



ISSN: 0974 - 0376

*The Ecoscan* : Special issue, Vol. IX: 121-124: 2016  
AN INTERNATIONAL QUARTERLY JOURNAL OF ENVIRONMENTAL SCIENCES  
[www.theecoscan.com](http://www.theecoscan.com)

## VARIETAL PERFORMANCE OF GARLIC (*ALLIUM SATIVUM* L.) ON GROWTH, YIELD AND QUALITY ATTRIBUTES

P. K. Rajole *et al.*,

### KEYWORDS

Garlic  
Growth  
Quality  
Variety and yield

Proceedings of National Conference on  
Harmony with Nature in Context of  
Resource Conservation and Climate Change  
(HARMONY - 2016)  
October 22 - 24, 2016, Hazaribag,  
organized by  
Department of Zoology, Botany, Biotechnology & Geology  
Vinoba Bhawe University,  
Hazaribag (Jharkhand) 825301  
in association with  
NATIONAL ENVIRONMENTALISTS ASSOCIATION, INDIA  
[www.neaindia.org](http://www.neaindia.org)



**P. K. RAJOLE, L. R. VARMA AND YOGESH PAWAR\***

Department of Vegetable Science,  
College of Horticulture, S. D. Agricultural University, Sardarkrushinagar - 385 506 (Gujarat) INDIA  
e-mail: yogesh517.pawar@gmail.com

## ABSTRACT

The field experiment on performance of eight varieties of garlic was conducted at Horticulture Instructional Farm, Sardarkrushinagar Dantiwada Agricultural University, Sardarkrushinagar, Gujarat. The findings of study revealed that, morphologically superior performance with germination percentage (98.99 %), height of plant (81.67 cm), length of leaf (48.23 cm), width of leaf (1.47 cm) and earliness in bulb initiation (47.06 days) was recorded with variety V<sub>3</sub> (Local). Maximum neck thickness *i.e.* 1.14 cm. and 1.50 cm. was recorded with V<sub>2</sub> (Yamuna Safed) respectively, at 60 and 120 days after sowing. Maximum number of leaves *i.e.* 6.57 and 10.17 at 60 and 120 days after sowing respectively and chlorophyll index (97.64) was recorded with treatment V<sub>1</sub> (Agrifound White). The significantly highest diameter of bulb (5.47 cm), maximum number of cloves per bulb (34.95) was recorded with V<sub>2</sub> (Yamuna Safed). Considering the yield and quality attributes, significantly maximum weight of bulb (59.16 g), yield of dry garlic bulb (248.32 q/ha), maximum length of clove (36.07 mm), more thicker clove *i.e.* 11.39 mm and maximum TSS (40.13 °Brix) was recorded with V<sub>1</sub> (Agrifound White). The variety Agrifound White was found to be promising with respect to growth, yield and quality attributes of garlic.

## INTRODUCTION

Garlic (*Allium sativum* L.) is one of the most important bulb crop belong to the family Alliaceae grown and consumed as spice throughout the India. Garlic is one of the most important crop for export and earning of foreign exchange. India ranks second in production and productivity of garlic in the world. Garlic is chief constituents of diallyl disulfide, trisulfide and allyl propyl disulfide (Bhonde and Prakash, 2006). The average productivity of garlic ranges between 5 to 6 tonnes per hectare which too less than its potentiality (Anon, 2013).

Very little work has been reported with respect to suitability of different cultivars of garlic released by various universities and ICAR institutes of India. In this regard some of scientist were reported their view for suitability of specific variety for certain region (Kadu *et al.*, 2005). Choudhari and Chatterjee (2009) reported that G-323 was most promising genotype of garlic for Tarai region of West Bengal. Market value of garlic are increasing by day by day due to less quantity of availability of garlic bulb in the market and this is due to decline in cultivated area as well as decreased productivity of garlic.

