

## Effect of different organic manures on the growth and yield of two garlic varieties

A. Akter, M. A. Rahim and H. Rahman

Department of Horticulture, Bangladesh Agricultural University, Mymensingh

**Abstract:** A field experiment was conducted to investigate the effect of organic manures on the growth and yield of two garlic varieties in the Horticulture farm, Bangladesh Agricultural University Mymensingh, during the period from October 2005 to March 2006. The experiment consisted of two varieties viz., BAU Rashun-1 and BAU Rashun-2 and eight organic manures viz., cowdung ( $T_1$ ), compost ( $T_2$ ), bone meal ( $T_3$ ), mustard oil cake ( $T_4$ ), biomeal ( $T_5$ ), biogold ( $T_6$ ), biostar ( $T_7$ ) and A-Salam brand item ( $T_8$ ). The two factorial experiment was laid out in Randomized Complete Block Design (RCBD) with three replications. There were significant variations in growth, yield contributing characters and yield between the varieties. The higher plant height (47.96 cm) was obtained from BAU Rashun-1 and it produced the higher yield (12.075 t/ha) than BAU Rashun-2 yield (9.325 t/ha). Different manures showed significant variation on growth, yield components and yield of garlic. The highest plant height (50.57 cm) was obtained from the treatment of cowdung and the lowest (39.05 cm) was from the A-salam brand. In case of yield, the treatment cowdung was produced the highest yield (13.72 t/ha) and the A-Salam brand showed the lowest (5.95 t/ha) result. On the other hand the treatment combinations of BAU Rashun-1 with mustard oil cake and BAU Rashun-1 with cowdung gave the maximum bulb yield (15.975 t/ha) while the lowest (5.375 t/ha) was found in the treatment combination of BAU Rashun-1 with A-Salam brand item. Therefore, in field performance BAU Rashun-1 is better than BAU Rashun-2 and among the organic manures cowdung and mustard oil cake were better than others.

**Key words:** Organic manures, Yield, Garlic, BAU varieties

### Introduction

Garlic (*Allium sativum* L.) is one of the most important herbaceous annual spice in Bangladesh as well as in the world belonging to the family Alliaceae. It originated in central Asia (Vvedensky, 1946) and Southern Europe, especially the Mediterranean region (Thompson and Kelly, 1957). The major garlic producing districts of Bangladesh are Faridpur, Jessore, Rajshahi, Dinajpur, Dhaka, Pabna, Rangpur and Comilla (BBS, 2004). Bangladesh has to depend on import from other countries as the production is insufficient. Moreover, the demand for garlic is increasing day by day due to gradual increase in population in Bangladesh. Therefore, to solve this problem is to increase the yield per unit area and this is possible by using high yielding varieties and use of proper doses of manures. A good soil has more than 3% organic matter content but soils of most regions have less than 1.5% organic matter in Bangladesh. The growth and yield of garlic may be influenced by manures to a great extent. Organic manures not only increase the production of crops by supplying all the essential plant nutrients but also provide organic matter to the soil. Maintenance of soil fertility is a prerequisite for long term sustainable agriculture and organic manures can play a vital role in the sustenance of soil fertility and crop production. Considering above facts, the present investigation was undertaken to study the growth and yield of garlic variety as influenced by the application of different organic manures.

### Materials and Methods

The two factor experiment was carried out in the Allium project of USDA following RCBD with three replications.

**Factor A:** Two varieties of garlic namely BAU Rashun-1 ( $V_1$ ) and BAU Rashun-2 ( $V_2$ )

**Factor B:** Eight different types of organic manure namely Cowdung ( $T_1$ ), Compost ( $T_2$ ), Bonemeal ( $T_3$ ), Mustard oil cake ( $T_4$ ), Biomeal ( $T_5$ ), Biogold ( $T_6$ ), Biostar ( $T_7$ ) and A-Salam Brand item ( $T_8$ ).

