The Pharma Innovation Journal 2022; 11(3): 386-388

www.ThePharmaJournal.com

The Pharma Innovation

ISSN (E): 2277- 7695
ISSN (P): 2349-8242
NAAS Rating: 5.23
TPI 2022; 11(3): 386-388
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www.thepharmajournal.com
Received: 07-01-2022
Accepted: 10-02-2022

Surbhi Prithiani
Research Scholar, Department of Horticulture, Rajasthan College of Agriculture, MPUAT, Udaipur, Rajasthan, India

Dr. SS Dighe
Assistant Professor, Department of Horticulture, PGI Mahatma Phule Krishi Vidyapeeth, Rahuri, Maharashtra, India

Raj Kumar Jakhar
Research Scholar, Department of Horticulture, Institute of Agricultural Sciences, Banaras Hindu University, Varanasi, Uttar Pradesh, India

Kumari Pushpa
Research Scholar, Department of Horticulture, Agriculture University, Jodhpur, Rajasthan, India

Deeksha Gautam
Horticulture Development Officer, Department of Horticulture, Panchkula, Haryana, India

Corresponding Author:
Raj Kumar Jakhar
Research Scholar, Department of Horticulture, Institute of Agricultural Sciences, Banaras Hindu University, Varanasi, Uttar Pradesh, India

Evaluation of different varieties on growth characteristics of onion (*Allium cepa* L.)

Surbhi Prithiani, Dr. SS Dighe, Raj Kumar Jakhar, Kumari Pushpa and Deeksha Gautam

Abstract
A field experiment was conducted to study the evaluation different varieties on growth characteristics of onion during *rabi* seasons of 2017-18 at Department of Horticulture, Mahatma Phule Krishi Vidyapeeth, Rahuri, Dist. Ahmednagar. The experiment was laid out in randomized block design eighteen genotypes *viz*, Phule Samarth, Phule Suvarna, Baswant-780, Phule Safed, Bhima Raj, Bhima Super, Bhima Shubra, Bhima Shakti, Bhima Kiran, Bhima Shweta, Bhima Dark Red, Bhima Safed, Bhima Red, RO-1, RO-2, RO-59, RO-252 and N-2-4-1. The results of onion genotypes revealed significantly higher leaf length and chlorophyll content was exerted under Baswant-780 genotype. While, significantly higher neck thickness was obtained under Bhima Shweta genotype. Whereas, number of leaves plant-1 could not reach the level of significance due to different genotypes.

Keywords: Genotypes, onion, chlorophyll content, neck thickness

Introduction
Onion (*Allium cepa* L.) is one of the most important bulbous vegetable crops belongs to family *Amaryllidaceae* (Alliaceae), chromosome number 2n=16 and locally known as *Pyaj* and in Maharashtra locally it is known as *Kanda*. It was domesticated in Iran and Pakistan i.e. Central Asia. It is very valuable crop for earning foreign exchange, exporting to abroad. It accounts for 70 per cent of India's total foreign exchange earnings from the export of fresh vegetables. India is the second largest producer of onion next to China in the world and Maharashtra is leading onion producing state in India and share 32%. In India, total production of onion is 22071.24 metric tonnes, obtained in an area of 1315.24 million hectare. While, Maharashtra state stands first with production of 6522.84 metric tonnes and Sikkim recorded highest productivity of 56.45 tonnes per hectare (Anonymous, 2018) [1]. Moreover, onion cultivars reveal wide variation in their yielding ability and potential when grown under varied agro-climatic zones of the country (Suhas *et al*., 2018) [8].
Successful onion production depends on the selection of varieties that are adapted to different conditions imposed by specific environment. *Kharif* onion is an off-season cultivation of the crop for which standardization of variety is of immense importance. Looking to its importance for domestic consumption as well as export greater attention is needed for its improvement.
A number of onion hybrids/varieties are being grown by the farmers are the best performing hybrids/varieties of onion having desirable quantitative and qualitative characters such as adoptability to adverse environment conditions resistance to biotic and abiotic stresses resulting into better monetary return to the vegetable growers. This is common fact that the varieties showing better performance under agro climatic zone may not be suitable for another agro climatic zone. The current study, therefore, was undertaken to investigate the evaluation of different varieties on growth characteristics of onion in Ahmednagar conditions.

