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Evaluation of different onion genotypes for quantitative and qualitative characters under central part of Uttar Pradesh

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Abstract

Twenty-one genotypes were evaluated for quantitative and qualitative characters of onion crop was carried out during rabi season of the year 2019-20 at Vegetable Research Farm, Department of Vegetable Science, Chandra Shekhar Azad University of Agriculture and Technology, Kalyanpur; Kanpur. The experiment was laid out in randomised complete block design with three replications. The experimental material consisting of twenty-one genotypes of onion maintained at the DOGR Nasik Maharashtra were utilized. Among genotypes evaluated OC 18-75 performed better for most of the characters like plant height (56.8 cm), polar bulb diameter (6.4 cm), total yield (279.75 q/ha), marketable yield (270.75 q/ha) and C-grade bulb (38.8%). Genotype OC 18-91 recorded maximum number of leaves (9.2 cm), OC 18-68 showed maximum equatorial diameter (6.4 cm) and OC 18-89 highest TSS (13.06%).

Keywords: Genotype, onion, quantitative and qualitative characters

Introduction

The onion (*Allium cepa*. L from Latin "onion") is one of the most important vegetable crops grown throughout the world and is said to be native of Central Asian and Mediterranean Region (McCollum, 1976) [6]. It is a monocot and belong to economically important family Alliaceae, sub-family, Allioideae and order Asparagels having basic chromosome number of $X. = 8$ ($2n = 16$). Cultivated onion is herbaceous annual for bulb production & biennial for seed production. The edible portion is a modified stem botanically known as "Truncated bulb". In Uttar Pradesh, it is grown in about 0.0268 mha and production 0.0439 million tons with 16.37 t/ha average productivity. Sikkim has highest productivity (56.45 t/ha) among different onion growing states of India. Onion are best source of vitamin B6, which help in the formation of blood cells. Nutritional intake of onion increases learning potential in students. Its predominantly winter (rabi season) crop, it grown in all three seasons viz, Rabi (March- June), Kharif (October- December) and Late Kharif (Jan- march) season.

Materials and Method

Experimental site: The present field experiment was laid out at Vegetable Research Farm, Kalyanpur, Department of Vegetable Science of C. S. Azad University of Agriculture & Technology, Kanpur during Rabi season 2019. The topography of experimental field was uniform with gentle slope and had adequate drainage.

Location and prevailing climatic conditions: Geographically, Kanpur is situated in the alluvial belt of Gangetic Plains of Central Zone of Uttar Pradesh at an altitude of 127.00 meters above mean sea level (MSL). It is located at latitude 25.26 to 26.28o N and longitude of 79.30 to 84.34o E. It has subtropical climate having a temperature range of 23o C to 45o C and 6o C to 31o C in summer and winter seasons, respectively. In this area most of the rainfall is received during mid-June to early October with occasional showers in winter.

Experimental Materials: The experimental material for the present study comprised of 21 diverse genotypes of onion maintained at the DOGR Nasik Maharashtra were used as

experimental material. The seedling of all 21 genotypes of onion were planted in randomized block design (RBD) with three replications with an optimum plot size of 2x2 m and spacing of 15 cm row to row and 10 cm plant to plant. Observation on Qualitative characters *i.e.*, plant height and number of leaves were recorded from 5 randomly selected plant in each replication at 70-75 days of transplanting (DAT) and Polar diameter, Equatorial diameter, neck thickness (cm), % A- grade bulbs, % B- Grade bulbs, % C- grade bulbs, % Bolter bulbs, % Double bulbs, Marketable bulb yield (q/ha), Total bulb yield (q/ha), days to Harvest were recorded from 5 randomly selected bulb and quality character *viz.*, Total Soluble Solids (TSS %), Bulb colour and Bulb shape was recorded.

Result and Discussion

There were significant differences among the genotypes for all concern characteristic under study. The mean performance for evaluation of genotypes and explanation of different characters were recorded during experimentation given below.

