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Effects of NPK from Organic and Inorganic Sources on Yield of Brinjal (*Solanum melongena* L.)

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ABSTRACT

The study was undertaken to investigate the effects of NPK from different sources on yield contributing characters and yield of brinjal. The experiment was conducted at the Horticulture Farm, Bangladesh Agricultural University, and Mymensingh during the period from 1st September, 2015 to 5th March, 2016. The experiment consisted of two varieties of brinjal (V_1= Uttara, V_2 = Kajla) and five different fertilizer doses. The two-factor experiment was laid out in Randomized Complete Block Design (RCBD) with three replications. Fertilizer combination showed significant effect on most of the yield components. Results revealed that, the highest plant height (87.89 cm), number of leaves (220.76), number of branches (18.17), number of flowers (38.50), number of fruits (34.84), individual fruit weight (56.50 g) and yield per plant (2.77 kg) and the lowest days required for first flowering (69.33) and first fruiting (78.50) were observed when the plants were treated with fertilizer dose T_4 (1250, 120, 36, 90 kg cow dung, N, P, K per ha). The lowest values were observed from the plants treated with T_0 (control) treatment except days required for first flowering and first fruiting.The present study is concluded that T_4 (1250, 120, 36, 90 kg cow dung, N, P, K per ha) fertilizer dose is the optimum dose for the growth and yield of brinjal.

Keywords: Brinjal, Growth, NPK fertilizer, Organic manure, Yield

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1. INTRODUCTION

Brinjal (*Solanum melongena* L.), also known as Aubergine, Brinjal or Guinea squash is an economically important vegetable widely cultivated in the tropics, subtropics and warm temperate regions. In Bangladesh the total production of brinjal is about 4, 50,000 metric tons which is covered around 12.34% of total area under vegetable (winter and summer) cultivation (BBS, 2017). There was production of 3,10,000 tons of brinjal from 76,000 acres area with an average yield of 10.06 ton/ha in rabi season during the year 2015-2016 (BBS, 2017) whereas the average yield in India and Japan are 20 and 30 tons/ha respectively (FAO, 2016).

In Bangladesh, nutrient stresses of soils are increasing day by day. Depletion of soil fertility has been identified as a major constraint for higher crop yield. Use of fertilizer is an essential component of modern farming of today with about 50% of the world crop production (Prodhan, 1992). Among the cultural technologies like application of organic manures with other inorganic fertilizers and selection of right variety is the important one. People have realized the benefits of organic manures for crops production and more specifically for vegetable production.

Now-a-days modern cultivation practices include organic manure for crops production including different fruits and vegetables. Vegetables that are produced by

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organic manures possess a better quality than that of produced by inorganic fertilizer. Application of proper dose of fertilizer is one of the most important ways of production quality vegetables s. Nitrogenous, phosphorus and potassic fertilizers have a great effect on this respect. Vizayakumar et al. (1995) reported that NPK fertilizers increase the vegetables growth and fruit yield of brinjal. Phosphorus is a constituent of nucleic acids and phospholipids which are important constituents of cell membrane (Sharma, 1995).

The efficient fertilizer management increases crop yield with the same time it reduces fertilization cost. Therefore, it is essential to find out the suitable rate of fertilizer for efficient utilization of this element by the plants for better yield performance. This research was undertaken to find out the optimum rate of organic and inorganic fertilizers to obtain satisfactory yield of brinjal.

2. MATERIALS AND METHODS

The experiment was conducted at the Horticulture Farm of Bangladesh Agricultural University, Mymensingh with two varieties of brinjal under different levels of organic and inorganic fertilizers during the period from 1st September, 2015 to 5th March, 2016. The experiment carried out in a high land belonging to the Old Brahmaputra Flood Plain (FAO, 1988). The texture was silty loam and soil p^H was 6.7. Total nitrogen 0.10%, available phosphorus 9.05 ppm, available potassium 0.10 me/100g soil.

During land preparation Urea, Triple Super phosphate (TSP) and Muriate of Potash (MoP) were applied as the source of nitrogen, phosphorus and potassium, respectively as per treatment in each experiment.Gypsum, $ZnSO4.7H_2O$ and Boric acid were applied as recommended. Half of cow dung was applied at the time of final land preparation. Remaining amount of cow dung and full amount of Phosphorus, Sulphur, Zinc and Boron were applied before one week of transplanting as per treatment. Nitrogen and potassium were applied in three equal installments 21, 35 and 50 days after transplanting (DAT) as ring method around the plants (Fertilizer Recommendation Guide, 2012).

The experiment was laid out in Randomized Complete Block Design (RCBD) design. There were two varieties and five doses of fertilizer, each replicated three times. The unit plot size was 2.4 m x 2.1 m = 5.04 sq. m and maintaining a spacing of 70 cm x 60 cm and with 0.5 m distance between unit plot. The experiment was consisted of 5 doses of organic and inorganic fertilizers and two varieties of brinjal.

