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Diagnosis on strengths and threats of mango in the context of Bihar : A case study

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ABSTRACT

The present study has been attempted to explore the reasons of growing mango in the study area and to identify the constrained faced by the sample mango growers. Ninety mango farmers were personally interviewed from six villages of Bhagalpur district of Bihar following multi-stage sampling technique. Garrett's ranking technique was employed for prioritizing the reasons as well as constraints of mango growing. The study area was predominated by marginal (32.22%) and small farmers (48.89%) followed by semi-medium farmers (18.89 %). The respondents were very keen to grow because of the magnitude yield of immediate net return generating capacity of the crop (Garrett score 75.16). Among the major problems faced by the mango growers, post harvest losses ranked first with Garrett score 73.81 followed by the heavy incidence of pests and diseases (71.94). Fruit drop, irregular bearing habit of mango plants, Lack of storage facilities, high cost of transportation, price fluctuation, lack of technical guidance, lack of proper and timely market information etc. were the other problems associated with mango production in the study area.

***Keywords*:** Constraint analysis, Garrett ranking, mango production and strength of mango

India is the largest producer of mango in the world, contributing to nearly 37.5 per cent of the total world production. India has an edge over other countries when it comes to production of 'king of fruits' in terms of natural resources required and climatic conditions. Mango accounts for 21.40 per cent of total fruit production in India during 2014-15 (Thulasiram *et al*., 2016). India produced 19.69 million tonnes of mango from an area of 22.63 lakh hectares with an average productivity of 8.7 tonnes ha^{-1} during 2016-17. India exported 53.18 thousand tones of fresh mango and earned 445.55 crore rupees of foreign exchange during 2016-17 (GoI, 2017). Bihar is the fifth leading producer of Mango in the country (7.52 %t) producing about 1.48 million metric tonnes from an area of 1.50 lakh ha. with productivity of 9.82 tonnes ha^{-1} during the year 2016-17. In Bihar, Bhagalpur produced 71.21 thousand metric tonnes of mango in 2015-2016 in an area of 7.68 thousand hectare and ranks seventh among all mango producing districts of Bihar (GoI, 2017). Having all the statistics, mango cultivators of India are confronted with serious challenges leading to negative growth rate. A drastic fall in production (1271.6 thousand tonnes) of mango was observed in the state in 2014-15 with the productivity of 8.57 tonnes ha^{-1} (Government of Bihar, 2015). High perishablity coupled with non-availability of storage and transportation facilities, considerable amount of mango fruit goes waste every year (Dash, 2011). Kumar *et al*. (2016) documented constraints like middlemen menace in procurement of fruits, huge post harvest losses during transportation and marketing, lack of support by the concerned nodal bodies, high cost of production, low capacity utilization and fluctuation in profitability related to mango production. This study is attempted to explore the underlying reasons behind growing mango in the study area and document the constraints faced by the mango growers.

MATERIALS AND METHODS

Multistage sampling technique was adopted for the selection of study area and sample respondents for collection of information required for the study. Primary data collected from 90 mango growers for the year 2017-18 from six villages of Bhagalpur district of Bihar form the data base of this study. Bhagalpur district has been selected purposively for the study. 3 blocks of Bhagalpur district namely, Sabour, Nathnagar and Sultanganj were selected by simple random sampling without replacement (SRSWOR) technique among the sixteen development blocks of Bhagalpur. In the next stage, two villages from each block, totaling six villages namely, Jhurkhuriya and Mansarpur villages of Sabour block, Bhimkita and Nayatola Mirzapur villages of Nathnagar block, Mahishi were selected in random manner. For prioritizing the constraints faced by farmers Garrett's ranking technique has been applied.

Garrett's ranking technique

In this method, respondents are asked to rank their perception to specific reasons of mango growing or problems faced by them. The assigned rank was converted into percentage position that was subsequently transferred into Garrett score using Garrett's table. For

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Table 1: Classification of the sample mango growers into different categories based on their size of operational holdings

Type of farmers	Size of operational holdings	Number of farmers			Overall
		Sabour	Nathnagar	Sultanganj	
Marginal farmers	d″ 1.25 acre	17(56.67)	11(36.67)	1(3.33)	**29(32.22)**
Small farmers	1.25 to 2.5 acres	12(40.00)	17(56.67)	15(50.00)	**44(48.89)**
Semi-medium farmers	2.5 to 5.0 acres	1(3.33)	2(6.66)	14(46.67)	**17(18.89)**
Total	**30(100.00)**	**30(100.00)**	**30(100.00)**	**90(100.00)**	

Note: Figures in parenthesis indicates percentage to total

each constraint, scores of individual responses were added together and divided by total number of response given by that particular respondent. Thus, mean score for each constraint has been ranked by arranging them in descending order (Rahaman and Haldar, 2014, De and Rahaman, 2014; Rahaman *et al*., 2015; Rahaman *et al*., 2013).

$$\text{Percentage position} = \frac{100(R_{ij} - 0.50)}{N_j}$$

where,

R_{ij} = Rank given to the i^{th} item by the j^{th} individual and

N_j = Number of items ranked by the j^{th} individual.

