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Performance study of onion (*Allium cepa* L.) varieties for quantitative traits in northern dry zone of Karnataka

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Abstract

An investigation was conducted to ascertain the production potentials of different genotypes of onion (*Allium cepa* L.) were carried out in Main Horticultural Research and Extension Centre, University of Horticultural Sciences, Bagalkot during 2016. Experiment was conducted with nine different varieties of onion. Among them, growth parameters like, more number of leaves were observed in Arka Bindu (12.62), highest plant height is seen in Arka Bheema (59.12cm) and the highest leaf length reported in Arka Kalyan (50.37). No. of rings- the highest is seen in Arka Pragati (10.50) and lowest in Arka Kalyan (7.70). TSS was found highest in Arka Keetiman (14.70 ° B). Among yield parameters, bulb weight was the highest in Arka Pragati (212.62 g), total weight was reported highest in Arka Pragati (12.75 kg). Thus onion is an important crop with many medicinal values, it has good yield and quality attributes. Thus identification of promising varieties as a commercial crop for the area with high yield and quality fruits would help the farmers in its adoption and improving their economic status.

Keywords: bulb, onion, parameters, quality, varieties, yield

Introduction

Onion (*Allium cepa* L.) belongs to the family Alliaceae; it is one of the most important commercial vegetable grown widely by large, small and marginal farmers in different parts of the country. It is mostly used as salad, pickles and garnish in cooked, fried, boiled and baked curries. Dietary demand of onion is increasing day by day due to the awareness of nutritional and medicinal importance. Nutritive value of onion varies from variety to variety; small multiplier onions are more nutritive and healthy with major value of flavour, flavonoids and other dietary values. Onion belongs to the family *Alliaceae*. South-West Asia is regarded as being the primary centre of domestication and variability. It has a hollow scope with a bubble-like swelling, but the leaves are completely flat. Onion is one of the most important commercial vegetable cum spice crop of India and widely cultivated throughout the World. It requires cool season and long day and highly cross pollinated crop. It is used as salad, cooked vegetable in preparation of pickles, dehydrate white & yellow onion for preparation of flour, flakes, paste *etc.* Pungency in onion is mainly due to sulphur containing compound allyl propyl disulphide. Certain varieties of onions are preferred for certain dishes. For instance, red onions are most commonly used in salads while the white and cream varieties are seldom used in salads. The Spring onions are also used mainly in salads and soup. Consumer preference is dictated by the level of onion pungency and type of food. Cultivars that have poor storage quality are generally less pungent. The self sufficiency of onion production is achieved due to proper planning of onion production in three seasons namely *kharif*, *late kharif* and *rabi* seasons, handling of post-harvest techniques like topping, curing and storage *etc.* Still it is necessary to make efforts for enhancement of productivity and minimizing post harvest losses to meet increasing demands of both domestic as well as export markets. So evaluating the promising varieties in the northern dry zone of Karnataka was prime mandatory.

Methodology

The field experiment on performance of onion (*Allium cepa* L.) was conducted in University of Horticultural Sciences, Bagalkot campus in front of RKVY building during 2016-17. The experimental plot was ploughed and brought into a fine tilth and applied the recommended dose of fertilizers (NPK) and farm yard manures (FYM).

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Complex fertilizer of 19:19:19 was given along with micro nutrients and also drippers were used for irrigation. Lateral pipe size used in beds were of 60 mm and drippers of 40 cm. Discharge rate of water from one dripper was 4 litre/hour. Seedlings were transplanted in a rows spaced at 15 cm and 10 cm from plant to plant. Other cultivation practiced was as per

package of practice in onion cultivation. Five representative plants were selected randomly from each genotype and were tagged for identification. Average from these five plants was worked out for the statistical computation. Statistical analysis were carried out by web agri stat package.

Table 1: Number of leaves, Plant height and leaf length of different onion varieties

Treatments	No. of Leaves	Plant Height (cm)	Leaf length (cm)
Arka Kalyan	12.37	57	50.37
Arka Keertiman	10.25	41.87	39.25
Arka Bheem	11.37	59.12	39.75
Arka Niketan	8.87	50.50	34.37
Arka Laleema	10.50	56.25	42.37
Arka Pragati	6.75	43.25	38
Arka Bindu	12.62	45.62	38.87
Indam 21	9.12	49.37	43.50
Indam Gulam	10.37	43.25	42.62
SEM	0.35	3.20	2.09
CD @ 5%	1.05	9.67	6.39

Table 2: Pseudo stem diameter, pseudo stem length, bulb diameter and total girth of onion varieties

Treatments	Pseudo stem diameter (cm)	Pseudo stem length (cm)	Bulb diameter (cm)	Total girth(cm)
Arka Kalyan	6.38	10.8	7.32	14.64
Arka Keertiman	6.75	9.25	6.37	12.75
Arka Bheem	5.55	11.50	7.34	14.68
Arka Niketan	6.38	7.57	5.64	11.28
Arka Laleema	6.75	11.75	7.55	15.10
Arka Pragati	7.48	10.52	7.80	15.60
Arka Bindu	6.88	9.75	6.90	13.80
Indam 21	5.90	11.21	7.13	14.27
Indam Gulam	6.30	10.93	6.98	13.96
SEM	0.29	0.72	0.75	0.86
CD (5%)	0.89	2.29	2.38	2.45

