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Adoption Gap Analysis in Tomato Cultivation in Banda District of Bundelkhand (U.P.)

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ABSTRACT

Bundelkhand area of Uttar Pradesh is comprised of seven districts viz., Chitrakoot, Banda, Hamirpur, Mahoba, Jalaun, Jhansi and Lalitpur. The present study was conducted in Banda district of Uttar Pradesh where the vegetable crops are grown by farmers in large areas. Among the eight blocks of Banda, two blocks namely Badokhar Khurd and Mahua were purposively selected. Eight vegetable growing villages (4 from Badokhar Khurd and 4 from Mahua block) based on production potential of the tomato were drawn up and from each village 18 vegetable growers (six from each category) having minimum 3 years of experience in commercial tomato cultivation were selected randomly with sample size is 144. It is revealed that technological gap in marginal farmers category was observed in the nursery raising and seed-treatment (74.80%) followed by plant protection measures (67.83%) and fertilizer application (67.00%). In small farmers category Identification of insect and pest (77.16%) followed by fertilizer application (74.50%) and plant protection measures (67.33%) were major whereas for medium category the technological gap was observed in nursery raising and seed-treatment (69.30%) followed by plant protection measures (67.58%) and fertilizer application (66.17%). The technological gap level in all categories of farmers revealed that the medium level of technological gap was observed in majority of tomato growers (44.45%) followed by high level of technological gap (38.20%) and low level of technological gap (17.36%).

INTRODUCTION

Farming in India is characterized by marginal, small and fragmented land holdings and they are highly dependent on monsoon showers. Operating small holdings is often unviable and, in this situation, farming is not a profitable enterprise. The challenges of Indian agriculture have been analyzed exhaustively and the need has been established for sustainable improvement in agricultural production aimed at food security in a context of increasing pressure on natural resources. In this context, the common and often large gap between actual and attainable yield is a critical target. Realistic solutions are required to close yield gaps in both small- and large-scale cropping systems to make progress in this direction.

Vegetable farming in agri-entrepreneurial models targeting various niche markets of the big cities is inviting regular attention of the vegetable growers for diversification from traditional ways of vegetable cultivation to the modern methods (Singh et al., 2015). Major challenges and issues in vegetable cultivation are high cost of production; market price fluctuation, low level of farm mechanization, lack of marketing and transport facilities etc. By using protected structures, it is also possible to raise an offseason and long duration vegetables of high quality (Chandan and Singh,

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2015). Considering the rapid changes in agricultural scenario, limited available opportunities and challenges posed by globalised agriculture market, there is a need for developing the capacity of our farmers by enhancing their technical knowledge, functional skills and favorable attitude towards vegetable farming.

The word "technology" means the way of doing. In the agriculture sector, technology development has been directed towards improving productivity in order to ensure the availability of food. Technology development and its transfer are considered as primary driving forces for growth and welfare of developing nations. Targeted and effective adoption process can only be achieved if farmers have sufficient awareness and knowledge of different cultivation practices. When the knowledge level of farmer is low, the rate of technology adoption is also low which ultimately results in loss of production and benefits. Therefore, there is need to develop suitable technologies to sustain these challenges which may come up in the form of various biotic and abiotic factors (Singh et al., 2010). Therefore, it is required to access the adoption level of recommended technology by the vegetable growers/ farmers. Keeping all these factors in mind the present study was undertaken to the analysis of technology adoption and its gap in tomato cultivation in Banda district of Bundelkhand (U.P.).

METHODOLOGY

The present study was conducted at Banda district of Uttar Pradesh. District Banda is situated in Bundelkhand region of Uttar Pradesh. Banda district having eight blocks namely Naraini, Bisanda, Baberu, Kamasin Badokhar Khurd, Tindawari, Jaspura, and Mahua. Among these eight blocks two block namely Badokhar Khurd and Mahua were purposively selected. Eight vegetable growing villages predominantly in tomato cultivation (4 from Badokhar Khurd and 4 from Mahua block) were purposely selected. For this study 144 commercial tomato growers having minimum 3 years of experience in commercial tomato cultivation were selected randomly. As per the Ministry of Agriculture & Farmers Welfare, Government of India categories the farmers (on the basis of their size of land holdings) into total five categories of farmers namely marginal (< 1 ha), small (1 to 2 ha), semi-medium (2 to 4 ha), medium (4 to 10 ha) and large (> 10 ha). On the basis of farmers categories only three categories namely marginal, small and medium farmers was purposely selected for this study. From each village 18 vegetable growers (six from each category) were selected randomly as respondents. To collect the various information of farmers related to vegetable cultivation a schedule was specially developed to know the adoption of technology and its gap.

