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Evaluation of Different Varieties of Onion (*Allium cepa* L.) under North Gujarat Condition

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A B S T R A C T

A field experiment was conducted at Department of Horticulture, C.P. College of Agriculture, S. D. Agricultural University Dantiwada (Gujarat) during *rabi* season of 2014-15 to investigate the evaluation of different varieties of onion (*Allium cepa* L.) under North Gujarat condition. It was conducted in three replications with fourteen varieties. The results revealed highest plant height at 45 days treatment V_{12} (NHRDF Red) and 90 DAT V_1 (Agrifound Light Red), number of leaves per plant at 45 and 90 DAT treatment V_{14} (NHRDF Red-3), neck thickness at 45 and 90 DAT, maximum weight of bulb, marketable yield per plot, yield per hectare, total yield of bulb per hectare and minimum days taken maturity with treatment V_9 (Bhima Shakti). Minimum per cent incidence of purple blotch is with treatment V_1 (Agrifound Light Red).

Introduction

Onion (*Allium cepa* L.) is one of the most important bulbs as well as cash vegetable crop belongs to family Alliaceae. It is semi-perishable in nature. The onions are used for condiments, salad, chutneys, pickles, curries, soups, sauces and seasoning foods. The crushed bulb contains colourless, odourless volatile oil knows as allyl propyl disulphide. The outer skin colour is due to the presence of quercetin. Nandkarni (1954) reported many medicinal properties of onion *viz*., diuretic, applied on bruises, boils and wounds. It also relieves heat sensation. India is prominent in the production and export of onion in the world. Onion is being grown in an area of 12.03 lakh hectare (Anonymous, 2014) which gives total production of 197.01 lakh MT after China. (Anonymous, 2014) Globally, India ranks second in area and fifth in production. In Gujarat, onion occupied an area of about 72.79 thousand hectare with total production of 18.51 lakh MT (Anonymous, 2014).

Materials and Methods

The investigation was carried out by Horticulture Instructional Farm, Department of Horticulture, C.P. College of Agriculture, S. D. Agricultural University SDAU, *Rabi* season during 2014-15. The soil type was drained and loamy sand. Fourteen onion varieties *Viz*. (V_1) Agrifound Light Red, (V_2)

Arka Kirthiman, (V_3) Arka Niketan, (V_4) Arka Kalyan, (V_5) Arka Lalima, (V_6) Pusa Red, (V_7) Pusa Ridhi, (V_8) Bhima Kiran, (V_9) Bhima Shakti, (V_{10}) Brown Spanish, (V_{11}) Puna Phursungi, (V_{12}) NHRDF Red, (V_{13}) NHRDF Red-2, (V_{14}) NHRDF Red-3 were evaluated in randomize block design with three replications. The seed are sown in nursery during the 18th October, 2014. Fifty eight days after healthy seedlings of each variety transplanting in main field.The plot size was 3.0 m x 1.5 m with 15 cm x 10 cm spacing. The seed are sown in nursery during the 18th October, 2014. Fifty eight days after healthy seedlings of each variety transplanting in main field. The crop received uniform dose of vermicompost 10 t/ha and fertilizer 100 Kg N, 50 Kg P_2O_5 and 50 Kg K_2O per hectare. Fertilizer was applied in the form of urea (46% N), single super phosphate (16% P) and muriate of potash (60% K). Vermicompost applied during land preparation and the dose phosphorus and potash and half of total nitrogen were applied at the time of planting. Remaining nitrogen was top dressed in equal two splits dose. The observations were recorded on ten randomly selected plant from each plot on different growth and yield characters (Table 1 and 2).

Results and Discussion

The results obtain from the present investigation on the Evaluation of different varieties of onion (*Allium cepa* L.) under North Gujarat condition during *Rabi* 2014-15 are discussed given below.