Material and Methods
A field experiment was conducted during *rabi* season of 2017-18 at Scheme for Research on Onion Storage, Department of Horticulture, Mahatma Phule Krishi Vidyapeeth, Rahuri, Dist. Ahmednagar (MH) situated at $19^0$47' N to $19^0$57' N latitude and $74^0$19' to $74^0$42' E longitudes with elevation of 525 m above mean sea level. Soil of the experiment field was medium black having good water holding capacity. The soil of experimental plot is grouped under the order vertisol and texture of soil was medium deep black.
The experiment was laid out in randomized block Design with eighteen genotypes *viz*, Phule Samarth, Phule Suvarna, Baswant-780, Phule Safed, Bhima Raj, Bhima Super, Bhima Shubra,

Bhima Shakti, Bhima Kiran, Bhima Shweta, Bhima Dark Red, Bhima Safed, Bhima Red, RO-1, RO-2, RO-59, RO-252 and N-2-4-1. The treatments were replicated three times. Main field was prepared to fine tilth through tillage operation and flat beds of size 3 x 2 m were made. Before transplanting on experimental site fertilizers were applied as FYM 20 t/ha and chemical fertilizer 50 kg N, 50 kg P_2O_5, 50 kg K_2O per hectare at the time of transplanting. Transplanting was done on 19th January 2018 and 15 x 10 cm spacing was kept. Immediately after transplanting, irrigation was given. Timely intercultural operations were followed as recommended for the crop like weeding and irrigation schedule. Leaf length of ten randomly selected plants from each plot were measured from the plots of each treatment using a ruler. The number of leaves plant^{-1} of ten randomly selected plants from each plot was counted. Total chlorophyll content in leaves was estimated with the method as recommended by Arnon (1949) [2]. Neck thickness of tagged plants was measured with the help of vernier calipers and average was calculated in cm. The data relating to each character were analysed as per the procedure of analysis of variance and significance was tested by "F" test (Gomez and Gomez 1984) [4].

Results and Discussions

Different varieties failed to show any significant effect on number of leaves plant^{-1} (Table 1). At 30 DAT, maximum number of leaves plant^{-1} (6.00) was noted under Bhima Shweta genotype and least (4.93) under RO-59. However at 45 DAT, maximum value (7.27) was recorded with RO-1. In case of 60 DAT, maximum number of leaves (9.00) was registered under Baswant-780 genotype over rest of the treatments but the difference was found to be non-significant.

Leaf length of onion was significantly influenced with different genotypes at 30 DAT (Table 2). At 30 DAT, significantly higher leaf length (38.01 cm) was exerted with Baswant-780 genotype which was statistically at par with N-2-4-1, Bhima Kiran, Bhima Super, Bhima Shweta, Bhima Dark Red, Bhima Shubra and Bhima Safed over rest of the varieties. Similar, results were recorded in onion by Hosamani *et al.* (2010) [5], Trivedi and Dhumal (2010) [11], Das *et al.* (2017) [33], Shrivastav *et al.* (2017) [7] and Suhas *et al.* (2018) [8]. However, least leaf length (24.25 cm) was recorded under Phule Suvarna genotype. Whereas, leaf length at 45 and 60 DAT did not reach the level of significance due to varieties.

