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PERFORMANCE OF CUCURBITACEOUS DEMONSTRATIONS IN CENTRAL PLAIN ZONE OF UTTAR PRADESH, INDIA

Dr. Saurabh Tomar

Research Scholar, Department of Vegetable Science, C. S. Azad University of griculture & Technology, Kalyanpur, Kanpur-208 024, Uttar Pradesh, India

ABSTRACT Half-field demonstrations were conducted on cucurbitaceous with improved technologies against farmers practices on farmer's fields during 2017-18 and 2018-19 in central plain zone of Uttar Pradesh. Full package of practices were followed. The demonstrations were conducted on bottle gourd (30), bitter gourd (28) and cucumber (35). The results showed that improved techniques increased yield over farmers practices by the margins of 130.16 q/ha or 52.43 % in bottle gourd, 45.64 q/ha or 38.87 % in bitter gourd and 77.58 q/ha or 68.93 % in cucumber. Net profit of Rs. 81,788.0/ha in bottle gourd and Rs. 53,512.0/ha in bitter gourd realized by farmers. Lowest of Rs. 35,204.5/ha net profit was increased in cucumber. There was wide technology gap, which need to bridge by promoting the scientific production and protection technologies of cucurbitaceous crops in central plain zone of Uttar Pradesh.

KEYWORDS : Cucurbitaceous demonstrations, Cucurbitaceous productivity and profitability, Technology gap analysis

INTRODUCTION

The cucurbitaceous are the important crops grown in central plain zone of Uttar Pradesh. However, the productivity of these crops is much lesser than the other part of state. The major constraints in crops production are non-availability of improved varieties seed, imbalance use of fertilizers and lack in adoption of improved cultivation techniques by majority of farmers (Rajiv, 2014). Most of the farmers in the zone are not aware about improved techniques of crops cultivation. If the productivity increases, the sizeable area under these crops will be increased and thus, production of cucurbitaceous to be enhanced. Keeping these factors in view, half-field demonstrations were organized at several locations on farmer's fields in district Kanpur Nagar, Kanpur Dehat and Fatehpur to enhance the productivity and profitability per unit area under the project of establishment and popularization of improved varieties of vegetables and their agro-techniques.

Methodology

The selection of farmers was done with the help of staff of line departments and KVKs. Only interested farmers were selected for demonstrations on different crops. Through preliminary discussion with selected farmers, causes for low crop yield of cucurbitaceous were identified and prioritized. Based on the major causes, technological interventions were finalized. Under improved techniques, demonstrations were included interventions *viz.*, use of improved variety with optimum seed rate, line sowing with optimum plant stand, optimum dose of fertilizer application, use of plant growth regulator and proper weed management. Under conventional system, farmers used old varieties with high seed rate, without seed treatment, imbalance use of fertilizer application, without use of plant growth regulator and no proper weed control. The demonstrations were conducted in form of half-field demonstration. Each demonstration had an area of 0.4 ha, in which half area (0.2 ha) was kept under conventional system and rest half (0.2 ha) under improved techniques of crop production demonstrated side-by-side. The 93 demonstrations on cucurbitaceous crops were conducted in selected districts for two consecutive *kharif* seasons in 2017-18 and 2018-19. Demonstrations on bottle gourd (30), bitter gourd (28) and cucumber (35) were laid out. Yield data were recorded and analyzed economics. Technology gap, extension gap and technology index were calculated by using the following formulae as suggested by Balai *et al*. (2014), Rajiv and Singh (2014) and Rajiv and Singh (2016).

Technology gap : Potential yield – Demonstration yield

Extension gap : Demonstration yield – Farmer's practice yield (Local check)

$$\text{Technology index (\%)} = \frac{\text{Technology gap}}{\text{Potential yield}} \times 100$$

