IF : 4.547 | IC Value 80.26 VOLUME-6, ISSUE-5, MAY-2017 • ISSN No 2277 - 8160

Original Research Paper Horticulture

Evaluation of Onion genotypes for different economic traits in central dry zone of Karnataka

D.A. PEERZADE Horticultural Research Station, Tidagundi, Bijapur, UHS, Bagalkot, Karnataka

B.N. HARISH BABU College of Horticulture, Hiriyur-577 598, UAHS, Shimoga, Karnataka.

ABSTRACT Thirteen onion genotypes were evaluated for bulb size and other economic characters in the Central Dry Zone of Karnataka. The genotype Baswant 780 recorded highest bulb yield of 421.62 q/ha with an average bulb weight of 73.33 g per bulb which was followed by Arka Kalyan which has recorded bulb yield of 371.56 q/ha with an average bulb weight of 66.02 g per bulb. The equatorial diameter of the bulb was highest in case of H-4 (5.08 cm) followed by Baswant 780 (4.67 cm). However, the polar diameter of the bulb was almost same in case of Baswant 780 (5.29 cm) and Arka Keerthiman (5.27 cm). Considering the bulb yield and average bulb weight of the bulb, Baswant 780 and Arka Kalyan were found to be superior and ideal cultivars for kharif season cultivation in the Central Dry Zone of Karnataka.

KEYWORDS : Onion, genotypes, bulb yield, equatorial diameter

INTRODUCTION

Onion (Allium cepa L.) is an important vegetable crop of India whose leafy portion is used as a vegetable and its bulbs are used as salad and spice. In India, onion occupies an area of 10.51 lakh ha with a total production of 16.81 mt (Anon., 2013). Maharashtra, Karnataka, Gujarat, Bihar, Madhya Pradesh, Rajasthan, Andhra Pradesh and Tamil Nadu are the major onion growing states. In Karnataka, onion is grown in an area of 1.59 lakh ha with a total production of 2.39 mt and productivity stands at 15mt/ha (Anon., 2013). The yield of onion is mainly dependent on the use of high yielding varieties, optimum use of fertilizers, plant protection measures and adaptability of a variety to a particular agro –climatic region. Bellary Red is the dominant variety which is well acclimatized to Karnataka. In addition to this variety, several cultivars are being grown to some extent, but scientific information on their performance in respect of bulb size and other characters of onion bulbs is not available. In this context, the present experiments on the evaluation of different onion genotypes for bulb size and other characters were conducted during kharif season in the central dry zone of Karnataka.

MATERIALS AND METHODS

Studies on the evaluation of different onion genotypes for economic traits were carried out during kharif 2013 and 2014 at the College of Horticulture, Hiriyur in the central dry zone of Karnataka, using 13 genotypes of onion viz., Arka Pragathi, Arka Niketan, Arka Kalyan, Arka Lalima (H-5), Arka Kirthiman (H-1), Bellary Red, Satara, N-53, H-3, H-4, Agri Found Light Red (AFLR), Agri Found Dark Red (AFDR) and Baswant 780. The experiment was laid out in a randomized block design with three replications during both the years. The seeds of different onion genotypes were sown during second week of May in the nursery and transplanted in third week of June. Each experimental plot consisted of 8 rows for each treatment. The plot size was 2.0 x1.5 m. The spacing of onion was 15 cm x 10 cm. The recommended packages of practices were followed for raising the crop.

The observations were recorded on five randomly selected plants in each treatment. The data was recorded on the characters like bulb weight (g), volume of bulb(ml), neck diameter(cm), polar and equatorial diameter of the bulb(cm), number of centers per bulb, number of rings per bulb, ring thickness (mm) and split bulbs (%), and then the density of the bulbs and bulb shape index were calculated. The data was subjected to statistical analysis by adopting the standard procedure of Panse and Sukhatme (1984) using Windostat software.

RESULTS AND DISCUSSION

The pooled analysis of the mean data obtained from two years (2013 and 2014) on various characters in onion is presented in tables 1 and 2. Significant differences were observed for all the traits in pooled analysis. However, non-significant differences in individual years (when data analyzed separately during 2013 and 2014) were recorded for equatorial diameter of the bulb, polar diameter of the bulb and bulb shape index.

