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YIELD GAP ANALYSIS IN VEGETABLE CROPS THROUGH ON FARM TESTING

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ABSTRACT
Most of the vegetable crops are grown in Shahjahanpur district at Farm Science Centre known as Krishi Vigyan Kendra laid down On Farm Testing (OFT) on three vegetable crops *i.e*. Bottlegourd, Cauliflower and Chilli by introducing hybrid varieties and applying scientific package of practices in their cultivation. The productivity and economic returns of Bottlegourd, Cauliflower and Chilli in advanced technologies were calculated and compared with the corresponding farmer's practices (local checks). All the three vegetable crops recorded higher gross returns, net return and benefit cost ratio in advanced technologies as compared to the plots where farmers were using traditional practices in their cultivation. It was found that farmers were using old varieties of vegetable crops without proper use of recommended scientific package of practices. So, it is suggested that location-specific integrated approaches would be needed to bridge the productivity gap of the vegetable crops grown in the district.

KEYWORDS: Bottlegourd, Cauliflower, Chilli, traditional practices, Farm Testing.

INTRODUCTION

The main aim of Krishi Vigyan Kendra is to reduce the time lag between generation of technology at the research institution and its transfer to the farmers for increasing productivity and income from the agriculture and allied sectors on sustained basis. KVKs are grass root level organizations meant for application of technology through assessment, refinement and demonstration of proven technologies under different 'micro farming' situations in a district (Das, 2007). On Farm Testing (OFT) is a long term educational activity conducted in a systematic manner in farmer's fields to worth of a new practice/technology. Farmers in India are still producing crops based on the knowledge transmitted to them by their forefathers leading to a grossly unscientific agronomic, nutrient management and pest management practices. As a result of these, they often fail to achieve the desired potential yield of various crops and new varieties. Keeping in view the constraints, Krishi Vigyan Kendra, Shahjahanpur, conducted On Farm Testing (OFT) on three vegetable crops which would ensure livelihood, nutritional security and economic empowerment of the farmers.

MATERIALS & METHODS

The present investigation was carried out in the villages located in the operational area of Krishi Vigyan Kendra, Shahjahanpur with the objective to identify the yield gaps as well as to work out the difference in input cost and monetary returns under On Farm Testing (OFT) and farmers' practices (local checks) of Bottlegourd, Cauliflower and Chilli vegetable crops. The baseline survey was conducted during 2013-14 and the aim of work was to research a replicable model for sustainable rural livelihood security. 10 technologies were tested in Sindhauli cluster consisting of 20 villages and involving 100 households in all 20 villages namely Barapur, Benipur, Adampur Uttari, Adampur Daxini, Garwapur, Rajau, Mahmandpur, Chadhari, Dhakiya Hameed Nagar, Muraharish, Shahjana, Paina Bujurg, Chack Kanhau, Mahau Durg, Baravan, Murcha, Murchi, Mahau Mahesh, Akhtiyarpur and Muriya Pawar . The data on production cost and monetary returns were collected for three years (2013-14 to 2015-16) from On Farm Testing (OFT) plots to work out the economic feasibility of advanced and scientific cultivation of vegetables. Besides, the data from local checks, data were also collected where farmers were using their own practices for cultivation of vegetable crops. The technology gaps, extension gaps and technology index were calculated as given by Samui *et al.*, (2000) as:

1. Technology gap = Potential yield – Demonstration yield
2. Extension gap = Demonstration yield – Yield from farmers practice (Local check)
3. $\text{Technology index} = \frac{\text{Potential yield} - \text{Demonstration yield}}{\text{Potential yield}} \times 100$

RESULTS & DISCUSSION

The details of trials conducted by Krishi Vigyan Kendra, Shahjahanpur are presented in Table 1. In each On Farm Testing (OFT), the hybrid varieties suitable to local condition was selected and the recommended package of practices was adopted. Some of the major differences between the improved technologies adopted in On Farm Testing (OFT) and farmers practices (local checks) adopted by farmers in different vegetable crops are summarized as below.

TABLE 1: Details of vegetable growing under On Farm Testing (OFT) and farmers practices

Crop	Particulars	Farmer Practices	On Farm Testing (OFT)	2013-14		2014-15		2015-16	
				Area (ha.)	No. of farmers	Area (ha.)	No. of farmers	Area (ha.)	No. of farmers
Bottle gourd	Variety	Local	Hybrid	16	40	16	40	16	40
Cauli-flower	Variety	Local	Hybrid	12	30	12	30	12	30
Chilli	Variety	Local	Hybrid	12	30	12	30	12	30
			Total	40	100	40	100	40	100

Bottlegourd

The advanced technologies included hybrid varieties (cv. Kashi Ganga, nutrient management (120:80:60 NPK kgha^{-1} and pest management (Imidachloprid 17.8 SL @250mlha^{-1}) were tested under demonstrations. Crop was sown by using seed @ 1.5kg ha^{-1}. The whole Phosphorus and Potash were applied as basal dose and Nitrogen was top dressed in two equal splits at 30 and 60 days after sowing. The fungicide, Score 250 SC (Difenoconazole) @ 0.5lha^{-1}was applied at pre sowing of bottle gourd crop. The Score 250 SC (Difenoconazole) @ 0.5lha^{-1} was applied at the time of incidence of different diseases like Leaf rust, leaf spot, powdery mildew and alternaria etc.

