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Mango Production in Flood Prone Lands of Shibganj Upazila: The Mango Growers' Perception

Md. Abdur Rakib, Md. Zulfikar Rahman, Md. Asaduzzaman Sarker✉, Md. Masud Rana

Department of Agricultural Extension Education, Bangladesh Agricultural University, Mymensingh 2202, Bangladesh

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Correspondence
M. Asaduzzaman Sarker
✉: masarker@bau.edu.bd

ABSTRACT

The main purpose of the study was to find out the extent of use of flood prone lands into mango production by planting different mango varieties, to find out the cause and effect of transformation of flood prone lands into mango production, to measure perception of the growers about using flood prone lands to mango production and explore the relationships between the selected demographic characteristics of the farmers and their perception of using flood prone lands to mango production. The study was conducted in four villages of Shibganj upazila under Nawabganj district. The sample size 80, randomly selected from a population of 400 mango growers. Interview schedule was used to collect data. Data were collected personally during 25 July to 15 September, 2015. Pearsons' product moment correlation co-efficient (r) was computed to explore the relationships between the selected characteristics of the mango growers and their perception on using flood prone lands to mango production. The main three causes of transformation of flood prone lands to mango production were: Mango provides more earning than field crops, the neighbours and other land owners who planted mango trees serve as facilitators for others to follow the same and mango plants once planted give good return for several years; but in case of other crops, one has to grow crops every year. The most important effects of mango cultivation were found: Mango cultivation maintains environmental balance, it helps in earning more money and provide bio-fertilizer by the fallen leaf. The majority (78.75%) of the mango growers possessed high positive perception about mango growing in the flood prone area while 20% had moderate perception about transformation of flood prone lands to mango production. Among the 11 selected socio-economic characteristics of mango growers, eight (08) characteristics namely education, annual income, farm size, cosmopoliteness, media exposure, organizational participation, innovativeness and knowledge on mango production had positive significant relationship with their percerption of using flood prone lands to mango production. The mango growers mentioned a number of problems as well as probable solutions in transformation of flood prone lands to mango production. By taking proper and timely initiatives the transformation process should be enhanced to ensure sustainable quality mango production and socio-economic development of mango growers.

Introduction

Bangladesh is one of the most densely populated countries in the world. The density of population in Bangladesh is 1240 people per sq. kilometer (World Bank, 2018). In this country, fruit is very essential for our daily life. It is recognized that there is a wide gap between demand and supply of fruits in our country. In the study area, weather is favourable for mango production. Before 10 years, farmers cultivated crops in flood prone lands but they did not get proper return because flood seriously damaged the crops during flood times. The study area is one of the low lying areas of Nawabganj district which is surrounded by Padma, Mahananda and Pagla river and affected by heavy rainfall and late monsoon in upper stream creates a temporary flood situation (BWDB, 2020). In that circumstance, they gradually converted their crop lands of flood prone areas to mango production and this has become an important source of earning for the cultivators.

Bangladesh marks the highest rate of increase in fruit production among the world's fruit producing countries. It is the 10th largest tropical fruit production countries. Over the last 18 years the rapid production of mango has been highest in Bangladesh. The production has increased by 16% per year and the per head consumption doubled over the last 10 years. In Bangladesh it occupies an area of 65 thousand ha of land with an annual production of around 2.4 million tons

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(FAO, 2018). Among the different fruits of Bangladesh, which are over fifty in number, mango has a unique position. It is top listed in terms of production area and total production among the fruits of Bangladesh (BBS, 2016). Mango is a new commercial crop in many countries of the South East Asia as Philippines, Indonesia, Thailand, Mayanmar, Malaysia and Ceylon. It has been cultivated for more than 4000 years. Mango grows almost all over in Bangladesh but commercial and good quality mangoes grown in the North-Western districts of the country. The leading mango growing districts of the country are Rajshahi, Naogaon, Chapainawabganj, Dinajpur and Satkhira.