Description of technologies disseminated and conventional system

Technologies disseminated in cucurbitaceous demonstrations were included improved varieties (Kashi Ganga of bottle gourd, Kashi Urvashi of bitter gourd and Kalyanpur Green of cucumber), seed soaking in 0.05 % solution of carbendazim before sowing (6 hours, 24 hours and 4 hours for bottle gourd, bitter gourd and cucumber, respectively), integrated nutrient management (20 ton FYM + NPK @ 80-100:60-80:60-80 kg/ha), effective weed management (pendimethalin @ 1.0 kg a.i./ha as pre emergence + 1 hand weeding at 35-40 days after sowing), IPM practices and bower or support system. The bottle gourd and bitter gourd crops were sprayed with M.H. @ 50 ppm and cycocel @ 250 ppm, respectively and cucumber crop with ethrel @ 100 ppm twice at 2 and 4 true leaf stages. All demonstrations were sown during *kharif* season between end of the June to mid July by using seeds of 5.0 Kg/ha in bottle gourd and bitter gourd and 3.0 Kg/ha in cucumber with crop geometry of 2.0-3.0 x 1.0-1.5 m, 1.5-2.5 x 0.6-1.2 m and 1.5-2.0 x 0.6-0.7 m, respectively. On the other hand, farmers were using without treated local variety seed with imbalance nutrients (NPK @ 125-135:40:0 kg/ha) and without herbicide, plant growth regulator, IPM practices and bower or support system. The seed rate used by the farmers was high as about 7.0 Kg/ha in bottle gourd and bitter gourd, while 4.0-4.5 Kg/ha in cucumber.

Results and Discussion

Yield analysis: Remarkable change on yield parameter was observed (Table 1). Technological interventions in terms of improved varieties, integrated nutrients management, integrated pest management, weed management, etc. made a difference on cucurbitaceous yield. The possibility of increasing yield of bottle gourd, bitter gourd and cucumber per unit area was found in the area at significant level. Maximum increase in yield due to improved techniques over conventional system was recorded in cucumber followed by bottle gourd, while lowest yield increase was seen in bitter gourd. On mean basis (2017-18 & 2018-19), bottle gourd, bitter gourd and cucumber increased 52.43 %, 38.87 % and 68.93 % yield, respectively, over conventional system. It might be mainly due to region specific improved variety with optimum seed rate, soaking of seeds in carbendazim solution before sowing, proper spacing, optimum fertilizer application, plant growth regulator spray, IPM practices, proper weed control and bower or support system. All these improved techniques had a great impact on cucurbitaceous and lead to high yield. The spray of plant growth regulators help a lot in modifying sex ratio and increased fruit set in cucurbitaceous. Under conventional system, local or old variety with high seed rate, dense spacing, imbalance use of fertilizer, no or imperfect plant protection measures and no proper weed control are the main reasons of poor yield. During the period of study, it was also observed that in cucurbitaceous, farmers use their own seed year after year, which lead to poor yield. Proper improvement in these inputs might have increased the cucurbitaceous yield with improved techniques over conventional system. These results are in conformity with the findings of Rajiv and Dabas (2011), Rajiv and Rathi (2012), Rajiv *et al*. (2013), Balai *et al*. (2014), Rajiv and Prakash (2014), Singh *et al*. (2014), Rajiv *et al*. (2018) on different crops. Rajiv (2014a) reported good impact of dissemination and diffusion of conservation agronomical practices on area expansion (119.8 ha) as well as volume (1317.8 t) and value of produce (461.23 lac) of okra in Hamirpur district of Uttar Pradesh.

Economic analysis: Cost of cultivation of cucurbitaceous has been raised due to higher rates of inputs per unit area. Increase in expenditure due to improved techniques over farmer's practices was lowest of Rs. 17,162.0/ha in cucumber to highest of Rs. 22,340.0/ha in bottle gourd. The use of improved techniques increased net economic gain from all cucurbitaceous under demonstrations considerably. Maximum increase of Rs. 81,788.0/ha in net profit was observed in bottle gourd followed by bitter gourd with Rs. 53,512.0/ha, while lowest of Rs. 35,204.5/ha net profit was found in cucumber (Table 2). The percent yield increase due to improved interventions was highest in cucumber but net profit was lowest. It might be attributed to lowest sale price of cucumber. Return per rupee invested on improved techniques was worked out highest of Rs. 4.66 in bottle gourd followed by Rs. 3.74 in bitter gourd, while lowest of Rs. 3.05 in cucumber. These results showed that investment on improved cultivation techniques is more profitable on bottle gourd in the zone. Rajiv and Dabas (2011), Rajiv and Dabbas (2012), Chaturvedi *et al*. (2014), Rajiv and Singh (2014), Rajiv (2014b), Rajiv (2015), Rajiv *et al*. (2018), Rajiv (2019) and Rajiv (2019a) have reported almost similar results on different crops earlier.

The increase in crop profitability (Rs/ha/day) due to improved techniques of bottle gourd, bitter gourd and cucumber was recorded by Rs. 681.57, 445.93 and 391.16, respectively. The crops, which give higher profitability, are economically beneficial.

