

Original Research Article

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## Evaluation of Garlic Variety for Better Growth and Higher Yield under Allahabad Agro – Climatic Condition

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### ABSTRACT

A field trial was conducted at the Vegetable Research Farm, Department of Horticulture, Allahabad Agricultural Institute-Deemed University, and Allahabad, to study the performance of different varieties on growth, yield and quality of Garlic (*Allium sativum* L.) under agro-climatic conditions of Allahabad. The experiment was laid out in randomized block design comprising of seven varieties (Local check, Agrifound White, IC-35265, G-283, Kaveri, KS-2 and G-4), each replicated three times. The experimental observations were recorded on germination percentage, days taken for germination, plant height (cm), number of leaf sheaths per plant, neck girth (cm), days to first initiation of bulb formation, days to full edible maturity of bulbs, fresh weight of bulb (g), number of cloves per bulb, bulb yield per plot (kg), bulb yield ( $t\ ha^{-1}$ ), dry matter (%), total soluble solid (%), and ascorbic acid (mg/100 g of edible portion). Economic feasibility of varieties was also worked out. Best results were recorded on all the parameters in variety KS-2 followed by variety G – 4 and the minimum were recorded with Agrifound White. Best results on quality parameters were also recorded in KS-2. Therefore, variety KS-2 emerged as superior over all other varieties tried in this experiment, in relation to growth, yield attributes and yield, quality, and economic returns of Garlic (*Allium sativum* L.) under agro-climatic conditions of Allahabad.

#### Keywords

Garlic, *Allium sativum* L., Growth, Yield, Quality, Varietal evaluation

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### Introduction

Garlic (*Allium sativum* L.) is an important spice crop only to onion (*Allium cepa* L.). It belongs to the family; *Alliaceae* with genus *Allium* and species *sativum* having  $2n=16$  chromosome number. The native place is central Asia and Southern Europe, specially the Mediterranean region. This crop is grown

as an important spice and condiment, through it is treated as a maligned vegetable in India, due to its undesired flavor, it is grown for medicinal usage in pharmaceutical industry also. The garlic plants are bulbous, hardy and perennial. The bulb is composed of separable parts of bulbils called “cloves” which range from 6 to 50 and are enclosed by thin sheathe, light pink to white in color. Alliums are

mostly popular for their flavor which characteristics of sulphur containing compounds formed directing by crashing, following a chemical reaction. Allinase an enzyme present in most numbers of *Allium genus* is responsible for flavor (Nutrition vol. 29, No. 1). Garlic has higher nutritive value than other bulb crops. A fresh peeled garlic clove 100 g contains moisture 62.8%, Protein 6.3g, Fat 0.1g, mineral 1g, Fiber 0.8g, Carbohydrate 29%, calcium 0.03g, Phosphorus 310mg, Iron 10 mg, calories 145/100 g., Nicotinic acid 0.40 mg/100g and vitamin-C 13.0 mg/100g. Garlic is grown throughout the plains of India. Generally it's grown as a winter crop in Madhya Pradesh, Gujarat, Rajasthan, Maharashtra and Uttar Pradesh. In India garlic is cultivated in 134.9 thousand hectare of land, Producing 598.2 thousand tones with an average yield of 4.43 tons per hectare (The Hindu Survey of Indian Agriculture 2007).

## Materials and Methods

The experimental area was ploughed with mould board plough and harrowing was done to bring soil to a fine tilt. Well decomposed farmyard manure @ 20.0 tonnes per hectare was applied and mixed well in the soil before final harrowing. The experimental site was divided in to a required number of plots of 1.25m x 1m size. The main and sub-irrigation channels were laid out, taking into consideration of gradient of the site. After layout of plots, the treatments were arranged to the different plots in each replication by using random. The seeds were sown at a spacing of 20cm x 10 cm. Cloves were detached carefully from the composite bulbs and used for planting. Only sound; bold unbroken and uninjured cloves were selected and used. The time of sowing is from 15<sup>th</sup> October to 15<sup>th</sup> November. Observation was recorded Two type one is Pre-harvest observation germination %, Plant height (cm)

Neck girth (cm), and Second is Pre-harvest observation Fresh weight of bulbs (g), yield per pot (Kg), Bulb yield (t / Ha). Randomized Block Design was adopted for conducting the experiment. The data recorded during the course of the study were subjected to statistical analysis as per method of (Analysis of variance) suggested by Fisher (1958).