Mango is seasonal cash crop of North-Western region of BangladeshThe cultivation of mango has gaining momentum among the farmers of these regions due to its low water requirement, favourable agro-ecological conditions, ready market and profitability (BBS, 2016).Due to land suitability, higher returns and productivity of fruits this group emerged as an important area for diversification and as an alternative cropping pattern. With this backdrop, area shifting in favour of fruits has been suggested as a viable option to stabilize and augment farm income, enhance agricultural growth and increase employment opportunities (BARI, 2013. It is estimated that more than 100 varieties of sweet edible mangoes can be found and around 85% people of the above mentioned districts are directly or indirectly dependent on mango cultivation and business (Dhaka Tribune, 2018). With the increased fruit yields, in 2018 the average fruit intake per head rose to 85gm from 55gm in 2006 (FAO, 2018). Mango is one of the most valuable fruits because it is an important source of macronutrients such as carbohydrates, lipid and fatty acids, protein and amino acids and organic acids. It also contains micronutrients such as vitamins and minerals and non-nutrient compound such as phenolic compounds, flavonoids and other polyphenols, chlorophyll, carotenoids and volatile compounds. The energy value for 100 g of the pulp ranges from 60 to 190 kcal (Corrales-Bernal *et al.*, 2016). Besides being consumed as such both ripe and green fruits are used to make variety of commercial products. The mango is really of immense value in respect of earning money and gain prosperity. Transformation of flood prone lands to mango production has currently received special attention by the mango growers. Gardens are important for maintaining ecological balance and for preserving the life-supporting system of the earth. Environment is a very delicate aspect of any country's resources. To preserve this environment, one of the vital ways is to grow more trees. It plays a key role in our lives by protecting us from the bad effect of environment and by enhancing fruit production. The following advantages are obtained from mango gardening: supply of human diet (Fruits), supply of timber, firewood, agricultural implements, provides protection and shelter for crops, animals and people from heat and strong wind, helps in reducing the impact of the greenhouse effect, relatively decrease the global warming, convert carbon dioxide to oxygen, control the air pollution, improve and sustain soil fertility by reducing erosion and salinity and by increasing biological activity including addition of organic matters, improve the quality of surface and ground water, improve the resilience of the land to drought, flood and fire, supply of raw materials for industry and improve and restore the natural beauty and landscapes. Perception simply means the act or faculty of apprehending by means of the senses or of the minds (Stein, 1971).

Perception follows sensation. It is the processes of identifying the stimuli received by the senses and classifying those stimuli into personally meaningful categories (Makay and Gaw, 1975). Perception is the process by which the brain organizes and interprets sensory information (Banyard and Hayes, 1994). According to Van den Ban (1986) perception is the process by which we receive information or stimuli from our environment and transform it into psychological awareness. It is the process of knowing objects and events through senses. However, it should be noted that communication alone may not necessarily be able to develop perception of the innovation in the desired way. Some organizations have been working in the transformation of flood prone lands to mango production in selected areas of Bangladesh. Therefore, an attempt has been made to study the perception of the mango growers in using flood prone lands to mango production. The foregoing discussion warrant an understanding of using flood prone lands to mango production and perception of the mango growers and its relationship with their various characteristics. This would be greatly helpful for planning and implementing this programmes to increase fruit production. But no empirical study so far has been conducted in relation to mango growers' perception about transformation of flood prone lands to mango production. Therefore, all these issues keeping in mind the present study was formulated to assess perception of the mango growers about using flood prone lands to mango production, to find out the cause and effect of transformation and to find out the problems faced by the mango growers in transformation of flood prone lands to mango production.

Materials and Methods

The study was conducted in four randomly selected villages of Shibganj upazila under Nawabganj District (Fig. 1 and Fig. 2). Nawabganj is a very well-known district in Bangladesh for producing varieties of quality