RESULTS AND DISCUSSIONS

Classification of farmers according to the size of operational holding

At the outset, the sample mango growers were post-stratified into marginal, small and semi-medium farmers based on the size of their operational holding (Reddy *et al.*, 2004) and presented in table 1. Marginal (32.22%) and small farmers (48.89%) were predominated in the study area followed by semi-medium farmers (18.89%). It was found that majority of the sample farmers of Sabour block belonged to marginal farmers group (56.67%) followed by the small farmers (40.00%) and semi-medium farmers. The majority of the sample farmers of Nathnagar block belonged to the category of small farmers followed by the marginal and semi-medium farmers. Whereas, Sultanganj block was predominated with small farmers (50.00%) followed by the semi-medium (46.67%) and marginal farmers (3.33 %). The average operational holding of the farmers belonged to Sabour and Nathnagar block of Bhagalpur was comparatively smaller than the sample farmers belonged to Sultanganj farmers. Further the data pertaining to mango growers only. Due to close proximity to Bhagalpur town the people of the study area have the opportunity to diversify the income through more remunerative non-agricultural activities. The subdivision, fragmentation of inherited lands among family members was the prime reason for the declining size of landholding and predominance of marginal and small farmers in the study area.

Reasons for growing mango by the sample farmers

The motivation of the farmers behind growing mango was explored and presented block wise in table 2. The higher net return coupled with physical yield of the mango and lack of labour availability were identified as the major reasons for taking up mango enterprises by the farmers with Garrett score 75.16, 67.49 and 63.10, respectively. Further, High cost of labour (60.17), price of plant protection chemicals and fertilizers (50.45), other business opportunities (48.98) and low cost of management (40.39) were other important criteria for the farmers to opt for mango.In Sabour block, the major reason for growing mango was identified as higher net return, physical yield of the mango, lack of labour availability, high cost of labour, price of plant protection chemicals and fertilizers, other business opportunity and low cost of management *etc*. with Garrett score 76.00, 66.00, 64.20, 62.00, 52.40 and 44.57, respectively. Whereas, in Nathnagar block the underlying reasons reported by the mango growers were lack of labour availability (74.80), High wage rate of hired labour (66.93), greater net returns (65.20), better physical yield (62.80), high cost of external input (51.13), more remunerative business opportunity (43.93) and poor irrigation facility (43.33) *etc*. The Sultanganj mango growers believed that the mango production gave higher net returns (73.80) and better physical yield (70.40) than other crops. Also dependence on external input (64.00) and hired labour (59.67) minimized when they opted for mango. Further, high labour wages (56.60), other business and service opportunity (43.63), existing poor irrigation facility (41.23), low output price of other crops (36.57), low cost of management of mango crop (34.07) aggravated the reasons for taking up mango enterprise.

The amount of net income per acre and magnitude of physical yield from mango production, both were higher than annual crops like rice and wheat. The recent

Table 2: Reasons for growing mango by the sample mango growers from different blocks of the study area

Sl. No.	Sabour			Nathnagar			Sultanganj			Overall		
	Particulars	Garrett Score	Rank	Particulars	Garrett Score	Rank	Particulars	Garrett Score	Rank	Particulars	Garrett Score	Rank
1.	High net returns	76.00	I	Lack of labour availability	74.80	I	High net returns	73.80	I	High net returns	75.16	I
2.	Higher output	66.00	II	High wages of labour	66.93	II	Higher output	70.40	II	Higher output	67.49	II
3.	Lack of labour availability	64.20	III	High net returns	65.20	III	High cost of plant protection chemicals and fertilizers	64.00	III	Lack of labour availability	63.10	III
4.	High wages of labour	62.00	IV	Higher output	62.80	IV	Lack of labour availability	59.67	IV	High wages of labour	60.17	IV
5.	Engagement with other businesses and services	52.40	V	High cost of plant protection and chemical fertilizers	51.13	V	High wages of labour	56.60	V	High cost of plant protection and chemical fertilizers	50.45	V
6.	Low production management	44.57	VI	Engagement with other businesses and services	43.93	VI	Engagement with other businesses and services	43.63	VI	Engagement with other businesses and services	48.98	VI
7.	High cost of plant protection and chemical fertilizers	42.47	VII	poor irrigation facility	43.33	VII	poor irrigation facility	41.23	VII	Low production management	40.39	VII
8.	Low output price in market	35.57	VIII	Low output price in market	36.43	VIII	Low output price in market	36.57	VIII	Low output price in market	36.20	VIII
9.	Poor irrigation facility	30.87	IX	Low production management	32.43	IX	Low production management	34.07	IX	Poor irrigation facility	34.96	IX
10.	Lack of govt. support	23.60	X	Lack of govt. support	21.20	X	Lack of govt. support	18.00	X	Lack of govt. support	21.07	X

