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Short Communication

Performance of improved varieties of vegetables under front line demonstration at farmers' field in Seoni district of Madhya Pradesh

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Among the food based approaches, cereals may not provide a solution for micronutrient deficiency, as it narrows down the biodiversity in production as well as in diets. Integration of micronutrient -rich foods, such as vegetables into the diet is the viable solution for alleviating micronutrient deficiency in human. Among the micronutrient-rich foods, vegetables are relatively cheap, and supply micronutrients at a relatively lower cost than others, such as livestock products (Ali and Tsou 1997). Vegetables are rich source of minerals, vitamins, vegetable fiber and contain good amount of carbohydrates and protein. Due to development of improved varieties, better market price and general awareness in nutritional security among the people, vegetable cultivation in the country is getting momentum among the growers, preferably small and marginal farmers for their livelihood security. Kymore plateau and Satpura hills in Madhya Pradesh is considered as potential area for vegetable cultivation, but lack of technical guidance and unawareness of improved technologies have compelled the farmers to grow traditional cultivars and adopt outdated agronomic practices. As per third estimates of National Horticulture Board (2017), the estimated area and production of vegetables in India during 2016-17 is 10.29 million ha and 176.29 million tones. Madhya Pradesh accounts for 6.7% and 7.8% of area and production of the country, respectively with the average yield of 20.5 tons/ha, which is slighter higher than the national average of 17.6 tons /ha. In Seoni district, vegetables are grown about 7670 ha area, but it still has the low productivity comparing to other vegetable growing regions. In Seoni district farmers are growing a large number of vegetables, but tomato, cowpea, okra and bottle gourd need much attention right from field preparation to the plant establishment and finally harvesting of the crop and marketing. Majority of the farmers in this region are still cultivating the traditional varieties, as the hybrid seeds from the private sectors are very expensive, and are also not readily available in the rural areas (Ojha and Singh 2013). Therefore, for creating awareness to the end users i.e. the farming community, efforts have been made to popularize the improved varieties of vegetable crops developed by IIVR Varanasi and NDUAT, Faizabad through the front line demonstration (FLD) in Seoni district. The objective of this study is to demonstrate the performance of improved vegetable varieties with the existing cultivars, and to find out the yield gaps in realization of higher yields at farmers' fields.

The present study was conducted in Seoni district of Madhya Pradesh during two subsequent seasons at four different villages, namely Jamunia, Semariya, Sahajpuri and Yerpa located in two blocks, Seoni and Lakhnadaoun under JNKVV-KVK, Seoni operational area. The villages were critically surveyed and selected for the FLD of improved vegetable varieties through survey, farmers meeting and training programmes were organized in villages on improved packages and practices of vegetable cultivation technology during the cropping period. Low productivity of vegetables in locality is primarily due to use of traditional old variety, imbalance and indiscriminate use of chemical fertilizers and poor management of insect-pest and diseases. The technology demonstrated includes varietal replacement in vegetable crops through introduction of improved varieties along with scientific package of practices. A total of 4 varieties of vegetable crop, one each in tomato, cowpea and okra developed from ICAR-IIVR Varanasi and bottle gourd from NDUAT, Faizabad were demonstrated in 60 farmers' field in a total area of 24 hectare. The demonstrated trials were regularly monitored and necessary data related to new varieties were collected. In addition to this, data on traditional practices followed by the farmers were also collected.

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Technology gap, extension gap and technology index were worked out as per formula suggested by Samui et al. (2000) and Dayanand and Mehta (2012) as given below:

Technology gap = Potential yield (P1) - Demonstration yield (D1);

Extension gap = Demonstration yield (D1) - Farmers yield (F1) and

$$\text{Technology index} = \frac{(PI - DI)}{PI} \times 100$$

It was observed that there were number of problems and constraints, which were responsible for the low productivity and lower adoption of vegetable technologies in the study area. Among them, the lack of knowledge about seeds and seedling treatment was the major constraint, and 86% of the farmers were aware of about it. Also, lack of knowledge of appropriate weedicide, insecticide and pesticides in vegetable crops (80 %), and lack of knowledge of improved suitable varieties (76%) were other major problems. Similar findings were also reported in pulse crops by Burman et al. (2010) and Avinashilingam and Singh (2013). With regard to the problems in fertilizers and its application, it was found that majority of the farmers (71%) were not aware about the recommended doses of fertilizers. Most of the farmers had been growing old/traditional varieties of vegetable crops, and had never used improved varieties. Another problem faced by the farmers was the high seed prices (59%). As for as losses due to insect-pest and diseases were concerned, it was found that majority farmers (63%) were not aware about the advanced plant protection practices. Other problems were lack of storage facilities, which resulted to force sale of produce by the farmers at low prices. Our study also revealed that more than 80% farmers were not getting appropriate prices for their produce. It is generally expected that the technology performed best in research station will also perform the best in farmers' field, but the assumption of consistency or repeatability of technology performance between research station and farmers' field may not always hold true. Under such situation, selection of the best technology for farmers cannot be based solely on research station trials. Such a selection process should in fact base on farm trails in which the new technology was compared with the farmers existing practices under the growing condition of the farm. The results of present study also indicated a greater impact of improved varieties over the existing cultivars.