mangos. The study area was selected purposively for investigation because the area was suitable for mango cultivation. Due to increasing rate of mango production, good communication facilities and researcher's perception about better co-operation from the mango growers motivated the researcher to select the study area.Mango growers of four randomly selected villages namely Mobarokpur, Kansat, Bishonathpur and Dhobrawere the population of the study. The total numbers of mango growers were 400 in the study area, among them 80 vegetable growers were randomly selected as the sample of the study which was 20% of total population. Data were collected by using a combination of different methods such as individual interview method, Focus Group Discussion (FGD) method, Key Informants Interview (KII) method and survey method. In case of individual interview method, a pre-structured interview schedule was used as data collecting instrument which contained both open and closed formed of questions. Data were collected from the respondents from the period of 25 July to 15 September, 2015. Eleven selected demographic characteristics of the vegetable growers such as age, education, annual income, family size, farm size, cosmopoliteness, training received, media exposure, organizational participation, innovativeness and knowledge on mango production were selected as explanatory variables. Appropriate methods were used to operationalize respondent's characteristics by developing suitable scales. Mango growers' perception of using flood prone lands to mango productionwas the focus variable of the study. For measuring the perception of the respondents a four point Likert scale (as developed by Likert, 1932) was used. A total of 18 relevant statements (14 positive and 4 negative) were adapted to the interview schedule to assess mango growers' perception of using flood prone lands to mango production. The statements were asked to the farmers against the possible responses such as "strongly agree", "agree", "undecided", and "disagree" with corresponding score of 3, 2, 1 and 0 respectively. Ullah *et al.* (2011) and Ghosh and Hasan (2013) also used Likert scale in their respective studies. The perception score of individual respondent was computed by summing the scores for responses to all the statements. Thus, the scale score could range from 0 to 54 where 0 indicates no perception and 54 indicates highly favourable perception towards using flood prone lands to mango production. Mango growers faced different problems during using flood prone lands to mango production. To identify the problems faced by the mango growers during using flood prone lands to mango production two FGDs were conducted with the selected mango growers. From the identified problems rank order was made based on the number of responses made by the mango growers. Suggestions were also identified through FGDs with the selected mango growers. From the identified suggestions rank order was made based on the number of responses made by the farmers. The collected data were properly edited and coded before final analysis. All inconsistent data were avoided to eliminate the errors and fault. The Statistical Package for Social Sciences (SPSS) was used for the data management. Descriptive statistics such as percentage, frequency, mean, standard deviation and inferential statistics such as correlation analysis were employed to find out the relationship between the selected demographic characteristics of mango growers and their perception of using flood prone lands to mango production.

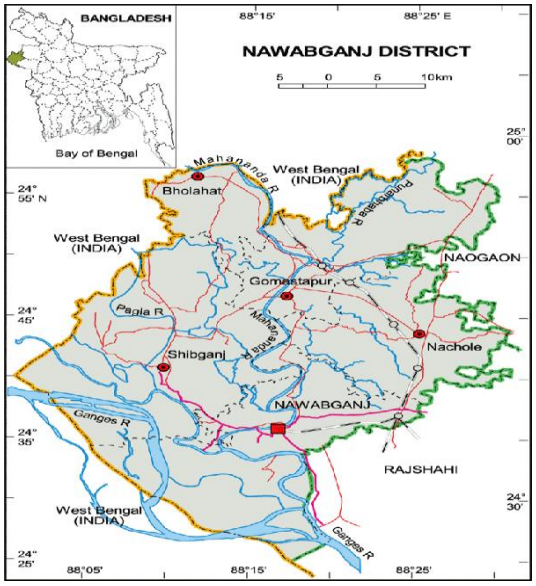

Figure 1. Location of Nawabganj district, in Bangladesh map

Figure 2. Map of Shibganj upazila showing the study area

Results and Discussion

Salient Features of the socio-economic characteristics of the respondents

The salient findings of the selected socio-economic characteristics of the respondents have been presented in Table 1. The age of the respondents ranged from 25 to 65 years with an average of 43.65 years and standard deviation of 10.32 years. Among 80 mango growers, most of them (57.5%) were middle aged, 25% were young aged while only 17.5% found as old. Almost similar findings were found by Sarker (2007), Hoque (2011) and Kowsari (2014). The level of education of the respondents ranged from 0 to 12 years, the average being 6.61 years and standard deviation of 4.17 years. Data revealed that among the respondents 32.5% of them had primary level of education, 32.5% had secondary level of education and 23.75% of the respondents had higher secondary level of education illiterate, while 11.25% of the respondents were illiterate. Almost similar findings were found by Fakir (2009), Hoque (2011) and Kowsari (2014). The annual income of the respondents ranged from Tk. 25000 to Tk. 1000000 with an average of Tk. 169000.90 and standard deviation of Tk. 150000.80. It is evident from Table 1 that most of the respondents (47.5%) had medium annual income while 32.5% of them had high annual income and only 20% of the respondents had low annual income. Thus, results revealed that most of the mango growers had low to medium annual income.

