



RESEARCH PAPER

Assessment of onion varieties for late *Kharif*

S. M. Hiremath* and S. M. Mantur

ICAR-Krishi Vigyan Kendra (U.A.S.), INDI, VIJAYAPUR (KARNATAKA) INDIA

(Email : hiremathsm10677@uasd.in)

Abstract : Onion (*Allium cepa* L.) is one of the important commercial vegetable crops grown in India for both domestic consumption and export. India accounts for 16 per cent of the world's area and occupies the second position after China in production with share of around 14 per cent. The production and productivity of onion is mainly depends on location, cultural practices, genotype and environmental factors. In Dharwad district of Karnataka state, onion plays major role in supplementing the income of small and marginal farmers. The productivity of onion in the district is much lower than the state and national average is mainly because of cultivation under rain fed condition, delayed on set of monsoon and non-availability of high yielding varieties particularly to late *Kharif* season. Hence, in this regard the Krishi Vigyan Kendra, Saidapur Farm, UAS, Dharwad conducted adaptive research on assessment of onion varieties for late *Kharif* season on farmers fields at Sotakanal, Kadadalli, Ballarawad, Hebballi and Navalagund villages of Dharwad district during 2013-14 and 2014-15. From the study it is revealed that onion variety Bhima Super performed better in both growth and yield parameter compared to Bhima Red, Arka Kalyan and Bellary Red variety. The market preference was more in Bhima Super variety and fetches higher price in the market. Bhima Super variety registered 34.01 per cent increased yield over Bellary Red variety.

Key Words : On farm testing, varietal evaluation, Farmers preference

View Point Article : Hiremath, S.M. and Mantur, S.M. (2018). Assessment of onion varieties for late *Kharif*. *Internat. J. agric. Sci.*, **14**(1) : 102-105, DOI:10.15740/HAS/IJAS/14.1/102-105.

Article History : Received : 08.06.2017; Revised : 14.11.2017; Accepted : 27.11.2017

INTRODUCTION

Onion (*Allium cepa* L.) is one of the important vegetable and spice crops of India. India produces 159.30 lakh MT of onion from 11.10 lakh ha area (FAOSTAT, 2011). India ranks first in area, second in production and third in export in the world. In India, onion is predominantly cultivated during *Rabi* (60%) followed by 20 per cent each in *Kharif* and late *Kharif* season. In Karnataka, the crop is cultivated in an area of 1.03 lakh hectares with annual production of 12.27 lakh tones.

Average yield is very low (11.91 t/ha) compared to National (12.97 t/ha) and World average (14.00 t/ha) productivity (Sheshadri and Chatarjee, 1996). In Karnataka onion is mainly grown in Dharwad, Vijayapur, Kalaburgi, Belagavi, Raichur, Gadag, Bellary, Chitradurga, Shivmogga and Chikkamagalur districts. Production and productivity of onion not only depends upon area and cultural practices but also on genotype and environment of the crop. In course of adoption and diversification out breeding mechanisms has promoted selections suited to diverse environment. In this regards,

* Author for correspondence:

Sr. No.	Technology options	Entries	Source	Year of release
1.	TO-1: Farmers practice	Bellary Red	Local	-
2.	TO-2: Recommended variety	Arka Kalyan	IIHR, Bangaluru	1987
3.	TO-3: Alternate practice-1	Bhima Super	DOGR, Pune	2009
4.	TO-4: Alternate practice -2	Bhima Red	DOGR, Pune	2009

systematic breeding programme was started in India as early as 1960. As a result, SAUs/ ICAR institutes/ various organizations developed 55 varieties including 28 hybrids (Lawande *et al.*, 2009 and Dharmatti *et al.*, 2014) for *Kharif* and *Rabi* season.

Recently, due to late monsoon and irregularities of rain in *Kharif* season there has been shift in planting from *Kharif* to late *Kharif*. *Kharif* onion is very sensitive and crucial crop in meeting domestic supply from October to January. Failure of *Kharif* onion leads to hike in prices. To tackle the changing climatic conditions, Directorate of Onion and Garlic Research, Pune has taken up onion crop improvement and developed some promising cultivars or breeding lines recently. Unfortunately there is limited varietal wealth for *Kharif* and late *Kharif*. As a result, few varieties are being grown to some extent, but scientific information is not available on their performance on growth and yield. Hence, in this regard, the present on farm testing study was undertaken to assess the onion varieties for late *Kharif* in different agro-climatic situations/locations in Dharwad district through farmers participatory approach.

