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Onion Variety Bhima Super Enhances Profitability of Onion (*Allium cepa*) Growers

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ABSTRACT

The study was conducted in farmer's field in Bagalkote district for three consecutive years during *kharif* season to assess the performance of Bhima Super over local variety. It was noticed that the onion variety (Bhima Super) recorded average yield of 19.56 t/ha with net return of Rs. 93266/-ha as compared to farmers' practice, which produced average yield of 16.23 t/ha with net return of Rs. 60958/- ha. Timely plant protection measures reduced the average bulb rotting incidence (11.8%) in Bhima super compared to local check (21.8%), average thrips incidence was also low in Bhima super (13.5 thrips no./plant) and in local check (19.90 thrips no./plant). There was less incidence of purple blotch disease (21.9%) but disease incidence was high in local variety (29.23%). The average extension gap, technology gap and technology index were 5.67, 2.53 and 11.50 per cent, respectively. The average benefit cost ratio was high in Bhima Super onion (3.12) compared to local variety (2.35). On an average, 19.4% yield increase was observe in demonstration plots over farmers' practice.

Key Words: Bhima Super, Demonstration, Extension gap, Front line, *Kharif* onion.

INTRODUCTION

Onion is one of the most important spice and vegetable bulb crop throughout the world and commercially cultivated in more than hundred countries. India ranks second in the world in area and production after China and third in export after Netherland and Spain. India is producing 17,511.10 thousand MT of onion from an area of 1,087.26 thousand hectares with an average productivity 16.10 t/ha. In Karnataka, it is grown about 177.20 thousand Mha with an average production of 2,451.20 thousand MT and productivity 13.83 t/ha (NHB data base 2016-17). In India, Maharashtra, Gujarat, Karnataka, Orissa, Uttar Pradesh, Madhya Pradesh, Rajasthan and Andhra Pradesh are major onion growing states. Because of its high export potential it comes under cash crop apart from vegetables.

In Bagalkot, onion is cultivated in an area of 18064.4 ha with the production of 298335 tons and productivity of 13.2 t/ha, which is below the average national productivity (14.21 t/ha). In Bagalkot area, the major constraints for lower productivity in onion were non availability of quality seeds, use of local cultivars, weed menace during early stages of crop accompanied by insects (thrips, aphids, leaf eating caterpillar) and disease problems (bulb rot, fungal rot, damping off, purple blotch and twisting disease). Most of the onion varieties grown were from private sector lines which are costlier and farmers uses self produced onion seeds which are susceptible for pest and disease. Hence, there was need for introducing new promising onion variety with good yielding potential and thus conducted front line demonstrations (FLD's) to show the worth of high yielding Onion variety Bhima super to the 30 selected onion growers each year during 2018-19, 2019-2020 and 2020-2021 on cluster villages concept basis in the district.

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

Sr. No.	Operation	Existing/ farmers' practice	Improve practice demonstrated
1	Variety used	Use of local/own seeds	Bhima Super, an improved variety from DOGR, recommended for *kharif* season.
2	Seed treatment	No seed treatment	Seed treatment with *Trichoderma* @ 10 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	Sucking pest management	Non-adoption of IPM practices	Adoption of integrated pest and disease management as recommended in Package of Practice

MATERIALS AND METHODS

The soil samples of selected farmers' fields were analyzed and based on the results, improved agronomic practices *viz.,* recommended quantity of manures (FYM-25t/ha) and correct dosage of fertilizers (125:75:125 kg NPK/ha) were demonstrated. Soil application of farm yard manure (FYM) enriched with *Trichoderma viridae* was demonstrated to combat soil borne diseases. For the purpose of FLD's, a high yielding onion variety Bhima Super was introduced to the selected farmers in the district. Bhima Super which is a new red onion variety with big bulb size developed by Directorate of Onion and Garlic Research, Rajgurunagar, Maharashtra which has been identified for release for *kharif* season in Chhattisgarh, Delhi, Gujarat, Haryana, Karnataka, Madhya Pradesh, Maharashtra, Odisha, Punjab, Rajasthan and Tamil Nadu. Normally farmers grew local onion varieties and the same varieties were used as check during front line demonstrations. To supplement micro nutrients, foliar sprays of vegetable special developed by IIHR, Bengaluru @ 4 g/l of water was demonstrated. For every 20 liters of water 80 g of vegetable special + one lemon juice + 1 sachet shampoo were mixed and sprays were taken. As part of integrated pest management practices, yellow and blue sticky traps @ 25 per hectare were erected (farmer share) for monitoring thrips and aphids infestation.

Front line Demonstration were conducted for consecutive 3 years during *kharif* season from 2018-19 to 2020-21 at Bagalkot, Bilagi, Hunagund and Badami clusters to assess the performance of Bhima Super over local variety. In order to reach more number of onion growers to disseminate improved technologies, the farmers of these area were provided with scientific knowledge about crop cultivation and processing through on and off campus training, method demonstration, field visits and exhibitions as part of capacity building activities.

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 were carefully recorded regarding plant characters, pest and diseases incidence, yield, production cost and returns were collected with frequent field visits from demonstration fields and farmers' practice

Table 2. Impact of improved production technology on plant growth, pest and disease parameters of Onion variety Bhima Super.