While annual income has been determined as one of the key factors that affect decision-making regarding the adoption of new technologies. Islam (2011), Hossain (2013) and Kowsari (2014) also found the similar findings in their respective studies. It is evident from Table 1 that family size of the respondents ranged from 2 to 12 members with a mean of 6.59 members and standard deviation of 2.16 members. Most of the respondents (47.5%) had medium family size while 32.5% of them had large family size and 20% of the respondents had small family size. Sarker (2007), Islam (2011), Hoque (2011) and Kowsari (2014) also found the almost similar findings in their respective studies. Farm size of the respondents ranged from 0.50 ha to 20 ha. Distribution of the respondents according to their farm size are shown in Table 1 that shows that the highest proportion of the respondents (40%) fell into the category of medium farm size, while one-third (33.75%) were in small farm size category and 26.25% were in large farm size category. Almost similar findings were reported by Hossain (2013) and Kowsari (2014) in their respective studies.

The cosmopoliteness score of the respondents ranged from 4 to 16 against the possible range of 0 to 18. The average cosmopoliteness score of the respondents was 9.53 and standard deviation 3.29. Data presented in Table 1 shows that the highest proportion of the respondents (56.25%) had medium cosmolpoliteness score while 22.5% of them had high cosmopoliteness score while 21.25% had low cosmopoliteness score. The training received score of the respondents ranged from 0 to 20 days with a mean of 2.55 days and standard deviation of 3.53 days. Majority of the respondents (91.25%) had short duration training while 6.25% had medium duration training and only 2.5% had long duration training. Where, training strengthens the individual's ability to efficiently and effectively manage their tasks and to contribute to get outcomes. The media exposure score of the respondents ranged from 10 to 30 against the possible range 0 to 39. Majority (80%) of the respondents had medium media exposure score while 16.25% had low media exposure score and only 3.75% had high media exposure score.

The organizational participation score of the respondents ranged from 4 to 28 against the possible score of 0 to 30. Data presented in Table 1 reveal that majority (61.25%) of the respondents had low organizational participation score while 31.25% had medium organizational participation score and only 7.5% had high organizational participation score. The findings indicated poor social involvement because in rural socio-cultural settings mango growers rarely participate in various social programmes like different associations, clubs and committees. Besides, the innovativeness score of the respondents ranged from 14 to 65 against the possible range of 0 to 100. Most of the respondents (71.25%) had moderate innovativeness score, 27.5% had low innovativeness score and only 1.25% had high innovativeness score. Kabir (2011) found 68.1% respondents had low innovativeness score while Kowsari (2014) found that 50% of the mango farmers had low innovativeness score. The knowledge level of the respondents on mango production ranged from 12 to 26 against the possible range from 0 to 26. From the data presented in Table 1 reveals that most of the respondents (52.5%) had good knowledge on mango production while 45% had very good knowledge and only 2.5% of the respondents had fair level of knowledge on mango production. Kowsari (2014) found that 60% of mango farmers had medium level of knowledge on mango production.

To have an understanding about the intervention wise perception of mango growers for each statement computed mean values have been shown in Table 2. It is evident from the Table 2 that 'Mango production in the flood prone lands is an extra botheration to me' ranked first as the perception score of the respondents was the highest (2.73) followed by 'It requires long time to get return from such mango plantation' ranked second

having the perception score (2.54). 'It needs extra fertilizer, insecticide to maintain a permanent tree' ranked third (2.43). 'Mango production in flood prone lands is essential to increase cash income' ranked fourth (2.38). 'The mango cultivation hampers neighbor's field crops which creates conflict among the landowners' ranked fifth (2.29). 'Mango cultivation is expensive and requires extra labour and care' ranked last as perceived by the mango growers. Analyzing the consequences of transformation of flood prone lands to mango production as perceived by the mango growers, suggests that desire to earn cash money and improve the socio-economic status of the mango growers are the most important factors for transformation of flood prone land to mango production.

Table 1. Distribution of the respondents according to their selected socio-economic characteristics (n=80)

