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Anjali M Gaharwar
Vasantrao Naik College of Agricultural Biotechnology, Yavatmal, Maharashtra, India

Jayashri D Ughade
Vasantrao Naik College of Agricultural Biotechnology, Yavatmal, Maharashtra, India

Correspondence
Anjali M Gaharwar
Vasantrao Naik College of Agricultural Biotechnology, Yavatmal, Maharashtra, India

Impact analysis study of front line demonstrations regarding integrated cultivation technology for onion var. Akola Safed

Anjali M Gaharwar and Jayashri D Ughade

Abstract
Front line demonstration is one of the key extension tool for transfer of technology at Grass root level that directly impact the horizontal spread of technology. Onion is an important Rabi season crop in Yavatmal district. Even though its productivity recorded is low due to lacking in knowledge of scientific cultivation technology and high yielding variety suitable to soil and climate. In order to increase the productivity of Rabi onion with the adoption of improved technologies, twenty nos. Of demonstration on ICM in onion with variety Akola Safed were carried out by Krishi Vigyan Kendra in adopted Farmers fields at different villages during the years 2014-15, 2015-16, 2016-17 and 2017-18. In all 100 demonstration were conducted on 40 ha. Land during the four years. Equal land 0.2 ha. Were allotted for demonstration and check plots every year for conduction of FLDs. From the conducted demonstrations, it was revealed that, an average increased yield of onion crop 29.20% was achieved with average technology gap of 22.71 q/ha and average extension gap of 62.66 q/ha. of onion bulbs production. Also reduced technology gap and technology index was noticed during the last two successive years of conducted trial of demonstrations over initial two years of demonstrations. This showed feasibility of demonstrated technology over framers practice.
The monetary returns were found to be influenced by crop yield and prevailing market prices of the produce. During all the years of demonstration, higher monetary returns with benefit: cost ration were obtained from the technology demonstrated plots as compared to farmers check plot i.e. regular farmers practice and recorded the maximum onion bulb yield, NMR and B:C ration during the year 2017-18. The extension gap further emphasised on conduction of such FLDs to bridge and nullify the yield gap difference in onion crop.

Keywords: Onion, FLD, yield, extension gap, technology gap

Introduction
Onion (*Allium cepa* L.) an important bulb vegetable crop belonging to the family Aliaceae is valued for its bulbs having characteristics odour, flavour and pungency. Green leaves of onion and bulbs are used for fresh consumption as greens in salad (Lannoy, 2001) [12] and also cooked as raw material in many ways in curries, fried, boiled, baked and used in making soups, pickles etc. (Strub and Emmet, 1992) [15]. The pungency in onion is due to volatile compound allyl propyl disulphide. Onion bulb is rich in minerals like phosphorous (50 mg/100g) and calcium (180 mg/100g).Many medicinal uses from onion bulbs rich in quercitin as anti inflamator, anti cholesterol, anti cancer and anti oxidant components are reported which acts in human body.
Onion is an important foreign exchange earning vegetable crop. India is the second largest of onion in the world next only to China accounting 19.90% share in world total onion production with 15118.00 thousand tonnes bulbs production from an area of 1064 thousand ha. Area the export of onion during 2011-12 was 1309863.26 thousand tonnes with a value of Rs. 1722.85 crore. Anonymous, 2011 (Indian Hort database, 2011).
Onion being a very important vegetable cum spice component in the Indian diet. The cultivation area under this crop throughout India is very large. Maharashtra is a leading state for onion cultivation and production. But productivity of onion as compared to other state is very low. There reported 4905 thousand million tonnes of production from an area of 415.00 thousand ha. With a productivity of 11.80 tonnes/ha (Anonymous, 2011). Hence, there is a need to maximize the onion cultivation area with the introduction of improved cultivation technologies for onion crop. In the survey made to compile production level of onion crop at grass root level, it comes to know that, among all the production factors variety contribute a major share in the crop production. Hence, front line demonstrations on integrated crop management in onion with var. Akola Safed were conducted in four Rabi seasons

of 2014-15 to 2017-18 with the objectives, to increase the production and productivity of onion crop, to study the feasibility of Onion var. Akola safed under Yavatmal climatic conditions, to study the technology gap, extension gap and technology index and work out the economics of production.

Material and Methods

The front line demonstrations on Integrated crop management in onion with var. Akola safed was conducted by KVK, Yavatmal during the four consecutive rabi seasons of 2014-15, 2015-16, 2016-17 and 2017-18 in the farmers field of adopted villages of KVK, Yavatmal. An area of 0.1 ha. Area for demonstration plots and 0.1 ha. Area for local check plots were allotted for conduction of Front line demonstration, thus conducted total 25 demonstrations on 10 ha. of land during each year. The soils of the cultivation areas where demonstration were conducted are medium to heavy, contains low organic matter, medium nitrogen and phosphorous and high potassium in the soil.

