

Studies on Performance of Onion (*Allium cepa* L.) Genotypes for Agro-morphological Traits During Rabi Season

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Abstract: Behaviour of 22 varieties of onion was studied during Rabi season during 2013-14. The analysis revealed that kharif varieties if grown in rabi season could confer equally good bulb yield as that of kharif. wide variations were observed among the genotypes for all the traits. Results revealed that the genotype Pamanakallur Local proved to be superior in terms of growth and yield parameters. therefore, this genotypes may be used for breeding programme. Significant differences were observed among the genotypes for all the traits.

INTRODUCTION

Onion (*Allium cepa* L.) is one of the most important vegetable crop grown extensively. The productivity can be increased by growing high yielding varieties and adoption of improved package of practices. Predominantly, onion is a rabi season crop in India. However, in Karnataka its cultivation is undertaken in three seasons viz., kharif, late kharif and rabi. The rabi cultivation in this area It is sown from Sept-Oct, transplanted in Nov.-Dec. and harvested from March to April. Looking to the huge area under rabi onion cultivation in this area, it was felt necessary to test different genotypes suitable for rabi season. Successful onion production depends on the selection of varieties that are adapted to different conditions imposed by specific environment. In Karnataka rabi onion is an best season for cultivation of the crop for which standardization of varieties is of immense utility. Since little information is available about rabi season onions, it was felt imperative to find out suitable varieties for its successful cultivation under Karnataka condition as a basic step towards its popularization. Hence, the present experiment was conducted to study the response of some improved varieties of common onion (*Allium cepa* L. var. *cepa*) during rabi season in order to achieve this objective.

MATERIALS AND METHODS

The present study was conducted during rabi season of 2013-14. The seeds were sown on raised bed and seedlings were prepared. The main field was ploughed twice, harrowed twice and raised beds of 5 x 2 m size were prepared. Eight weeks old seedlings were transplanted at 10 x 10cm spacing during second week of December. The 20 t/ha FYM and 100:50:50 kg/ha NPK were applied to the crop before transplanting. 22 cultivars of onion were evaluated in randomized block design with two replications. Recommended cultural practices were followed to ensure good crop. Observations were recorded on growth, yield, quality and other traits. The data so generated was statistically analysed.

RESULTS AND DISCUSSION

Information on genetic variability is very much essential and it forms the basis for breeding programme. To acquaint with the existing variability in any crop, the initial step is to evaluate the collections for various quantitative and qualitative traits. Onion is being grown under varied environmental conditions and seasons. Thus assessing performance among the genotypes to find the suitable cultivar for rabi season is the need of the hour.

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Table 1
Analysis of variance for yield and yield attributing characters of various onion genotypes.

Sl. no.	Source of variation/parameters	Means sum of squares			S. Em \pm	CD (5%)
		Repli.	Genotypes	Error		
	Degrees of freedom	1	21	21		
A.	<i>Growth parameters</i>					
1.	Plant height (cm)	1.87	64.74*	0.53	0.51	1.50
2.	Number of leaves per plant	0.08	1.19*	0.03	0.12	0.34
3.	Leaf area (cm)	10.18	19188.84*	1.93	0.98	2.87
4.	Days to maturity	2.27	191.23*	2.27	1.07	3.11
B.	<i>Yield parameters</i>					
5.	Average weight of bulb (g)	0.41	242.08*	2.86	1.20	3.49
6.	Bulb diameter (cm)	0.01	0.30*	0.00	0.04	0.11
7.	Bulb length (cm)	0.00	0.19*	0.01	0.06	0.17
8.	Number of rings per bulb	0.06	2.15*	0.20	0.31	0.92
9.	Bulb yield (t/Ha)	10.49	205.21*	1.27	0.80	2.33
C.	<i>Quality and other parameter</i>					
10.	Total Soluble Solid ($^{\circ}$ B)	0.63	1.26*	0.09	0.21	0.61
11.	Bulb neck thickness (cm)	0.00	0.09*	0.00	0.03	0.08
12.	Bulb shape index	0.00	0.00	0.00	0.01	0.03

* Significant at 5 per cent probability

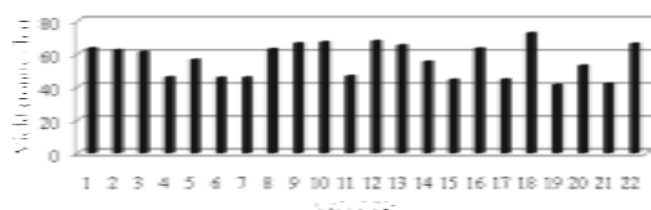


Figure 1: Genotypic performance of onion genotypes for bulb yield per hectare.

All the genotypes displayed considerable amount of variation in their mean performance with respect to most of the characters studied, which indicated that genotypes under the study were genetically variable. The analysis of variance (Table 1) revealed significant mean square estimates for all the characters except bulb shape index and leaf area index indicating sufficient diversity among the varieties. The results obtained were discussed as follows and the mean performances of all the genotypes for various traits were presented in Table 2.

The tallest plant (75.86 cm) was achieved by the cultivar Pamanakallur Local whereas the most dwarf plant was produced by Anand-2 (53.85 cm). Similarly, Pamanakallur Local registered maximum number of leaves/plant (10.4) On the contrary, minimum number of leaves/plant was noted in Akola Safed (7.3). Maximum LA was observed in Bellary Red (777.98 cm²) whereas, least were recorded in Anand-2 (333.76 cm²) and these results are in conformity with the results of [1].

Maximum equatorial bulb diameter was recorded in Pamanakallur Local (6.67 cm) whereas, maximum Polar diameter was in Arka Bheema (5.76 cm) but least was noticed in Anand-2 (4.51 cm: 5.09 cm), on the other hand bulb shape index was highest in L-819 (0.96) and lowest in Bheema Kiran (0.81).