Table 3: Constraints faced by sample mango growers of different blocks in production of mango

Sl. No.	Sabour			Nathnagar			Sultanganj			Overall		
	Constraints	Garrett Score	Rank	Constraints	Garrett Score	Rank	Constraints	Garrett Score	Rank	Constraints	Garrett Score	Rank
1.	Post harvest losses	74.07	I	Incidence of pest and diseases	73.53	I	Post harvest losses	73.96	I	Post harvest losses	73.81	I
2.	Incidence of pest and diseases	70.23	II	Post harvest losses	73.50	II	Incidence of pest and diseases	72.36	II	Incidence of pest and diseases	71.94	II
3.	Fruit drop	62.40	III	Fruit drop	62.60	III	Fruit drop	62.29	III	Fruit drop	62.48	III
4.	Irregular bearing	59.60	IV	Irregular bearing	59.20	IV	Irregular bearing	59.46	IV	Irregular bearing	59.51	IV
5.	Lack of storage facility	58.70	V	Lack of storage facility	57.43	V	Lack of storage facility	57.36	V	Lack of storage facility	57.99	V
6.	High cost of transportation	55.17	VI	High cost of transportation	54.53	VI	High cost of transportation	54.89	VI	High cost of transportation	54.96	VI
7.	High costs of input	49.70	VII	High costs of input	51.33	VII	High costs of input	50.14	VII	High costs of input	50.24	VII
8.	Price fluctuation	49.53	VIII	Price fluctuation	47.90	VIII	Price fluctuation	48.32	VIII	Price fluctuation	48.49	VIII
9.	Lack of technical guidance for mango production	40.20	IX	Lack of technical guidance for mango production	39.90	IX	Lack of technical guidance for mango production	40.57	IX	Lack of technical guidance for mango production	40.29	IX
10.	Lack of proper market information	32.83	X	Long gestation periods	33.03	X	Lack of proper market information	32.50	X	Lack of proper market information	32.60	X

expansion of non farm sector and better communication facilities helped the farm family members to engage in remunerative nonfarm self-employment, business and service opportunities. Once established, the mango crops required less management, less amount of external inputs and less labour than annual crops. The existing market price of mango is quite stable and higher than traditional rice and wheat. Many of the farmers need not to think about marketing also as the orchards were leased out to pre-harvest contractors. Further poor irrigation infrastructure aggravated the option of mango production. Being, predominance of marginal and small farmers in the study area, mango gives cash payment of bulk of rupees with less effort. The climate and soil of the area is also very suitable for a large varity of mango production. Therefore, due long tradition and bulk of monetary gains at one go made the farmers interested for mango production.

Problems and constraints faced by the farmers in production of mango

The problems and constraints faced by the different categories of mango growers across the study blocks were identified, ranked and presented in table 3. Out of ten major problems identified for mango production, the post harvest losses ranked first with Garrett score 73.81 followed by the heavy incidence of pests and diseases (71.94). Fruit drop (62.48), irregular bearing habit of mango plants (59.51), lack of storage facilities (57.99), high cost of transportation (54.96) had occupied the 3rd, 4th and 5th position, respectively. The other problems associated with crop production were price fluctuation, lack of technical guidance, lack of proper and timely market information *etc*.

The Sabour farmers listed high post harvest losses, heavy infestation of pest and diseases, fruit drop and irregular bearing habit of the mango plants as the four major problems of mango production with Garrett score 74.07, 70.23, 62.40 and 59.60, respectively. In Nathnagar block, the farmers viewed that incidence of pests and diseases, post harvest losses and fruit drop as the major three problems and ranked 1st, 2nd and 3rd with Garrett score 73.53, 73.50 and 62.60, respectively. The Sultanganj farmers expressed post harvest losses, incidence of pests and diseases, and fruit drop as the major three problems and ranked 1st, 2nd and 3rd with Garrett score 73.96, 72.36 and 62.29, respectively. The other problems reported by them were irregular bearing habit (59.46), lack of storage facility (57.36), high cost of transportation (54.89), high cost of external input (50.14), price fluctuation of output (48.32), lack of technical guidance (40.57) and lack of technical know-how (32.50).