The maturity of onion is somewhat depends upon the neck thickness of the bulb. Minimum neck thickness leads the early maturity of the genotype. The data presented in Table 3 revealed the significant differences among the different treatments for neck thickness at various intervals. At 30 DAT, significantly higher neck thickness (0.89 cm) was noted under Bhima Shweta genotype which was statistically at par with Bhima Super, Bhima Red, Bhima Shubra, Bhima Safed, RO-1, Bhima Kiran, Bhima Dark Red, Bhima Shakti, Bhima Raj and RO-252 over rest of the varieties. However, least neck thickness (0.61 cm) was noted under N-2-4-1 genotype. Almost a similar trend was noted at 45 and 60 DAT. Neck thickness of bulb depends on genotype and sometimes it is influenced by temperature and rainfall received during cropping period. Patil (1984) [6] reported that thin bulb neck is responsible for natural top fall and good storage quality and thick bulb neck correlates with poor keeping quality. In the present investigation N-2-4-1 showed the minimum neck thickness followed by other varieties. Such variations in the growth among the cultivars were reported by Trivedi and Dhumal (2010) [11], Tripathy *et al.* (2013) [9], Utagi *et al.* (2015) [12], Tripathy *et al.* (2016) [10] and Suhas *et al.* (2018) [8].

It is evident from the data in Table 4 that significant differences in chlorophyll content in fresh leaves was exerted at 30 and 60 DAT. At 30 DAT, significantly higher chlorophyll content in onion fresh leaves (61.48 mg/100 g) was noted under Baswant-780 genotype which was statistically at par with N-2-4-1, Bhima Super, Bhima Dark Red, Bhima Safed, Bhima Shubra, RO-59, Phule Safed, Bhima Shweta, RO-252 and Bhima Raj. However, least chlorophyll content was noted under RO-2 genotype. Almost a similar trend was noted at 60 DAT. Whereas at 45 DAT, varieties showed non-significant variation in chlorophyll content in fresh leaves of onion. This is due to genetic makeup of varieties. Similar results were also reported by Tripathy *et al.* (2013) [9], Tripathy *et al.* (2016) [10] and Suhas *et al.* (2018) [8].

Table 1: Assessment of different onion genotypes for number of leaves per plant

Treatment	Genotypes	30 DAT	45 DAT	60 DAT
T_1	Phule Samarth	5.33	6.33	8.20
T_2	Phule Suvarna	5.73	6.07	7.87
T_3	Baswant-780	5.87	6.87	9.00
T_4	Phule Safed	5.60	6.87	8.33
T_5	Bhima Raj	5.60	7.00	7.60
T_6	Bhima Super	5.67	6.73	7.73
T_7	Bhima Shubra	5.80	6.73	7.67
T_8	Bhima Shakti	5.20	6.67	8.60
T_9	Bhima Kiran	5.53	6.53	8.20
T_{10}	Bhima Shweta	6.00	7.00	7.33
T_{11}	Bhima Dark Red	5.87	6.67	8.07
T_{12}	Bhima Safed	5.87	6.40	8.27
T_{13}	Bhima Red	5.80	6.53	7.93
T_{14}	RO-1	5.60	7.27	8.00
T_{15}	RO-2	5.33	6.67	8.33
T_{16}	RO-59	4.93	6.20	8.53
T_{17}	RO-252	5.00	6.87	7.47
T_{18}	N-2-4-1	5.13	7.13	7.60
S.E.±		0.31	0.34	0.59
CD @ 5%		NS	NS	NS
CV %		9.70	8.85	12.67

Table 2: Assessment of different onion genotypes for average length of leaf (cm)