Maximum average bulb weight was recorded in L-819 (121.10 g), whereas, least average bulb weight was noticed in Anand-2 (59.29 g), on other hand bulb shape index was highest in L-819 (0.96) and lowest in Bheema Kiran (0.81). Total soluble solid content was maximum in L-744 (12.20 $^{\circ}$ B). Whereas, least TSS content was recorded in Bellary Red (8.97 $^{\circ}$ B). The thickest neck of 1.26 cm was marked in Bheema Raj while Agrifound Dark Red (0.29 cm) acquired the thinnest neck (0.60 cm). Maximum number of rings per bulb were found in Akola Safed (10.07) whereas, least number of rings per bulb was recorded in Agrifound Light Red (6.4). Variation among the entries may be because of controlled vegetative growth and very thin neck. The number of days to crop maturity was minimum in L-652, L-819 and N-53 these genotypes took 90 days for maturity whereas Bheema Shakthi, Arka Bheema and Arka Niketana took maximum number of days (120) for crop maturity. Variation among the entries may be because of controlled vegetative growth and very thin neck and same result were found by [2].

Table 2
Performantance of onion genotypes for Growth, yield, quality and other parameters.

Sl. no.	Genotypes	Plant height (cm)	No. of leaves per plant	Leaf area (cm ²)	Average bulb wt. (g)	Bulb diameter (cm)	Bulb length (cm)	No. of rings/bulb	TSS (°B)	Bulb neck thickness (cm)	Bulb shape index	Days for Maturity	Bulb yield (t /ha)
1.	Agrifound Dark Red	59.50	8.90	532.51	92.93	5.79	5.25	7.10	11.10	0.29	0.91	97.50	63.00
2.	Agrifound Light Red	67.78	9.55	491.25	101.68	6.13	5.22	6.43	12.15	0.49	0.85	102.50	61.93
3.	Akola Safed	61.86	7.33	418.82	94.48	5.85	4.92	10.08	10.25	0.74	0.84	112.50	60.80
4.	Anand-2	53.85	7.90	333.77	59.29	5.09	4.51	7.15	10.90	0.64	0.89	100.00	45.50
5.	Bheema Kiran	67.40	9.44	616.66	104.00	5.91	4.78	9.50	10.90	0.85	0.81	115.00	56.13
6.	Bheema Raj	55.79	8.73	502.83	103.25	6.31	5.55	7.00	10.38	1.27	0.88	115.00	45.25
7.	Bheema Red	63.92	9.00	389.43	89.88	6.22	5.22	8.75	10.80	1.02	0.84	105.00	45.40
8.	Bheem Shakti	69.08	9.73	591.11	113.23	6.38	5.44	9.25	11.05	1.07	0.86	120.00	62.54
9.	BheemaShubra	59.82	9.00	559.85	104.00	5.97	5.32	8.25	11.70	1.02	0.89	100.00	66.03
10.	Bheema Super	59.80	9.00	524.28	102.75	6.34	5.53	8.75	9.95	0.92	0.87	100.00	66.78
11.	L-652	69.90	9.15	588.65	103.23	5.77	5.42	8.50	12.15	0.97	0.94	90.00	46.20
12.	L-744	64.94	8.43	596.48	113.55	5.82	5.10	9.00	12.20	0.86	0.88	100.00	67.35
13.	L-819	65.86	8.80	442.06	121.13	5.82	5.63	7.75	11.00	1.02	0.97	90.00	64.83
14.	N-53	59.23	8.23	507.16	80.25	5.69	5.39	6.75	11.25	0.74	0.95	90.00	54.88
15.	NHRDF Red	60.94	8.38	367.24	80.45	5.30	4.82	6.58	10.54	0.64	0.91	100.00	43.95
16.	NHRDF Red-2	65.02	9.90	503.86	98.23	5.99	5.31	8.12	11.23	0.92	0.89	100.00	62.90
17.	NHRDF Red-3	55.13	8.13	453.56	86.64	5.63	5.00	7.20	10.12	0.86	0.89	100.00	44.13
18.	Pamanakallur Local	75.87	10.48	566.13	113.50	6.68	5.50	8.75	11.08	1.03	0.83	95.00	72.25
19.	Arka Bheema	57.26	8.10	528.16	101.63	6.40	5.77	8.28	11.45	0.81	0.90	120.00	40.78
20.	Arka Kalyan	54.98	8.10	598.72	82.95	5.78	5.11	8.50	10.95	0.84	0.89	95.00	52.53
21.	Arka Niketan	60.06	9.03	467.28	76.50	5.50	5.16	6.75	12.04	0.85	0.94	120.00	41.55
22.	Bellary red	67.46	10.00	777.98	119.28	6.40	5.53	8.50	8.98	0.79	0.87	97.50	65.78
	S.Em±	0.51	0.12	0.98	0.98	0.04	0.06	0.31	0.21	0.03	0.01	1.07	0.80
	CD (5%)	1.50	0.34	2.87	2.86	0.11	0.17	0.92	0.61	0.08	0.03	3.11	2.33

The highest bulb yield per/ha. was noticed in Pamanakallur Local (72.25 t), Whereas, least bulb yield per plot was recorded in Arka Bheema (40.77 t).

The difference in yield during *rabi* may be attributed mainly to the difference in their average weight of bulb, number of leaves per plant, plant height, bulb dimension and leaf area, These findings were in agreement with [3], [4] and [5].

In the present investigation, among several genotypes Pamanakallur Local noticed significant difference for plant height, number of leaves per plant and bulb diameter. Which contributed to higher yield. Thus, Pamanakallur Local for *rabi* is high yielding genotype because of its yield is significantly higher than all other varieties.

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