Number of superior varieties of garlic released by different universities and ICAR institutes of India. But there is no any recommendation has been made with respect to suitability of specific variety for certain region. Keeping in to consideration the above facts in mind present investigation was planned and executed to find out the influences of different varieties of garlic with respect to growth, yield and quality parameters. There is urgent need to made certain recommendations to generate research evidence with respect to suitability of certain variety in specific region for benefits of the garlic growers.

## MATERIALS AND METHODS

The experiment was conducted at Horticulture Instructional Farm, C. P. College of Agriculture, Sardarkrushinagar Dantiwada Agricultural University, Sardarkrushinagar, (Gujarat) India during *Rabi* season of 2011. Experiment was laid out in randomized block design with four replications. Eight varieties of garlic were taken under investigation *viz*; Agrifound White, Yamuna Safed, Local, Yamuna Safed-3, Yamuna Safed-4, Gujarat Garlic-3, Gujarat Garlic-4 and Yamuna Safed-2. The seeds of these varieties were procured from National Horticultural Research and Development Foundation Karnal, Haryana, Junagadh Agricultural University, Gujarat and Local market of Palanpur, Gujarat.

Sowing of garlic was taken up on October, 2011. Cloves were dibbled at 15 cm x 10 cm spacing in each bed. Recommended package of practices were followed to raise the crop. Recommended dose of fertilizers *i.e.*, 20 tonne of FYM and 50 kg N, 50 kg P and 50 kg K per hectare were applied at the time of soil preparation and rest of 50 kg nitrogen were applied in two splits at 45 and 75 days after sowing. Irrigation was stopped before two weeks of harvesting when fifty per cent neck falls as well as leaves are completely dried.

Various observations on growth, yield and quality aspects were recorded to assess

\*Corresponding author

the treatment effect. Height, length and width characters were measured using measuring scale and diameter with digital vernier calliper (CD-6" CSX, Mitutoya). The chlorophyll index of leaves was measured with the help of digital chlorophyll meter (CCM-200, Opti-sciences). Total soluble solid content was estimated by using hand refractometer. The recorded data were subjected to statistical analysis using the analysis of variance technique (Gomez and Gomez, 1984).

## RESULTS AND DISCUSSION

### Growth parameters

Data pertaining to growth parameters revealed that, the variety  $V_1$  (Agrifound White) was found significantly superior with respect to minimum days taken (6.20 days) for germination in comparison to all other varieties of garlic. However, maximum percentage (98.99%) of germination was recorded with variety  $V_3$  (Local).

Germination behaviour of garlic may either be cultivar characteristics or due to dormancy of bulbs. Similar findings have been reported by Mahmood *et al.* (2002) and Osman and Moustafa (2009), in garlic.

During the first phase, *i.e.* 60 days after sowing the maximum height (59.30 cm) of plant was recorded with  $V_3$  (Local) variety in comparison to all other varieties of garlic. Significantly maximum height (81.67 cm) of plant was recorded with variety  $V_3$  (Local).

Variation in plant height and other vegetative character most probably it may be due to such type of genetic makeup of specific genotype. The present results are in close accordance

with reports of Tiwari *et al.* (2002), Dubey and Singh (2012) in garlic and Sarkar and Jain (2002), Chandrika and Reddy (2011), Hirave *et al.* (2015) in onion.

Significantly maximum neck thickness *i.e.* 1.14 cm. and 1.50 cm. was recorded with  $V_2$  (Yamuna Safed) respectively at 60 and 120 days after sowing. Maximum number of leaves was recorded with treatment  $V_1$  (Agrifound White) *i.e.* 6.57 and 10.17 at 60 and 120 days after sowing respectively.

The variation in number of leaves per plant in different varieties may be due to their genetical characters. Similar findings have been reported by Tiwari *et al.* (2002), Dubey and Singh (2012), in garlic and Sarkar and Jain (2002), Chandrika and Reddy (2011) in onion.

The variety  $V_1$  (Agrifound White) was found significantly superior with respect to maximum chlorophyll index (97.64) of leaves in comparison to all other varieties of garlic at 60 days after sowing. Significantly maximum length of leaf (48.23 cm) and width (1.47 cm) of leaf, minimum days (47.06) taken for bulb initiation was recorded with  $V_3$  (Local).

