

## Effect of seed clove size on growth and yield of two lines of garlic under dry land condition at BAU, Mymensingh

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**Abstract:** The experiment was carried out to find the effect of seed clove size on growth and yield of two lines of garlic under dry land condition at BAU, Mymensingh during 2005 to 2006. The two-factor experiment had 3 clove sizes (large-1.22g, medium -1.04 g and small -0.76 g) and 2 garlic lines: G<sub>2</sub> and G<sub>19</sub>. The experiment was conducted in randomized complete block design (RCBD) with 4 replications. Yield and yield contributing characters were found to be highest in garlic lines G<sub>19</sub>. The highest yield (17.27 t/ha) was obtained from garlic line G<sub>19</sub> followed by garlic line G<sub>2</sub> (13.18 t/ha). Seed clove size had significant influence on all the growth and yield parameters. Higher yield was also recorded from large sized clove (16.87t/ha) than that of medium (15.69t/ha) and small (13.10 t/ha) ones. The combined effect of garlic lines and seed clove size revealed significant variation in bulb yield and various yield components. The treatment combination of garlic line G<sub>19</sub> and use of large size clove produced the highest yield (17.27 t/ha) and treatment combination of garlic line G<sub>2</sub> and small sized clove gave the lowest yield (13.18 t/ha).

**Key words:** Clove, garlic, dry land.

### Introduction

Use of high yielding variety is the most important consideration for cultivation of any crop. Up to 2005, there was no recommended variety of garlic in Bangladesh. Evaluation and characterization provide a rapid, reliable and efficient tool on information to augment the utilization of germplasm. In Bangladesh, there are many cultivated types of garlic, which are known either by their local or the locality where grown or characteristics of the crop. According to Singh (2003) evaluation may consist for nothing more than description of the place of origin and a morphological and phenological description of the places of origin or it may consist of information on physiological, biochemical, genetical, plant pathological or other characteristics. For the development of suitable varieties of garlic, it is essential to evaluate the characters of the available germplasm properly and conserve the collected materials for future use. The genetic information on yield and yield contributing characters of the crop species are properly assessed for its improvement. Hence, selection of better plant types through positive selection would improve the performance and uniformity of the variety.

Garlic is propagated by cloves. The size of clove can greatly influence the growth and yield of garlic (Sultana *et al.* 1997). The expression of life cycle, the ontogeny of the phenotype and the strategy of bulbing depend on the size of cloves, which affect the final yield of garlic (Baten *et al.* 1989) The initial clove size to be planted has profound effect on yield and other morphological growth attributes in garlic. Unhealthy seed cloves when used for propagation produce weak plants resulting in general crop degeneration. Although the use of the best quality seed cloves is the first of the essentials of improved method of cultivation. The growth, development and bulbing in garlic are influenced by various edaphic, climatic and internal factors of the cloves. The large mother bulb produced bulbs having average diameter and weight of 2.21cm and 9.87g, respectively compared to 2.07cm and 8.43g produced by the small mother bulbs (Couto, 1958).

In Bangladesh, the demand for garlic is increasing gradually with the increasing of population growth. It is difficult to increase the area of the crop due to land constraint. One of the ways to overcome the problem is to increase garlic yield per unit area by developing suitable

varieties and appropriate management practices. In the above context, the effect of garlic lines and seed clove size on the growth and yield of garlic was undertaken to develop garlic varieties through selection, and to find out the economic size of seed clove for garlic.

### Materials and Methods

The present research work was conducted at the Spice Research Centre of Bogra during 2005 to 2006. The 2-factor experiment had 3 clove sizes (large -1.22g, medium -1.04 g and small -0.76 g) and 2 garlic lines: G<sub>2</sub> and G<sub>19</sub>, (The garlic lines were collected from ARMP project, Department of Horticulture, BAU, Mymensingh). The experiment was conducted in randomized complete block design (RCBD) with 4 replications. The garlic lines collected from the ARMP project, Department of Horticulture, BAU, Mymensingh. The unit plot size were 1.5m × 1m; plant spacing: 20 cm × 10 cm; total number of treatments: 3 × 2 = 6; Total number of unit plots: 6 × 4 = 24; Total number of plants per plot = 75; Date of planting: 9 Nov, 2005; Date of harvesting: 29 March, 2006. Data were recorded on yield and yield contributing characters on height of plant, no. of leaves per plant, fresh weight of bulb diameter of bulb, length of bulb, no. of cloves per bulb, yield of bulb per plot and yield of bulb per hectare. The difference between the treatment means was judged by Least Significance Test (LSD).

