Advances in Bioresearch
Adv. Biores., Vol 9 (3) May 2018: 163-167

Print ISSN 0976-4585; Online ISSN 2277-1573
Journal's URL:http://www.soeagra.com/abr.html
CODEN: ABRDC3
DOI: 10.15515/abr.0976-4585.9.3.163167

Advances in Bioresearch

ORIGINAL ARTICLE

Evaluation on the Performance of Different Multiplier Onion (*Allium cepa* var. *aggregatum*) Germplasm Under Sub Tropical Region of Uttar Pradesh

[1]Saurabh Dixit*, [1]A.K. Dubey, [1]H.V. Dube, [2]P.K. Dwivedi and [1]V.P. Singh
Department of Vegetable Science, Kalyanpur
[1]C.S. Azad University of Agriculture & Technology, Kanpur-208 024
[2]Krishi Vigyan Kendra, Raisen-466 551 (Madhya Pradesh)
*Corresponding address: Email- sdixit307@gmail.com

ABSTRACT
The objective of this research work was to evaluate for different quantitative and qualitative characters of multiplier onion germplasm under central U.P. condition. The germplasm which possess huge diversity for various quantitative characters it can be exploited for widening the genetic base and improving the yield of multiplier onion. Field experiment was conducted at Vegetable Research Farm of CSAUA&T, Kalyanpur, Kanpur. Twenty-seven along with three checks of multiplier onion germplasm sources from DOGR, Pune were characterized according to five qualitative characters viz. Foliage Colour, Foliage Attitude, Leaf Waxiness, Bulblet Colour and Bulblet Shape. There were great variations among the accession with regard to Foliage Colour, Bulblet Colour and Bulblet Shape. On the other hand, highly significant differences were observed among different accessions for all the quantitative characters. The results revealed that based on yield performance which showed that highest total yield was recorded in 1538 (Agg), 1526 (Agg) and DOGR-CO-4-1 with the value of (222.25, 199.50 and 197.35 q ha^{-1} respectively). Therefore, these accessions could be recommended as commercial cultivation under Central U.P. condition and also could be used in future breeding programme.
***Keywords**: Multiplier onion, Performance, Yield, Quality*

Received 22.12.2017 Revised 13.01.2018 Accepted 15.02.2018

How to cite this article:
Saurabh Dixit, A.K. Dubey, H.V. Dube, P.K. Dwivedi and V.P. Singh. Evaluation on the Performance of Different Multiplier Onion (*Allium cepa* var. *aggregatum*) Germplasm Under Sub Tropical Region of Uttar Pradesh. Adv. Biores. Adv. Biores. Vol 9 [3] May 2018: 163-167.

INTRODUCTION

The multiplier onion (*Allium cepa* var. *aggregatum* Don.) is one of the important species of Allium vegetables as it forms an indispensable part of many diets, both vegetarian and non-vegetarian. It is also known as small onion, potato onion, underground onion, shallots, nesting onions, ever-ready onion and Egyptian ground onion noted for its hardiness and early maturity than the common onion. It forms closely packed clusters of bulbs underground, rather than on the surface like the shallot. Potato onions are more commonly grown by replanting the bulbs than by seed. Nutritive value of onion varies from variety to variety; small multiplier onions are more nutritive and healthy with major value of flavour, flavonoids and other dietary values. It contributes significantly to nutritional value of the human diet and is primarily consumed for its unique flavor or for its ability to enhance the flavor of other foods because of the presence of volatile compound known as allyl-propyl disulphide Randle and Ketter [8]. Potato onions are mostly used fresh, but the bulblets can also be used as a pickle in vinegar and brine. Dehydrated products potato onions are not common Shinde and Sontakke [11]. It is a crop of tropical and subtropical region which are tolerant to hot and humid tropical climate, better tolerance to pest and diseases and have longer storage life than the common onion.

A cultivar crop performs differently under different agro-climatic conditions and various cultivars of the same species grown even in the same environment give different yields as the performance of a cultivar mainly depends on the interaction of genetic makeup and environment Boukary *et al.* [1]. Hence, the

present Investigation was undertaken with objective to examine the evaluation of different multiplier onion germplasm select the most suitable high yielding germplasm with better growth and other desirable traits.