Highest bulb yield of 421.62 q/ha was recorded in the genotype Baswant 780 followed by Arka Kalyan (371.56 q/ha) and Agri Found Light Red/AFLR (326.19 q/ha). Similarly, the average bulb weight was also highest in case of Baswant 780 (73.35 g) followed by Arka Kalyan (66.02 g) and AFLR (57.28 g). The equatorial diameter of the bulb was highest in case of H-4 (5.08 cm) followed by Baswant 780 (4.67 cm) and AFLR (4.37 cm). The genotype Baswant 780 recorded maximum polar diameter of 5.29 cm followed by Arka Kirthiman (5.27 cm) and Arka Pragathi (5.25 cm). The bulb shape index was found to be highest in case of Arka Lalima (1.38) followed by Arka Pragathi (1.32) and H-3 (1.31). The local cultivar Bellary Red recorded maximum number of centers per bulb (2.60) followed by H-4 (1.78) and Arka Kirthiman (1.68). Highest number of rings per bulb were documented in case of highest yielding genotype-Baswant 780 (11.31) followed by Arka Kalyan (10.05) and AFLR (9.98). Similarly, the ring thickness was also highest in case of Baswant 780 (2.88 mm) followed by Arka Kalyan and AFLR, both of them recorded an average ring thickness of 2.66 mm. Further, the genotypes Baswant 780 and Arka Kalyan recorded least percentage of split bulbs (0.5 %). These results are in close agreement with the earlier reports on onion in respect of weight of bulb, polar and equatorial diameter of the bulb among the different onion varieties/hybrids grown under different conditions and seasons (Muthukrishnan et al., 1978; Jadhav et al., 1990; Patil et al., 1991; Somkumar et al., 1994; Pathak and Gowda, 1994; Sharma and Chaudhary, 1995; Khan, 1997).

The high yielding genotypes- Baswant 780, Arka Kalyan and AFLR (Agri Found Light Red) recorded highest weight of bulb which could mainly be attributed to the maximum volume of the bulb, polar diameter of the bulb, number of rings per bulb, ring thickness, as these components had positive and significant correlation with the weight of bulb. Similar trend was documented in the previous studies on onion (Patil et al., 1990; Sharma and Chaudhary, 1995; Khan, 1997). However, the maximum growth and production of bulb could be attributed to better growth and vigour of these varieties coupled with high production of dry weight of leaves might have helped in accumulation of more photosynthates in the bulbs.

Among the 13 genotypes evaluated, the variety Baswant 780 recorded highest bulb yield and was also superior in terms of bulb weight (73.35 g), bulb volume (75.20 ml), polar diameter (5.29 cm), number of rings per bulb (11.31), ring thickness (2.88 mm) and also

with a least number of split bulbs. The second best genotype identified in the present study is Arka Kalyan which has recorded the second highest bulb yield along with its superiority in terms of bulb weight or bulb size, number of rings per bulb, ring thickness coupled with a least per cent of split bulbs when compared to local cultivar Bellary Red which has recorded highest per cent of split bulbs indicating its inferior quality and low yielding ability (222.5 q/ha). Consistently least value of these yield components recorded in Bellary Red and could be mainly attributed to the poor growth performance, least uptake of nutrients and minimum dry weight of leaves. It was also in agreement with the findings of Patil et al. (1990). The variations in the yields of different varieties/hybrids grown under similar conditions have been reported by several workers (Jadhav et.al., 1990; Patil et.al., 1991; Somkumar et .al., 1994 and Khan, 1997).

Based on the performance of the genotypes under study, it was concluded that the genotypes Baswant 780, Arka Kalyan and AFLR which gave higher yield coupled with bigger size of the bulbs, maximum bulb weight and bulb volume, could be adopted for commercial cultivation in the central dry zone of Karnataka for increased production and productivity of onion.