### Results and Discussion

The size of clove can greatly influence on the growth and yield of garlic. The initial clove size to be planted has visible effect on yield and other morphological growth attributes in garlic.

**Effect of garlic lines:** Garlic lines showed significant influence on height of plant, no. of leaves per plant at different days after planting and fresh weight of bulb, diameter and length of bulb, no. of cloves per bulb, yield of bulb per plot and yield of bulb per hectare at harvest. Height of plant and no. of leaves per plant were taken 30, 60, 90, 120 and 135 days after planting (DAP). The highest height of plant (78.25cm), no of leaves per plant (8.76) (Table 1), fresh weight of bulb (35.00g), diameter (4.13 cm) and length (4.16cm) of bulb, no. of cloves per bulb (28.43), yield of bulb per plot (2.60 kg) and yield of

bulb per hectare (17.27 t/ha) were obtained from the plots in garlic line G<sub>19</sub>. Height of plant and no. of leaves per plant increased with the time from 30 to 120 days after planting and then it reduced due to senescence while the lowest values of all the above mentioned parameters were found in garlic line G<sub>2</sub>. When yield was considered garlic line G<sub>19</sub> produced the highest amount (17.27 t/ha) while the lowest (13.18t/ha) was obtained from garlic line G<sub>2</sub>

(Table 2). This might be due to the fact that germplasm G<sub>19</sub> had a good genetic potential which enhanced more cell division and cell elongation resulting best performance. These results are in agreement with Rahman *et al.*, (2005), Islam *et al.* (2004), Azad (2002) and Halim (2000). They also stated that the most promising cultivars are G<sub>2</sub> and G<sub>19</sub> in terms of yield potential.

**Table 1.** Main effect of garlic lines on height of plant and number of leaves per plant under dry land condition at different days after planting (BAU, Mymensingh/2005-06)

Treatments	Height of plant in cm at DAP					No. of leaves/plant at DAP				
	30	60	90	120	135	30	60	90	120	135
G <sub>19</sub>	33.75	47.01	62.77	78.40	66.50	4.73	6.50	7.57	8.76	8.13
G <sub>2</sub>	29.60	42.80	57.60	73.60	62.87	4.27	5.60	6.87	8.51	7.71
Level of Sig.	**	**	**	**	**	**	**	**	**	**

\*\* = Significant at 1% level of probability

**Table 2.** Main effect of garlic lines on growth and yield of garlic bulb under dry land condition at harvest (BAU, Mymensingh/2005-06)

Treatments	Fresh wt. of bulb (g)	Length of bulb (cm)	Diameter of bulb (cm)	No. of cloves/bulb	Yield/plot (kg)	Yield (t/ha)
G <sub>19</sub>	35.00	4.16	4.13	28.43	2.60	17.27
G <sub>2</sub>	27.63	3.80	3.67	24.80	1.98	13.18
Level of Sig.	**	*	NS	**	**	**

\* = Significant at 5% level of probability, \*\* = Significant at 1% level of probability, NS = Non significant

**Table 3.** Main effect of seed clove size on height of plant and number of leaves per plant under dry land condition at different days after planting (BAU, Mymensingh/2005-06, Expt. 7a)

Treatments	Height of plant in cm at DAP					No. of leaves/plant at DAP				
	30	60	90	120	135	30	60	90	120	135
T <sub>1</sub>	35.20	48.50	66.30	83.25	71.90	4.90	6.60	7.80	9.25	8.60
T <sub>2</sub>	31.02	45.70	59.75	78.30	66.70	4.60	6.00	7.35	8.55	7.76
T <sub>3</sub>	28.80	40.51	54.50	66.45	55.45	4.00	5.55	6.50	8.10	7.40
Level of Sig.	**	**	**	**	**	**	**	**	**	**

\*\* = Significant at 1% level of probability, T<sub>1</sub> = Large size clove (1.22 g), T<sub>2</sub> = Medium size clove (1.04 g), T<sub>3</sub> = Small size clove

**Table 4.** Main effect of seed clove size on growth and yield of garlic bulb under dry land condition at harvest (BAU, Mymensingh/2005-06, Expt. 7a)

Treatments	Fresh wt. of bulb (g)	Length of bulb (cm)	Diameter of bulb (cm)	No. of cloves/bulb	Yield/plot (kg)	Yield (t/ha)
T <sub>1</sub>	34.40	4.34	4.20	31.00	2.53	16.87
T <sub>2</sub>	32.00	3.95	3.95	26.25	2.35	15.69
T <sub>3</sub>	27.55	3.65	3.55	22.60	1.97	13.10
Level of Sig.	**	**	NS	**	**	**