Technology gap analysis: The data depicted in Table 1 revealed that the bottle gourd, bitter gourd and cucumber produced average yield of 378.42 q/ha, 163.06 q/ha and 190.12 q/ha under demonstrations as against the potential yield of 450 q/ha, 200 q/ha and 225 q/ha, respectively. Thus, there was a wide gap found between the demonstration yield and potential yield. The highest technology gap of 71.58 q/ha was recorded in bottle gourd followed by bitter gourd (36.94 q/ha), while minimum gap was found in cucumber (34.88 q/ha). There was highest gap existed between the potential yield and demonstration yield (improved technologies) in bottle gourd followed by bitter gourd, whereas lowest was in cucumber. However, demonstrations were conducted under close supervision of field staff but the technology gap was found there. It might be due to varied agro-ecosystems of the area. In addition, it was also observed that the reasons responsible for the technology gap were lack of adoption of complete or thoroughly recommended package of practices at demonstration fields under improved technologies due to non-availability of some important inputs at the time of requirement, high cost of inputs and insufficient technological advice.

The highest extension gap of 130.16 q/ha was recorded in bottle gourd followed by cucumber (77.58 q/ha) whereas lowest was in bitter gourd (45.64 q/ha) which indicates that there was a gap existed between the yield of demonstrations and local check/farmers practice. In comparison between the improved technologies and conventional system, it was observed that the farmers did not use balance nutrients, herbicide, plant growth regulator and plant protection measures properly, local varieties were sown without seed treatment and optimum plat population, which was not maintained under conventional system. Thus, the farmers were failed to adopt recommended package of practices under conventional system and lead to extension gap. The extension gap in the yield indicates that there is big scope to increase the yield of cucurbitaceous on farmer's fields by adopting the recommended package of practices. Therefore, to bridge the extension gap, there is a need to give more emphasis on transfer of improved technologies and management practices of bottle gourd and cucumber as compared to bitter gourd through strengthening of extension network. The extension gap for all cucurbitaceous was higher as compared to the technology gap, which also indicates that there is need to train and educate the farmers about improved technologies.

Technology index ranging from 15.50 to 18.47 % indicates of higher scope for further improvement in productivity of cucurbitaceous in central plain zone of Uttar Pradesh. Singh *et al*. (2014), Rajiv and Singh (2016) and Rajiv *et al.* (2018) also observed similar findings.

CONCLUSION

Demonstrations conducted on bottle gourd (30), bitter gourd (28) and cucumber (35) were performed better. The results showed that improved techniques increased average yield over farmers practices by the margins of 130.16 q/ha or 52.43 % in bottle gourd, 45.64 q/ha or 38.87 % in bitter gourd and 77.58 q/ha or 68.93 % in cucumber. The farmers realized net economic gain of Rs. 81,788.0/ha in bottle gourd and Rs. 53,512.0/ha in bitter gourd. Lowest of Rs. 35,204.5/ha net gain was increased in cucumber. There is wide technology gap, which need to be bridged by promoting the scientific production and protection technologies in varied condition. Major attention on district and area specific technology modules should be developed for enhancing the productivity of cucurbitaceous in varied conditions and agro-eco systems of central plain zone of Uttar Pradesh.

Table 1: Yield and gap analysis of cucurbitaceous in central plain zone of Uttar Pradesh

Crop	No. of demo.	Potential yield (q/ha)	Average yield (2017-18 & 2018-19) (q/ha)		% increase in yield over conv.	Technology gap (q/ha)	Extension gap (q/ha)	Technology index (%)
			Conv.	Imp.				
Bottle gourd	30	450	248.26	378.42	52.43	71.58	130.16	15.91
Bitter gourd	28	200	117.42	163.06	38.87	36.94	45.64	18.47
Cucumber	35	225	112.54	190.12	68.93	34.88	77.58	15.50

Demo. – Demonstrations; Conv.- Conventional system; Imp.- Improved techniques

Table 2: Economic analysis of cucurbitaceous in central plain zone of Uttar Pradesh

Crop	Increase with improved techniques over conventional system in					
	Yield (q/ha)	Gross income (Rs./ha)	Expenditure (Rs./ha)	Net profit (Rs./ha)	Return per rupee invested	Crop profitability (Rs./ha/day)
Bottle gourd	130.16	104128.0	22340.0	81788.0	4.66	681.57
Bitter gourd	45.64	73024.0	19512.0	53512.0	3.74	445.93
Cucumber	77.58	52366.5	17162.0	35204.5	3.05	391.16

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