## Results and Discussion

### Germination percentage

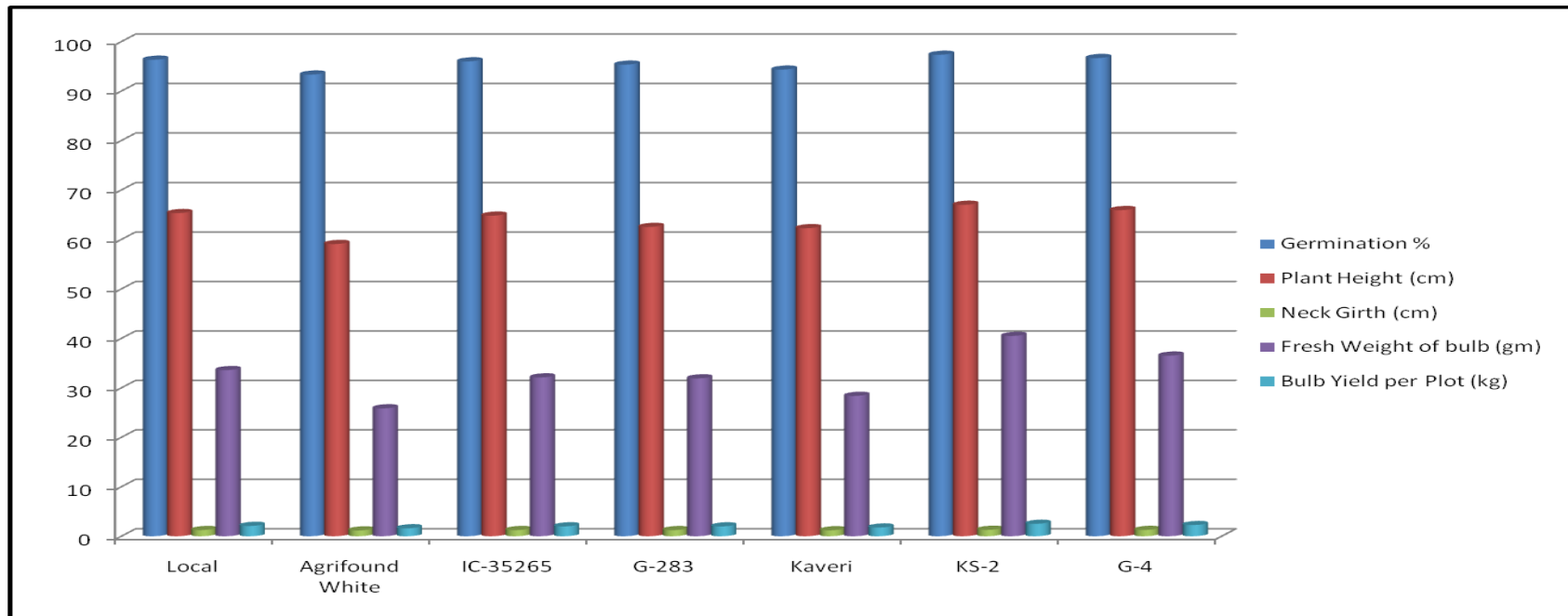
The data on germination percentage as influenced by different varieties are presented in Table 1 and graphically depicted in Figure 1. The germination percentage was influenced by different varieties and the results were found to be significant. The maximum germination percentage was recorded in KS-2 (97.33) followed by G-4 (96.67%), Local (96.33%), IC-35265 (96.00%), G-283 (95.33%) and Kaveri (94.33%). The minimum germination percentage was recorded in agri found white (93.33%). The higher germination percentage in KS-2 may be due to viability. The seed viability varies with the species and storage conditions reported by Baten *et al.*, (1989) and Pandey and Sinha (1996).