Crop	Demonstration (Onion-Bhima Super)				Check (Farmers practice)			
Parameter	2018-2019	2019-2020	2020-2021	Average	2018-2019	2019-2020	2020-2021	Average
No. of leaves at grand growth	8.10	9.20	8.40	8.53	6.76	7.40	7.60	7.25
S.Em±	0.86	0.94	0.95	-	0.24	0.34	0.28	-
CD (0.05)	2.65	2.90	2.93		0.75	0.94	0.87	
Thrips/ plant(no.)	12.24	14.58	13.52	13.5	13.76	19.86	17.46	17.0
S.Em±	0.59	0.72	0.57	-	0.45	0.69	0.74	-
CD (0.05)	1.80	2.23	1.78		1.39	2.13	2.29	
PDI (%) for Purple blotch	28.5	22.2	21.0	23.90	35.1	28.6	24.0	29.23
S.Em±	1.01	0.83	0.65	-	0.88	0.45	0.52	-
CD (0.05)	3.10	2.58	2.01		2.72	1.40	1.62	
Bulb rotting (%)	3.2	18.5	5.1	11.80	6.8	37.4	6.3	21.85
S.Em±	0.42	0.61	0.21	-	0.22	1.13	0.28	-
CD (0.05)	1.26	1.90	0.64		0.68	3.48	0.88	
Bulb weight (g)	116	136.3	128.5	126.93	127.8	122.6	115.3	121.90
S.Em±	0.82	2.24	0.96	-	0.70	0.71	1.01	-
CD (0.05)	2.54	6.90	2.95		2.18	2.20	3.08	

fields (control) and finally extension gap, technology gap and technology index were calculated as given by (Singh and Sharma, 2017).

RESULTS AND DISCUSSION

The results of the pooled data for three years (2018-19, 2019-2020 and 2020-21) were given in Table 2. The bulb rotting and purple blotch incidence was expressed in percentage and thrips damage by number of insects per plant. It was observed that in Bhima super , average bulb rotting incidence was low (11.8%) compared to local check (21.8%), average thrips incidence was also low in Bhima super (13.5 thrips no./plant) than in local check (19.90 thrips no./plant). There

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CD (0.05)	2.65	2.90	2.93		0.75	0.94	0.87	
Thrips/ plant(no.)	12.24	14.58	13.52	13.5	13.76	19.86	17.46	17.0
S.Em±	0.59	0.72	0.57	-	0.45	0.69	0.74	-
CD (0.05)	1.80	2.23	1.78		1.39	2.13	2.29	
PDI (%) for Purple blotch	28.5	22.2	21.0	23.90	35.1	28.6	24.0	29.23
S.Em±	1.01	0.83	0.65	-	0.88	0.45	0.52	-
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was less incidence of purple blotch disease (21.9%) but disease incidence was high in local variety (29.23%). These results were in line with the findings of Chaudary *et al* (2021) in *kharif* onion.

It was evident that under the demonstrations, performance of *Kharif* onion was sustainable higher than that in the farmer's practices (local check) during three years of the study. The data (Table 3) 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 variety Bhima super variety recorded average yield of 19.56 t/ha with net return of Rs. 93266/ha as compared to farmers practice, which produced average yield of 16.23 t/ha with net return of Rs. 60958/-ha. Hence, the average benefit cost ratio was high in Bhima Super onion (3.12) compared to local variety (2.35). The higher average onion yield in demonstration fields compared to farmer's field was due to superior varietal characters of Bhima Super and integrated crop management practices. These results were in line with the findings of Hiremath *et al* (2012), Hirave *et al* (2015), Meena *et al* (2016), Dubey *et al* (2019), and Bhoi *et al* (2020), Chaudary *et al* (2021) in

Table 3. Impact of improved production technology on yield and economics of Onion variety Bhima Super.

Crop	Demonstration (Onion-Bhima Super)				Check (Farmers practice)			
Parameter	2018-2019	2019-2020	2020-2021	Average	2018-2019	2019-2020	2020-2021	Average
Yield (t/ha)	18.5	20.3	19.90	19.56	15.6	17.8	15.28	16.23
% increase	15.67	12.31	30.23	19.40	-	-	-	-
Cost of Cultivation	32900	31250	59500	41216.67	33975	31250	59500	41575
Gross Income (Rs/ha)	116550	68000	218900	134483.33	82530	56960	168080	102523.3
Net Income (Rs/ha)	83650	36750	159400	93266.67	48555	25740	108580	60958.33
Benefit Cost Ratio	3.5	2.17	3.68	3.12	2.4	1.82	2.82	2.35

Table 4. Technological gap, Extension gap and Technology Index of Onion (Bhima Super).

Year	Potential yield (t/ha)	Average yield (t/ha)		Increase in yield over farmers practice (%)	Extension Gap (t/ha)	Technology Gap (t/ha)	Technology Index (%)
		Farmers practice (Check)	Demo plot (FLD)				
2018-19	22	15.6	18.5	15.67	2.9	3.5	15.90
2019-2020	22	17.8	20.3	12.31	9.5	1.7	7.72
2020-21	22	15.28	19.9	30.23	4.62	2.4	10.90
Mean	22	16.23	19.56	19.40	5.67	2.53	11.50

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.

Technology gap

The technology gap is the difference between the demonstration yield and potential yield. It was recorded 3.5 t/ha in the first year (2018-19) and later on decreased 1.7 t/ha and 2.4 t/ha in next two years, respectively, due to technology received from KVK scientists time to time. It was found an average 2.53 t/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 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.

Extension gap

The difference between demonstrated yield and yield under existing farmers practice is extension gap. It was recorded as 5.67 t//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.

Technology index

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 11.50 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.

CONCLUSION

It can be concluded that improved technology reduce technology gap to a considerable extent, thus leading to increased production of *kharif* onion in Bagalkot district of Karnataka. 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 thereby yield gap so as to increase the income of farmers. The economic details of the demonstrations give us a insight to further popularize them among the farming community for large scale adoption.

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