Characteristics (Measuring unit)	Possible range	Observed range	Categories	No.	Percentage (%)	Mean	SD
Age (Actual years)	-	25-65	Young (18- 35)	20	25	43.65	10.32
			Middle aged (36-55)	46	57.5		
			Old (above 55)	14	17.5		
Education (Year of schooling)	-	0-12	Illiterate (0)	9	11.25	6.61	4.17
			Primary level (1-5)	26	32.5		
			Secondary (6-10)	26	32.5		
			Higher secondary (above 10)	19	23.75		
Annual income ('000' Tk)	-	25-1000	Low (25-80)	16	20	169.9	150.80
			Medium (80-200)	38	47.5		
			High (above 200)	26	32.5		
Family size (No. of members)	-	2-12	Small family (upto 4)	16	20	6.59	2.16
			Medium family (5-7)	38	47.5		
			Large (above)	26	32.5		
Farm size (Hectare)	-	0.50-20	Landless(0.02 ha)	0	0	3.52	3.77
			Marginal (0.021-0.2 ha)	0	0		
			Small (0.21-1.0 ha)	27	33.75		
			Medium (1.01-3.0 ha)	32	40		
			Large (>3 ha)	21	26.25		
Cosmopoliteness (Scores)	0-18	4-16	Low (upto 6)	17	21.25	9.53	3.29
			Moderate (7-12)	45	56.25		
			High (above 12)	18	22.5		
Training received (Days)	-	0-20	Short (upto 6 days)	73	91.25	2.55	3.53
			Meduim (7-12)	5	6.25		
			Long (above 12)	2	2.5		
Media exposure (Scores)	0-39	10-31	Low (upto 13)	13	16.25	18.80	4.65
			Meduim (14-26)	64	80		
			High (above 26)	3	3.75		
Organizational participation (Scores)	0-30	4-28	Low (upto 13)	49	61.25	10.86	5.72
			Medium (11-20)	25	31.25		
			High (above 20)	6	7.5		
Innovativeness (Scores)	0-100	14-65	Low (upto 30)	22	27.5	35.78	9.89
			Moderate (31-60)	57	71.25		
			High (above 60)	1	1.25		
Knowledge on mango production (Scale scores)	0-26	12-26	Fair knowledge (upto 13)	2	2.5	20.89	2.90
			Good knowledge (14-21)	42	52.5		
			Very good knowledge (above 21)	36	45		

SD= Standard Deviation

Table 2. Statement wise mango growers' perception about transformation of flood prone lands to mango production

Statements	Responses				PI	Mean	Rank order
	SA	A	UD	D			
Mango production in the flood prone lands is an extra botheration to mango growers (-)	0	2	18	60	218	2.73	1
It requires long time to get return from such mango plantation (-)	2	8	15	55	203	2.54	2
It needs extra fertilizers and insecticides to maintain a permanent tree (-)	4	10	14	52	194	2.43	3
Mango production in flood prone lands is essential to increase cash income (+)	55	5	15	5	190	2.38	4
The mango cultivation hampers neighbors field crops which creates conflict among the landowners (+)	51	10	10	9	183	2.29	5
Mango tree should be planted in the flood prone area to save the nature (+)	50	8	12	10	178	2.23	6
Easy to cultivate inter crop but it is not possible to get proper and adequate yield (+)	48	10	7	15	171	2.14	7
It is a good technology to fulfil long time requirement (+)	47	7	14	12	169	2.11	8
Flood cannot damages young mango trees (+)	45	8	15	12	166	2.08	9
It is very easy to cultivate inter crop simultaneously in flood prone lands through mango plantation (+)	43	7	15	15	158	1.98	10
It is possible to get return after some times (+)	40	10	17	13	157	1.96	11
Raising new varieties in the flood prone land is acceptable for me (+)	40	8	15	17	151	1.89	12
Sapling damage may be protected by stalking (+)	38	9	18	15	150	1.88	13
Mango cultivation does not hamper neighbors' field crop (-)	15	18	11	36	148	1.85	14
Mango production in the flood prone lands is easy and does not require extra cost (+)	35	5	25	15	140	1.75	15
The probability of sapling damage is high due to absence of mango orchard or trees in the nearby land (+)	33	9	20	18	137	1.71	16
It is possible to fulfill the requirement of fuel wood through such mango production practices (+)	30	15	5	30	125	1.56	17
Mango cultivation is expensive and requires extra labour and care (+)	28	0	25	27	109	1.36	18

Notes: SA: Strongly Agree; A: Agree; UD: Undecided; D: Disagree; PI: Perception Index

Mango growers' overall perception towards transformation of flood prone lands to mango production