Table 1. Pooled analysis of the bulb weight, volume of bulb and density of bulb of different onion genotypes

Sl. No.	Treatment	Bulb yield (q/ha)			Bulb weight (g)			Equatorial diameter of bulb (cm)			Polar diameter of bulb (cm)			Bulb shape index		
		2013	2014	Pooled	2013	2014	Pooled	2013	2014	Pooled	2013	2014	Pooled	2013	2014	Pooled
1	Bellary Red	216.98	228.01	222.50	31.69	32.89	32.29	4.21	4.31	4.26	5.1	5.29	5.195	1.21	1.22	1.22
2	Baswant-780	415.65	427.58	421.615	72.59	74.12	73.355	4.6	4.75	4.675	5.2	5.38	5.29	1.13	1.14	1.14
3	Satara	224.01	235.98	229.995	33.32	32.99	33.155	4.2	4.41	4.305	5.2	5.28	5.24	1.2	1.2	1.20
4	Arka Pragathi	299.5	307.78	303.64	45.89	42.33	44.11	3.9	4.05	3.975	5.1	5.4	5.25	1.32	1.31	1.32
5	Arka Niketan	306.51	314.29	310.4	48.21	49.1	48.655	4.1	4	4.05	5.05	5.28	5.165	1.26	1.27	1.27
6	Arka Kalyan	366.58	376.54	371.56	66.79	65.24	66.015	4.3	4.21	4.255	5	5.15	5.075	1.21	1.21	1.21
7	Arka Lalima	260.32	262.33	261.325	36.25	37.85	37.05	3.12	3.19	3.155	4.3	4.38	4.34	1.38	1.37	1.38
8	Arka Kirthiman	285.64	301.83	293.735	43.25	44.85	44.05	4	4.12	4.06	5.12	5.42	5.27	1.3	1.3	1.30
9	N-53	267.44	274.69	271.065	41.5	39.12	40.31	4.21	4.25	4.23	5	4.91	4.955	1.22	1.21	1.22
10	H-3	250.14	257.85	253.995	35.89	34.96	35.425	3.8	4	3.9	4.9	5.15	5.025	1.3	1.31	1.31
11	AFDR	289.66	295.11	292.385	40.12	41.89	41.005	3.98	4.11	4.045	4.7	4.5	4.6	1.14	1.13	1.14
12	H-4	306.54	311.62	309.08	46.77	45.89	46.33	5	5.16	5.08	5.45	5.95	5.7	1.18	1.17	1.18
13	AFLR	322.12	330.25	326.185	58.12	56.44	57.28	4.3	4.45	4.375	5	4.95	4.975	1.13	1.13	1.13
	F.test	*	*	*	*	*	*	NS	NS	*	NS	NS	*	NS	NS	*
	S.Em±	23.4	20.21	14.01	5.61	4.51	3.60	0.31	0.30	0.21	0.24	0.23	0.16	0.05	0.06	0.05
	CD at 5 %	67.93	59.02	39.02	16.42	13.12	9.85	-	-	0.68	-	-	0.54	-	-	0.15

* Significant at 5% level

Table 2. Pooled analysis of the number of centres per bulb, number of rings per bulb, ring thickness and split bulbs of different onion genotypes