Cauliflower

Farmers were using local variety of cauliflower and the seed rate used by the farmers was very high (1.0 kgha^{-1}). Chemical fertilizers *i.e*. Urea and DAP were used by the farmers. In advanced technologies includes hybrid variety Kashi Agahani (seed rate 200gm ha^{-1}) The seed was treated with Carbendazim@ 2.5g kg^{-1}seed), nutrient management (150:60:60 NPK kgha^{-1}) and spray of micronutrient 2.5kg/ha..

Chilli

In case of Chilli (Table 1), farmers were using local or improved varieties of chilli. The farmers were sowing the seeds in flat bed using broadcast method without the use of any fungicide. In advanced technologies, included hybrid variety (Arka Meghna, seed rate 300gm/ha), nutrient management (100:80:60 NPK kgha^{-1}) and Insect and Pest management (Imidachloprid 17.8 SL @250mlha^{-1}) and fungicide Score 250 SC (Difenoconazole) @ 0.5lha^{-1}were tested.

Economic Impact of On Farm Testing (OFT)

TABLE 2: Productivity of vegetables, yield gap and technology index (average over year)

Crop	No. of Trials	Area (ha.)	Productivity (Q/ha.)			Percent Increase over local	Technology gap (q/ha.)	Exten.gap (q/ha.)	Technology Index (%)
			Potential	Advanced Technologies	Local Check				
Bottlegourd	40	16	450	384	278	38.13	66.00	106.00	17.19
Cauli-flower	30	12	250	195	155	25.81	55.00	40.00	28.20
Chilli	30	12	300	259	198	30.81	41.00	61.00	15.83

During the period of study, it was observed that in On Farm Testing (OFT) of advanced technologies increased productivity of all the vegetables over respective local checks (Table 2). The advanced technologies recorded higher productivity of bottle gourd and chilli 384.00q ha^{-1}, 259.00q ha^{-1} as compared to farmers practices (local checks) 278.00q ha^{-1}, 198.00q ha^{-1}, respectively. The increase in productivity of bottle gourd and chilli over respective local checks were 38.13 % and 30.81 %. The higher productivity of bottle gourd and chilli under advanced technologies were due to the sowing of latest high yielding varieties and adoption of improved nutrient and pest management techniques. Similar results have been reported earlier by Haque (2000), Hiremath and Nagaraju (2009) and Dhaka *et al.*, (2010). The year wise fluctuation in yields was observed mainly on the account of variations in soil fertility status, disease and insect pest management practices. Similarly, cauliflower recorded higher production of 195.00qha^{-1} in advanced technologies as compared to local check (155.00q ha^{-1}). The increase in the productivity of cauliflower over local check was 25.81 %. The yield improvement in cauliflower might be due to combined effect of high yielding, moderate disease resistant hybrid varieties and adoption of improved weed and nutritional management. Similar yield enhancement in different crops in On Farm Testing has amply been documented by Haque (2000), Tiwari *et al.* (2003), Mishra *et al.* (2009) and Kumar *et al.* (2010). Yield of the On Farm Testing trials and potential yield of the crop was compared to estimate the yield gaps which were further categorized into technology and extension gaps (Hiremath and Nagaraju, 2009). The technology gap shows the gap in the demonstration yield over potential yield and it was highest in bottle gourd (66.00q ha^{-1}) in comparison to cauliflower (55.00q ha^{-1}) and chilli (41.00q ha^{-1}). The other reasons include dissimilarity in soil fertility status, marginal land holdings. Further the higher extension gap of 106.00 q ha^{-1} was recorded in bottlegourd after chilli (61.00 q ha^{-1}) and cauliflower (40.00 q ha^{-1}). This emphasized the need to educate the farmers through various extension means for the adoption of scientific practices in cultivation of all the vegetable crops. Mukharjee (2003) has also opined that depending on identification and use of farming situation, specific interventions may have greater implications in enhancing system productivity.

CONCLUSION

Thus, the cultivation of vegetable crops with advanced technologies including suitable varieties, weed management, nutrients and pest management has been found more productive and fruit yield in bottlegourd, cauliflower and chilli and was increased up to 39.34, 38.46, and 37.84 per cent, respectively. Technological and

extension gaps existed which can be bridged by popularizing package of practices with emphasis on the seed of improved vegetable hybrid varieties, use of proper seed rate, balanced nutrient application and proper use of plant protection measures. Replacement of local varieties with the released hybrid varieties of bottlegourd, cauliflower and chilli would increase the production and net income of these vegetable crops.

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