Table 3: TSS, ascorbic acid and no. of rings of onion varieties

	TSS in Brix	Ascorbic acid (mg /g)	No. of rings
Arka Kalyan	13.45	45.25	7.50
Arka Keertiman	14.70	41.50	8
Arka Bheem	12.35	42.75	8.75
Arka Niketan	12.78	38.58	8.25
Arka Laleema	13.78	40.25	7.75
Arka Pragati	11.43	41.75	10.50
Arka Bindu	12.58	39.52	9.64
Indam 21	11.96	40.76	8.97
Indam Gulam	12.11	40.95	9.15
SEM	0.53	0.83	0.57
CD (5%)	1.59	2.50	1.73

Table 4: Weight of bulb and total weight of onion varieties.

Treatment	Weight of bulb (g)	Yield (ton/ha)
Arka Kalyan	163.75	13.99
Arka Keertiman	182	20.22
Arka Bheem	167.25	18.70
Arka Niketan	128.62	14.29
Arka Laleema	194.25	21.58
Arka Pragati	212.62	23.62
Arka Bindu	208.625	23.17
Indam 21	173.25	19.25
Indam Gulam	201.37	22.37
SEM	1.97	1.12
CD (5%)	3.17	3.19

Results and Discussion

The experimental results revealed that significantly more number of leaves were observed in Arka Bindu (12.62)

followed by Arka Kalyan (12.37). Significantly less number of leaves were recorded in Arka Niketan (8.87). The highest plant height is seen in Arka Bheem (59.12 cm) followed by Arka Kalyan (57 cm) and lowest in Arka Keertiman (41.87 cm). In the same way, the highest leaf length is seen in Arka Kalyan (50.37 cm) followed by Indam 21 (43.50 cm) and lowest is seen in Arka Pragati (38 cm). Variation in the growth parameters among the Varieties may be due to climatic condition and genetic make up of the varieties. Similar reports were found with Vidyasagar *et al.* (1993), Golani *et al.* (2006) [7] Haydar *et al.* (2007) [8] Degewione *et al.* (2011) [4] Rashid *et al.* (2012) Monpara *et al.* (2005) in onion.

Among bulb yield parameters, the highest pseudo stem diameter is seen in Arka Pragati (7.48 cm) followed by Arka Pragati (6.88 cm) and lowest is seen in Arka Bheem (5.55 cm). The highest pseudo stem length is reported in Arka Laleema (11.75 cm) followed by Arka Bheem (11.50 cm) and lowest is seen in Arka Niketan (7.57 cm). Regarding bulb diameter, the highest is seen in Arka Pragati (7.80 cm) followed by Arka Bheem (7.34 cm) and lowest is seen in Arka Keertiman (5.64 cm). And also total girth, the highest is recorded in Arka Pragati (15.60 cm) and Arka Laleema (15.10) and lowest is seen Arka Niketan (11.28 cm). Variation in the yield parameters is correlated with growth parameters and also genetic make up of the variety in that environmental condition. Similar reports were found with Vidyasagar *et al.* (1993), Golani *et al.* (2006) [7] Haydar *et al.* (2007) [8] Degewione *et al.* (2011) [4] and Monpara *et al.* (2005) in onion.

With respect to quality parameters, Ascorbic Acid was highest in variety Arka Kalyan (45.25 mg/g), followed by Arka Keertiman (42.75 mg/g) and lowest is seen in Arka Niketan (38.58 mg/g). No. of rings was highest in Arka Pragati (10.50) and lowest in Arka Kalyan (7.50). Similar reports were found with Leja *et al.* and Jonanthan *et al.*, 2012. The highest TSS was recorded in Arka Keertiman (14.70 ° B) and lowest in Arka Pragati (11.43 ° B). Similar reports were recorded with Ananthan and Balkrishnamoorthy (2007) ^[1], Dhotre (2009) ^[5], Ram *et al.*, 2011) and Hosamani *et al.* (2010) ^[9] in onion. Bulb weight was highest in Arka Pragati (212.62 g) and lowest in Arka Kalyan (163.75 g). Total weight was highest in Arka Pragati (12.75 kg) with lowest in Arka Kalyan (9.82 kg). Finally total yield (ton/ha) was calculated where, Arka Pragati reported highest yield (23.62t/ha), followed by Arka Bindu (23.17t/ha). Similar results were found with Bharti *et al.* (2011) ^[16], Dhotre (2009) ^[5], Haydar *et al.* (2007) ^[8], and Golani *et al.* (2006) ^[7] in onion.

Conclusion

From the undertaken research results and discussion it would be concluded that among the nine different onion varieties tested for their performance under northern dry zone of Karnataka, for various growth, yield, quality, the varieties., Arka Pragati and Arka Bindu, for yield purpose and Arka Keertiman and Arka Kalyan for quality purpose were found better performers with respect to their yield potential, with good quality parameters compared to other varieties which could be used as source for further crop improvement programme and ultimately to increase yield and productivity.

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