J Krishi Vigyan 2021, 9 (2) : 57-61 DOI : 10.5958/2349-4433.2021.00011.8

Evaluation of Technology for Cultivation of *Kharif* Onion in Sikar District of Rajasthan

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ABSTRACT

A study was conducted at the farmer's field in Sikar district during *kharif* season of 2018-19 and 2020-21 on Agrifound Dark Red cultivar of onion. Yield attributes under both demonstration and farmers' practices were recorded and percent yield enhancement, technology gap, extension gap, technology index, were analyzed. The data revealed that average bulb yield under demonstration was obtained 240.87 q/ha compared to the farmers' practices (203.26q/ha) and the per cent increase in bulb yield was 20.15. The average technological gap, extension gap and technological index were observed as 55.80 q/ha, 40.95 q/ha and 18.60 per cent, respectively. The net profit of demonstration was Rs. 4,09,640/ha under recommended practices while, it was Rs 2,82,016.7 under farmers' practices. The gross returns and BCR on demonstration were higher (Rs. 4,49,490/ha and 4.40) respectively as compared to farmer's practices (3,73,823/-ha and 4.07). Hence, it can be said the yield of *kharif* onion could be enhanced to a great extent with increase in the income level of the farming community.

KeyWords: Cultivation, Demonstration, Extension gap, *Kharif* onion, Technology.

INTRODUCTION

In India, onion is cultivated mainly in three seasons– *Kharif*, late *Kharif* and *rabi*. Sixty percent production comes from *rabi* crop, while, *kharif* and late *kharif* crops contribute 20 percent each (Hiremath and Mantur, 2018). The *rabi* season crop of onion is harvested in April-May, while, *Kharif* and late *Kharif* crop of onion is available in the market from October to December and January – February, respectively. The major portion of *Rabi* season crop is stored throughout the country. This stored material is available for domestic markets as well as for export from May to October. Generally, the onion storage filled by *Rabi* onion gets exhausted by around August to September beyond which storage loss rises to 30 per cent and above (Samra *et al,* 2006). There is critical gap in supply of onion from October to December in the country and as a result the prices shoot up (Tripathi and Lawande, 2008).

Mahala *et al* (2019) showed that transplanting of onion in 15×10cm resulted in significantly higher plant height (30.87 cm), number of leaves per plant (12.20), bulb diameter (polar-5.20 cm and equatorial-5.74 cm) and average bulb weight (83.90g) as compared to 10×7.5 cm but statistically at par with 10×10cm crop geometry. Highest bulb yield was recorded in 10×10cm (307.64q/ha) with per cent increase of was 23.41 and 0.57 in comparison to 10×7.5 (247.85q/ha) and 15×10cm (305.89 q/ha), respectively. Kaur *et al* (2017) stated the garlic yield on bed sowing was comparatively less as compared to flat sowing but the bulb diameter was significantly higher in bed sowing, which in turn resulted in 30-40 per cent higher market price. Likewise, *Kharif* onion is very perceptive and crucial crop in meeting domestic supply from October to January and has several advantages *viz.,* increases total production to meet out the demand of fresh onion in the market and have higher price

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as compared to main season onion. Further, *Kharif* crop of onion is grown on a very limited scale in the district due to adverse climatic conditions at the time of nursery raising. Front line demonstration (FLD) is one of the key extension tools for transfer of technology at grass root level that directly impact the horizontal spread of technology. It is a unique approach to provide a direct interface between researcher and farmers as the scientists are directly involved in planning, execution and monitoring of the demonstrations for the technologies developed by them and get direct feedback from the farmers. Thus, an experiment was conducted in order to test the suitability of *kharif* onion variety in Sikar district of Rajasthan.