MATERIAL AND METHODS

The investigation was carried out at the Vegetable Research Farm, C.S.A. University of Agriculture and Technology at Kalyanpur, Kanpur under the All India Network Research Project on Onion and Garlic (ICAR) for *Rabi* season during 2015- 2016. The experiment site is located at 26° 29 N latitude and 80° 18 E longitudes with an altitude of 125.9 m above from mean sea level. The soil of the experimental field was clay loam with pH value 7.65. The climate of this zone is subtropical with a short winter spell during December to February. The experimental material consisted of 27 accessions including three checks of multiplier onion germplasm sources from DOGR, Pune were tested in a randomized block design with two replications. The bulbs were sown manually in flat beds of 1x1 m size at a spacing of 15x10 cm. Well decomposed farm yard manure at the rate of 15 tons per hectare was applied at the time of land preparation. Inorganic fertilizers were applied at the recommended dose of 60:60:30 kg ha^{-1} of NPK. All phosphorus, potassium and half of the nitrogen was applied at the time of final land preparation; whereas, the other half nitrogen dose was applied at 30 days after planting of bulbs. All the recommended cultural practices were followed to raise the crop successfully. The observations were recorded from ten randomly selected plants from each accession in each replication for twelve quantitative characters viz, plant height, number of leaves per hills, polar diameter, equatorial diameter, number of bulblets per hills, weight of bulblets per hills, bolter (%), total yield, total soluble solids, stemphyllium incidence, purple blotch incidence, thrips incidence and five qualitative characters viz, foliage colour, foliage attitude, leaf waxiness, bulblet colour and bulblet shape. The mean data collected on various aspects were subjected to statistical analysis according to standard procedure.

RESULTS AND DISCUSSION

Qualitative characters

All investigated qualitative characters showed low differences between accessions, thus indicating the low diversity of germplasm investigated are presented in Table [1]. The result of the study indicated that the foliage colours of the different germplasm were light green, medium green and dark green. Foliage colour of seven germplasm was found light green while others were medium and dark green. All the germplasm were produced foliage attitude in erect nature and leaf waxiness are present. Variability was observed among the all germplasm in respect of bulblet colour as well as bulblet shape as indicated in Table [1]. Bulblet colour varied from light red, red and white. The germplasm WM-514 was found white colour bulb and remaining the germplasm registered light red and red colour bulbs under studied. All germplasm were produced globe shaped bulbs except 1523(Agg), 1532(Agg), 1543(Agg) and 1533(Agg), in which bulbs were oval shaped. There were differ variations were found amongst the germplasm with regard to foliage colour, bulblet colour and bulblet shape. The difference between studied genotypes might be related to genetic makeup by the used cultivars as per Kandil *et al*. [4] Similar results were obtained by Gemma *et al*. [3] and Soleymani *et al*. [12].

Quantitative characters

The investigation also revealed that all the germplasm differed significantly with respect to different quantitative characters are presented in Table [2]. Among the accession, significantly highest plant height was recorded in 1545 (Agg) with the value of 20.49 cm whereas the lowest value of 13.20 cm for the same trait was found in 1520 (Agg). The accession, 1538(Agg), had produced significantly highest number of leaves per hills with the value of 7.99 closely followed by 1519(Agg) and 1534(Agg) with the value of 7.41 and 7.37 respectively. The results on bulb parameters, i.e. polar diameter, equatorial diameter, number of bulblets per hills and weight of bulblets per hills showed significant variations among the tested germplasm. The polar diameter and equatorial diameter of the individual bulblet**s** which varied from 1.45 to 1.85 cm and 1.16- 1.75 cm, respectively. In both the cases the accession 1535 (Agg) performed better as compared to other accession. The bulb diameter with respect to polar side was lowest 1.45 cm in case of DOGR -CO-4-1and in case of equatorial was for 1549 (Agg) and WM-514 with the value of 1.16 cm. On the other hand, different germplasm evaluated under investigation produced bulbs in which the number of bulblets and weight of bulblets were observed to vary in a great extent from 6.56 to 10.27 and 35.38 to 88.57 respectively. The highest number of bulblets per hills with the value of 10.27 was counted for 1549 (Agg) followed by 1534 (Agg) with the value of 10.21 whereas lowest number of bulblets per hills was registered with the check accession CO- 5 with the value of 6.56. The importance weight of bulblet per plant as an important yield component has been reported by Padda *et al.* [6]. Weight of bulblet is the most