Treatment	Genotype	30 DAT	45 DAT	60 DAT
T_1	Phule Samarth	24.26	33.95	38.75
T_2	Phule Suvarna	24.25	31.48	36.47
T_3	Baswant-780	38.01	40.70	42.71
T_4	Phule Safed	26.71	34.89	41.29
T_5	Bhima Raj	26.23	37.91	39.32
T_6	Bhima Super	36.30	37.44	39.10
T_7	Bhima Shubra	35.43	36.88	37.20
T_8	Bhima Shakti	24.75	39.23	40.10
T_9	Bhima Kiran	37.09	37.45	39.50
T_{10}	Bhima Shweta	36.19	36.48	38.01
T_{11}	Bhima Dark Red	35.63	35.76	38.54
T_{12}	Bhima Safed	34.63	37.96	40.69
T_{13}	Bhima Red	33.84	35.09	36.37
T_{14}	RO-1	25.22	36.89	36.21
T_{15}	RO-2	28.19	38.60	40.39
T_{16}	RO-59	29.36	35.72	40.04
T_{17}	RO-252	25.07	39.50	40.38
T_{18}	N-2-4-1	37.39	39.97	42.33
S.E.±		1.65	1.89	2.80
CD @ 5%		4.7	NS	NS
CV %		9.22	8.84	12.68

Table 3: Assessment of different onion genotypes for neck thickness (cm)

Treatment	Genotypes	30 DAT	45 DAT	60 DAT
T_1	Phule Samarth	0.68	1.04	1.13
T_2	Phule Suvarna	0.63	0.87	1.15
T_3	Baswant-780	0.63	0.98	1.11
T_4	Phule Safed	0.69	0.95	1.41
T_5	Bhima Raj	0.76	1.24	1.33
T_6	Bhima Super	0.83	1.06	1.16
T_7	Bhima Shubra	0.81	1.11	1.29
T_8	Bhima Shakti	0.76	1.10	1.22
T_9	Bhima Kiran	0.77	1.13	1.20
T_{10}	Bhima Shweta	0.89	1.25	1.31
T_{11}	Bhima Dark Red	0.76	1.16	1.42
T_{12}	Bhima Safed	0.78	1.11	1.28
T_{13}	Bhima Red	0.82	1.17	1.26
T_{14}	RO-1	0.77	1.11	1.27
T_{15}	RO-2	0.75	1.04	1.29
T_{16}	RO-59	0.69	1.04	1.30
T_{17}	RO-252	0.74	1.13	1.29
T_{18}	N-2-4-1	0.61	0.81	1.04
S.E.±		0.05	0.08	0.07
CD @ 5%		0.15	0.22	0.199
CV %		11.92	12.23	9.60

Table 4: Assessment of different onion genotypes for chlorophyll content (mg/100 g)

Treatment	Genotypes	30 DAT	45 DAT	60 DAT
T_1	Phule Samarth	44.36	62.77	52.36
T_2	Phule Suvarna	45.35	47.43	42.22
T_3	Baswant-780	61.48	67.88	59.86
T_4	Phule Safed	54.01	52.61	51.23
T_5	Bhima Raj	51.46	61.90	41.26
T_6	Bhima Super	57.52	65.00	43.82
T_7	Bhima Shubra	55.25	64.79	50.36
T_8	Bhima Shakti	48.03	62.71	45.72
T_9	Bhima Kiran	45.99	60.76	51.46
T_{10}	Bhima Shweta	52.54	59.13	42.36
T_{11}	Bhima Dark Red	57.08	60.92	43.61
T_{12}	Bhima Safed	57.03	59.02	55.65
T_{13}	Bhima Red	48.20	57.08	53.97
T_{14}	RO-1	43.76	56.31	53.68
T_{15}	RO-2	40.87	51.19	40.13
T_{16}	RO-59	54.51	51.87	50.38
T_{17}	RO-252	51.63	53.20	40.66
T_{18}	N-2-4-1	58.49	65.36	56.21
S.E.±		4.19	6.72	6.48
CD @ 5%		12.04	NS	7.40
CV %		14.08	19.76	9.17

Conclusion

From the above overall study, it is recommended that to obtain higher leaf length and chlorophyll content, genotype Baswant-780 and for neck thickness Bhima Shweta is the best genotype under ago-climatic conditions of Ahmednagar region of Maharashtra.

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