\*\* = Significant at 1% level of probability, NS = Non significant, T<sub>1</sub> = Large size clove (1.22 g), T<sub>2</sub> = Medium size clove (1.04 g), T<sub>3</sub> = Small size clove (0.76 g)

**Table 5.** Combined effect of garlic lines and seed clove size on height of plant and number of leaves per plant under dry land condition at different days after planting (BAU, Mymensingh/2005-06, Expt. 7a)

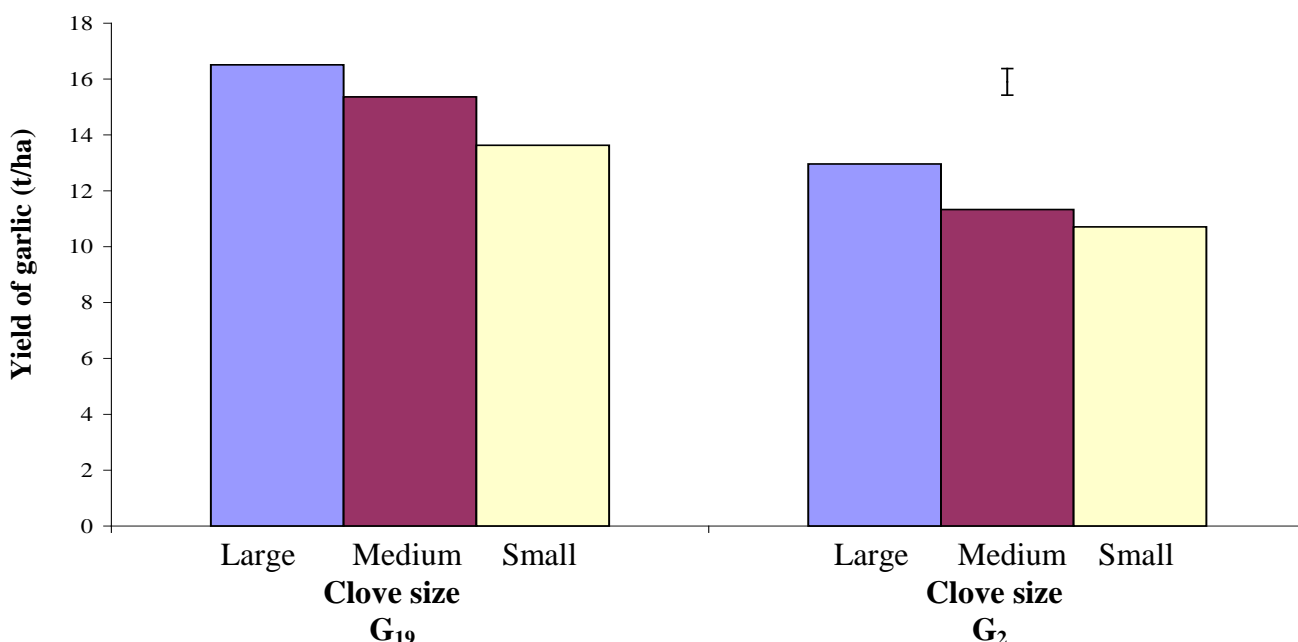
Treatment Combination	Height of plant in cm at DAP					No. of leaves/plant at DAP				
	30	60	90	120	135	30	60	90	120	135
V <sub>1</sub> T <sub>1</sub>	36.80	50.60	69.20	84.20	73.40	5.20	6.90	8.00	9.50	8.900
V <sub>1</sub> T <sub>2</sub>	33.64	47.80	63.30	80.40	68.60	4.80	6.50	7.70	8.57	8.10
V <sub>1</sub> T <sub>3</sub>	30.80	42.62	55.80	70.60	57.50	4.20	6.10	7.00	8.20	7.40
V <sub>2</sub> T <sub>1</sub>	33.60	46.40	63.40	82.30	70.40	4.60	6.30	7.60	9.00	8.30
V <sub>2</sub> T <sub>2</sub>	28.40	43.60	56.20	76.20	64.80	4.40	5.50	7.00	8.52	7.42
V <sub>2</sub> T <sub>3</sub>	26.80	38.40	53.20	62.30	53.40	3.80	5.00	6.00	8.00	7.40
Level of Sig.	**	**	**	**	**	**	**	**	**	**

\*\* = Significant at 1% level of probability, V<sub>1</sub> = Garlic line G<sub>19</sub>, V<sub>2</sub> = Garlic line G<sub>2</sub>, T<sub>1</sub> = Large size clove (1.22 g), T<sub>2</sub> = Medium size clove (1.04 g), T<sub>3</sub> = Small size clove (0.76 g)