Sl. No.	Genotypes	No. of centres per bulb			No. of rings per bulb			Ring thickness (mm)			Split bulbs (%)		
		2013	2014	Pooled	2013	2014	Pooled	2013	2014	Pooled	2013	2014	Pooled
1	Bellary Red	2.61	2.58	2.60	9.05	8.82	8.94	1.8	1.71	1.76	11.54 (10.64)	11.85 (11.20)	12.60 (10.98)
2	Baswant-780	1.52	1.45	1.49	11.2	11.41	11.31	2.85	2.9	2.88	0.39 (7.38)	0.68 (5.65)	0.52 (5.48)
3	Satara	1.5	1.58	1.54	8.9	9.05	8.98	2.34	2.13	2.24	1.68 (6.87)	2.69 (7.68)	2.18 (7.26)
4	Arka Pragathi	1.48	1.58	1.53	9.41	9.3	9.36	2.45	2.5	2.48	6.75 (9.45)	7.85 (9.70)	7.56 (9.33)
5	Arka Niketan	1.41	1.31	1.36	9.62	10.25	9.94	2.45	2.58	2.52	0.38 (5.36)	0.68 (5.71)	0.56 (5.57)
6	Arka Kalyan	1.52	1.44	1.48	10.25	9.85	10.05	2.6	2.51	2.56	0.36 (5.43)	0.76 (5.72)	0.55 (5.57)
7	Arka Lalima (H-5)	1.41	1.29	1.35	9	9.26	9.13	2.4	2.26	2.33	2.68 (7.26)	3.39 (7.56)	3.10 (7.41)
8	Arka Kirthiman (H-1)	1.65	1.7	1.68	9.25	9.45	9.35	2.5	2.41	2.46	1.38 (6. 40)	2.12 (6.75)	1.64 (6.65)
9	N-53	1.5	1.45	1.48	9.24	9.4	9.32	2.41	2.28	2.35	1.34 (6.37)	2.08 (6.83)	1.69 (6.59)
10	H-3	1.58	1.45	1.52	8.91	9.28	9.10	2.35	2.15	2.25	6.43 (9.38)	7.53 (9.68)	6.93 (9.51)
11	AFDR	1.52	1.44	1.48	9.14	9.58	9.36	2.45	2.36	2.41	1.38 (6.38)	2.20 (6.89)	1.76 (6.67)
12	H-4	1.65	1.9	1.78	9.25	9.82	9.54	2.54	2.45	2.50	6.43 (9.34)	7.53 (9.68)	6.95 (9.31)
13	AFLR	1.42	1.51	1.47	10.1	9.85	9.98	2.6	2.51	2.56	8.05 (9.88)	14.20 (10.30)	8.60 (9.98)
	F.test	*	*	*	*	*	*	*	*	*	*	*	*
	S.Em±	0.19	0.18	0.12	0.34	0.33	0.24	0.17	0.18	0.13	0.65	0.83	0.55
	CD at 5 %	0.51	0.55	0.35	0.95	0.91	0.65	0.48	0.45	0.35	1.93	2.33	1.46

* Significant at 5% level Figures in the parenthesis are root and arc-sine transformed values

REFERENCES

1. Anonymous, 2013, Horticultural crop statistics of Karnataka state at a glance, Directorate of Horticulture, Government of Karnataka, Lalbaugh, Bangalore-560 004.
2. Jadhav, R.S., Shinde, N.N. and Sontakke, M.B., 1990, Performance of onion (Allium cepa L.) varieties in rabi season. Prog. Hort., 22(1-4) : 84-86.
3. Khan, I.A., 1997, Performance of onion (Allium cepa L.) cultivars in mid hill conditions of Uttar Pradesh. Prog. Hort., 29(1-2) : 97-99.
4. Muthukrishnan, C.R., Mohideen, M.K., Rangaswamy, P., Mehta, A.V. and Rajagopal, A., 1978, Evaluation of onion (Allium cepa L.) varieties at Coimbatore. South Indian Hort., 26 (4): 180-183.
5. Panse, V.G. and Sukhatme, P.V., 1967, Statistical methods for agricultural workers. Indian Council of Agricultural Research, New Delhi, pp. 155.
6. Pathak, C.S. and Gowda, R.V., 1994, Breeding for the development of onion hybrids in India; Problems and Prospects. Acta Horticulturae, 358 : 239-242.
7. Patil, A.H., Dod, V.N., Kale, P.B. and Kulwal, L.V., 1990, Performance of onion varieties with reference to seed production. PKV Res. J., 14(2): 123-126.
8. Patil, D.R., Hebbara, M. and Naganagoud, A., 1991, Performance of onion varieties on black soils. Karnataka J. Agric. Sci., 4(1-2) : 54-56.
9. Sharma, D.K. and Chaudhary, D.R., 1995, Varietal evaluation of onion cultivars in Kulu Valley, Himachal Pradesh. Indian J. Hort., 52(2) : 125-127.
10. Somkumar, R. G., Gowda, V.R., Singh, J.H. and Pathak, C.S., 1994, Evaluation of onion varieties for growth and yield characters. Division of Vegetable Crops, IIHR, Bangalore-65.