The experiment was carried out at the field of USDA Allium project at Horticulture Farm, Bangladesh

Agricultural University, Mymensingh. The whole experimental field was first divided into three blocks and each of which was then divided into 16 unit plots. The treatment combinations were randomly distributed among the unit plots of each block so that all treatments were placed once in each block. Each unit plot size was 1 m × 1m. The distances between the blocks and plots were 50 cm and 30 cm, respectively. Planting was done by placing cloves at a depth of 5 cm in the soil with the use of a pointed stick. For maintaining spacing of 10 × 20 cm, fifty cloves were planted in each unit plot. Doses of organic manures were cowdung (15 t/ha), compost (10 t/ha), bonemeal (3 t/ha), mustard oil cake (5 t/ha), biomeal (51.87 kg/ha), biogold (24.7 kg/ha), biostar (19.76 kg/ha) and A-Salam brand item (51.87 kg/ha). Total amount of manure were added to the soil in unit plot during final land preparation. Data were recorded on plant weight (cm), No. of leaves per plant, fresh weight of leaves per plant (g), dry weight of leaves per plant (g), fresh weight of roots per plant (g), dry weight of roots per plant (g), fresh weight bulbs per plant (g), dry weight of bulbs per plant (g), diameter of bulbs (cm), no. of cloves per bulb, yield of bulb per plot (kg) and yield of bulb per hectare (t). Data were collected from 29 November, 2005 and continued up to 4 April, 2006.

### Results and Discussion

**Effect of varieties on growth and yield of garlic:** The main effects of varieties on growth and yield of garlic have been presented in Tables 1.

**Plant height and number of leaves per plant:** It was found that variety exhibited significant variation in plant height at 90 DAP. The maximum plant height (47.96 cm) was recorded from the BAU Rashun-1 at 90 DAP. The minimum plant height (39.67cm) was recorded from BAU Rashun-2 (Table 1). This variation in plant height might be due to varying characters of the variety. At 90 DAP, the maximum number of leaves (4.95) per plant was obtained from BAU Rashun-1. The minimum number of leaves (4.88) per plant was found from BAU Rashun-2 (Table 1). Higher number of leaves in BAU Rashun-1 was

possibly due to positive influences of the higher plant height and more deposition of photosynthates during vegetative growth of plants.

**Fresh weight and dry weight of bulb per plant:**

Significant variation was also observed in bulb weight of two varieties. BAU Rashun-1 gave the higher individual bulb weight (23.5 g). The lower individual bulb weight (19.475 g) was obtained from the BAU Rashun-2 (Table 1). The higher dry weight (7.775 g) of individual bulb was recorded from BAU Rashun-1 and the lower (6.45 g) dry weight was found from BAU Rashun-2 (Table 1). Variation in dry weight of individual bulb of the two varieties was due to variation in growth characteristics. These results agree with the results of Chowdhury (1999).

**Diameter of bulb:** Non significant variation was found in two varieties in respect of bulb diameter. However, BAU Rashun-2 gave the higher (3.11 cm) bulb diameter and it was lower (3.1 cm) in BAU Rashun-1 (Table 1)

**Yield per hectare:** The yield of bulb per hectare was statistically significant due to the effect varieties. The higher yield of bulb was found in BAU Rashun-1 (12.075 t/ha) and the lower was from BAU Rashun-2 (9.325 t/ha) in table 1. The higher yield found in BAU Rashun-1 was possibly due to the production of larger number of cloves.

**Effect of organic manures on the growth and yield of two garlic varieties:** The main effects of organic manures on the growth and yield of garlic have been presented in Tables 2.

**Plant height and number of leaves per plant:** The highest plant height (50.57cm) was found with the plant grown under cowdung followed by-MOC (50.16 cm),and compost (44.56 cm) (Table 3). The lowest plant height (39.05 cm) was found when plants were grown under the treatment of A-Salam brand item. The

maximum plant height obtained from cowdung application was due to its contribution towards improvement of soil physical properties which might have encouraged more vegetative growth and development. The highest number of leaves (6.41) per plant was obtained from the plants grown with cowdung followed by MOC (5.43) and compost (5.17) and the minimum (4.12) was found in the treatment of A- Salam brand item (Table 2).