For quantifying the technological gap, one score was assigned to each right answer and zero score for each wrong or no answer in respect of each item of every items of the technological gap. The mean score and technological gaps were worked out for different categories of the farmers and based on the gap percentage corresponding ranks were assigned. The technological gap was calculated by using the following formula:

$$\text{Technological Gap} = \frac{\text{Extent of Recommendation–Extent of Adoption}}{\text{Extent of Recommendation}} \times 100$$

RESULTS AND DISCUSSION

In spite of various efforts of state horticulture department, KVK scientist and extension personnel of other related organizations and, it has been observed that the vegetable growers of Banda district of Bundelkhand region are achieving good quantity production but still production, productivity and the quality have not been reached to the expectation level of both the scientists and the tomato growers. An attempt was made to find out the extent of adoption of recommended production technology and its practices for various components of tomato cultivation like land preparation and management practice, selection of variety, time of nursery raising and seed-treatment, nursery management and transplanting, age of seedling while transplanting and treatment, planting method, weeding and intercultural operation, fertilizer application, identification of insect and pest, plant protection measures, physiological disorder control, water management and harvesting and post-harvest practices in order to work out the technological gap. The results have been presented in Table 1 to 4.

Practices wise technological gap among marginal farmers

The distribution of respondents according to practice wise technological gap about recommended tomato cultivation technology was ascertained and findings with respect to them are presented in Table 1. Table 1 show that among marginal farmers' the highest technological gap was found in nursery raising and seed-treatment (74.80%). This gap may be due to the marginal farmers arrange the transplanting material or seedling from other sources so they do not practice nursery raising and seed treatment. Other reason may be that the initial cost of tomato seed is comparatively high to other crop seeds and farmers are unable to purchase the seeds of tomato. The second major technological gap was found in plant protection measures (67.83%) which may be due to majority of farmers may not identify or differentiate between entomological and pathological problems simply he asked to input dealers about management practices by showing the infected plant. The third major technological gap was found in fertilizer application (67.00%) followed by identification of insect and pest (66.83%) and selection of variety (62.83%). The gap may be due to lack of awareness of the marginal farmers about the recommended doses of different fertilizers and manures. Marginal farmers were not having knowledge about high yielding and location specific varieties. The lowest technological gap (22.88%) was found in land preparation and management practice and methods of planting (27.83%). This might be due to that the farmers were aware about the land preparation and management practices as being practiced since long. Another reason may be due to majority of the farmers are having appropriate agricultural implement which makes it easy to prepare land for cultivation. It also clear from Table 1 that none of the recommendations were fully adopted by the marginal farmers. These findings are supported by findings of Roy et al., (2019) that the technological gap for marginal farmers' ranges from 97.11 to 32.00 per cent.

Practices wise technological gap among small farmers

The data presented in Table 2 indicates that the highest technological gap among small farmers' was observed in

Table 1. Distribution of the respondents according to their practice wise technological gap of marginal farmers in tomato cultivation

S.No.	Recommended practices	Maximum attainable score	Obtained mean score	Gap in percentage
1	Land preparation and management practice	8	6.17	22.88
2	Selection of variety	6	2.23	62.83
3	Nursery raising and seed-treatment	10	2.52	74.80
4	Nursery management and Transplanting	10	6.35	36.50
5	Methods of planting	6	4.33	27.83
6	Transplanting spacing	5	3.24	35.20
7	Weeding and intercultural operation	10	6.38	36.20
8	Fertilizer application	12	3.96	67.00
9	Identification of insect and pest	12	3.98	66.83
10	Plant protection measures	12	3.86	67.83
11	Physiological disorder control	8	4.23	47.13
12	Irrigation and water management	12	6.63	44.75
13	Harvesting and post-harvest practices	10	6.53	34.70

Table 2. Distribution of the respondents according to their practice wise technological gap of small farmers in tomato cultivation

S.No.	Recommended Practices	Maximum attainable score	Obtained mean score	Gap in percentage	Rank
1	Land preparation and management practice	8	6.23	22.13	XII
2	Selection of variety	6	3.32	44.66	IX
3	Nursery raising and seed-treatment	10	4.06	59.40	IV
4	Nursery management and Transplanting	10	6.35	36.50	X
5	Methods of planting	6	4.55	13.59	XIII
6	Transplanting spacing	5	3.24	35.20	XI
7	Weeding and intercultural operation	10	5.47	45.30	VII
8	Fertilizer application	12	3.06	74.50	II
9	Identification of insect and pest	12	2.74	77.16	I
10	Plant protection measures	12	3.92	67.33	III
11	Physiological disorder control	8	4.37	45.38	VI
12	Irrigation and water management	12	6.60	45.00	VIII
13	Harvesting and post-harvest practices	10	5.36	46.40	V

identification of insect and pests (77.16%). Farmers were unaware about the identification of insects and pest which damage the crops. This might be due to the facts that the farmers were getting maximum information about insect and pest as well as the management practice from the input suppliers and fellow farmers. The second major technological gap was found in fertilizer application (74.50%), this might be due to the fact that farmers were simply knowing the name of fertilizers they might be not knowing the requirement of fertilizers and their doses. This insufficient knowledge of fertilizer requirements and their doses in particular crops might be an important reason for low level of adoption of recommended fertilizers and it led to technical gap. Plant protection measures (67.33%) were observed as third major technological gap among small farmers' categories. It indicates that small farmers were unaware and cannot identify the insect and pest so they were unable to manage them by their own knowledge and experiences. The data also shows that the nursery raising and seed-treatment (59.40%) and harvesting and post-harvest practices (46.40%) have less adopted technology by the small farmers and occupied fourth and fifth rank in relation to tomato cultivation. The lowest technological gap (13.59%) was found in the methods of planting. The above findings were supported by findings of Hussain et al., (2018).