### Plant height (cm)

The plant height was influenced by different varieties at 25 DAP and result were found to be significant. The plant height was the highest in KS-2 (25.87 cm), followed by G-4 (24.68cm), Local (23.93 cm), IC-35265 (23.83cm), G-283 (23.47 cm) and Kaveri (22.93 cm) respectively. The minimum plant height was recorded in agrifound white (19.60 cm). At 50 days after planting and result were found to be significant. The plant height was the highest in Ks-2 (31.53 cm) followed by G-4 (31.43 cm), Local (30.77 cm), Ic-35265 (30.40 cm), G-283 (29.60cm) and Kaveri (28.80 cm) respectively.

**Table.1** Performance of different varieties of garlic (*Allium Sativum L.*)

| Varieties       | Germination % | Plant Height (cm) |             |             | Neck Girth (cm) |        |         | Fresh Weight of bulb (gm) | Bulb Yield per Plot (kg) |
|-----------------|---------------|-------------------|-------------|-------------|-----------------|--------|---------|---------------------------|--------------------------|
|                 |               | 25 DAS            | 75 DAS      | 125 DAS     | 25 DAS          | 75 DAS | 125 DAS |                           |                          |
| Local           | 96.33         | 23.93             | 53.17       | 65.33       | 0.41            | 1.20   | 1.25    | 33.58                     | 2.08                     |
| Agrifound White | 93.33         | 19.60             | 48.10       | 59.07       | 0.33            | 1.11   | 1.17    | 25.85                     | 1.60                     |
| IC-35265        | 96.00         | 28.83             | 52.57       | 64.80       | 0.39            | 1.19   | 1.24    | 32.10                     | 1.99                     |
| G-283           | 95.33         | 23.47             | 52.17       | 62.53       | 0.38            | 1.18   | 1.23    | 31.91                     | 1.98                     |
| Kaveri          | 94.33         | 22.93             | 50.80       | 62.27       | 0.36            | 1.11   | 1.20    | 28.37                     | 1.76                     |
| KS-2            | 97.33         | 25.87             | 54.53       | 67.00       | 0.42            | 1.23   | 1.29    | 40.49                     | 2.51                     |
| G-4             | 96.67         | 24.67             | 54.47       | 65.93       | 0.41            | 1.21   | 1.27    | 36.51                     | 2.26                     |
| SEm±            | <b>0.39</b>   | <b>0.15</b>       | <b>0.16</b> | <b>0.14</b> | -               |        |         | <b>0.31</b>               | <b>0.02</b>              |
| C.D (p=0.05)    | <b>0.85</b>   |                   |             |             |                 |        |         | <b>0.67</b>               | <b>0.04</b>              |



The minimum plant height recorded in agrifound white (27.57 cm), At 75 days after planting and result were found to be significant. The plant height was the highest in KS-2 (54.53 cm), followed by G-4 (54.47 cm), Local (53.17 cm), IC-35265 (52.57 cm), G-283 (52.17 cm) and Kaveri (50.80 cm) respectively. The minimum plant height was recorded in agrifound white (48.10 cm), At 100 days after planting and result were found to be significant. The maximum plant height was recorded in KS-2 (69.67 cm), followed by G-4 (69.00 cm), local (67.83 cm), IC-35265 (67.27 cm), G-283 (65.57 cm) and Kaveri (64.67 cm) respectively. The minimum plant height was recorded in agrifound white (62.30 cm) and at 125 days after planting and result was found to be significant. The maximum plant height was recorded in KS-2 (67.00 cm), followed by G-4 (65.93 cm), Local (65.33 cm), IC-35265 (64.80 cm), G-283 (62.53 cm) and Kaveri (62.27 cm). The minimum plant height was recorded in agrifound white (59.07 cm), respectively. Similar result were also reported by Noor *et al.*, (1999) and Singh and Tiwari (1994).