Factor A: Two Brinjal varieties V_1= BARI Brinjal-1 (Uttara), V_2= BARI Brinjal-4 (Kajla). Factor B: Different levels of N, P and K from organic and inorganic source

T_0 = Control, T_1 = Only organic-100% (Cow dung – 5000 kg per ha), T_2 = Organic- 75% (Cow dung – 3750 kg per ha) +inorganic - 25% (40,12,30 kg N, P, K per ha), T_3 = Organic-50% (Cow dung – 2500 kg per ha) +inorganic - 50% (80,24,60 kg N, P, K per ha), T_4 = Organic-25% (Cow dung - 1250 kg per ha) + inorganic -75% (120,36,90 kg N, P, K per ha)

The collected data on various parameters under study were analyzed using the MSTAT statistical package program. The means for all the treatments were calculated and analyses of variance for all the characters were performed by F-variance test. The significance of the differences between the pairs of treatment means were evaluated by the least significant difference (LSD) test (Gomez & Gomez, 1984).

3. RESULTS AND DISCUSSION

3.1 Effect of variety on the yield and yield components of brinjal varieties

The effect of varieties in respect of plant height was found significant at 30, 50, 70, 90 and 110 DAT. Uttara variety produced maximum plant height (79.98 cm) while Kajla produced minimum plant height (77.86 cm) at 110 DAT (Table 1). But the variation among two varieties with respect to the average plant height was statistically significant. The variation might be due to the fact of genetically make up of these varieties which encouraged more vegetative growth through rapid cell elongation leading to the highest length. The present result is supported by the report of Sarkar & Haque (1980).

The effect of brinjal varieties in relation to number of leaves per plant was significant at 30, 50, 70 90 and 110 DAT. The variety Uttara produced the maximum number of leaves per plant (214.68) while Kajla produced the minimum (208.60) at 110 DAT (Table 1). This is occurred due to the genetical characteristics. Similar result was reported by Ahmed et al. (1988). They conducted an experiment with seven different varieties of brinjal and observed a significant variation in the number of leaves per plant.

Varieties of brinjal showed highly significant variation in respect of number of branches per plant. The variety Uttara produced the maximum number of branches per plant (18.00) while Kajla produced the minimum (16.01) number of branches (Table 1). This might have occurred due to the genetically.

Different brinjal varieties showed significant variations in respect of days to first flowering. The variety Uttara took minimum days (69.33) to first flowering while Kajla required maximum days (71.87) to initiate first flower (Table 1). However, V_1 and V_2 were statistically significant in this regard at 1% level of significance. The variations in days to first flowering in different brinjal varieties were possible due to their varietal traits. This result is in conformity with Sarkar and Haque (1980). They observed that the period of flowering varied from variety to variety. Vijay et al. (1977) also reported similar result.

There was a highly significant response of different varieties to the production of number of flowers per plant. The variety Kajla produced the maximum number of flowers per plant (38.60) and Uttara produced the minimum number of flowers (35.20) per plant (Table 1).The variation is probably duo to due to the varietal characteristics.

Table 1. Effect of variety on the yield and yield components of brinjal verities

Variety	Plant Height (cm) 110 DAT	No. of leaves 110 DAT	No. of branches 110 DAT	No. of flowers/plant	Days required for first flowering	Days required for first fruiting	No. of fruits/plant	Fruit length (cm)	Fruit breadth (cm)	Fruit weight (g)	No. of fruits/ plant	Yield (Kg/plant)	Yield (Kg/ plot)	Yield (Ton/ha)
Uttara	79.98	214.68	18.00	38.60	69.33	79.33	34.52	12.37	9.70	50.07	34.52	2.24	23.79	47.20
Kajla	70.55	208.60	16.52	35.20	71.87	81.88	29.47	12.57	9.84	52.00	29.47	1.90	21.12	41.90
LSD0.05	0.42	0.43	0.44	0.48	0.88	0.75	0.61	0.21	0.20	0.71	0.61	0.13	0.65	.75
LSD0.01	1.90	1.04	0.53	0.65	1.21	1.03	0.84	0.29	0.27	0.97	0.84	0.17	0.88	.89
Level of significance	**	**	**	**	**	**	**	NS	NS	**	**	**	**	

** = Significant at 1% level of probability, NS= Not significant,

Table 2. Effect of organic and inorganic fertilizer doses on the yield and yield components of brinjal

Treatment	Plant Height(cm) 110 DAT	No. of leaves 110 DAT	No. of branches 110 DAT	No. of flowers/plant	Days required for first flowering	Days required for first fruiting	No. of fruits/plant	Fruit length (cm)	Fruit breadth (cm)	Fruit weight (g)	No. of fruits/ plant	Yield (Kg/plant)	Yield (Kg/ plot)
T_0	56.75	163.73	13.12	32.50	73.50	84.50	23.98	11.35	8.32	45.00	23.98	1.47	14.44
T_1	70.55	176.25	13.52	37.67	69.50	80.33	30.37	11.55	9.25	48.67	30.37	1.75	21.11
T_2	77.56	183.63	14.93	37.83	70.67	80.00	33.03	13.05	11.10	52.00	33.03	1.95	24.25
T_3	80.85	193.67	15.48	38.00	70.00	79.67	34.84	13.25	10.93	53.00	34.84	2.43	25.83
T_4	87.89	220.76	18.17	38.50	69.33	78.50	33.78	13.13	9.25	56.50	33.78	2.77	26.62
$LSD_{0.05}$	0.54	0.94	0.78	0.75	1.39	1.19	0.97	0.33	0.31	1.12	0.97	0.20	1.02
$LSD_{0.01}$	0.66	1.64	0.92	1.03	1.91	1.63	1.33	0.46	0.43	1.53	1.33	0.27	1.40
Level of significance	**	**	**	**	**	**	**	**	**	**	**	**	**