MATERIAL AND METHODS

The present study was carried out for two years by ICAR-Krishi Vigyan Kendra, Dharwad during late *Kharif* (2nd fortnight of July) of 2013-14 and 2014-15 in farmers fields of five adopted villages *viz.*, Sotaknal, Kadadalli, Ballarwad, Hebballi and Navalgund of Dharwad district under protective irrigation. Three improved varieties along with one local variety (check) were evaluated in an area of 0.4 ha. The details of source of cultivars are presented in Table A. Seeds of each variety were sown with seed-cum fertilizer drill to maintain uniform plant spacing. All the recommended package of practice was adopted in all the entries uniformly to raise a good crop (Anonymous, 2014). In general, soils of the area under study were deep black cotton soils having fertilizer status of low nitrogen, medium phosphorus and high potassium content. Farm science centre scientists were facilitated in performing

the field operations like sowing, manuring, weeding, spraying, harvesting, post harvest handling and marketing during the course of training and visits. Ten plants were randomly selected in each entry in both the years to record observations on growth, yield, quality parameters, pest and disease incidence. The bulb yield was accounted on plot bases. Economics of onion was worked out based on the current market price of inputs and outputs. The mean data collected on various aspects over the years were subjected to standard statistical analysis to know the economic feasibility of the technology.

RESULTS AND DISCUSSION

Persual of data indicates that, onion varieties had profound effect on growth and quality parameters (Table 1 and 2). The higher marketable bulb yield was observed in Bhima Super variety (296.50 q/ha) followed by Bhima Red (276.50 q/ha), Arka Kalyan (243.50 q/ha) and Bellary Red (221 q/ha) varieties. Increase in yield of these improved varieties over Bellary Red was to the tune of 34.01, 25.30 and 9.76 per cent, respectively. Such superior yield of Bhima Super variety was mainly due to higher growth and yield parameters like plant height (45.50 cm), number of leaves per plant (7.49), pseudo stem length (4.98 cm), leaf diameter (1.56 cm), bulb diameter (polar-45.67 mm and equatorial-48.38 mm) and per cent bulb yield (A grade - 43.21%, B grade - 35.77% and C grade - 21.03%). The variation in the bulb yields of different varieties of onion have also been reported from several places. The superiority and higher yields of Bhima Super as late *Kharif* onion variety has been reported by Kerure *et al.* (2016) in Karnataka, Lawande *et al.* (2011) in Maharashtra and Tripathy *et al.* (2013) in Odisha conditions. Besides these growth and yield parameters, Bhima Super variety recorded the lower pest (thrips, 15.95%) and disease incidence (purple leaf blotch, 28.17%) compared to Bellary Red (Table 4).

The year wise economics of onion production under on farm testing were estimated and the results have been presented in Table 3. The economic analysis of the data over the years revealed that Bhima Super variety

recorded higher gross returns (Rs.1,73,834/ha), net returns (Rs. 1,52,650/ha) and B:C ratio of 4.22 compared to Bellary red. Further by inclusion of Bhima Super

variety additional net returns of Rs. 11,365, Rs. 31,541 and Rs. 45,041 over Bhima Red, Arka Kalyan and Bellary Red were gained suggesting its higher profitability and

Table 1: Growth and yield attributing parameters of onion as influenced by different varieties

Sr. No.	Parameters	Technology options											
		Bellary Red			Arka Kalyan			Bhima Super			Bhima Red		
		2013-14	2014-15	Mean	2013-14	2014-15	Mean	2013-14	2014-15	Mean	2013-14	2014-15	Mean
1.	Plant height (cm)	42.00	40.00	41.00	43.93	41.40	42.67	46.69	44.30	45.50	46.18	43.60	44.89
2.	No. of leaves/ plant	6.33	5.70	6.02	7.00	6.00	6.50	7.67	7.30	7.49	7.33	6.30	6.82
3.	Pseudo stem length (cm)	3.93	3.20	3.57	4.05	4.10	4.08	5.15	4.80	4.98	4.96	4.40	4.68
4.	Leaf diameter (cm)	1.05	1.00	1.03	1.45	1.30	1.38	1.61	1.50	1.56	1.47	1.40	1.44
5.	Polar diameter (mm)	36.25	34.50	35.38	38.67	35.60	37.14	47.74	43.60	45.67	46.38	42.00	44.19
6.	Equatorial diameter (mm)	39.80	35.30	37.55	42.22	39.70	40.96	50.96	45.80	48.38	49.82	43.30	46.56
7.	Days to harvest	98.00	98.00	98.00	115.00	114.00	114.50	120.00	120.00	120.00	120.00	120.00	120.00