Table 1: Major problems and constraints faced by farmers (N=60)

Particulars	Percentage of respondents
Lack of knowledge of improved suitable varieties	76
Lack of knowledge about seed and seedling treatment	86
Unavailability of quality seeds	74
High seed prices	59
Lack of knowledge of recommended doses of fertilizers	71
High cost of fertilizers	58
Lack of knowledge of appropriate weedicide, insecticide and pesticides	80
Losses due to insect-pest	63
Losses due to weeds	18
Poor quality of insecticide/pesticides	64
Non-remunerative prices	80
Lack of storage facilities	68
Less support from Government	32

Source: Field survey

Yield of FLD trials and potential yield of respective vegetable crops were compared to estimate the yield gaps, which were further categorized into technology and extension gaps. The adoption of technology in front line demonstration trials was studied through technology index, which shows the feasibility of the evolved varieties on farmers' field. The lower the value of the

Table 2: Performance of vegetable varieties during subsequent two seasons

Crop	Variety	Area (ha)	No. of demonstrations	Average yield (q /ha)		Per cent increase
				Demonstration	Local check	
Tomato	Kashi Vishesh (H-86)	6.0	15	220.35	130.00	69.50
Cowpea	Kashi Kanchan	6.0	15	129.10	94.85	36.10
Okra	Kashi Pragati (VRO-6)	6.0	15	130.79	85.91	52.24
Bottle gourd	Narendra Jyoti	6.0	15	230.40	140.61	63.85

Table 3: Yield, technology gap, extension gap and technological index % in vegetable crops

Crop	Variety	Yield (q /ha)			% increase over local	Technology gap (q /ha)	Extension gap (q /ha)	Technology index (%)
		Check variety	Demonstrated variety	Potential				
Tomato	Kashi Vishesh (H-86)	130.00	220.35	300.00	69.50	79.65	90.35	26.55
Cowpea	Kashi Kanchan	94.85	129.10	140.00	36.10	10.90	34.25	7.78
Okra	Kashi Pragati	85.91	130.79	180.00	52.24	49.21	44.88	27.33
Bottle gourd	Narendra Jyoti	140.61	230.40	300.00	63.85	69.60	89.79	23.20

technology index more is the feasibility of the demonstrated varieties. One varieties of each vegetable crop was demonstrated in 60 locations at farmers' field in Seoni district of Madhya Pradesh. The average yield of demonstrated variety of tomato (Kashi Vishesh) at the farmers' field was 220.35 q/ha as compared to 130.0 q/ha from local check (Table-1). Since the FLD trials were laid out at the farmer's field under the supervision of the scientists, but still there was a gap exists between the potential yield and demonstration yield. This may be due to varied soil fertility and weather condition; hence location specific recommendations are necessary to bridge the gap. Table-1 clearly shows an increase of 69.50 percent in tomato yield over control. In tomato, ToLCV is the major problem, and the variety Kashi Vishesh developed by ICAR-IIVR, Varanasi demonstrated at the farmers' field showed moderate resistant to ToLCV during the cultivation. Efforts were made to demonstrate cowpea variety, Kashi Kanchan evolved from ICAR-IIVR, Varanasi and their performance as compared to local variety grown by the farmers of that locality. Kashi Kanchan variety performed very well in the farmers field with technology gap of only 10.90 q/ha and technology index of 7.78 % (Table-1) The average yield of demonstrated cowpea variety at farmers field was 129.10 q/ha as compare to 94.85 q/ha in local check. Okra variety, Kashi Pragati (VRO-6) developed from ICAR-IIVR, Varanasi was demonstrated at farmers' field. It has registered an average yield of 130.79 q/ha with 52.24 % increase in yield over local check variety. This variety has now most popular in this area, as it is the most suitable for growing in black soils of the district. The dark green colour, 8-10 cm pod size with moderately resistance to YVMV has resulted to fetch more market prices compare to other varieties (Singh et al. 2012). Narendra Jyoti a variety of Bottle gourd were demonstrated at farmers field and recorded average yield of 230.40 q/ha with 63.85 % increase over control. Technology index was lowest in case of cowpea variety Kashi Kanchan followed by bottle gourd variety Narendra Jyoti, tomato variety H-86, and least in okra variety Kashi Pragati (VRO-6). Since the technology index of all the four demonstrated varieties range between 7.78 and 27.33, which lies in the lower quarter indicates their high level of adoption (Singh et al. 2007). It was concluded from the study that with the introduction of improved vegetable varieties and scientific package of practices there was a significant impact on productivity and farmers' income. FLD brought out an increase of 36.10 to 69.50% in yield of vegetable crops due to intervention with improved packages and practices of vegetable in the Seoni district of Madhya Pradesh.

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