A. Quantitative characters

a. Plant height (cm)

Significant differences were observed among the twenty-one onion genotypes, whereas OC 18-75 (56.8cm) showed maximum plant height at 75 days after transplanting. The genotype OC 18-81 (46.4 cm) was recorded the minimum plant height at 75 days after transplanting.

b. Number of leaves /Plant (cm)

In this study gained OC 18-91 maximum number of leaves per plant (9.2 cm). Similarly, by different workers recorded different number of leaves of kharif onion.

c. Polar diameter (cm)

Maximum polar bulb diameter was recorded in OC 18-75 (6.4 cm). The lowest polar bulb diameter was recorded in OC 18-63 (3.83 cm). Similar finding was also reported by Amarana jundeswara, H, Priyadarshini G *et al.* (2020)^[2].

d. Equatorial diameter (cm)

Maximum equatorial bulb diameter was recorded in OC 18-68 (6.4 cm). The lowest equatorial bulb diameter of 3.8 cm was recorded in OC 18-59. Similar finding was also reported by Das Ratan *et al.* (2017)^[3] they recorded maximum equatorial diameter in PBR-14-46.

e. Neck thickness (cm)

It is clear from data that the maximum neck thickness was

recorded in OC 18-61 (1.09 cm). However, minimum neck thickness was recorded in OC 18-85 (0.73 cm). Similar finding was also reported by Utagi *et al.* (2015)^[9] observed that maximum neck thickness (1.34) was observed in variety Bhima Super

f. % of A, B and C grade bulbs

On the basis of diameter of bulb maximum a-grade bulb obtained in OC 18-63 (26.5). Lowest A grade bulbs obtain in OC 18-99 (21.62). The maximum B grade bulb recorded OC 18-89 (34.65), while lowest B grade bulb obtain in OC 18-91 (29.00) and maximum C grade bulb produced from OC 18-75 (38.8) and lowest C grade bulb observed OC 18-73 (32.00) genotype. Similar findings were also reported by Sharma *et al.* (2015)^[8] the genotypes CSKO-1119 was produced maximum A grade bulbs.

g. Bolter bulbs (%)

Significantly maximum data recorded on maximum percentage of bolter bulbs obtained in OC 18-61 (5.18%). There were many genotypes in which bolting was not found such as OC 18-59, OC 18-73, OC 18-87 and OC 18-94.

h. Average bulb weight (g)

In present study maximum average bulb weight was recorded in genotype OC 18-87 (58.94 g). However, minimum bulb weight was recorded in OC 18-68 (39.02 g). Similar results were also reported by Lakshmipathi *et al.* (2017)^[5] the genotype Arka Kalyan noticed maximum average bulb weight (131.0 g) and ten bulb weight (1266.00 g)

i. Total yield (q/ha)

Present study revealed that maximum total yield was recorded in OC 18-75 (279.75 q/h) while lowest total yield was noted in OC 18-99 (180.75 q/ha). Similar finding was also reported by Gupta *et al.* (2018)^[4] that highest bulb yield was recorded in 1523-Agg (228.08 q/ha) in accessions of multiplier onion

j. Marketable bulbs yield (q/h)

The maximum marketable yield was recorded in OC 18-75 (270.75 q/h) while lowest marketable bulb yield was noted in OC 18-99 (156.75 q/ha). Utagi *et al.* (2015)^[9] found that in variety Bhima Super found maximum marketable bulb yield (40.19 t/ha).

k. Days to harvest

The maximum days to harvest after transplanting were recorded in genotype OC 18-87 (127), which was at par with OC 18-97 (127), while minimum days to harvest after transplanting were recorded in OC 18-83 (116).