Table 2 : Effect of onion bulb yield as influenced by different varieties

Parameters	Technology options											
	Bellary Red			Arka Kalyan			Bhima Super			Bhima Red		
	2013-14	2014-15	Mean	2013-14	2014-15	Mean	2013-14	2014-15	Mean	2013-14	2014-15	Mean
Grade %												
A grade (>6.5 cm)	39.29	39.00	39.15	43.55	44.00	43.78	43.42	43.00	43.21	42.86	43.00	42.93
B grade (5.5 - 6.5 cm)	33.93	34.00	33.97	35.48	35.00	35.24	35.53	36.00	35.77	35.71	36.00	35.86
C grade (4.5 - 5.5 cm)	26.79	27.00	26.90	20.97	21.00	20.99	21.05	21.00	21.03	21.43	21.00	21.22
Yield (q/ha)												
A grade (>6.5 cm)	110.00	64.00	87.00	135.00	77.00	106.00	165.00	93.00	129.00	150.00	87.00	118.50
B grade (5.5 - 6.5 cm)	95.00	55.00	75.00	110.00	63.00	86.50	135.00	76.00	105.50	125.00	73.00	99.00
C grade (4.5 - 5.5 cm)	75.00	43.00	59.00	65.00	37.00	51.00	80.00	45.00	62.50	70.00	44.00	57.00
Total yield (q/ha)	280.00	162.00	221.00	310.00	177.00	243.50	380.00	213.00	296.50	350.00	203.00	276.50
Increase in yield (%)	-	-	-	10.71	8.80	9.76	35.71	32.30	34.01	25.00	25.60	25.30

Table 3: Yield and economics of onion as influenced by different varieties

Sr. No.	Parameters	Technology options											
		Bellary Red			Arka Kalyan			Bhima Super			Bhima Red		
		2013-14	2014-15	Mean	2013-14	2014-15	Mean	2013-14	2014-15	Mean	2013-14	2014-15	Mean
1.	Total yield (q/ha)	280	162	221	310	177	243.5	380	213	296.5	350	203	276.5
2.	Gross cost (Rs./ha)	43100	40767	41934	42500	40617	41559	42000	40367	41184	41900	40200	41050
3.	Gross return (Rs./ha)	154000	105083	129542	170500	114833	142667	209000	138667	173834	192500	132167	162334
4.	Net return (Rs./ha)	130900	84317	107609	148000	94217	121109	187000	118300	152650	170600	111967	141284
5.	B:C ratio	3.57	2.58	3.09	4.01	2.83	3.43	4.98	3.44	4.22	4.59	3.29	3.95

Table 4 : Reaction of pest and diseases incidence of onion varieties under natural field conditions

Sr. No.	Parameters	Technology options											
		Bellary Red			Arka Kalyan			Bhima Super			Bhima Red		
		2013-14	2014-15	Mean	2013-14	2014-15	Mean	2013-14	2014-15	Mean	2013-14	2014-15	Mean
1.	Thrips incidence (%)	18.25	18.54	18.40	15.65	15.85	15.75	15.45	16.45	15.95	15.52	16.51	16.02
2.	Purple leaf blotch incidence (%)	35.50	37.50	36.50	15.20	17.70	16.45	25.77	30.57	28.17	26.51	32.83	29.67
3.	Reaction to purple leaf blotch	Moderately susceptible			Moderately resistant			Moderately susceptible			Moderately susceptible		

Table 5 : Varietal performance and farmers perception on various characters of onion

Sr. No.	Variety	Size	Shape	Colour	Skin	Yield	Purple leaf blotch	Market preference	Availability of seeds	Total points	Ranking
1.	Bellary Red	5	6	5	5	5	6	4	2	38	IV
2.	Arka Kalyan	3	3	4	4	3	1	3	2	23	III
3.	Bhima Super	1	1	1	1	1	2	1	5	13	I
4.	Bhima Red	2	2	2	2	2	3	2	6	21	II

Preference scale: 1-6 (1- highest preference, 6 lowest preference)

economical viability. A similar better economic return by cultivation of Bhima Super variety compared to other varieties was reported by Kerure *et al.* (2016).

