility of high production of mango	70	32	0	0	0	376	4

	by applying modern technical knowledge							
5	Possibility of adequate supply of mango if industrial need will intense	55	47	0	0	0	361	5
6	Possibility of adequate supply of mango if marketing system will develop here	54	42	6	0	0	354	6
7	Possibility of enhancing mango plantation even in existing circumstances	12	80	10	0	0	308	7
8	Possibility of enough supply of mango if storage facilities is sufficient here	24	58	13	7	0	303	8
9	Possibility of high production of mango within a short period	0	63	25	14	0	253	9
10	Possibility of growing mango tree at adverse environmental condition	0	0	8	65	29	81	10

PFI = Perception Faced Index

N = 102

5.0 CONCLUSION, RECOMMENDATIONS AND FUTURE DIRECTION

The research regarding farmers perceptions of mango farming in Naogaon District demonstrates that the future of mango farming has a bright prospect though challenges that should be overcome to ensure the best growth are present. Mango planting is becoming a lucrative venture, as farmers have captured the long-term economic advantage of the venture, particularly against the conventional crops. The major considerations that affect their perceptions relate to the economic viability of the mango farming, the environmental appropriateness and the increased demand of the mangoes within and outside the country. A number of challenges, however, including poor pest control, post-harvest management, storage and processing infrastructure remain to be limiting the potential of mango farming in the area. Higher learning and availability of extension services also make farmers have positive perception on the sector because their knowledge on the latest methods of farming, pest control and marketing is enhanced. Most of the farmers are however not well trained and use traditional ways of farming which influences the quality and yield of the mangoes. The research

proposes the enhancement of agricultural extension services, which should include more whole-hearted training on mango farming, pest control, and modern farm applications. Also, by coming up with improved storage systems and setting up mango processing plants this would aid in alleviating the losses after harvesting, boosting revenue and stabilizing market prices. The other form of institutional support that can help farmers face the challenges would be the incorporation of agricultural cooperatives and the ability to get access to resources and technology in an easier way. At a bigger scale, the government should also invest in research and development of high yield, climate resistant, mango varieties adapted to the conditions of the region. In future studies, the effects of government policies and financial aid on mango farming in the long-term, as well as the possibility of technological advances, including drones and climate management plans to optimize mango farming, should have been studied. Moreover, the study of the international market conditions of the mango export and the increased demand of the processed mango product might create additional prospects to the farmers of Naogaon. Since there is a high rate of mango production in the area and it plays an increasing economic role, it is important to control these issues by policy provision, training and technological advancement so that in future these farmers can have sustainable growth and more profits.

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