Available online at www.ijpab.com

DOI: http://dx.doi.org/10.18782/2320-7051.6778

ISSN: 2320 – 7051

Int. J. Pure App. Biosci. **6 (6):** 579-583 (2018)

Research Article

International Journal of Pure & Applied Bioscience

OPEN ACCESS

Evaluation of Different Garlic (*Allium sativum* L.) Genotypes for Storage Behavior

Asiya Kowser, R.[1], Amarananjundeswara, H.[2*], Aravinda Kumar, J. S.[3], B. Doddabasappa[4], Veere Gowda, R.[5], Soumya Shetty[2], Sandhya G. C.[2] and Prasad P. S.[2]

[1]Department of Vegetable Science, College of Horticulture, Kolar, Karnataka, India

[2]Horticulture Research and Extension Station, Hassan, Karnataka, India

[3]Department of Vegetable Science, College of Horticulture, Mysore, Karnataka, India

[4]Department of Entomology, College of Horticulture, Kolar, Karnataka, India

[5]ICAR- Division of Vegetable Science, IIHR, Bengaluru, Karnataka, India

*Corresponding Author E-mail: amar.horti@gmail.com

Received: 7.08.2018 | Revised: 22.09.2018 | Accepted: 3.10.2018

ABSTRACT

An experiment was carried out at Department of Vegetable Science, College of Horticulture, Kolar on evaluation of twenty six garlic genotypes for the yield attributes and storage behavior during Rabi season of 2016-17 by adopting RCBD with two replications. The sowing of garlic cloves was done in beds of 2.0 m x 1.5 m (3m^2 area) size at a spacing of 15 cm x 10 cm in last week of September, 2016. The maximum plant height was recorded in Yamuna Safed-9 (70.44 cm) and maximum number of leaves per plant was recorded in Yamuna Safed-3 (9.60). The bulb yield per hectare was highest in Yamuna Safed-3 (14.51 t/ha) and lowest in check DWG-1 (4.25 t/ha).The storage behavior of different genotypes revealed that three months after storage minimum PLW and total loss at yield were noticed in GRS-1328 (7.98 and 9.81%) followed by GRS-1345 (10.13 and 11.15 %) respectively.

Key words: *Yield, PLW, Total loss, Storage*

INTRODUCTION

Garlic (*Allium sativum* L.) belongs to the family Alliaceae having chromosome number of 2n (2X) = 16. It is believed to have originated from semi-arid areas of Central Asia and it is the second most widely cultivated vegetable crop after onion under the genus *Allium.* The wild species of *Allium longicuspis* Regel considered to be the closest relative and revealed as ancestor of the garlic[9]. India is the second largest garlic producing country with the production of 12.71 lakh tonnes from 2.74 lakh hectare area and having an average productivity of 5.44 tonnes per hectare. In India major garlic producing states are Madhya Pradesh, Gujarat, Uttar Pradesh, Rajasthan, Assam, Punjab and Maharashtra.

Cite this article: Kowser, A.R., Amarananjundeswara, H., Aravinda Kumar, J.S., Doddabasappa, B., Veere Gowda, R., Shetty, S., Sandhya G.C. and Prasad P.S., Evaluation of Different Garlic (*Allium sativum* L.) Genotypes for Storage Behavior, *Int. J. Pure App. Biosci.* **6(6):** 579-583 (2018). doi: http://dx.doi.org/10.18782/2320-7051.6778

In Karnataka, garlic is grown during *Rabi* season in an area of 4.70 thousand hectares with the production of 6.30 thousand tonnes and a productivity of 1.34 tonnes per hectare[1]. Garlic exhibits greater adoptibility to agro-techniques, environmental condition and possesses a wide range of variability on bulb traits and yield attributes as well as the storability. To meet out the domestic as well as export requirement, a selection of suitable genotypes for growing under different agro-climatic conditions and having better shelf-life for the bulbs. The sprouting, physiological loss in weight (PLW) and rotting are the main incites of loss during storage. These losses again depends on the genotype, type of storage and weather conditions. Therefore, it is essential to increase the shelf-life of garlic without deterioration of its quality.