Maturity period as influenced by different varieties of garlic showed marked variation and found significant decrease in number of days taken for maturity due to variety  $V_6$  (Gujarat Garlic-3).  $V_6$  (Gujarat Garlic-3) was significantly superior with respect to minimum days (145.67) taken for maturity than all other varieties.

Days taken for bulb initiation due to physiological behaviour of different varieties. Similar findings have been reported by Seifal *et al.* (2011), Sangeeta *et al.* (2014) in garlic.

### Yield parameters

**Table 1: Influences of different varieties on growth parameters of garlic**

Treatments	Days for germination	Germination (%)	Plant height at 60 DAP (cm)	Plant height at 120 DAP (cm)	Neck thickness (cm) at 60 DAP	Neck thickness (cm) at 120 DAP	Number of leaves per plant at 60 DAP	Number of leaves per plant at 120 DAP	Length of leaf at 60 DAP (cm)	Width of leaf at 60 DAP (cm)	Days taken for bulb maturity
Agrifound White ( $V_1$ )	6.25	98.25	44.72	69.64	0.92	1.36	6.58	10.18	42.41	1.36	160.00
Yamuna Safed ( $V_2$ )	7.00	93.33	52.64	78.09	1.14	1.50	5.80	8.88	45.75	1.47	158.67
Local ( $V_3$ )	6.50	99.00	59.30	81.68	0.98	1.40	6.00	9.93	48.24	1.47	152.00
Yamuna Safed-3 ( $V_4$ )	7.00	97.41	51.72	74.95	1.06	1.46	5.83	9.25	41.56	1.41	153.00
Yamuna Safed-4 ( $V_5$ )	6.50	97.08	52.03	75.35	1.02	1.35	5.88	9.28	40.98	1.44	164.00
Gujarat Garlic-3 ( $V_6$ )	9.50	97.92	33.84	52.51	0.67	1.20	5.00	7.50	31.77	1.08	145.67
Gujarat Garlic-4 ( $V_7$ )	8.50	98.66	37.05	69.36	0.72	1.22	5.65	8.28	32.56	1.16	152.33
Yamuna Safed-2 ( $V_8$ )	7.00	98.33	47.01	73.67	0.81	1.26	5.95	9.50	40.36	1.30	163.00
S.Em $\pm$	0.348	1.175	1.153	1.212	0.024	0.020	0.128	0.209	0.938	0.029	1.096
C.D. at 5%	1.023	3.455	3.390	3.565	0.070	0.059	0.376	0.614	2.759	0.086	3.224

**Table 2: Influences of different varieties on yield and quality attributes of garlic**

Treatments	Diameter of bulb (cm)	Weight of bulb (g)	Bulb yield (q ha <sup>-1</sup> )	Number of cloves per bulb	Length of clove (mm)	Thickness of clove (mm)	Total soluble solid ( $^{\circ}$ Brix)
Agrifound White ( $V_1$ )	4.92	59.17	248.32	24.00	36.07	11.39	40.13
Yamuna Safed ( $V_2$ )	5.47	55.30	112.23	34.95	31.13	8.89	33.49
Local ( $V_3$ )	4.44	44.45	191.54	31.51	30.63	8.33	34.12
Yamuna Safed-3 ( $V_4$ )	4.54	49.80	156.61	24.66	31.30	10.07	35.26
Yamuna Safed-4 ( $V_5$ )	4.31	52.00	154.90	34.84	30.88	9.50	38.26
Gujarat Garlic-3 ( $V_6$ )	3.62	30.11	126.15	33.70	27.25	7.80	26.63
Gujarat Garlic-4 ( $V_7$ )	4.26	33.01	145.39	32.66	29.64	8.07	32.43
Yamuna Safed-2 ( $V_8$ )	4.66	43.81	188.35	31.39	31.16	8.71	34.81
S.Em $\pm$	0.167	1.610	6.224	0.778	0.313	0.200	0.979
C.D. at 5%	0.492	4.736	18.306	2.289	0.921	0.588	2.879

Diameter of bulb influences by different varieties was found significant. The significantly highest diameter of bulb (5.47 cm) was recorded with treatment V<sub>2</sub> (Yamuna Safed).