important component that contributes directly to the yield in aggregatum onion. Among the different accession, 1550 (Agg) recorded the highest weight of bulblet per hills 88.57 and lowest weight of bulblet per hills 35.38 was recorded in the check accession CO-5. The highest weight of bulblet in this accession may be due to its genetic character and adaptability to agro-climatic conditions by the place of the experiment. Results of this study are in accordance with the findings of Shimeles [10] and Thingalmaniyan *et al.* [14]. Bolting is a problem of physiological nature and is undesirable for better bulb production as it causes mobilization of reserves towards the developing inflorescence, at the expense of bulb development. Such bulbs cannot be marketed because of hard center of the bulb Rabinowitch [7]. The bolters percent were highly significant variation among the different accession. The highest bolters (93.18 %) were recorded in accession 1519 (Agg) and lowest bolters (17.16%) was recorded in accession 1546 (Agg). The variation in bolting percentage between different accessions influenced by the genetic makeup of variety and also affected by environmental factor. The findings were in conformity with those reported by Tabor *et.al.* [13] and Mushtaq *et.al.* [5]. Yield is a composite character and is dependent on many constituent traits. The production of total bulb yield under by different accession varies from 153.40 to 222.25 q ha^{-1}. The accession**,** 1534 (Agg) had produced significantly highest total bulb yield of 222.25 q ha^{-1} than the rest of the tested germplasm**.** These results are in accordance with the findings of Bharathi *et al*. [2] and Thingalmaniyan *et al.* [14] who reported significant differences for bulb yield in different multiplier onion germplasm. The total soluble solid of onion bulbs were estimated using hand refractometer and the Brix percent total soluble solid was recorded. The highest total soluble solid 13.34^0 Brix was recorded in the accession 1519 (Agg) and lowest value 10.27^0 Brix was recorded in the accession 1533 (Agg). Similar findings were also observed earlier report by Rohini *et.al.* [9]. Despite the attacked of both thrips and foliar diseases play the key role during different growth stages which causes considerable reducing the bulb yield and quality of produce in the crop. However, the research results indicated that lowest incidence of purple blotch (6.10 %) and stemphylium blight (7.65 %) was found in 1534 (Agg). **Similarly, the significantly lowest infestation of thrips (1.84 %) was recorded in** accession 1534 (Agg). The present study also indicated that accession like 1534 (Agg) showed tolerance to both purple blotch as well as thrips infestation under this region.

Table 1 Qualitative characters of different multiplier onion germplasm

Accession	FC	FA	L.Wax.	BC	BS
1513 (Agg)	Medium Green	Erect	Present	Light Red	Globe
1521(Agg)	Dark Green	Erect	Present	Light Red	Globe
1520 (Agg)	Dark Green	Erect	Present	Light Red	Globe
1542 (Agg)	Light Green	Erect	Present	Red	Globe
1526 (Agg)	Dark Green	Erect	Present	Red	Globe
1531 (Agg)	Dark Green	Erect	Present	Red	Globe
1523 (Agg)	Light Green	Erect	Present	Red	Oval
1545 (Agg)	Light Green	Erect	Present	Red	Globe
1544 (Agg)	Dark Green	Erect	Present	Red	Globe
1549 (Agg)	Dark Green	Erect	Present	Light Red	Globe
1550 (Agg)	Medium Green	Erect	Present	Red	Globe
1546 (Agg)	Medium Green	Erect	Present	Red	Globe
1532 (Agg)	Medium Green	Erect	Present	Red	Oval
1543 (Agg)	Medium Green	Erect	Present	Red	Oval
1533 (Agg)	Medium Green	Erect	Present	Red	Oval
1535 (Agg)	Medium Green	Erect	Present	Red	Globe
1515 (Agg)	Dark Green	Erect	Present	Red	Globe
1512 (Agg)	Dark Green	Erect	Present	Light Red	Globe
1519 (Agg)	Dark Green	Erect	Present	Red	Globe
1538 (Agg)	Light Green	Erect	Present	Red	Globe
1534 (Agg)	Light Green	Erect	Present	Light Red	Globe
DOGR -CO-4-1	Light Green	Erect	Present	Red	Globe
DOGR -CO-5-1	Light Green	Erect	Present	Red	Globe
WM-514	Dark Green	Erect	Present	White	Globe
AFR (C)	Dark Green	Erect	Present	Light Red	Globe
CO- 4 (C)	Medium Green	Erect	Present	Light Red	Globe
CO- 5(C)	Medium Green	Erect	Present	Light Red	Globe

FC= Foliage colour, **FA**=Foliage attitude, **LW**=Leaf waxiness, **BC**= Bulblet colour, **BS**= Bulblet shape.