MATERIAL AND METHODS

An experiment was conducted at the site of Department of Vegetable Science, College of Horticulture, Kolar, Karnataka (Eastern Dry Zone). The treatment consists of 26 garlic genotypes collected from different institutions and local cultivated areas across the country *viz*., Bhima Purple, Bhima Omkar, Yamuna Safed, Yamuna Safed-2, Yamuna Safed-3, Yamuna Safed-4, Yamuna Safed-5, Yamuna Safed-8, Yamuna Safed-9, Baram Local-06, HG-17, Jamnagar Local, Mandsaur Local, Ranebennur Local, Maharashtra Sangam, Ooty Local, GRS-1328, GRS-1345, GRS-1330, GN-14-27, GN-14-01, GN-14-25, GN-14-15, GN-14-05, DWG-2 and DWG-1 (Check). An experiment was laid out in Randomized Complete Block Design (RCBD) with two replications. The cloves were sown in beds of 2.0 m ×1.5 m area at a spacing of 15 cm ×10 cm in the last week of September 2016. An agronomic practices *Viz.*, application of recommended dose of fertilizers, irrigation and weeding etc., were carried out as per UHS, Bagalkot, Karnataka. Five plants from each treatments were tagged and observations were recorded on vegetative growth and yield characters such as plant height (cm), number of leaves per plant, maximum length of leaves (cm), equatorial cum polar diameter of bulb (cm), ten bulb weight, bulb yield per plot (g) and bulb yield per hectare (t). The genotypes were stored under ambient condition for three months and the data was recorded at 30 days interval on PLW, black mould, waxy break down and total loss. The recorded data were statistically analyzed at 5 per cent level of significance by following the standard process as stated by Panse and Sukhatme[7].

RESULTS AND DISCUSSION

Yield attributing traits

The data with respect to vegetative growth and yield parameters were presented in Table 1. The results revealed that Yamuna Safed-9 was tallest with a plant height of 70.44 cm and it was at par with Mandsaur Local (69.29 cm) and Yamuna Safed-2 (69.27 cm) and Yamuna Safed-3 (69.04 cm). Whereas, the genotype GN-14-05 (47.21 cm) was found shortest. The number of leaves was found maximum in Yamuna Safed-3 (9.60). Whereas, the least number of leaves was observed in GN-14-25 (7.00) and DWG-1 (7.00). The maximum leaf length was recorded in Yamuna Safed-5 (53.71 cm). While, the minimum leaf length was indicated in GRS-1328 (30.22 cm). The maximum leaf width was noticed in Yamuna Safed-9 (1.84 cm). The results were similar to the findings of Islam *et al.*[3], Moustafa *et al.*[6].

The data with respect to yield traits revealed that maximum polar diameter was recorded in Yamuna Safed-3 (3.30 cm). However, the minimum was indicated in Bhima Omkar (1.76 cm). While, the maximum equatorial diameter of the bulb was registered in genotype Yamuna Safed-3 (4.42 cm) which was on par with Yamuna Safed-2 (4.15 cm) and Yamuna Safed-4 (4.14 cm). However, the minimum equatorial bulb diameter was recorded in Ranebennur Local (2.14 cm). The ten bulb weight was found to be highest in Yamuna Safed-3 (284.10 g) followed by Yamuna Safed-5 (255.35 g), Yamuna Safed-4 (249.35 g) and Yamuna Safed-2 (238.05 g). However, the minimum ten bulb weight was recorded in DWG-2 (101.05 g).The results showed that the highest yield per hectare was recorded in genotype Yamuna Safed-3 (14.51 t/ha) which was on par with Yamuna Safed-2 (12.94 t/ha) and Yamuna Safed-9 (12.10 t/ha. While, the lowest yield was recorded in check

DWG-1 (4.25 t/ha). These results are in accordance with the findings of Khar *et al*.[4], Partha and Ranjit[8], Lawande *et al.*[5], and Yadav *et al.*[13].

