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Impact of front line demonstrations on yield and economics of onion set planting technology in Pune district

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Abstract
The Present study was carried out at Pune district of Maharashtra during January 2017. Front line demonstrations were conducted on onion by the active participation of 100 farmers with the objective of improved technologies of onion production potential. The improved technologies consist onion set planting technology, improved varieties (Baswant-780 and Phule samarth) and integrated pest and disease management, etc. In onion set planting production technology sowing of onion seed was done and bulbs were produced. These bulbs were stored in a shadow/shade for 2-3 months. After a storage period bulb selection was done and planted in field to obtain onion production. Demonstrations recorded the average onion yield of Phule Samarth as 45.00 quintal acre^{-1} and Baswant-780 as 40.16 quintal acre^{-1} in demonstration plot as against 43.46 quintal acre^{-1} of Phule Samarth and 38.34 quintal acre^{-1} of Baswant-780 in farmer practice. In Phule Samarth maximum yield was 49.00 quintal acre^{-1} and minimum 40.00 quintal acre^{-1} whereas, in Baswant 780 maximum yield was 44.00 quintal acre^{-1} and minimum yield 36.00 quintal acre^{-1} were obtained from demonstrations. The higher Benefit Cost Ratio of 1.09 in Phule Samarth and 1.07 in Baswant-780 was obtained in demonstrations as against 1.06 in Phule Samarth and 1.04 in Baswant-780 in farmers practice.

Keywords: Onion, Phule Samarth, Baswant-780, demonstrations and yield

Introduction
Onion (*Allium cepa* L.) is one of the most important vegetable spice in the world. Besides seasonal production, it consumed throughout the year in every household. It is widely cultivated, second only to tomato, and is a vegetable bulb crop known to most cultures [1]. Onion is used in fresh as well as various processed forms like powder, flecks, shreds, paste etc. Nutritionally, onion is considered one of the richest sources of flavonoids, which contribute to a great extent in the human overall dietary intake of these compounds, minerals like sodium, potassium, calcium, iron, and vitaminsB-6 and vitamin C [2]. Major onion producers are China, India, the United States, Turkey, Japan, and Spain. India is the second largest producer of onions after China with total annual production of 22427 thousand tones on 1306 ha in the year of 2016-17. (NHRDF, 2018). It is one of the most important crop of the Maharashtra state. The major constraints of traditional onion growing is low productivity because of non-adoption of advanced technologies like improved varieties, timely sowing, use of recommended fertilizers doses and application at proper time and integrated crop management technologies etc. To increase the production, productivity and quality of agricultural produce, front line demonstrations (FLD) are being conducted at various farmers' field. Front line demonstration is playing a very important role for transfer of technologies and changing scientific treatment of the farmers by seeing and believing principle [3]. Bulbs are produced and stored in a shade for 2-3 months after a storage period bulbs were selected for planting. In this way, the biological cycle of the species is followed, which implies roughly 8 months from sowing to harvest. Onion sets are small bulblets up to 30-40 mm-diameter produced in high density seedbeds. This method allows the early supply of onion to market. The training was given to selected farmers for set planting method of onion.

Materials and methods
Pune district is located in the western part of Maharashtra. The total geographical area of the district is 15.62 lakh hectares, comprises 5 per cent of the state's total geographical area. The Pune district lies between 17.54 to 19.24 degree North latitude and 73.19 to 75.10 degree

eastern longitude. The climate of district is characterized by dry atmosphere except monsoon. The summer is moderately high and temperature varies from 36 °C to 42 °C. The average annual rainfall is 905 mm mostly during the months of June to September.

On the basis of feedbacks and participation of farmers, the project is being implemented with objectives to demonstrate SAU's (Mahatma Phule Krishi Vidyapeeth) developed technologies through cluster approach on farmer's field for improving production, productivity and income of farmers. To test the adoption of technologies with the components of onion set plantation based production technologies. The present study was conducted in Shindavane village of Pune district in Maharashtra during 2017 under Farmer First Project by Regional Extension Center, College of Agriculture, Pune (Table.1). All the participant farmers were trained on various aspects of onion set plantation technologies. The first step was the production of onion sets in seedbeds sown on January 2017 with 5 kg of seeds, then the bulbs were harvested and stored in shade. After the onset of monsoon these onion bulbs were transplanted to the fields and harvested in August 2017. The yield and economic performance of the front line demonstrations, the data on output were collected from FLDs as well as farmers based plots. The onion yield, cost of cultivation, net returns with benefit cost ratio was worked out. To estimate the extension gap following formula used by [4], [5].