The variation in bulb characters in different garlic germplasm were attributed to intervarietal differences associated with genetic makeup of the cultivars and it is governed by the cell size and intercellular spacing of the clove tissues. (Golani *et al.*, 2000). The present findings are close accordance with that of Singh and Singh (1999), Agarwal and Tiwari (2003), Singh (2003), Singh and Chand (2003), Vashisht and Singh (2005), Kadu *et al.* (2005), Futane *et al.* (2006), Kamal *et al.* (2007), Choudhari and Chatterjee (2009) in garlic and Sarkar and Jain (2002), Hirave *et al.* (2015) in onion.

The data presented in table showed significant responses with respect to weight of bulb. Treatment V<sub>1</sub> (Agrifound White) was produced significantly maximum weight (59.16 g) of bulb, yield of dry garlic bulb *i.e.* 248.32 quintal per hectare.

Similar trends of results reported by Mahmood *et al.* (2002), Singh and Chand (2003), Kadu *et al.* (2005), Dhiman and Gandhi (2009), Rahim (2011), Seifel *et al.* (2011), Sangeeta *et al.* (2014) in garlic.

#### Quality parameters:-

It is quite apparent from the table showed that different varieties were significantly influenced the number of cloves per bulb. The significantly maximum number of cloves per bulb (34.95) was recorded under treatment V<sub>2</sub> (Yamuna Safed).

Significantly maximum length of clove (36.07 mm), more thicker clove *i.e.* 11.39 mm and maximum total soluble solid (40.13 °Brix) was recorded with treatment V<sub>1</sub> (Agrifound White).

Similar findings have been reported by Singh and Chand (2003), Patil *et al.* (2003), Vashisht and Singh (2005), Shashidhar *et al.* (2005), Kadu *et al.* (2005), Futane *et al.* (2006), Dubey and Singh (2012) in garlic.

The variety Agrifound White was found to be promising with respect to growth, yield and quality attributes of garlic.