Table 2 Mean performance of various quantitative characters on multiplier onion germplasm

Accession	PH	NOL	BP	BE	NOB	WOB	B	TY	TSS	PDI		TI
										SB	PB	
1513 (Agg)	19.22	6.16	1.85	1.30	9.17	61.27	50.44	186.90	12.67	12.51	8.43	3.35
1521(Agg)	18.53	6.36	1.55	1.20	8.25	61.13	58.79	156.90	12.30	13.79	6.79	5.02
1520 (Agg)	13.20	5.34	1.63	1.23	7.74	60.66	39.53	163.80	12.97	8.44	4.54	4.65
1542 (Agg)	19.82	5.04	1.72	1.25	9.86	75.99	85.81	185.10	13.28	6.13	4.93	3.34
1526 (Agg)	17.54	5.19	1.65	1.28	8.88	79.66	79.84	199.50	12.60	5.98	3.42	2.29
1531 (Agg)	17.50	5.81	1.54	1.33	7.13	70.01	69.39	181.20	12.03	7.06	3.85	3.58
1523 (Agg)	17.42	6.36	1.66	1.29	9.78	77.81	62.18	171.65	12.46	9.99	7.00	3.64
1545 (Agg)	20.49	7.16	1.58	1.20	7.92	46.62	73.87	166.60	10.71	11.46	9.88	4.05
1544 (Agg)	16.81	5.34	1.62	1.26	9.15	55.66	58.20	175.05	12.32	8.99	5.98	3.42
1549 (Agg)	14.59	5.64	1.66	1.16	10.27	62.33	33.57	182.35	13.00	6.46	3.58	2.76
1550 (Agg)	19.14	6.93	1.56	1.27	9.10	88.57	71.63	164.55	11.95	12.91	8.79	4.35
1546 (Agg)	19.34	6.85	1.51	1.19	9.76	87.18	17.16	158.45	13.06	15.80	6.82	4.57
1532 (Agg)	16.86	4.75	1.56	1.20	8.92	68.99	67.16	190.47	11.37	8.26	8.65	2.55
1543 (Agg)	17.62	5.51	1.56	1.25	9.55	70.50	73.12	153.40	12.56	12.21	8.00	4.47
1533 (Agg)	15.12	6.38	1.53	1.35	7.95	48.34	85.07	183.00	10.27	7.35	5.70	3.34
1535 (Agg)	17.10	7.02	1.60	1.75	8.13	71.61	42.53	163.90	12.36	10.33	3.98	4.28
1515 (Agg)	14.88	7.16	1.51	1.19	8.49	67.75	86.11	169.70	12.03	8.99	4.73	3.90
1512 (Agg)	18.95	6.42	1.49	1.17	8.09	49.34	71.38	161.25	12.80	11.65	6.13	4.28
1519 (Agg)	17.27	7.41	1.58	1.31	6.73	36.27	93.18	180.00	13.34	7.97	3.42	2.91
1538 (Agg)	17.25	7.99	1.57	1.30	9.29	65.21	71.39	181.15	12.12	8.86	4.44	2.80
1534 (Agg)	18.81	7.37	1.66	1.20	10.21	85.39	90.47	222.25	12.23	5.38	2.93	1.84
DOGR-CO-4-1	16.18	6.22	1.45	1.30	8.99	71.56	85.54	197.35	11.66	6.98	5.32	2.37
DOGR -CO-5-1	18.47	5.60	1.53	1.23	7.56	60.53	22.12	187.95	10.74	6.36	3.52	2.91
WM-514	19.40	6.35	1.63	1.16	9.08	58.02	60.04	168.55	12.82	9.84	4.72	3.70
AFR (C)	18.49	5.60	1.64	1.23	9.50	64.12	44.35	163.70	13.04	7.87	3.41	3.77
CO- 4 (C)	17.39	4.62	1.67	1.21	6.61	38.77	39.49	155.50	12.62	13.42	7.72	4.60
CO- 5(C)	19.66	5.22	1.60	1.25	6.56	35.38	31.68	161.70	12.08	11.98	5.00	4.07
CD @ 5 %	1.67	0.74	0.19	0.14	0.87	9.77	15.10	0.24	0.85	0.96	1.03	0.24
CV %	4.61	5.88	5.85	5.75	4.94	7.47	11.91	6.90	3.37	4.84	8.80	3.33

PH=Plant height (cm), **NOL=**Number of leaves /hills, **BP=**Bulblet-polar diameter (cm), **BE=**Bulblet-equatorial diameter (cm), **NOB=**Number of bulblets /hills, **WOB=**Weight of bulblets /hills, **%B**= % Bolter plants (on basis of number of bolted plants), **TY=**Total yield (q/ha), **TSS**=Total Soluble Solids (^{0}B), **SB**= Stemphyllium incidence (PDI), **PB**= Purple blotch incidence (PDI), **Thrips Inc.** =Thrips incidence.