Most of the mango farmers responded that a significant quantity of mango production was wasted due to poor post-harvest handling and lack of technical know-how. However, they felt that high premature fruit drops, irregular bearing habit of the trees cause severe loss of yield but the premature fruit drops is quite natural to adjust the fruit load and irregular bearing habit was common for old orchards with alternate bearing varieties of mango trees. They also reported that heavy loss was occurred due to infestation of pest and diseases that may be controlled with regular survey and surveillance. Some farmers felt that the price of plant protection chemicals and fertilizers were quite high but it depends upon the efficacy of the chemical and price policy approved by the government. The farmers also responded that they were lacking of market information, storage facilities and vulnerable to high price fluctuations occurred during short post harvest season of the crop.

The mango farmers did not keep a record and it is the immediate magnitude of income that outweighed the possibility of taking up other enterprises. They preferred to purchase the staples for daily food requirement rather than producing in their own farm and adopted mango production which seems to be highly remunerative for them. The mango farmers were mostly concerned with the alternate bearing habit of the mango trees. Most of the mango orchards in the studied area were 20-30 years old and even more that almost at the verge of full production period or declining phase of production. Most of the trees in their orchard were of Maldah, Dasehari, Himsagar, Gulabkhas, Zardalu, Bombay variety. The general nature of these varieties of mango trees having alternate bearing habit with large canopy. Replacing the old trees with regular bearing varieties like Amrapali, Mallika having shorter plant height and small canopy may boost the income of the farmers. The outbreak of pest and diseases was an important concerned shown by the mango farmers. Regular survey and surveillance of pest and disease will keep the infestation below Economic Injury Level (EIL). It was also quite natural to drop a sizable quantity of immature mango at green stage based on the capacity of each plant. It was found that farmers hardly apply fertilizer and manure and irrigate the orchard very occasionally. The regular application of recommended dose of manures and fertilizers and timely irrigation may check the fruit drop and increase the yield.

REFERENCES

Dash, A.K. 2011. Economics of production and processing of mango in Chittoor district of Andhra Pradesh. MBA-ABM Thesis, Acharya N.G. Ranga Agricultural University, Rajendranagar, Hyderabad - 500 030, pp. 111.

De, S. and Rahaman S.M. 2014. Economics of production and marketing of cabbage in Bankura district of West Bengal. J. Crop and Weed, 10(1): 101-106. Available at http://www. cropandweed. com/archives/2014/vol10issue1/18.pdf

Government of Bihar, 2015. Bihar Statistical Hand Book 2014. Directorate of Economics & Statistics Department of Planning & Development, Bihar, Patna, pp. 233.

Government of India, 2017. Horticultural Statistics at a Glance 2017. Horticulture Statistics Division, Department of Agriculture, Cooperation & Farmers Welfare, Ministry of Agriculture & Farmers Welfare, Department of Agriculture, Cooperation and & Farmers Welfare, Government of India, Oxford University Press, New Delhi, India, pp.511.

Kumar, G.V.M., Goud, V.K., Shankar, M. and Gowda, M.C. 2016. Cost Analysis Study of Mango Fruit Processing Industry in southern India. *Int. J. Trop. Agric*., **34**(6): 1625-1629.

Rahaman, S.M. and Haldar, S. 2014. Sewage fed Farming Systems and Sustainable Livelihood in Peri-urban Kolkata. *Econ. Affairs*, **59**(2): 147-161. Available at http://ndpublisher.in/admin/issues/EAV59I2e.pdf.

Rahaman, S.M., Bera, B.K. and Ananth, G. S. 2013. A study on problems and constraints in production and marketing of fish in West Bengal. *J. Crop and Weed*, **9**(1): 110-113. Available at http://www. crop and weed.com/archives/2013/vol9issue1/18.pdf.

Rahaman, S.M., Ghosh, A., Pal, S. and Nandi, S. 2015. A comparison of resource use efficiency and constraints of wastewater and freshwater fish production system in West Bengal. *Econ. Affairs*, **60**(2): 249-255.

Reddy, S.S., Ram, P.R., Sastry, T.V.N. and Devi, I.V. 2004. Agricultural Economics. Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi, pp.142-303.

Thulasiram, R., Alagumani, T. and Duraisamy, M.R. 2016. Preference of quality attributes for mango export: A conjoint analysis approach. *Int. Res. J. Agril. Econ. Stat*., **7**(1): 42-47.