#### REFERENCES

- Agarwal, A. and Tiwari, R. S. 2003. Physico-chemical characterization of sixteen germplasm lines of Garlic (*Allium Sativum* L.). *Approaches for Sustainable Development of Onion and Garlic*. pp. 90-92.
- Anon 2013. Annual report, National Horticultural Research and Development Foundation Nasik . p. 68.
- Bhonde, S. R. and Prakash, H. 2006. Garlic cultivation in India, Technical bulletin edition No.7, National Horticultural Research and Development Foundation publication. pp. 1-3
- Chandrika, V. and Reddy, D. S. 2011. Response of onion genotypes (*Allium Cepa* L.) to varied planting patterns in Southern agro-climatic zone of Andhra Pradesh. *J. Res. ANGRAU*. **39(3)**: 21 -25.
- Choudhuri, Partha and Chatterjee, Ranjit 2009. Evaluation of some Garlic (*Allium sativum*L.) germplasm for their suitability under Terai zone of West Bengal. *Int. J. Agric. Environ & Biotech*. **2(3)**: 271-273.
- Dhiman, R. C. and Gandhi, J. N. 2009. Varietal differences in garlic yield and growth parameters under three years old poplar plantation. *Advances in Plant Sciences*. **22(1)**: 307-30.8
- Dubey, B. K. and Singh, R. K. 2012. Selection of garlic genotypes for yield, quality and better storage. *Indian J. Hort*. **69(1)**: 125-128.
- Futane, N. W., Jogdande, N. D., Gonge, V. S., Warade, A. D. and Khandagale, S. S. 2006. Evaluation of garlic (*Allium sativum* L.) genotypes. *International J. Agricultural Sciences*. **2(1)**: 4-5.
- Golani, I. J., Vaddoria, M. A., Patel, R. K. and Purohit, V. L. 2000. Performance of different promising garlic collections under Saurashtra region in Gujarat state. In: proceedings of National Symposium on onion-garlic production and post harvest management-challenges and strategies. *Nashik*. pp. 38-40
- Gomez, K. A. and Gomez, A. A. 1984. Statistical procedures for agricultural research, 2<sup>nd</sup> edition. *J. Wiley and Sons*, New York. p. 680.
- Hirave, P. S. Wagh, A. P. Alekar, A. N. and Kharde, R. P. 2015. Performance of red onion varieties in kharif season under Akola conditions, *The Ecoscan (Special issue)* **8**: 381-384.
- Kadu, R. B., Shebhekar, R. Z., Deshmukh, N. A., Chopade, N. K., Kore, M. S. and Gondane S. U. 2005. Performance of garlic (*Allium sativum* L.) varieties under Nagpur conditions. *J. Soils and Crops*. **15(2)**: 437-441.
- Kamal, Neel., Brar, P. S., Singh, Mohan and Arora, D. 2007. Characterization of garlic germplasm on the basis of physical and chemical attributes. *Haryana J. Hortic. Sci*. **36(3&4)**: 342-343.
- Mahmood Tariq, Hussain Syed Ijaz, Khokhar Khalid Mahmood, Bhatti M. H. and Laghari Hashim. 2002. Comparative performance of garlic cultivars. *Asian J. Plant Sciences*. **1(2)**:160-161.
- Osman, Sayed A. M. and Moustafa Yasser, M. M. 2009. Horticultural and cytogenetical characteristics of some Egyptian and Foreign garlic cultivars. *African Crop Science Conference Proceedings*. **9**: 459-465.
- Patil, B. T., Ranpise, S. A. and Birade, R. M. 2003. Studies on performance of colour garlic selections under Nasik conditions of Maharashtra. *Orissa J. Horticulture*. **31(1)**: 54-57.
- Rahim, M. A. 2011. Evaluation of genetic resources for variety development of garlic and onion. *Krishi Gobeshona Foudation*, technical bulletin No. 4
- Sangeeta, S. Kumar, R. Bharati, D. K. and Singh, P. K. 2014. Performance studies of some diverse garlic (*Allium sativum* L.) genotypes, *The Ecoscan (Special issue)* **6**: 441-445.
- Sarkar, S. K. and Jain, B. P. 2002. Evaluation of onion varieties in kharif season. *J. Indian Agriculturist*. **46(1/2)**: 49-53.
- Seifel, Nasr H., Gadel, Hak., Yasser, M. M. Moustafa, Gamal, F. Abdel Naem and Ismail, A. Abdel Wahab. 2011. Studying different quantitative and qualitative traits of some white and colored bulb garlic genotypes grown under a drip irrigation system. *Australian J. Basic and Applied Sciences*. **5(6)**:1415-1427.
- Shashidhar, T. R., Dharmatti, P. R. and Nagraja, T. E. 2005. Performance of garlic genotypes under northern Karnataka region. *Karnataka J. Horticulture*. **1(2)**: 27-32.
- Singh Daljeet, 2003. Development and evaluation of Onion and Garlic elite genetic material. *Approaches for sustainable development of onion and garlic*. pp.100-102.
- Singh, J. P. and Singh, S. B. 1999. Evaluation of different selections/ varieties of garlic for yield and some yield-contributing parameters. *Crop Research (Hisar)*. **18(2)**: 216-217.
- Singh, Yudhvair and Chand, Ramesh. 2003. Performance studies of some garlic (*Allium sativum* L.) clones. *Himachal J. Agricultural Research*. **29(1/2)**: 35-42.
- Tiwari, R. S., Agarwal, A. and Sengar, S. C. 2002. Performance of 20 garlic genotypes under Tarai Region of Uttaranchal. *Progressive Horticulture*. **34(2)**: 183-186.
- Vashisht, V. K. and Singh, Rajinder 2005. Performance of garlic genotypes for yield and its related attributes. *Haryana J. Horticulture sciences*. **34(1/2)**:194-195.