Mango growers' perception towards transformation of flood prone lands to mango production was the main focus of the study. Perception score of the mango growers varied from 16 to 51 against the possible range of 0 to 54 with a mean of 41.43 and standard deviation 6.40. Based on the observed overall perception scores, the respondents were classified into three categories as shown in Figure 3. Data presented in Figure 3 reveals that, most of the mango growers (78.75%) had high perception towards transformation of flood prone lands to mango production compared to 20% of the respondents had medium perception and only 1.25% had low perception transformation of flood prone lands to mango production. Gardening experience, cosmopoliteness, low crop productivity due to frequent flood and desire to earn cash money and improve the socio-economic status of the mango growers may be reasons for developing moderate to high perception about using flood prone lands. Majlish (2007) found that that most of the respondents (59%) had favourable perception while 30% and 11% of them had moderately favorable and unfavorable perception of social forestry programme of BRAC. Karim (2009) reported that majority (92.9%) of the fish farmers had moderately favorable perception on flood coping mechanism. Ullah *et al.* (2011) found that 38% farmers had unfavourable perception while 34% of the respondents had favourable to highly favourable perception of one house one farm approach.

The causes and effects of transformation of flood prone lands to mango production

Mango is the king of all fruits on the world. It is grown in all parts of the country but production of quality mango is confined to the north-western districts particularly the districts of Nawabganj, Rajshahi and Dinajpur. The increase of production of mango fruits to a greater extent depends upon the use of high yielding varieties and proper growers' perception about using flood prone lands to mango production because several hectares land are covered during the flood times. Mango growers practice flood prone lands to mango production for some reasons and as a result some effects are likely to be visible of flood prone lands (mango production). The causes for transformation of flood prone land into mango production is presented in Table 3. Data presented in Table 3 it is evident that the cause namely "Mango provides more earning than field crops" ranked first based on the citation of the mango growers. The second and third cited causes of transformation of flood prone lands to mango production were "As the neighbours and other land owners planting mango trees so all other also do the same" and "Mango plants once planted given return for several years, but in case of other crops they need to be grown every year", respectively.

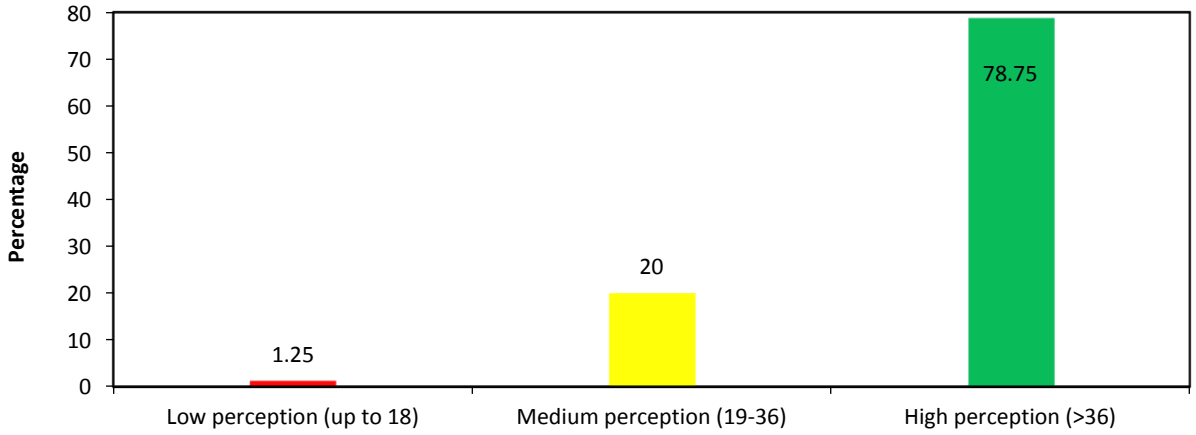

Figure 3. Distribution of the mango growers according to their overall perception score towards transformation of flood prone lands to mango production

Table 3. Rank order of causes for transformation of flood prone land into mango production as perceived by the mango growers

Causes	No. of citation	Rank order
Mango provides more earning than field crops	76	1
As the neighbours and other land owners planting mango trees so I also followed them	72	2
Mango plants once planted give return for several years, but in case of other crops they need to be grown every year	68	3
Motivated by others	64	4
Mango garden is a pleasant job	60	5
It is possible to fulfil the nutritional demand by raising mango	54	6
Low cost	52	7

Table 4. Rank order of effects of transformation of flood prone lands to mango production as perceived by the mango growers

Effects	No. of Citation	Rank Order
Maintain the environmental balance	78	1
Earn more money	74	2
Make bio-fertilizer by the fallen leaf	72	3
Get fresh air	68	4
Trees serve as house of birds which are very essential	64	5
Fulfil nutritional demand	61	6
Solve unemployment problem	58	7
Fulfil fuel demand	53	8
Prevent soil erosion	48	9
Maintain same water level	45	10
Give shade at summer season	42	11
Maintain friendship with the neighbours by planting mango trees together	38	12