Practice wise technological gap among medium farmers

Table 3 depict that the recommended technologies for tomato cultivation were also not fully adopted by the medium farmers as like other categories of farmer i.e. marginal and small farmers. The technological gap for medium farmers ranged from 22.25 to 69.30 per cent. The highest gap (69.30%) was found in the practice of nursery raising and seed-treatment. The reasons behind these were found same as mentioned earlier like inadequate knowledge about method, time, preparation of beds and seed treatment before sowing etc. The second highest technological gap (67.58%) was found in plant protection measures of tomato cultivation followed by fertilizer application (66.17%) in third position. This might be due to lack of knowledge and interests on plant protection measures and less number of extension programme attended by them in this regard. Majority of the farmers agreed that the soil testing is important before applying the fertilizers, but they were not familiar with how it will do and where it will be tested, so, they cannot do it by themselves. Identification of insect and pest (65.08%) ranked fourth position. The lowest technological gap of medium farmers was found in land preparation and management practice (22.25%) and planting method (27.50%) of tomato.

Table 3. Distribution of the respondents according to their practice wise technological gap of medium farmers in tomato cultivation

S.No.	Recommended Practices	Maximum attainable score	Obtained meanscore	Gap in percentage	Rank
1	Land preparation and management practice	8	6.22	22.25	XIII
2	Selection of variety	6	2.28	62.00	V
3	Nursery raising and seed-treatment	10	3.07	69.30	I
4	Nursery management and Transplanting	10	6.05	39.50	VIII
5	Planting method	6	4.35	27.50	XII
6	Transplanting spacing	5	3.27	34.60	X
7	Weeding and intercultural operation	10	6.38	36.20	IX
8	Fertilizer application	12	4.06	66.17	III
9	Identification of insect and pest	12	4.19	65.08	IV
10	Plant protection measures	12	3.89	67.58	II
11	Physiological disorder control	8	3.89	51.37	VI
12	Irrigation and water management	12	6.33	47.25	VII
13	Harvesting and post-harvest practices	10	6.69	33.10	XI

Table 4. Distribution of respondents according to technological gap level in all categories of farmers

Technological gap level	Number	Percentage
Low	25	17.36
Medium	64	44.45
High	55	38.19
Total	144	100.00

It is evident of data from Table 4 that, 44.44 per cent of respondents were observed under medium level of technological gap of recommended tomato cultivation practices followed by 38.19 per cent of respondents observed in high level of technological gap and 17.36 per cent of the respondents under low level of technological gap. It clearly indicated that the farmers were mediocre in using the recommended management practices and need to adopt more to improve the production and quality of tomato in the Banda district of Bundelkhand region. These results are also supported with the findings of Basanayak et al., (2014), in his study observed highest mean technological gap was in disease management followed by fertilizer application, pest- management, pit size, spacing, FYM, irrigation method and plating season. Here, second highest technological gap was found in post-harvest practices. These findings were also supported by findings of Kadam et al., (2010), Maraddi et al., (2012), Roy et al., (2013), Nain and Chandel (2013), Rathod and Jayabhaye (2014), Sharma et al., (2018) and Singh et al., (2018).

CONCLUSION

It is concluded that majority of tomato growers were observed in medium level of technological gap of tomato cultivation. It may be due to the information and services provided by State Horticulture department are not sufficient and appropriate, timely dissemination of information also play a crucial role to increase the level of adoption. They were not fully aware about the nutrient deficiency of tomato crop, fertilizer requirements of their soils, methods and time of fertilizer application etc. They candidly admitted that for any fertilizer related queries they used to consult with the local fertilizer dealer. Hence, it is required to increase the efforts of officials and field level workers to improve the knowledge and adoption of farmers regarding training of crop. Timely availability and access to seed and planting materials, planting methods, spacing, plant protection measures, fertilizer and manuring will also help in reducing the technological gap and raising productivity and profitability in tomato cultivation It is also required that Government should provide some inputs like seeds of HYV, plant protection measures, micronutrients and short term loan facilities particularly to the vegetable growers at low rate of interest as the crop require intensive practices for successful cultivation for which high initial investment is needed. It will also help to motivate the other interested farmers for adoption of efficient and sound agricultural practices to achieve more yield and income. Furthermore, it is necessary to fix the optimum market rate for getting assured profit to the tomato growers by the any means of contract if requires.

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