Table 1: Mean performances of different genotypes of onion for Plant height (cm), No. of leaves/plant, Polar diameter (cm), Equatorial diameter (cm), neck thickness (cm)

S. No.	Genotypes	Plant height (cm)	No. of leaves/plant	Polar diameter (cm)	Equatorial diameter (cm)	Neck thickness (cm)
1	OC 18-59	50.4	6	4.72	3.8	1.07
2	OC 18-61	53.4	8.3	5.4	5.2	1.09
3	OC 18-63	51.6	7.6	3.83	5.8	0.97
4	OC 18-65	50.9	8.2	4.7	5.3	0.88
5	OC 18-68	47.9	7.5	4.84	6.4	1.01
6	OC 18-71	55.9	8.2	5.03	5.1	0.83
7	OC 18-73	53.4	7.7	4.68	5.6	1.01
8	OC 18-75	57.2	8.9	6.4	5.2	0.74
9	OC 18-77	53	8.6	4.9	5.6	0.71
10	OC 18-79	54	8.2	4.8	3.56	1.04
11	OC 18-81	46.4	7.9	5.26	5.1	0.81

12	OC 18-83	50.1	7.4	5.34	4.8	0.97
13	OC 18-85	49.8	8.1	5.4	5	0.73
14	OC 18-87	56.8	7.7	5.26	5.5	1.03
15	OC 18-89	52.2	8.5	5.27	5.3	0.97
16	OC 18-91	54.6	9.2	5.72	5.4	0.95
17	OC 18-92	49.8	8.2	5.1	5.2	0.91
18	OC 18-94	51.7	8	4.5	5.2	0.99
19	OC 18-96	50.8	7.9	4.94	5.1	0.88
20	OC 18-97	50.2	7.2	4.6	5.3	0.81
21	OC 18-99	48.1	7.7	4.28	5	1.08
SE(m)		1.0086	0.3022		0.1889	0.1889
CD at 5%		2.8837	0.8646		0.5403	0.5403

Table 2: Mean performances of different genotypes of onion for following characters

S. No.	Genotypes	A- grade bulbs (%)	B- grade bulbs (%)	C- grade bulbs (%)	Bolter bulbs (%)	Day to harvest	Average bulb weight (g)	Total yield (q/ha)	Marketable yield (q/ha)
1	OC 18-59	26.4	32.6	35.51	0	118	45.81	246	232.5
2	OC 18-61	25.66	31.62	38.35	5.18	119	39.73	200.5	191.75
3	OC 18-63	26.5	32.51	35.2	6.27	124	43.77	250.5	236
4	OC 18-65	25.13	30.24	34	3.43	117	46.71	254.4	227
5	OC 18-68	26.25	32.5	34.26	3.2	117	39.02	232.5	216.25
6	OC 18-71	25.62	31.52	34.66	2.21	122	42.63	277.5	254.75
7	OC 18-73	23.55	29.77	32	0	125	48.6	245.25	209.25
8	OC 18-75	24.32	33.66	38.8	0.85	121	44.05	279.75	270.75
9	OC 18-77	24.56	32.4	35.11	1.86	126	42.51	256.65	236.32
10	OC 18-79	23.12	31.13	35	3.81	122	50.25	256	228.5
11	OC 18-81	24.5	32	36	4.94	118	41.63	200.25	185.25
12	OC 18-83	23	30.31	33	2.56	116	51.67	232	200.25
13	OC 18-85	25.4	34.12	37	0.31	120	57.27	198.25	191.5
14	OC 18-87	24	32.66	35.86	0	127	58.94	224	207.25
15	OC 18-89	25.33	34.65	37.77	1.2	122	50.33	245.32	239.82
16	OC 18-91	23.62	29	34.1	2.11	126	54.13	251.5	218.12
17	OC 18-92	22.5	29.5	34.47	1.12	124	40.26	244	211
18	OC 18-94	23	30	34	0	123	49.04	214.75	187
19	OC 18-96	22.66	29	33.39	0.59	126	48.23	215.75	183.5
20	OC 18-97	21.92	31.11	34.48	1.66	127	55.61	224.25	196.25
21	OC 18-99	21.62	30.43	35	1.74	118	51.57	180.75	156.75
SE(m)		0.4286	0.5212	0.6928	0.1798	1.0080	1.2599	10.0786	8.8186
CD at 5%		1.2254	1.4900	1.9846	0.5151	2.8819	3.6021	28.8144	25.2121