The ranking of onion varieties based on the perception of the farmers are presented in Table 5, which indicates Bhima Super variety as the most preferred onion variety compared to Bhima Red, Arka Kalyan and Bellary Red varieties. The farmers perceived and ranked Bhima Super variety number one as this variety produced good size of bulbs, attractive shape, colour, skin, better yield and market preference. Bhima Red was ranked number two among the varieties studied. While Bellary Red recorded the lowest preference because farmers did not appreciate its size, shape, colour, skin, lower yield, and market preference along with its nature of susceptibility to purple blotch disease. However based on seed availability for current season crop production, the traditional variety Bellary Red and ruling variety Arka Kalyan ranked number one, compared to other two varieties as these varieties still needs to be introduced into seed chain. Arka Kalyan ranked number one with regard to resistance to purple leaf blotch disease, as it was having moderately disease resistance character. Based on varietal characters and market preference, farmers rated Bhima Super as the best variety followed by Bhima Red, Arka Kalyan and Bellary Red varieties. Similar evaluation of onion varieties for productivity performance was reported in Botswana (Southern Africa) (Baliyan, 2014).

Hence, it can be concluded from the study that by adoption of Bhima Super variety during late *Kharif* season yield potentiality of onion can be increased to a greater extent.

Acknowledgement:

Authors are gratefully acknowledge the University of Agricultural Sciences, Dharwad and Director, ICAR-ATARI, zone VIII, Bengaluru, for providing guidance

and financial support, respectively for conducting the study under on farm testing programme.

REFERENCES

- Anonymous (2014). Package of practices for horticulture crops. University of Horticultural Sciences, Bagalkot, (KARNATAKA) INDIA.
- Baliyan, Som Pal (2014).** Evaluation of onion varieties for productivity performance in Botswana. *World J. Agric. Res.*, **2** (3): 129-135.
- Dharmatti, P. R., Hegde, R.V. and Shashidhar, T. R.(2014).** Innovations in onion and garlic production. *J. Asian Hort.*, **10** (4): 87-98.
- Kerure, P., Chandrappa, D., Salimath, S. Rudragouda, F., Chandragouda, S., Onkarappa and Gajendra, T. H. (2016).** Varietal assessment in onion for higher productivity and quality. In: *1st KVK Symposium zone VIII*, held at UAS, Dharwad from 21-22, January, 2016, 85pp.
- Lawande, K. E., Anil Khar, V., Mahajan, P. S., Srinivas, V. S. and Singh, R. P. (2009).** Onion and garlic research in India. *J. Hort. Sci.*, **4** (2): 91-119.
- Lawande, K. E., Mahajan, Vijay Krishna, Prasad, V. S. R. and Khar, A. (2011).** Bhima Super -A new red onion variety for *Kharif* season from DOGR. In: National Symposium on Alliums: Current scenario and emerging trends, held at Pune from 12-14 March 2011, pp. 160.
- Sheshadri, V. S. and Chatarjee, S.S. (1996).** The history and adoptability of some introduced vegetable crops in India. *Vegetable Sci.*, **23**: 114-140.
- Tripathy, P., Priyadarshini, A, Das, S.K., Sahoo, B.B. and Dash, D.K. (2013).** Evaluation of onion (*Allium cepa* L.) genotypes for tolerance to thrips (*Thrips tabaci* L.) and purple blotch [*Alternaria porri* (Ellis) (Iterri)]. *International J. Bio-resource & Stress Mgmt.*, **4** (4) : 561-564.

WEBLOGRAPHY

FAOSTAT (2011). Food and Agriculture organization of the United Nations. Available from <http://faostat.fao.org/site/567/Desktop Default.aspx. page ID=567#ancor>.

12th
Year
★★★★★ of Excellence ★★★★★