Storage studies

The data pertaining to storage studies was presented in table 2. After one month of storage, the minimum physiological loss in weight was noticed in GN-14-01 (1.42 %) followed by Mandsaur Local (1.76 %). Whereas, the maximum was PLW recorded in HG-17 (39.43 %) followed by Check DWG-1 (26.48 %) and Yamuna Safed-8 (23.86 %). However, no black mould incidence was noticed in the genotypes Bhima Purple, BhimaOmkar, Yamuna Safed, Yamuna Safed-3, Yamuna Safed-9, Baram Local-06, Jamnagar Local, Mandsaur Local, Ranebennur Local, Ooty Local, GRS-1328 , GRS-1345, GRS-1330, GN14-01, GN14-25, GN14-15, DWG-2 and DWG-1. The physiological disorder, waxy break down per cent was varied from 0.00 to 3.70 in all genotypes, except Ranebennur Local (22.67 %) which recorded maximum waxy break down incidence.

After two months of storage, minimum PLW was noticed in Mandsaur Local (5.45 %) followed by GRS-1328 (7.32 %) and GRS-1345 (7.66 %). While, maximum was revealed in HG-17 (53.01 %) and check DWG-1 (41.84 %). Where as, black mould incidence was ranged from 0.00 to 27.74 per cent. However, waxy break down was revealed in Yamuna Safed-3, Yamuna Safed-8, Yamuna Safed-9, HG-17, GRS-1345 and GN-14-05.

At three months after storage, GRS-1328 recorded minimum PLW (7.98 %) followed by Mandsaur Local (9.08 %), GRS-1345 (10.13 %) and Yamuna Safed-3 (10.53 %). While the maximum PLW was registered in genotype HG-17 (54.99 %) followed by DWG-1 (44.82 %). However, black mould incidence was ranged from 0.00 % to 30.36 per cent. Whereas, Yamuna Safed-8 and HG-17 were free from waxy break down disorder. While, the maximum bulbs were affected in genotypes like DWG-1 (54.50 %) followed by Ranebennur Local (39.94 %). The minimum total loss was documented in GRS-1328 (9.81%) followed by GRS-1345 (11.15 %), GN-14-01 (11.85%), Yamuna Safed-3 and Mandsaur Local (13.72 % each). While maximum storage total loss was recorded in check DWG-1 (98.31 %). These results are in accordance with the findings of Dubey and Singh *et al.*[2], Singh *et al.*[11], Sharma *et al.*[10].