B. Quality parameters**a. Total soluble solid (T.S.S.)**

The significant variations in total soluble solids were observed among the genotypes. The highest TSS was recorded in OC 18-89 (13.06), whereas the OC 18-79 (11.39) registered the lowest TSS. The similar findings were noticed by Umamaheswarappa *et al.* (2014) [10] they reported that, the significant differences were noticed with respect to total soluble solids among varieties and hybrids, grown under different seasons and conditions.

b. Predominant bulb skin colour and shape

In present study among the twenty-one genotypes of onion 10

were having light Red, OC 18-59, OC 18-81 dark red predominant bulb colour and OC 18-83 recorded red bulb colour, remaining 8 genotypes were found in white colour after curing of the bulbs in storage. Similar findings were also reported by Rivera *et al.* (2005) [7], Yadav *et al.* (2009) revealed that PBR 322, 324, 302, 310 and 298 were found bulb colour varied from light to deep red. Bulb shape varied from oval globe to flat globe

c. Per Cent Uniformity in Bulb Shape

Genotype OC 18-87 (93.72) showed a highest per cent uniformity in bulb size and least per cent uniformity in bulb size was observed in the genotype OC 18-83 (79.37).

Table 3: Mean performances of different genotypes of onion for days to harvesting and total soluble solids (TSS), Predominant Bulb Colour, Predominant Bulb Shape and % Uniformity in Bulb Shape

S. No.	Genotypes	TSS (%)	Predominant Bulb Colour	Predominant Bulb Shape	% Uniformity in Bulb Shape
1	OC 18-59	12.81	Dark Red	Round-Oval	81.04
2	OC 18-61	11.4	Light Red	R	90.41
3	OC 18-63	12.97	Light Red	R	90.6
4	OC 18-65	12.06	Light Red	R	93.05
5	OC 18-68	12.22	White	Round-Oval	87.83
6	OC 18-71	12.75	Light Red	R	91.44
7	OC 18-73	11.75	Light Red	R	92.6
8	OC 18-75	11.48	Light Red	R	90.75
9	OC 18-77	12.91	White	R	83.86
10	OC 18-79	11.37	Light Red	Round-Oval	90.44

11	OC 18-81	12.1	Dark Red	R	82.21
12	OC 18-83	12.06	Red	Round-Oval	79.37
13	OC 18-85	12.46	Light Red	Round-Oval	86.79
14	OC 18-87	11.75	Light Red	R	93.72
15	OC 18-89	13.06	Light Red	Round-Oval	84.98
16	OC 18-91	12.35	White	Round-Oval	88.61
17	OC 18-92	12.92	White	Round-Oval	81.3
18	OC 18-94	12.7	White	R	90.34
19	OC 18-96	11.91	White	Round-Oval	84.15
20	OC 18-97	12.07	White	Round-Oval	89.16
21	OC 18-99	11.84	White	R	92.87
SE(m)		0.2317	-	-	1.0841
CD at 5%		0.6625	-	-	3.0992

Conclusion

The present investigation, we concluded that Among genotypes evaluated OC 18-75 performed better for most of the characters viz., plant height (56.8 cm), polar bulb diameter (6.4 cm), total yield (279.75 q/ha), marketable yield (270.75 q/ha) and C-grade bulb (38.8%). Genotype OC 18-91 recorded maximum number of leaves (9.2 cm), these genotypes are most suitable and considerable genotypes of onion under regional climatic condition of Central Uttar Pradesh.

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