Growth attributes

The results revealed that significantly maximum plant height at 45 DAT (days after transplanting) were observed with treatment V_{12} (NHRDF Red) (30.00 cm) which was at par with treatment V_7 (Pusa Ridhi) (27.52 cm), treatment V_1 (Agrifound Light Red) (27.22 cm), treatment V_{11} (Pune Phursungi) (27.20 cm) and treatment V_6 (Pusa Red) (26.73 cm) and at 90 DAT were recorded with treatment V_1 (Agrifound Light Red) (60.97 cm) with which was statistically at par with treatments V_9 (Bhima Shakti) (59.72 cm), treatment V_3 (Arka Niketan) (59.70cm), treatment V_7 (Pusa Ridhi) (59.28 cm), treatment V_{14} (NHRDF Red-3) (57.67 cm), treatment V_6 (Pusa Red) (57.51 cm), treatment V_{10} (Brown Spanish) (54.94 cm), treatment V_{12} (NHRDF Red) (54.82 cm) and treatment V_3 (Arka Lalima) (54.57 cm), whereas the minimum plant height at 45 DAT was recorded with treatment V_{10} (Brown Spanish) (21.02 cm) and 90 DAT was noted under treatment V_4 (Arka Kalyan) (48.12 cm). This type of differences in plant height at different stages of plant growth might be due to their genetical behaviour and also suitability of climate and soil for specific variety. These findings are in accordance with the findings of Mohanty and Prusti (2001), Dwivedi *et al.*, (2012), Kushal *et al.*, (2015) and Hirave *et al.*, (2015) in onion.

Maximum number of leaves per plant at 45 and 90 DAT was observed with treatment V_{14} (NHRDF Red-3) (5.93) (10.73), at pat with 45 DAT treatment V_{12} (NHRDF Red) (5.86), treatment V_8 (Bhima Kiran) (5.46 cm) treatment V_6 (Pusa Red) (5.40), treatment V_2 (Arka Kirthiman) (5.33), and treatment V_4 (Arka Kalyan) (5.26) and 90 DAT treatment V_{11} (Puna Phursungi) (10.53), treatment V_{12} (NHRDF Red) (10.40), treatment V_1 (Agrifound Light Red) (10.10), treatment V_3 (Arka Niketan) (10.06), treatment V_7 (Pusa Ridhi) (10.03 cm), treatment V_4 (Arka Kalyan) (9.93), treatment V_8 (Bhima Kiran) (9.86), treatment V_5 (Arka Lalima) (9.66) and treatment V_{13} (NHRDF Red-2) (9.60). Minimum number of leaves per plant at 45 days (4.66) and 90 DAT (8.70) were found with treatment V_{11} (Puna Phursungi) treatment V_2 (Arka Kirthiman).

Table.1 Response of different onion varieties on growth parameters as influenced by the North Gujarat conditions

Treatments (varieties)	Plant height at 45 and 90 days (cm)		Number of leaves/ plant at 45 and 90 days		Neck thickness at 45 and 90 days (cm)		Days taken for maturity	Bolting Percent (%)	Incidence of Purple Blotch (%)
V_1	27.22	60.97	5.06	10.10	1.19	1.94	127.33	2.70	13.21
V_2	22.70	54.22	5.33	8.70	1.12	1.70	126.67	4.89	19.07
V_3	25.45	59.70	4.93	10.06	0.98	1.55	135.66	5.01	16.45
V_4	25.72	48.12	5.26	9.93	0.98	1.54	127.33	6.33	16.26
V_5	25.01	54.57	5.20	9.66	1.09	1.59	127.0	4.79	15.85
V_6	26.73	57.51	5.40	9.33	0.96	1.50	135.66	3.02	16.26
V_7	27.52	59.28	5.06	10.03	1.03	1.57	133.33	3.67	15.88
V_8	24.56	53.57	5.46	9.86	1.25	1.99	129.0	2.24	18.11
V_9	24.79	59.72	5.20	9.13	1.40	2.09	126.33	2.79	17.02
V_{10}	21.02	54.94	5.00	8.86	1.04	1.58	162.0	0.00	18.05
V_{11}	27.20	52.06	4.66	10.53	1.07	1.60	127.67	2.19	16.77
V_{12}	30.00	54.82	5.86	10.40	0.98	1.55	127.33	2.86	17.79
V_{13}	24.62	53.85	5.13	9.60	0.98	1.55	131.0	3.72	18.68
V_{14}	24.27	57.67	5.93	10.73	1.01	1.63	129.33	2.23	17.84
S. Em±	1.31	2.29	0.23	0.41	0.05	0.07	0.97	0.21	1.00
C.D. at 5 %	3.82	6.67	0.67	1.18	0.14	0.19	2.83	0.62	2.90
CV %	8.93	7.12	7.55	7.17	7.92	6.87	1.28	11.12	10.18