**Table 6.** Combined effect of garlic lines and seed clove size on growth and yield of garlic bulb under dry land condition at harvest (BAU, Mymensingh/2005-06)

Treatment combination	Fresh wt. of bulb at harvest (g)	Length of bulb at harvest (cm)	Diameter of bulb at harvest (cm)	No. of cloves per bulb at harvest	Yield per plot (kg)
V <sub>1</sub> T <sub>1</sub>	38.40	4.47	4.40	33.00	2.84
V <sub>1</sub> T <sub>2</sub>	36.00	4.10	4.20	28.10	2.66
V <sub>1</sub> T <sub>3</sub>	30.60	3.90	3.80	24.20	2.26
V <sub>2</sub> T <sub>1</sub>	30.40	4.20	4.00	29.00	2.22
V <sub>2</sub> T <sub>2</sub>	28.00	3.80	3.70	24.40	2.04
V <sub>2</sub> T <sub>3</sub>	24.50	3.40	3.30	21.00	1.67
Level of Sig.	**	**	**	**	**

\*= Significant at 5% level of probability, \*\*= Significant at 1% level of probability, NS = Non significant, T<sub>1</sub> = Large size clove (1.22 g), T<sub>2</sub> = Medium size clove (1.04 g), T<sub>3</sub> = Small size clove (0.76 g), V<sub>1</sub> = Garlic line G<sub>19</sub>, V<sub>2</sub> = Garlic line G<sub>2</sub>



**Fig. 1.** Combined effect of garlic lines and seed clove size on the yield of baulbs under dry land condition at BAU, Mymensingh during 2005-06. Vertical bar represents LSD at 5% level.

**Effect of clove size:** The clove size had significant influence on all the parameters studied. The highest plant height (83.25cm), number of leaves per plant (8.60) (Table 3), bulb diameter (4.20cm) and length (4.34 cm), fresh weight of bulb (34.40g), no of cloves per bulb (31.00), yield per plot (2.53kg) and yield per hectare (16.87t/ha) (Table 4) were found in large sized clove, while the lowest values of all the above mentioned parameters were obtained from small sized clove. The bulb yield was influenced by different clove sizes. With the increase in clove size, the yield of bulb per hectare increased. This was probably due to the presence of higher amount of initial reserved food material in the propagating unit. So that produced vigorous plants along with larger bulbs than the medium and smaller ones. In large sized clove, crop emerged rapidly and thereafter established quickly on its physiological system. So that produced vigorous plants along with larger bulbs than the medium and smaller ones. This ensured better plant growth in this treatment with maximum number of leaves per plant, which helped in higher photosynthesis resulting in maximum bulb yield. Karlovic and Komissrov (1977) stated that plant produced

from large seed clove gave higher yield than those of medium and small sized cloves. The results obtained from the study are similar to those reported by Baten *et al.*, (1998), Ara *et al.*, (1998), Sultana *et al.*, (1997), Lampurlanes *et al.* (2002), Alam *et al.*, (2000), Barrios *et al.*, (2006) and Mahmud *et al.*, (2001). The yield from large bulb was higher (by 10.25%) than the medium bulbs which in turn gave a higher yield by 12-13% than that of small bulbs.

**Combined effect of garlic lines and seed clove size:** A remarkable combined effect was observed between the different seed clove sizes and different lines of garlic on all the parameters studied different days after planting (Table 5 & 6). The tallest plant (80.20 cm) and the maximum number of leaves (8.90) per plant were found in large size clove with garlic line G<sub>19</sub> 120 DAP and the shortest plant (26.80 cm) and minimum numbers of leaves (3.8) were obtained from small size clove with garlic line G<sub>2</sub> 30 DAP (Table 5). The highest fresh weight of bulb per plant (38.40g), length (4.47cm) and diameter (4.40cm) of bulb, number of cloves per bulb (33.00) and yield per plot (2.84 Kg) were obtained from large size clove with

garlic lines G<sub>19</sub> and the minimum values were found in all the mentioned parameters from small size clove with garlic line G<sub>2</sub> (Table 6). The large size clove with garlic lines G<sub>19</sub> gave the highest (18.95 t/ha) yield and the lowest (11.10t/ha) was recorded from small size clove with garlic line G<sub>2</sub> (Fig 1).

Garlic line G<sub>19</sub> and large size clove (1.22g) produce the maximum yield and also show the best performance in respect of all the yield contributing characters studied. So garlic lines G<sub>19</sub> and large sized clove may be used in garlic production to get maximum yield.

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