### **Neck girth (cm)**

The neck girth was not influenced by different varieties at 25 days after planting and results were found to be non-significant. The maximum neck girth was recorded in KS-2 (0.42 cm), followed by G-4 (0.41 cm), Local (0.41 cm), IC -35265 (0.39), G-283 (0.38) and Kaveri (0.36) respectively. The minimum was recorded in agrifound white (0.33 cm), 50 days after planting and results were found to be significant. The maximum neck girth was recorded in KS-2 (0.66 cm), followed by G-4 (0.65), Local (0.65), IC-35265 (0.63), G-283 (0.63cm) and Kaveri (0.62) respectively. The minimum was recorded in agrifound white (0.59 cm), at 75 days after planting and result were found to be significant. The maximum

neck girth was recorded in KS-2 (1.23 cm), followed by G-4 (1.21 cm), local (1.20 cm) and Kaveri (1.11 cm) respectively. The minimum neck girth was recorded in agrifound white (1.11 cm) at 100 days after planting and results were to be significant. The maximum neck girth was recorded in KS-2 (1.41 cm), followed by G-4 (1.39 cm), Local (1.37 cm), IC – 35265 (1.36 cm), G-283 (1.35 cm) and Kaveri (1.29 cm) minimum with agrifound white (1.26 cm).at 125 days after planting and results were found to be significant. The maximum neck girth was recorded in KS-2 (1.29 cm), followed by G-4 (1.27 cm), local (1.25 cm), IC-35265 (1.24 cm), G-283 (1.23 cm) and Kaveri (1.20 cm) minimum with the agrifound white (1.17 cm) respectively. Similar result were also reported by Om and Srivastava (1977) and Mettananda and Fordham (1999).

### **Fresh weight of bulb (g)**

The fresh weight of bulbs was influenced by different varieties and the results were found to be significant. The maximum bulb weight was recorded in KS-2 (40.49 gm), followed by G-4 (36.5 gm), Local (33.58 gm), IC-3565 (32.10 gm), G-283 (31.91 gm) and Kaveri (28.37 gm). The minimum bulb weight was recorded in agrifound white (25.85). KS-2 seemed to be better in position in utilizing the input and in enhancing bulb weight, compared to other varieties in this agro-climatic condition. Similar results were also reported by Korla and Rastogi (1979).

### **Yield per plot (kg)**

The yield per plot was influenced by different varieties and the results were found to be significant. The maximum yield was with KS-2 (2.51 kg) followed by G-4 (2.26 kg), Local (2.08 kg), IC-35265 (1.99 kg) G-283 (1.98 kg), Kaveri (1.76 kg) and minimum with the agri found white (1.60 kg) respectively, KS-2

being prolific vegetative growth variety, must have utilized its leaf capacity, the photosynthesis, which in turn must have helped this variety to be superior than others. Similar results were also reported by Korla and Rastogi (1979) and Pandey *et al.*, (1992).

### **Bulb yield (t/ha)**

The bulb yield was influenced by different varieties and the results were found to be significant. The maximum yield was with KS-2 (20.8 t/ha), followed by G-4 (18.11 t/ha), Local (16.66 t/ha), IC-35265 (15.92 t/ha), G-283 (15.83 t/ha) and Kaveri (14.07 t/ha). The minimum yield was with agrifound white (12.80 t/ha) similar results were also recorded by Deshmukh and Deore (1990) and Lallen Singh *et al.*, (1993) and Shrestha *et al.*, (2000).