The certified seeds of onion var. Akola safed were procured from the AICRP (Vegetable), Dr. PDKV., Akola and ARS, Achalpur for the conduction of demonstrations and distributed to farmers for conduction of demonstrations. Prior to conduct the FLD/s at Farmers field trainings on nursery raising for onion crop and Integrated crop management technology for onion were conducted for the beneficiaries by SMS (Horticulture) at farmer's villages. During the training session, farmers were guided on the aspects of land preparation, preparation of nursery beds, seed treatment, seed sowing and transplanting, nutrient management and weed management practices, plant protection, harvesting, curing of bulbs and post harvest practices. The technology that demonstrated against the farmers practice for conduction of front line demonstrations were described in the tabulated form in the table 1. Right from nursery sowing till harvesting of the crop, the demonstrated plots were frequently visited and supervised by the scientist for correct implementation of the technology at proper time by the farmers. The front line demonstrations were conducted as per suggested steps for FLD/s by Choudhary, 1999 that include selection of beneficiary, site selection, preparation of demonstration plots, effective utilization of input and technology, and active participation of the farmer in the condition of demonstration. A field day was conducted before a month of crop harvesting by KVK scientists at demonstration farmer's fields. The data on cost of production, gross and net monetary returns, Benefit: Cost ratio from both demonstrated plots and check plots were compiled, calculated to work out the economic feasibility of the demonstrated technology against the framer's practice. The yield of demonstrated plots or trials were compared with check plots yield and potential yield of the crop variety to estimate the yield gaps which are further categorized to assess the technology and extension gap. The Technology and Extension gap were calculated by using the following formulae as suggested by Eswarprasad *et al.* 1993 and Samui *et al*. 2000 [3, 16].

Technology Gap = Potential yield – Demonstrated yield

Extension Gap = Demonstrated yield – Farmer's yield (Local check)

$$\text{Technology Index} = \frac{\text{Potential yield} - \text{Demonstrated yield}}{\text{Potential yield}} \times 100$$

Table 1: Technology details for the study on integrated crop management technology for onion crop under front line demonstration.

S.N.	Particulars	Technology for Onion cultivation under	
		Demonstration	Local check /Farmer's practice
1.	Farming situation	Irrigated	Irrigated
2.	Variety	Akola safed	Onion white
3.	Time of Nursery raising and seed sowing	Nov. 1st week. Seeds were sown in rows spaced 10 cm apart	November –Dec. Seeds sown by line sowing method
4.	Seed rate	10 kg/ha.	10-12 kg/ha.
5.	Seed treatment	Carbendazim 3g/kg seed	No seed treatment
6.	Transplanting	Jan. 1st Week	January 2nd fortnight
7.	Weed management	Pre emergence weedicide application of oxyflurofen 23.5% EC 0.1-0.15 kg a.i./ha + 1 HW at 45 DAT	Two hand weeding at 20,40 and 60 DAT.
8.	Fertilizer dose	100:50:50 kg NPK/ha. Half N & full P_2O_5 and K_2O applied at the time of transplanting and half dose of N 1 month after TP.	50:70:0 kg NPK/ha.
9.	Plant protection measures	Application of fungicide Dithane M-45 for control of blight disease.	Use of incorrect dose of pesticides abruptly.

Results and Discussion

The data regarding bulb yield of onion crop, yield, technology gap, extension gap and technology index for onion crop for the demonstration years 2014-15 to 2017-18 were recorded and reported in table 2 and discussed under following parameters.

Crop yield

The data regarding bulb yield of onion crop presented in table 2, it was revealed that, the increased onion bulb yield over the check were noticed during all the years of demonstration. The maximum av. onion bulbs yield (277.29 q/ha.) was obtained in the demonstrated technology with 29.20% average increased yield over the local check. the results are in accordance with the results obtained by Warade *et al.* 2006 [21], Gupta *et al*., 2015 [4]; Gaharwar *et al*. 2017 [5], Kumar Udit, 2014 [11] for onion crops. Similar yield enhancement in different crops through front line demonstrations were reported by Balai *et al*. 2013 [1] in vegetables, Haque 2000 in rice [6], Hiremath and Nagraju 2010 [7] in onion, Kumar *et al.* 2010 in bajra [10], Mishra *et al.* 2009 [13] in potato, Singh *et. al.* 2004 in solanaceous vegetables crops and Tandel *et al.* 2015 in brinjal.