MATERIALS AND METHODS

The present study was carried out by Krishi Vigyan Kendra, Fatehpur-Shekhawati, Sikar for three consecutive years from 2018-19 to 2020-21 at the farmers' field in different locations through front line demonstration. Total 60 demonstrations at 14 ha area were conducted at 60 farmers' field. In demonstration plots, critical inputs in the form of quality seed of improved variety (ADR), seed treatment with *Trichoderma viridi*, line sowing, raised nursery bed, weed control technique, recommended dose of fertilizer, etc. were emphasized. In case of farmer's practices, existing practices used by farmers were followed.

Before conducting the demonstrations, training to the framers of respective villages was imparted with respect to envisaged technology interventions, site selection, farmer's selection, layout of demonstration, and farmer's participation etc. were followed. The data of yield, production cost and returns were collected with frequent field visits from demonstration fields and farmers' practice fields (control) and finally extension gap, technology gap, and technology index were calculated as given by (Singh and Sharma,2017).

RESULTS AND DISCUSSION

Responses regarding various problems in production were recorded and analyzed during the demonstrations. It was observed (Table 2) that high temperature at the time of nursery preparation

Table 1. Details of *Kharif* onion growing under demonstrations and existing practices.

Sr. No	Operation	Existing practice	Improve practice demonstrated
1	Variety used	Use of local/own seeds	Agrifound Dark Red, an improved variety from NHRDF, recommended for kharif season.
2	Seed treatment	No seed treatment	Seed treatment with *Trichoderma* @ 6 g/ kg.
3	Nursery Rising	Flat bed or direct seed sowing without shade	Raised bed (3 m x 1 m size, raised up to 20- 25 cm.) covered with green shade net
4	Method of sowing	Broadcasting	Line sowing
5	Fertilizer application	Imbalanced application of fertilizer FYM,10 t/ha N:P:K @ 60:30:00 kg/ ha	Application of recommended dose of fertilizers along with foliar spray of micronutrients
6	Weed management	Hand weeding	Combined application of Oxyfluorfen 23.5 % EC @ 1ml/l + quizalofopethyl 5 % EC @ 2 ml/L at 20-25 days after transplanting (DAT) and at 30-35 DAT
7	Sucking pest management	Non-adoption of IPM practices	Adoption of integrated pest and disease management as recommended in PoP

Table 2. Constraints in *kharif* onion production in Sikar district.

Sr. No.	Constraint	Frequency (N=60)	%	Rank
1	Nursery damage due to high temperature	53	88.33	I
2	More pest and disease infection	50	83.33	II
3	Erratic rainfall at time of nursery	49	81.67	III
4	Weed problem	48	80.00	IV
5	Inadequate availability of improved seed and seedlings in time	43	71.67	V
6	High cost of improved variety seeds	40	66.67	VI
7	Lack of knowledge about seed treatment	40	66.67	VII
8	Lack of scientific knowhow about field operations	36	60.00	VIII
9	Non-availability of labour at the time of transplanting	35	58.33	IX
10	Lack of irrigation facility	30	50.00	X

of *kharif* onion cause nursery damage, the major constraint faced by 88.33per cent farmers of Sikar district. The problems like more pest and disease infection (83.33%), erratic rainfall at time of nursery (81.67 %), weed problem (80.00%) and high cost of improved variety seeds (66.67%) were the other important constraints.

It was evident from results that under the demonstrations, performance of *Kharif* onion was sustainable higher than that in the farmer's practices (local check) in all the three years of the study (Table 3). The variety Agrifound Dark Red (ADR) recorded higher average yield of 240.87 q/ha as compared to farmer's practices (203.26q/ha). The per cent increase in yield over local was 20.15. The higher average onion yield in demonstration fields compared to farmer's field was due to superior varietal characters of ADR and integrated crop management practices. These results were in line with the findings of Dubey *et al* (2019), Hirave, *et al* (2015), Meena *et al* (2016) and Bhoi *et al* (2020) in *kharif* onion. Fluctuations in yield observed over the years were mainly on account of variation in temperature, rainfall, sowing time and pest and disease management.