Table.2 Response of different onion varieties on yield parameters as influenced by the North Gujarat conditions

Treatments (varieties)	Weight of bulb (g)	Marketable yield of bulb per plot (kg)	Unmarketable yield of bulb per plot (kg)	Marketable yield of bulb per hectare(q)	Unmarketable yield of bulb per hectare(q)	Total yield of bulb per hectare (q)
V_1	76.83	17.97	1.27	512.15	36.27	548.42
V_2	74.34	17.05	1.42	485.75	40.45	526.20
V_3	74.22	17.36	1.45	494.67	41.49	536.16
V_4	70.58	16.51	1.85	470.36	52.89	523.25
V_5	68.66	16.06	1.82	457.54	51.84	509.38
V_6	73.13	17.15	1.29	488.69	36.74	525.43
V_7	71.91	16.82	1.20	479.29	34.37	513.66
V_8	77.38	18.10	1.43	515.76	40.83	556.59
V_9	82.99	19.41	1.28	553.17	36.65	589.82
V_{10}	52.48	12.27	4.74	349.75	135.2	484.95
V_{11}	71.57	16.74	1.27	477.10	36.37	513.47
V_{12}	69.29	16.21	1.29	461.82	36.74	498.56
V_{13}	69.40	16.25	1.43	462.96	40.83	503.79
V_{14}	73.08	17.09	1.56	487.26	44.63	531.89
S. Em±	2.21	0.53	0.06	15.10	2.40	15.47
C.D. at 5 %	6.41	1.53	0.24	43.90	6.97	44.98
CV %	5.32	5.47	8.71	5.47	8.74	5.10

The differences in number of leaves may be due to genetic makeup of variety and suitability under different climatic and soil condition. The present results are in accordance with the findings of Mohanty (2001), Tripathy *et al.,* (2013), Kushal *et al.,* (2015) and Sarkar *et al.,* (2015) in onion.

Treatment V_9 (Bhima Shakti) was observed to have maximum neck thickness at 45 and 90 DAT (1.40 cm) (2.09 cm),which was statistically at par with treatment V_8 (Bhima Kiran) and treatment V_1 (Agrifound Light Red) (1.94 cm) at 90 DAT, minimum neck thickness at 45 (0.96 cm) and 90 (1.50 cm) DAT was observed in V_6 (Pusa Red). The variation in neck thickness may be due to genetical makeup of plant and climate and soil of the region. The present finding are in accordance with the findings of Sharma (2009), Dwivedi *et al.,* (2012), Tripathy *et al.,* (2013), and Sarkar *et al.,* (2015) in onion.