CONCLUSION

Based on the qualitative and quantitative characters of different multiplier onion germplasm, it can be concluded that there was wide variations for different characters and accession 1538 (Agg) proved superior considering the yield as well as tolerance to diseases and insect-pest infestation has shown great promise for this region. Hence, there is a great possibility of improvement in attributes of this valuable *Alliums* crop.

ACKNOWLEDGEMENTS

We are highly thankful to the AINRP on Onion and Garlic from Directorate of Onion and Garlic Research, Rajgurunagar, Pune (M.S.) for supplying necessary seed material and funds for the concerned experiment and also to Department of Vegetable Science, C.S.A.U.A & T, Kalyanpur, Kanpur (U.P.) for providing every facilities experimentation.

REFERENCES

1. Boukary H, Haougui A, Barage M, Adam T, Roumba A and Saadou M. (2012). Evaluation agro-morphology of onion varieties under ecotypes of Nigeria. International Journal of Biological and Chemistry Science; 6(6): 3098-3106.
2. CB Sharmila, Mohan B, Sangeetha R, Gohila G and Paneerselvam K.(2015). Front line demonstration on multiplier onion (*Allium cepa* L. *var aggregatum* Don.) to reduce cost of production. Krishi Vigyan; 4(1): 30-36
3. Gemma AC, Terry LA and White PJ. (2007). Effect of controlled atmosphere storage on abscisic acid concentration and other biochemical attribute of onion bulbs. Post harvest Biol. Tec. 39:233-242
4. Kandil AA, Leilah AA, Mostafa AK and Fathalla FH (2010). Study on the internal bulb quality of some new Egyptian onion cultivars under different irrigation regimes. Int. J. Plant Prod. 1(2):205-212
5. Mushtaq S, Amazed M, Ziaf K, Cheema KL, Raza MA and Hafeez OA (2013). Productive and qualitative evaluation of onion cultivars under agro-climatic conditions of Faisalabad. Pak. J. Agri. Sci., 50(2): 199-2013.

6. Padda, DS, Singh G. and Saimbhi MS (1973) Genetic variability and correlation studies in onion. Indian Journal of Horticulture; 31: 391-393.
7. Rabinowitch, H.D. (1990). Physiology of flowering. pp. 113-134. In: H.D. Rabinowitch and J.L. Brewster (ed). Onions and Allied Crops. CRC press, Boca Raton, Florida, USA
8. Randle, W.M. and C.A. Ketter, 1998. Pungency assessment in onions. Proceedings of the 19 workshop conference of the Association for Biology Laboratory Education (ABLE). pp177- 196
9. Rohini, N and Paramaguru, P. 2016. Seasons' influence on bulb, seed yield and quality of aggregatum onion, *Allium cepa* L. var *aggregatum. Int. J. Farm Sci.,* 6(1):174-183
10. Shimeles A (2014). The performance of true seed shallot lines under different environments of Ethiopia. Journal of Agricultural Sciences; 59 (2): 129-139
11. Shinde NN and Sontakke M.B., (1986). 'Bulb Crops (Onion)'.In Bose, T.K. and Som, M.G. (eds.)
12. Soleymani A, Shahrajabian MH (2012). Effects of different levels of nitrogen on yield and nitrate content of four spring onion genotypes. Int J Agric Crop Sci. 4(4):179-182.
13. Tabor G, Stüetzel H and Zelleke A. (2006). Influence of planting material and duration of bulb vernalization on bolting of shallot (*Allium cepa* L. *var. ascalonicum Backer*). Journal of Horticultural Science and Biotechnology; 81(5):797-802.
14. Thingalmaniyan KS, Rohini N and Arumugam T. (2017). Performance evaluation of *Aggregatum* onion genotypes (*Allium cepa* var. aggregatum) for yield, quality and resistance characters. International Journal of Current Microbiology and Applied Sciences; 6 (6): 634-642