**Fresh weight and dry weight of bulb per plant:** The highest weight of individual bulb (29.40 g) was found from the treatment of MOC followed by cowdung (26.75 g) and bonemeal (26.75 g) and bonemeal (24.43 g). The lowest bulb weight (12.63 g) was observed when plants were grown under the treatment of A-Salam brand item (Table 2). The highest dry weight (11.625 g) of bulb was recorded from the treatment of cowdung followed by MOC (9.5 g) and bonemeal (8.05 g). The lowest dry weight of bulb (4.575 g) was observed in the treatment of A-Salam brand item (Table 2).

**Diameter of bulb:** The highest diameter of bulb (3.62 cm) was found with the plants having bonemeal followed by compost (3.61 cm) and MOC (3.46 cm). The lowest bulb diameter (2.23 cm) was obtained from the treatment of biogold (Table 2).

**Yield of bulb:** The highest bulb yield (13.725 t/ha) was obtained from the treatment of cowdung followed by MOC (13.55 t/ha) and Biomeal (13.175 t/ha) and the lowest (5.95 t/ha) was from the treatment of A-Salam brand item (Table 4 and Fig. 2). The highest yield was probably due to the improved physical condition of soil for better growth of garlic at different stages. Mallanagouda *et al.* (1995), Vinay *et al.* (1995), Bogatirenko (1975) obtained the highest yield of bulb from organic + inorganic fertilizers.

**Table 1. Effect of varieties on growth, yield components and yield of garlic**

Treatments	Plant height (cm) at 90 DAP	Number of leaves at 90 DAP	Fresh weight of bulb (g)	Dry weight of bulb (g)	Diameter of bulb (cm)	Yield of bulbs/ha (t)
BAU Rashun-1 (V <sub>1</sub> )	47.96	4.95	23.25	7.78	3.10	12.07
BAU Rashun-2 (V <sub>2</sub> )	39.67	4.88	19.47	6.45	3.11	9.32
LSD at 1%	5.95	-	0.87	0.31	--	0.40
Level of significance	**	NS	**	**	NS	**

**Table 2. Effect of organic manures on growth, yield components and yield of garlic**

Treatments	Plant height (cm) at 90 DAP	Number of leaves at 90 DAP	Fresh weight of bulb (g)	Dry weight of bulb (g)	Diameter of bulb (cm)	Yield of bulbs/ha (t)
T <sub>1</sub> (Cowdung)	50.57	6.41	26.75	11.63	3.30	13.73
T <sub>2</sub> (Compost)	44.56	5.17	22.10	7.03	3.61	11.23
T <sub>3</sub> (Bone meal)	40.03	4.88	24.43	8.05	3.62	11.00
T <sub>4</sub> (MOC)	50.16	5.43	29.40	9.50	3.46	13.55
T <sub>5</sub> (Biomeal)	41.63	4.80	21.03	5.18	3.45	13.18
T <sub>6</sub> (Biogold)	41.25	4.13	16.43	5.30	2.23	8.08
T <sub>7</sub> (Biostar)	43.27	4.40	18.18	5.73	2.60	8.93
T <sub>8</sub> (A-Salam brand)	39.05	4.12	12.63	4.58	2.58	5.95
LSD at 1%	11.90	0.58	1.74	0.62	0.56	0.81
Level of significance	**	**	**	**	**	**