The treatment V_9 (Bhima Shakti) (126.33) required minimum days taken for maturity which was statistically at par with treatment V_2 (Arka Kirthiman) (126.67), treatment V_5 (Arka Lalima) (127.0), treatment V_1 (Agrifound Light Red), treatment V_4 (Arka Kalyan), treatment V_{12} (NHRDF Red) (127.33), treatment V_{11} (Pune Phursungi) (127.67) and treatment V_8 (Bhima Kiran) (129.00), While treatment V_{10} (Brown Spanish) (162.0) was recorded maximum days taken maturity. These type of differences among different varieties may be due to genetic makeup of different varieties and adoptability under different climatic conditions also reported by Sharma (2009), Singh and Bhonde (2011), Tripathy *et al.,* (2014), Hirave *et al.,* (2015), Kushal *et al.,* (2015) and Tarai *et al.,* (2015) in onion.

Significantly none of bolting was noticed in treatment V_{10} (Brown Spanish) (0.00%) and maximum bolting per cent (6.33) was observed in treatment V_4 (Arka Kalyan). The differences in bolting percentage among different varieties of onion may be due to genetic makeup of plant and weather conditions during the crop transplanting. These results are in accordance with the findings of Supe *et al.,* (2008), Sharma (2009), Tripathy *et al.,* (2013) and Hirave *et al.,* (2015) in onion.

Minimum incidence of purple blotch disease (13.21 %) was observed under treatment V_1 (Agrifound Light Red) which was statistically at par with treatment V_5 (Arka Lalima) (15.85 %) and treatment V_7 (Pusa Ridhi) (15.88 %). Maximum incidence of purple blotch (19.07 %) was observed with treatment V_2 (Arka Kirthiman) (19.07%). This type of differences in incidence of purple blotch disease in different varieties of onion may be due to genetic makeup and immunity for certain climatic conditions. These findings are in accordance with the findings of Singh and Bhonde (2011) and Sarkar *et al.,* (2015) in onion.

Yield attributes

The maximum weight of bulb (82.99 g), marketable yield of bulb per plot (19.41 kg), marketable yield of bulb per hectare (553.17 q/ha) and total yield of bulb per hectare (589.82 q/ha) were obtained with treatment V_9 (Bhima Shakti). The treatment V_9 (Bhima Shakti) was found statistically at par with treatment V_8 (Bhima Kiran) (77.38 g) (18.10 kg) (515.76 q/ha) and (556.59 q/ha) and V_1 (Agrifound Light Red) (76.83 g) (17.97 kg) (512.15 q/ha) (548.42 q/ha) and minimum unmarketable yield of bulb per plot (1.20 kg) and yield per hectare (34.37q) were found under treatment V_7 (Pusa Ridhi). The treatment V_7 (Pusa Ridhi) was found statistically at par with treatment V_1 (Agrifound Light Red) and treatment V_{11} (Puna Phursungi) (1.27 kg) (36.37 q/ha),

treatment V_9 (Bhima Shakti) (1.28 kg) (36.65 q/ha), treatment V_6 (Pusa Red), treatment V_{12} (NHRDF Red) (1.29 kg) (36.74 q/ha), treatment V_2 (Arka Kirthiman) (1.42 kg) (40.45 q/ha), treatment V_8 (Bhima Kiran) and V_{13} (NHRDF Red-2) (1.43 kg) (40.83 q/ha).Minimum weight of bulb (52.48 g), marketable yield of bulb per plot (12.27 kg), marketable yield of bulb per hectare (349.75 q/ha), total yield of bulb per hectare (484.95 q). Maximum unmarketable yield of bulb per plot (4.74 kg) and maximum unmarketable yield of bulb per hectare (135.2 q/ha) were observed with treatment V_{10} (Brown Spanish). This type of varietal differences in onion was also reported by Mohanty (2001), Sharma (2009), Singh and Bhonde (2011), Tripathy *et al.*, (2013), Kumar and Prasad (2015) and Sarkar *et al.*, (2015) in onion.

The experimental evidences warrant the following specific conclusion which may be adopted for profitable cultivation of onion. On the basis of results of the present investigation, it may be concluded that Bhima Shakti, Bhima Kiran and Agrifound Light Red varieties of onion are high yielding and most remunerative for cultivation under North Gujarat condition during *Rabi* season.

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