### **References**

- Ayala, A. and Svon, J.R. (1986). Comparative study of garlic (*Allium sativum*) clones. *Agriculture, Hortalizas Ppa, Granosy Fibras*. 5(2): 73-80.
- Basallote, M.J., Bejarano, J., Blance, M.A., Jimenez Diaz, R.M. and Mebra, J.M. (1994). Soil solarization a strategy for the control of diseases caused by soil borne plant pathogens and for reducing crop rotations. *Investigation Agraria, Producciony Vegetables, Fuera deserie* No. 2. 207-220.
- Baten, M.A., Khan, M.A.H., Karim, M.A. and Mondal, M.F. (1989). Studies on the comparative morphology, yield components and yield of 2 garlic cultivars. *Bangladesh Hort*. 17(2):38-41.
- Charchar, J.M., Tenente, R.C.V. and Aragao, F.A.S. (2003). Resistance of garlic cultivars to *Ditylenchus dipasaci*. *Nematologia-Brasileria*. 27 (2): 179-184.
- Deshmukh, V.V. and Deore, B.P. (1990). Relationship between dry matter and yield in garlic genotype. *Ann. Of plant physio*. 4(1): 122-123.
- Gupta, N.K. and Ganeshe, R.K. (2000). Response of Borax and Zinc sulphate on growth and yield of garlic (*Allium sativum L.*) *Advances in Plant Sciences*, 13 (1): 237-239.
- Humayun-Khan, Azim-Khan, Derawadan, Mazulla-Khan and Abdoul-Mjeed (1997). Environmental effect on garlic genotypes for yield and yield component in Swat Valley. *Sarhad J. of Agri.*, 13 (4): 357-361.
- Khar, A., Asha, Devi, Mahajan, V. and Lawande, K.E. (2004). Performance studies of some promising garlic accessions under Rajgurunagar conditions. *J. of Maharashtra Agri. Univ.*, 29 (2): 214-216.
- Lalan-Singh, Dubey, P.K., Pandey, V.B. and Singh, L. (1993). Studies on the performance of defferent promising garlic collection under Nasik conditions in Maharashtra. *Newsletter Associated Agricultural Development Foundation*. 13 (2): 8-10.
- Mangal, J.L. Singh, R.K., Yadav, A.C., Lal, S. and Pandey, U.C. (1990). Evaluation of garlic cultivars for salinity tolerance. *J. of Hort. Sci.*65 (6): 657-658.
- Muller, S. and Biasi, J. (1989). Performance of garlic cultivars on the Santa Catarina Plateau. *Horticultura Brasileria*. 7 (1): 7-9.
- Noor-B., Khalid-M., Badshah, N. and Umar, K. (1999). Evaluation of garlic (*Allium sativam L.*) cultivars grown under the agro climatic conditions Peshawar valley. 15 (5): 431-436.
- Pandey, U.C., Jintender-Singh and Singh, J. (1989). Performance of new varieties of garlic (*Allium sativum L.*) under varying nitrogen levels. *Indian J. of Agro*. 41 (1): 174-176.

- Patel, B.G., Khanpara, V.D., Malavia, D.D. and Kneria, B.B. (1996). Performance of drip and surface method of irrigation for garlic (*Allium sativum* L.) under varying nitrogen levels. *Indian J. of Agro.* 41 (1): 174-176.
- Rakesh Mehra and Vinod batra (2005). Evaluation of garlic varieties against purple blotch disease and yield. *J. of Medicinal and Aromatic plant Sci.* 27 (1): 7-9.
- Sherestha, R.L., Karki, T. and Pun, A. (2000). Performance evaluation on garlic genotypes in the research command area of lumle, during 1998-1999. Working paper, *Lumle Agricultural Rresearch Centre*. No. 2000-2001, iii+5pp.
- Singh, D.K., Gupta, R.P., and Choudhary, S.N. (2002). Studies on the evaluation of the performance of advance lines in garlic. *News Letter National Hort. Res. And Development foundation.* 22 (2): 11-15.
- Suberi, H. and Price, T.V. (2000). Stemphylium leaf blight of garlic (*Allium sativum* L.) in Australia. *Australasian plant patho.* 29 (3): 192-199.
- Tiwari, R.S., Ankur Agrawal, Sengar, S.C. and Agrawal, A. (2003). Performance of garlic genotypes under Tarai Region of Uttaranchal. *Progress. Hort.*, 34(2): 183-186.

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