Extension Gap = Di (Demonstration Yield) – Fi (Farmers yield).

Benefit cost ratio (BCR): It was calculated by following formula [6].

$$BCR = \frac{\text{Gross returns}}{\text{Total production cost}}$$

The block demonstrations on onion set plantation technology were organized in the selected cluster villages on 40 hectares area with improved seed material (Table.1). The demonstration plots were monitored by the University scientists time to time and guided the participated farmers about the cultivation of onion by sets. Also demonstration field visits, group discussions and farmers rally were organized during the crop period at selected village.

Results and discussion

The data related to the cost of cultivation, production, productivity, gross return and net return were collected as per schedule and analyzed. The result of the study indicated the gap existed in the potential yield and demonstration yield is due to varietal difference. Present results clearly show that the yield and economics of onion can be boost up by adopting onion set planting technology.

Onion yield

After completion of harvesting in onion, the data on yield, production cost, market prices were collected and complied (Table 3). The average yield of onion demonstrations variety Phule Samarth and Baswant-780 was much higher as 45.00 qt acre^{-1} and 40.16 qt acre^{-1} than the average yield of farmers practice as 43.46 qt acre $^{-1}$ and 38.34 qt acre $^{-1}$ respectively. The average per cent increase in the yield over farmers practice was 3.54 per cent in Phule Samarth and 4.74 per cent in Baswant-780. The results indicated that the front line demonstrations have given the good impact over the farming community of Pune district as they were motivated by new agricultural technologies/varietal change amongst farmers applied in the FLD plots (Table 1). The yield gap with experimental records in Uruguay exceeding 1000 kg ha^{-1} [7]. The global average of 500 kg ha^{-1} for most onion seed producing areas of the world [8].

Table 1: Cluster villages selected for Demonstrations and area

Sr. No.	Name of village	Tahsil and Dist.	No. of farmer partners	Area (ha)
1.	Shindavne	Haveli and Pune	100	40.00
	Total		100	40.00

Table 2: Onion set planting yield of demonstrations

Crop Onion	Farmers associated	Total area (ha)	Maximum yield (qt acre $^{-1}$)	Minimum yield (qt acre $^{-1}$)	Average yield (qt acre^{-1})
Phule Samarth	50	20.00	49.00	40.00	45.00
Baswant.- 780	50	20.00	44.00	36.00	40.16

Extension gap

The extension gap of onion 1.54 qt acre^{-1} in Phule Samarth and 1.82 qt acre^{-1} in Baswant 780 has been recorded through FLDs. This emphasized need to educate the farmers through various means for the adoption of improved agricultural technologies to reverse the trend of wide extension gap. The new technologies will eventually lead to the farmers to discontinue the old practices and to adopt new technology.

Economic returns

The input and output prices of commodities prevailed during the study were taken for calculating gross returns, cost of cultivation, net returns and benefit: cost ratio (Table 3). The cultivation of onion under onion set planting reported higher gross monetary returns of Rs. 28,433.61 per acre in cv. Phule Samarth and Rs. 27,599.72 per acre in Baswant 780 as compared to farmers practices. The benefit cost ratios of Phule Samarth and Baswant 780 under demonstrations were 1.09 and 1.07 as compared to 1.06 and 1.04 under farmers practice, respectively.

Table 3: Average yields and monetary benefits of demonstrations

Onion	Average yield (qt/acre)		Average cost of production (Rs./ acre)		Market rate (Rs./qt)		Gross monetary returns (Rs./ acre)		Average B:C ratio	
	DP	FP	DP	FP	DP	FP	DP	FP	DP	FP
Phule Samarth	45.00	43.46	25825.69	24966	632.63	614.60	28433.61	26711	1.09	1.06
Baswant- 780	40.16	38.34	25497.86	24189	686.48	659	27599.72	25266	1.07	1.04

Note: DP- Demonstration plots
FP-Farmer practice

Conclusion

On an average, the Phule Samarth and Baswant-780 produced 3.54 per cent and 4.74 per cent higher yields than the crop sown under farmers practice, respectively. The average productivity of Phule Samarth and Baswant-780 of demonstrations were 45.00 and 40.16 qt $acre^{-1}$ respectively (Table 2). Thus it can be concluded that the cultivation of onion set planting with improved production technology was found to be more productive over farmer's practice.

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