To have an understanding about the effects of transformation of flood prone lands to mango production rank order is made on the basis of citation of the mango growers. According to the data presented in Table 4 it is evident that “Maintain the environmental balance” ranked first. The second and third ranked effects were “Earn more money” and “Make bio-fertilizer by the fallen leaf” respectively while “Maintain friendship with the neighbours by raising mango trees together” was the least mentioned effect of using flood prone lands to mango production. Pearson’s Product Moment Correlation Co-efficient (r) was used to test the null hypothesis concerning relationships between any two variables. Out of eleven variables, the relationships of eight variables with their perception of using flood prone lands to mango production found significant and three were non-significant. Education of mango growers and their perception of using flood prone lands to mango production showed significant positive relationship (r= 0.403**). The reason behind this might with the increase of level of education of an individual will improve the horizon of knowledge and broaden their outlook.

An educated man is supposed to be more rational than an illiterate man. Thus, education had a positive significant relationship on the perception of the respondent related to transformation of flood prone land to mango production.

Similar findings were observed by Sultana *et al.* (2018). The relationship between annual income of mango growers and their perception of using flood prone lands to mango production was significantly positive (r=0.272*). The reason behind this might be mango growers with higher annual income provides more opportunity to maintain their family properly. Because of higher annual income of the mango growers, they do not have to think much regarding pulling resources for the maintenance of their family. Therefore, they can invest more time and money in the transformation of flood prone lands to mango production properly. Higher annual income also predisposes the mango growers to maintain better economic and social standing in the society which may contribute to their mental satisfaction. As their investment of time in agricultural related activities is more, their perception on the using of flood prone lands to mango production is also likely to be positive. Sultana *et al.* (2018) found no significant relationship in her study. Farm size of the respondents showed significant positive relationship (r=0.245*) with their perception of using flood prone lands to mango production. The reason behind this phenomenon might be mango growers with comparatively large farm size had better socio-economic status than the mango growers with comparatively smaller farm size. Similar relationship was observed by Sultana *et al.* (2018) in her study.

The relationship between cosmopoliteness of mango growers and their perception of using flood prone lands to mango production was significantly positive (r=0.286*). The reason behind this might be the mango growers with more cosmopoliteness score had better social activity and information sources compared to mango growers with low cosmopoliteness score. Similar findings were reported by Pervez *et al.* (2015) and Sultana *et al.* (2018) in their respective studies. The media exposure of the mango growers and their perception of using flood prone lands to mango production was significantly positive (r=0.366**). This relationship indicates that the mango growers with higher media exposure had more favourable perception on using flood prone lands. Usually, the farmers with higher media exposure had higher education and higher cosmopoliteness and consequently they had higher perception about transformation of flood prone lands to mango production. The organizational participation of the respondents and their perception of using flood prone lands to mango production was significantly positive showed significant positive (r=0.347**) relationship. The reason behind this might be the respondents having higher organizational participation were usually well informed about different agricultural practices than the respondents with lower organizational participation. They were interested to receive updated information about different agricultural practices. Similar findings were observed by Ajunwa *et al.* (2016), Pervez *et al.* (2015) and Sultana *et al.* (2018) in their respective studies.

The relationship between innovativeness of the respondents and their perception of using flood prone lands to mango production showed significant positive (r=0.325**) relationship. This relationship indicates that mango grower who was innovative, has more inquisitiveness to know about various new agricultural innovations and reject the old ideas. Thus, the innovative mango growers could develop their favourable perception on transformation of flood prone lands to mango production. The relationship between the respondents knowledge on mango production and their perception of using flood prone lands to mango production was found significantly positive (r=0.636**). This relationship indicates that mango growers who possessed high knowledge on production have high perception also. This is quite rational to think that knowledge of an individual gives him/her capacity to respond according to situation and contributes to the analysis of situation which in turn helps to develop favourable perception. Thus, high knowledge of the mango growers may have contributed to develop favourable perception on transformation of flood prone lands to mango production. Sultana *et al.* (2018) also observed similar findings in her respective study.