The increased crop yield in demonstrated plots showed the feasibility of demonstrated technology and suitability of onion var. Akola safed under Yavatmal climatic condition. The increased in yield may be due to high yielding demonstrated onion variety Akola safed with integrated weed and nutrient management technology contributed for increased crop yield over check, Warade *et al.*, 2008 [22].

Technology Gap

From the data presented in table 2, the average technology gap of 22.71 q/ha. Was reported i.e. the yield gap between demonstrated technology and potential yield that needs to be minimized with the conduction of FLD/s. The variation in technology gap during the demonstration years may be due to varied soil fertility, climatic condition of the area and management practices implemented by the farmers. Hence, more location specific recommendations and precise use of technology in the fields are necessary to bridge the technology gap as supported by Singh *et al.* 2011 [18].

Extension Gap

The average extension gap (62.66 q/ha.) between demonstrated technology and local check was mostly due to the use of lacking in adoption of high yielding variety and use of improved production technology. The results are in conformity with the findings of Teggelli *et al.* 2015 [20], who stated the progressive use of improved crop production technologies with high yielding variety will subsequently change this alarming trend of galloping extension gap. It directed to educate and emphasised the farmers for the adoption of demonstrated technologies so as to bridge the extension gap by planning and implementation of technologies through various means of extension. The results are in agreement with the research worker Mukharjee, 2003, who stated that, location based problem identification and thereby specific interventions may have great implications in the enhancement of crop productivity.

Technology Index

The technology index reported in table 2, showed the decreasing trend of technology index values with slight increased value in 2017-18, showed the feasibility of demonstrated technology during the demonstration years. The average technology index value 7.57%, might be due to précised use of demonstrated technologies in the field and suitable climatic conditions during demonstration period. As technology index denotes the gap between technology generated at research farm and farmer's field, lower the technology index more feasible will be the technology (Jeengar *et al*. 2006 and Hiremath and Nagraju, 2010, Sagar and Chandra, 2004) [9, 7, 10].

Economic Analysis

The data obtained regarding the economic analysis for the demonstrated technology was presented in table 3. The data 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. An increased average net monetary returns of Rs 137406.8 and B:C ratio 3.45 was obtained in the demonstrated technology over farmers check with NMR Rs 95117.00 and B:C ratio 2.73. The higher returns was due to higher bubs yields obtained in the demonstrated technology over check plots. The results are in confirmation with the findings of Hiremath and Nagraju 2010 [7], Tandel 2011, Hiremath and Hilli, 2012 [8].

Table 2: Productivity, technology gap, extension gap and technology index of onion crop under FLDs

S. N.	Year	Area (ha.)	No. Of farmers	Seed yield (q/ha)			% increase over control	Technology gap (q/ha)	Extension gap (q/ha)	% Extension gap	Technology Index (%)
				Potential	Demonstration	Control					
1.	2014-15	10	25	300	256.24	200.7	28.08	43.76	56.17	21.92	14.59
2.	2015-16	10	25	300	278.54	211.5	31.70	21.46	67.04	24.07	7.15
3.	2016-17	10	25	300	288.26	224.18	28.58	11.74	64.08	22.14	3.91
4.	2017-18	10	25	300	286.12	222.78	28.43	13.88	63.34	22.23	4.63
	Average			300.00	277.29	214.79	29.20	22.71	62.66	22.59	7.57

Table 3: Yield and returns obtained

Year	Cost of production (Rs/ha).		Gross Return Rs./ha.		Net Return Rs./ha.		C: B ratio	
	Demonstration	Control	Demonstration	Control	Demonstration	Control	Demonstration	Control
2014-15	53500	55000	204992	160056	149992	106556	3.73	2.99
2015-16	55000	56219	167124	126900	110905	71900	2.97	2.31
2016-17	55000	56350	171622	133668	115322	78668	3.05	2.43
2017-18	56000	57200	230608	179344	173408	123344	4.03	3.20
Average	54875	56192.25	193586.5	149992	137406.8	95117	3.445	2.73

Conclusion

From the Front Line demonstration conducted at farmer's field on "Íntegrated crop management technology for onion crop var. Akola safed" during the four successive years from 2014-15 to 2017-18, obtained increased onion bulbs yield with higher monetary returns and B:C ratio and reduction in technology gap and technology index values in demonstrated technology. This stated the feasibility of demonstrated technology at farmer's field under Yavatmal climatic condition over local check. As found an average 62.66 q/ha i.e. 22.59% of extension gap between demonstrated technology and local practice, it was concluded that, front line demonstration 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.

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