The technology gap is the difference between the demonstration yield and potential yield. It was recorded 66.50q/ha in the first year (2018-19) and later on decreased 51.62 and 49.27q/ha in next two years, respectively, due to technology received from KVK scientists time to time. It was found an average 55.80q/ha. This could be due to the lack of awareness about the improved crop management technologies of *kharif* onion. The technology gap observed might be attributing to the dissimilarity in soil fertility status and weather conditions. Therefore, variety

Table 3. Impact of improved production technology on realization of productivity and potential of onion.

Year	Area (ha.)	No. of Demon.	Bulb Yield (q/ha)			Per cent increase	Tech. gap	Ext. gap	Tech. index
			Potential	Demon.	FP				
2018-19	6.0	20	300	233.50	196.14	19.05	66.50	37.36	22.17
2019-20	7.0	30	300	248.38	208.85	18.95	51.62	39.53	17.21
2020-21	1.0	10	300	240.73	204.78	22.44	49.27	45.95	16.42

*FP- Farmer's practice

Table 4.Impact of improved production technology on economics of onion.

Year	Cost of production (Rs/ha)		Gross Return (Rs/ha)		Net Returns (Rs./ha)		BCR	
	Demon.	FP	Demon.	FP	Demon.	FP	Demon.	FP
2018-19	104600	91450	350250	294210	339650	202760	3.35	3.22
2019-20	98750	89670	496760	417700	398010	328030	5.03	4.65
2020-21	102000	94300	501460	409560	491260	315260	4.92	4.34

*FP- Farmer's practice

wise location specific recommendation appears to be necessary to minimize the technology gap for yield level in different situations. Hence, to narrow down the technology gap awareness about the improved variety appears necessary to educate the farmers and seed production activities for further multiplication. These findings were similar to the findings of Hiremath and Hill (2012) in *kharif* onion.

The difference between demonstrated yield and yield under existing farmers practice is extension gap. It was recorded as 40.95q/ha in this study and it should be filled by various extension methods. Information on improved practices need to be disseminated through training, awareness programmes, communication through print and electronic media, etc. extension personnel intervention to reduce this gap is required. The new technologies will eventually lead to the farmers to discontinue old verities with the new high yielding varieties. These results were in line with the findings of Ojha and Singh (2013) and Rajput *et al* (2018) in *kharif* onion.

The technology index showed the feasibility of the evolved technology at the farmer's fields. The ratio between technology gap and potential yield expressed as percentage is technology index. It was 18.60 per cent in this study. This has increased as a result of technology gap. With adoption of improved practices the technology gap can be reduced as a result technology index also will be minimized. Similar results were also reported by Singh and Singh (2018), Ojha and Singh (2013) in *kharif* onion.

The data (Table 4) revealed that, monetary returns were directly influenced by the market price of onion bulbs and cost of production during the successive years of demonstrations. During all the years of demonstrations, the increased gross monetary return, net monetary returns and benefit: cost ration were obtained in the demonstrated technology over local check of farmers. The average economic analysis of the data all the three years revealed that variety ADR recorded higher gross returns (Rs. 4,49,490/ha.), net return (Rs. 4,09,640/ha.) and B:C ratio (1:4.4) compared to farmers practices. A Similar result on profitability of onion was observed by Dhemre and Desale (2010) and Rajput *et al* (2018).

CONCLUSION

On the basis of above finding in present study, it was concluded that front line demonstrations of improved technology reduce technology gap to a considerable extent, thus leading to increased production of *kharif* onion in Sikar district of Rajasthan. FLD is an effective extension mean to disseminate the proven technology at village level and to bridge the extension gap that increase the crop yield, monetary returns and livelihood status of the farming community. This also improved linkages between farmers and scientists, and built confidence for adoption of the improved technology. However, the technology needs to be popularized to decrease the extension gaps, technology gap, technology index and there by yield gap so as to increase the income of farmers. The economic details of the demonstrations give us a green signal to further popularize them among the farming community for large scale adoption.

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Received on 28/03/2021 *Accepted on 15/05/2021*