Problems faced by the mango growers

The mango growers were asked to mention the problems faced by them due to using of flood prone lands to mango production. To have an understanding about the intensity of the problems, the frequency of citation and respective rank order of the problems have been shown in Table 6. From the data presented in Table 6, it is evident that “Lack of technical facilities” was the most cited problems faced by the mango growers while “Lack of credit facilities” was the second most cited problem by the mango growers. Credit from banks and other donating organizations was not easily available to them. So, lack of credit was also found as one of the major problems to use flood prone lands to mango production. “Lack of locally improved adapted varieties” was the third cited problem of the mango growers while “Unavailability of skilled labour” and “Lack of coordination among the mango growers” were the fourth and fifth cited problems by the mango growers respectively. Similar findings were observed by Katalyst (2016), Khan (2014), The Independent (2016) and Pervez *et al.* (2018) in their respective studies.

Table 5. Relationship between selected characteristics of mango growers and their perception of using flood prone lands to mango production

Mango growers' characteristics	Co-efficient of co-relation coefficient (r) with df= 78
Age	-0.095
Education	0.403**
Annual income	0.272*
Family size	0.064
Farm size	0.245*
Cosmo politeness	0.286*
Training received	0.172
Media exposure	0.366**
Organizational participation	0.347**
Innovativeness	0.325**
Knowledge on mango production	0.636**

*Significant at 0.05 level of probability (2- tailed); **Significant at 0.01 level of probability (2-tailed)

Table 6. Rank order of problems faced by the mango growers in using flood prone lands to mango production

Problems	No. of citation	Rank order
Lack of technical facilities	56	1
Lack of credit facilities	45	2
Lack of locally improved adapted varieties	35	3
Unavailability of skilled labourers	30	4
Lack of coordination among the mango growers	25	5
Lack of disease resistant varieties	20	6
Lack of proper selection of pesticide/insecticide	18	7
Lack of coordination of the BSs with mango growers in implementing this method	15	8
A huge shade of big trees reduce the production of crops of the lands near the road side	10	9
Trees die due to unknown reasons	8	10

Table 7. Rank order of the probable solutions of the problems suggested by the mango growers

Solutions suggested by the mango growers	No. of citation	Rank order
Providing more training facilities	60	1
To supply local improved adapted varieties	47	2
Strengthening of mango growers association	45	3
Distribution of agricultural credit at low interest rate	42	4
To create coordination among the mango growers	35	5
Proper care of seedlings	32	6
Availability of skilled labourers	30	7
To cut big branches from some trees	28	8
Proper selection of insecticide and pesticide	25	9
More contact between the BSs and mango growers	15	10

Probable solutions suggested by the mango growers

The mango growers were requested to mention probable suggestions for above mentioned problems in transformation of flood prone lands to mango production. The probable solution of the problems as suggested by the mango growers along with concerned rank order is presented in Table 7. To overcome the problems faced by the mango growers' probable suggestions were also mentioned by themselves. From the data presented in Table 7 it is evident that "providing more training facilities" was the most cited solution by the mango growers and seems to be essential to use flood prone lands to mango production by improving the knowledge level of the mango growers. Otherwise, the mango growers will have to face miserable condition for a long time. The second and third probable solutions suggested by the mango growers were "To supply local improved adapted varieties" and "Strengthening of mango growers association". All the probable solutions suggested by the mango growers need to be addressed properly by the concerned organizations and this will play vital role to use flood prone lands to mango production.

Conclusion

The findings reveal that the majority of the mango growers had high perception about transforming of flood prone lands into mango production. This is due to the higher profitability of mango production compared to other crop farming. The study explored that level of

education, annual family income, farm size, cosmopoliteness, media exposure, organizational participation, innovativeness and knowledge on mango production of the mango growers had significant relationship with their perception of using flood prone lands into mango production. The reasons mentioned by the mango farmers for transformation of cropland into mango orchard were suitable weather condition of the area, environment friendly, profitability and cost-effectiveness because of its long time return. In addition, transformation of cropland into mango orchard was found to have some positive effect on economy, environment, household food security and social status of the mango growers. The reasons for transformation were very much rational, logical and reasonable and effect of transformation of cropland into mango orchard on different aspects had positive impact as perceived by the mango growers of the study area. The mango growers faced number of problems during the transformation of flood prone lands to mango production. If necessary, actions are taken by the concerned agencies of the Government to solve the problems associated with transformation of flood prone land into mango production may ensure better income of the farmers through expansion of mango production in the study area.

Conflict of Interests

The authors declare that there is no conflict of interests regarding the publication of this paper.

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