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

### Combined effect of varieties and organic manures on the growth and yield of garlic:

At 90 DAP, the highest plant height (63.18 cm) was recorded from the treatment combination of BAU Rashun-1 with MOC and the lowest (34.40cm) was found from the treatment combination of BAU rashun-2 with biomeal. At 90 DAP, the highest number of leaves per plant (6.60) was obtained from the treatment combination of BAU Rashun-2 with cowdung and the minimum number of leaves per plant (3.83) was recorded from the combination of BAU Rashun-1 with A-Salam brand treatment (Table 3). It was observed that the treatment combination of BAU Rashun-1 with MOC gave the highest fresh weight of individual bulb (32.50 g) and BAU Rashun-2 with A-Salam brand

treatment combination gave the lowest fresh weight (11.425 g) of individual bulb (Table 3). The treatment combination of BAU Rashun-1 with cowdung gave the highest dry weight of individual bulb (12.225 g) and the lowest (3.15 g) was obtained from BAU Rashun-2 with biomeal (Table 3). The treatment combination of BAU Rashun-2 with bonemeal gave the highest bulb diameter (4.11cm) and the lowest diameter (2.10cm) was obtained from by the treatment combination of BAU Rashun-1 with Biogold (Table 3). The treatment combination of BAU Rashun-1 with cowdung gave the highest yield per hectare (15.975 t) and the treatment combination of BAU Rashun-1 with A-Salam brand produced the lowest yield per hectare (5.375 t) in Table 3.

**Table 3. Combined effect of varieties and organic manures on growth, yield components and yield of garlic**

Treatments	Plant height (cm) at 90 DAP	Number of leaves at 90 DAP	Fresh weight of bulb (g)	Dry weight of bulb (g)	Diameter of bulb (cm)	Yield of bulbs/ha (t)
V <sub>1</sub> T <sub>1</sub>	52.38	6.22	28.00	12.23	3.50	15.98
V <sub>1</sub> T <sub>2</sub>	46.28	5.40	24.70	6.78	4.00	12.88
V <sub>1</sub> T <sub>3</sub>	43.00	5.10	26.15	8.20	3.13	11.88
V <sub>1</sub> T <sub>4</sub>	63.18	5.47	32.50	10.43	3.46	15.98
V <sub>1</sub> T <sub>5</sub>	48.87	4.53	18.63	7.18	3.51	13.83
V <sub>1</sub> T <sub>6</sub>	39.50	4.27	21.18	6.50	2.10	10.40
V <sub>1</sub> T <sub>7</sub>	47.60	4.80	21.08	6.18	2.59	10.35
V <sub>1</sub> T <sub>8</sub>	42.90	3.83	13.83	4.83	2.54	5.38
V <sub>2</sub> T <sub>1</sub>	48.76	6.60	25.50	11.03	3.10	11.48
V <sub>2</sub> T <sub>2</sub>	42.83	4.93	19.50	7.25	3.22	9.58
V <sub>2</sub> T <sub>3</sub>	37.07	4.67	22.70	7.90	4.11	10.13
V <sub>2</sub> T <sub>4</sub>	37.13	5.40	26.33	8.58	3.46	11.13
V <sub>2</sub> T <sub>5</sub>	34.40	5.07	23.43	3.15	3.38	12.53
V <sub>2</sub> T <sub>6</sub>	43.00	4.00	11.68	4.10	2.37	5.73
V <sub>2</sub> T <sub>7</sub>	38.93	4.00	15.25	5.30	2.62	7.50
V <sub>2</sub> T <sub>8</sub>	35.20	4.40	11.43	4.33	2.61	6.50
LSD at 1%	16.82	0.81	2.47	0.88	0.79	1.15
Level of significance	**	**	**	**	**	**

T<sub>1</sub> = Cowdung (15 t/ha), T<sub>2</sub> = Compost (10 t/ha), T<sub>3</sub> = Bone meal (3 t/ha), T<sub>4</sub> = MOC (5 t/ha), T<sub>5</sub> = Biomeal (51.87 kg/ha), T<sub>6</sub> = Biogold (24.7 kg/ha), T<sub>7</sub> = Biostar (19.76 kg/ha), T<sub>8</sub> = A-Salam (51.87 kg/ha); V<sub>1</sub> = BAU Rashun-1; V<sub>2</sub> = BAU Rashun-2; \*\* = Significant at 1% level of probability; NS = Not significant

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