Table 1. Growth and yield characters of different genotypes of garlic

Sl. No.	Genotypes	Plant height (cm)	Number of leaves/ plant	Leaf length (cm)	Bulb diameter (cm)		Bulb weight (g)		Ten clove weight (g)	Cloves per bulb	Bulb yield	
					Polar	Equatorial	Single bulb	Ten bulb			kg/ plot	t/ha
1	**Bhima Purple**	54.13	8.50	37.54	2.35	3.30	15.77	151.50	14.60	15.50	2.12	7.06
2	**BhimaOmkar**	56.27	8.50	34.22	1.76	2.38	10.36	108.65	09.05	18.50	1.65	5.45
3	**Yamuna Safed**	66.87	8.70	48.18	2.92	4.05	21.91	210.70	16.05	19.50	2.96	9.87
4	**Yamuna Safed-2**	69.27	8.60	49.46	2.99	4.15	24.24	238.05	16.15	19.33	3.88	12.94
5	**Yamuna Safed-3**	69.04	9.60	49.49	3.30	4.42	32.20	284.10	17.00	20.17	4.35	14.51
6	**Yamuna Safed-4**	67.45	9.50	48.33	2.95	4.14	24.94	249.35	17.60	19.17	3.21	10.71
7	**Yamuna Safed-5**	68.41	8.80	53.71	3.08	4.10	26.48	255.35	17.45	21.66	3.61	12.05
8	**Yamuna Safed-8**	67.82	8.70	52.52	2.91	3.82	22.80	226.10	22.70	13.33	2.62	8.73
9	**Yamuna Safed-9**	70.44	8.00	49.76	2.96	3.83	23.81	245.60	15.40	17.17	3.63	12.10
10	**Baram Local-06**	61.04	9.00	44.65	2.92	3.81	17.82	193.25	14.20	20.83	2.26	7.54
11	**HG-17**	64.86	7.70	44.83	2.50	3.72	18.64	178.95	15.30	19.66	2.61	8.69
12	**Jamnagar Local**	65.91	9.40	39.78	2.15	2.91	20.84	179.10	14.50	16.16	2.35	7.84
13	**Mandsaur Local**	69.29	9.40	40.55	2.69	3.59	16.79	171.05	13.35	13.17	2.75	9.18
14	**Ranebennur Local**	48.48	7.50	30.67	2.77	2.14	13.66	117.45	08.20	20.33	1.67	5.57
15	**Maharashtra Sangam**	68.54	9.50	43.00	2.14	2.92	17.99	150.45	13.40	15.50	2.45	8.15
16	**Ooty Local**	67.92	9.50	43.33	2.03	2.72	20.64	212.90	17.70	14.16	2.76	9.20
17	**GRS-1328**	49.80	8.30	30.22	1.97	2.45	14.19	127.05	11.45	14.66	1.80	6.00
18	**GRS-1345**	53.67	7.60	33.18	2.46	3.24	13.37	142.80	12.35	15.67	1.95	6.37
19	**GRS-1330**	65.36	9.40	42.04	2.73	3.93	21.60	220.70	12.05	18.17	3.14	10.46
20	**GN-14-27**	54.03	8.20	34.65	2.60	3.50	12.62	127.50	13.40	13.33	1.87	6.23
21	**GN-14-01**	55.64	7.70	35.81	3.23	3.94	18.98	160.85	23.00	13.67	2.31	7.71
22	**GN-14-25**	56.09	7.00	34.71	2.52	2.98	16.56	155.95	8.35	28.33	2.25	7.51
23	**GN-14-15**	55.64	7.60	37.39	2.19	2.63	12.15	126.10	11.30	13.33	1.58	5.27
24	**GN-14-05**	47.21	8.90	30.90	2.74	3.36	12.67	129.15	15.20	18.33	1.68	5.60
25	**DWG-2**	58.56	7.20	40.46	2.58	2.93	10.64	101.05	06.10	19.67	1.76	5.85
26	**DWG-1 (Check)**	53.80	7.00	36.38	2.58	3.50	11.03	119.60	06.05	17.67	1.27	4.25
	SEm±	**3.47**	**0.53**	**3.02**	**0.22**	**0.34**	**1.36**	**18.36**	**1.10**	**1.54**	**0.23**	**0.80**
	CD at 5%	**10.11**	**1.57**	**8.81**	**0.65**	**1.00**	**3.97**	**53.48**	**3.21**	**4.49**	**0.69**	**2.34**

Table 2: Storage behavior and keeping quality of different garlic genotypes during storage (March to June 2017)

Sl. No	Genotypes	One month after storage (30 DAS)			Two months after storage (60 DAS)			Three months after storage (90 DAS)			Total loss (%)
		PLW (%)	Black Mould (%)	Waxy break down (%)	PLW (%)	Black Mould (%)	Waxy break down (%)	PLW (%)	Black Mould (%)	Waxy break down (%)	
1	**Bhima Purple**	02.51	0.00 (0.39)	0.00 (0.39)	08.14	0.00 (0.39)	2.17 (6.21)	11.63	0.00 (0.39)	4.35 (8.77)	15.98
2	**BhimaOmkar**	10.54	0.00 (0.39)	0.00 (0.39)	16.07	0.00 (0.39)	0.58 (3.21)	17.48	0.00 (0.39)	2.90 (7.17)	20.38
3	**Yamuna Safed**	10.72	4.86 (9.28)	0.00 (0.39)	24.17	6.90 (11.10)	0.65 (3.47)	28.90	12.50 (15.19)	0.65 (3.47)	42.05
4	**Yamuna Safed-2**	11.13	1.10 (4.46)	0.00 (0.39)	20.17	1.10 (4.46)	7.44(15.30)	23.53	1.10 (4.46)	9.50 (17.58)	34.13
5	**Yamuna Safed-3**	03.59	0.00 (0.39)	0.00 (0.39)	09.15	0.00 (0.39)	0.00 (0.39)	10.53	0.00 (0.39)	3.19 (7.51)	13.72
6	**Yamuna Safed-4**	17.39	14.63 (16.57)	1.00 (4.26)	25.08	15.85(17.33)	1.00 (4.26)	28.68	17.07 (18.07)	2.04 (6.02)	47.79
7	**Yamuna Safed-5**	17.27	12.66 (19.75)	0.86 (3.96)	24.52	12.66(19.75)	2.02 (8.14)	28.10	14.69 (21.78)	2.02 (8.14)	44.81
8	**Yamuna Safed-8**	23.86	11.32 (19.57)	0.00 (0.39)	32.60	26.34(30.87)	0.00 (0.39)	35.40	27.48 (31.59)	0.00 (0.39)	49.38
9	**Yamuna Safed-9**	07.49	0.00 (0.39)	0.00 (0.39)	12.09	0.00 (0.39)	0.00 (0.39)	12.73	0.00 (0.39)	2.05 (6.03)	14.78
10	**Baram Local-06**	02.47	0.00 (0.39)	3.70 (8.09)	09.96	0.00 (0.39)	6.17(10.48)	13.91	0.00 (0.39)	6.79 (11.01)	20.70
11	**HG-17**	39.43	24.12 (30.02)	0.00 (0.39)	53.01	27.74(31.56)	0.00 (0.39)	54.99	30.36 (33.30)	0.00 (0.39)	85.35
12	**Jamnagar Local**	03.90	0.00 (0.39)	0.00 (0.39)	11.92	0.00 (0.39)	7.31(15.36)	14.73	0.74 (3.68)	11.68 (19.97)	27.15
13	**Mandsaur Local**	01.76	0.00 (0.39)	2.34 (6.44)	05.45	0.00 (0.39)	2.90 (7.16)	09.08	0.00 (0.39)	4.64 (12.25)	13.72
14	**Ranebennur Local**	11.06	0.00 (0.39)	22.67 (26.05)	30.31	0.00 (0.39)	36.09 (36.67)	30.41	0.00 (0.39)	39.94 (39.04)	70.35
15	**Maharashtra Sangam**	07.62	1.30 (4.38)	0.66 (3.50)	14.81	2.13 (8.31)	6.45 (10.72)	16.08	2.14 (8.33)	8.06 (15.69)	26.28
16	**Ooty Local**	02.77	0.00 (0.39)	0.65 (3.47)	12.92	0.00 (0.39)	0.65 (3.47)	17.98	2.46 (6.59)	0.65 (3.47)	21.09
17	**GRS-1328**	02.59	0.00 (0.39)	0.00 (0.39)	07.32	0.00 (0.39)	1.21 (4.68)	07.98	0.00 (0.39)	1.83 (5.70)	9.81
18	**GRS-1345**	03.88	0.00 (0.39)	0.00 (0.39)	07.66	0.00 (0.39)	0.00 (0.39)	10.13	0.00 (0.39)	1.02 (4.30)	11.15
19	**GRS-1330**	03.05	0.00 (0.39)	0.00 (0.39)	08.47	0.00 (0.39)	4.32 (8.74)	11.33	2.54 (6.71)	4.37 (8.79)	18.24
20	**GN-14-27**	03.77	2.20 (6.25)	0.00 (0.39)	12.99	2.75 (9.07)	0.00 (0.39)	14.89	6.27 (14.34)	1.47 (5.13)	22.63
21	**GN-14-01**	01.42	0.00 (0.39)	0.00 (0.39)	10.26	0.69 (3.57)	0.64 (3.45)	11.16	0.00 (0.39)	0.65 (3.45)	11.81
22	**GN-14-25**	08.65	0.00 (0.39)	0.00 (0.39)	14.33	0.00 (0.39)	6.50(14.76)	16.19	0.00 (0.39)	7.95 (16.38)	24.14
23	**GN-14-15**	04.82	0.00 (0.39)	0.00 (0.39)	11.44	2.10 (6.11)	0.95 (4.16)	14.72	2.10 (6.11)	0.95 (4.16)	17.77
24	**GN-14-05**	02.03	1.21 (04.68)	0.00 (0.39)	26.54	4.73(12.48)	0.00 (0.39)	27.88	5.70 (13.59)	3.88 (8.28)	37.46
25	**DWG-2**	16.32	0.00 (0.39)	1.89 (5.81)	25.54	2.53 (8.84)	2.90 (9.69)	28.79	3.16 (9.71)	5.18 (13.07)	37.13
26	**DWG-1 (Check)**	26.48	0.00 (0.39)	6.25 (10.55)	41.84	0.00 (0.39)	47.37(52.25)	43.81	0.00 (0.39)	54.50 (63.75)	98.31
	S Em±	**3.55**	**3.90**	**3.91**	**5.14**	**4.16**	**3.39**	**5.25**	**4.82**	**3.44**	-
	CD at 5%	**10.34**	**11.36**	**11.39**	**14.99**	**12.11**	**9.90**	**15.31**	**14.06**	**10.02**	-

DAS: Days After Storage

CONCLUSION

In the study a significant difference among the genotypes was noticed for all the traits. The genotypes Yamuna Safed-3, Yamuna Safed-2, Yamuna Safed-9 and Yamuna Safed-5 were proved promising for yield parameters. While, minimum total loss during storage period was noticed in GRS-1328 (9.81 %) followed by GRS-1345 (11.15 %), GN-14-01 (11.85 %), Yamuna Safed-3 (13.72 %) and Mandsaur Local (13.72 %). So these lines can be improved further in developing durable planting material with minimum storage losses.

REFERENCES

1. Anonymous, Horticultural Statistics at a Glance.pp. 230 (2017).
2. Dubey, B. K. and Singh, R. K., Selection of garlic genotypes for yield, quality and better storage. *Indian J. Hort.*, **69(1):** 125-128 (2012).
3. Islam, M. J., Islam, M. A., Akter Tania, S., Saha, S. R., Alam, M. S. and Hasan, M. K., Performance of evaluation of some garlic genotypes in Bangladesh. *Asian J. Plant Sci.*, **3(1):** 14-16 (2004).
4. Khar, A., Devi, A., Mahajan, V. And Lawande, K. E., Stability analysis of some elite onion lines in late kharif season. Indian J. Hort., **64(4):** 415-419 (2007).
5. Lawande, K. E., Anil, K., Mahajan, V., Srinivas, P. S., Sankar, V. And Singh, R. P., Onion and garlic research in India. *J. Hort. Sci*., **4(2):** 91-119 (2009).

6. Moustafa, Y. M. M., Latif, S. S., Abdel Naem, G. F., Fouly, H. M. H. And Ahmed, S. I., Performance of new imported foreign garlic genotypes grown under the Egyptian conditions. *Egypt. J. Agric. Res.*, **87(1):** 219-240 (2009).
7. Panse, V. G. And Sukhamte, P. V., Statistical Methods for Agricultural workers, ICAR. (1967).
8. Partha, C. And Ranjit, C., Evaluation of some garlic (Allium sativum .,) germplasm for their suitability under terai zone of West Bengal. *Int. J. Agric. Environ. And Biotech*., **2(3):** 271-273 (2009).
9. Regel, E., Alliorum adhuc cognitorum monographia. *Acta Horti Petrop.*, **3**: 1-256 (1875).
10. Sharma, N., Gupta, A. And Samnotra, R. K., Studies on yield and yield contributing characters in different genotypes of garlic (*Allium sativum* L.). *J. Hill Agric*., **1(1):** 72-74 (2010).
11. Singh, R. K., Dubey, B. K. And Bhonde, S. R., Studies on some genotypes for yield, quality and storage in garlic. *SAARC J. Agri*., **10(2):** 165-170 (2012).
12. Singh, R. K., Dubey, B. K., Singh, S. K. And Bhonde, S. R., Selection of high yielding and good keeping quality variety in red onion. *Progr. Hortic.,* **43(2):** 243-247 (2011).
13. Yadav, N. K., Krishna, P. S, Naidu, A. K. And Nair, B., Estimation of genetic variability for yield and its components in garlic (*Allium sativum* L.). *Prog. Agric*., **12(1):** 26-34 (2012).