** = Significant at 1% level of probability, DAT= Days After Transplanting

T_0 = Control, T_1 = Only organic-100% (Cow dung – 5000 kg per ha), T_2 = Organic- 75% (Cow dung – 3750 kg per ha) +inorganic - 25% (40,12,30 kg N, P, K per ha), T_3 = Organic-50% (Cow dung – 2500 kg per ha) +inorganic - 50% (80,24,60 kg N, P, K per ha), T_4 = Organic-25% (Cow dung - 1250 kg per ha) + inorganic -75% (120,36,90 kg N, P, K per ha)

Different brinjal varieties showed significant variations in respect of days to first fruiting. Uttara took minimum days (79.33) to first fruiting, while Kajla required maximum days (81.88) to set first fruit (Table 1). The variations in time to first fruiting in different brinjal varieties were possibly due to their varietal traits. This result is in agreement with Sarkar and Hoque (1980). They observed that the period of fruiting varied from variety to variety

There was a highly significant response of different brinjal varieties to the production of number of number of fruits per plant. Uttara produced the maximum number of fruits (34.52) per plant and Kajla produced the minimum number of fruits (29.47) per plant (Table 1). The variation in the number of number of fruits per plant among the brinjal varieties was probably due to the varietal characteristics.

The length of fruit wasn't found to be significant due to different brinjal varieties. However, Kajla produced longer fruit (12.57 cm). On the other hand, Uttara gave the shorter fruit (11.37 cm) (Table 1). Different length was shown in different varieties, which was also be influenced by different doses of organic and inorganic fertilizers. The variation in the length of fruit among the brinjal varieties was possibly due to genetic make-up of different varieties. This finding is supported by the observation of Passam and Bolmatis et al. (1997).

The breadth of fruit wasn't found to be significant due to different brinjal varieties. The maximum breadth of fruit (9.84 cm) was obtained from Kajla and the minimum breadth (8.52) cm) was found from Uttara (Table 1).

The result showed that weight of individual fruit was significantly influenced by varieties. The maximum weight of individual fruit (52 g) was found in Kajla and the minimum weight of individual fruit (50.07 g) was found from Uttara (Table 1).

Analysis of variance showed that different brinjal varieties resulted in significant variation in yield per plant. The maximum yield (2.24 kg) per plant was found in Uttara and the minimum yield (1.90 kg) per plant was found in Kajla at harvest (Table 1). The differences in the yield per plant might be due to the environmental adaptability of different varieties in different season or localities and due to the genetic make-up of the varieties. This is supported by the observation of Ahmed et al. (1983).

The differences in yield per plot were highly significant as influenced by different brinjal varieties. The maximum yield per plot (23.79 kg) was obtained from Uttara and the minimum yield per plot (21.12 kg) was recorded from Kajla at harvest (Table 1). The differences in the yield per plot might be due to the higher number of fruits.

The yield of fruits per plot of brinjal varieties was converted into per hectare and has been expressed in metric ton. The varietal difference in relation to yield was highly significant. The maximum yield per ha (47.20 ton) was obtained from Uttara and the minimum yield per ha (41.90 ton) was found in Kajla (Table 1).

3.2 Effect of organic and inorganic fertilizer doses on the yield and yield components of brinjal

There were significant differences in plant height influenced by the application of different doses of organic and inorganic fertilizer. The maximum plant height (87.89 cm) was recorded from the fertilizer dose T_4 (1250, 120, 36, 90, kg cow dung, N, P, K per ha) and minimum obtained from the control treatment (Table 2).

The number of leaves produced per plant under different doses of fertilizers was found statistically significant. The number of leaves per plant showed a gradual increase with the increasing rates of nitrogen. The maximum number of leaves per plant (220.76) was found from the application of fertilizer dose T_4 (1250, 120, 36, 90, kg cow dung, N, P, K per ha) and the lowest (200.66) was found by control treatment at 110 DAT (Table 2). The highest doses of fertilizer substances in plant body which have a function in cell organelles and create balance and more cell division, result more vegetative growth, Pandy and Sinha (1981).

The number of branches produced per plant under different doses of organic and inorganic fertilizer was found statistically significant. The maximum number of branches per plant (18.17) was found from the application of fertilizer dose T_4 (1250, 120, 36, 90, kg cow dung, N, P, K per ha) and the lowest (15.22) was found from the control treatment (Table 2).

Different organic and inorganic fertilizer doses showed highly significant variation in the requirement of days to first flowering. The plants fertilized with T_4 (1250, 120, 36, 90, kg cow dung, N, P, K per ha) dose resulted in early flowering (69.33), whereas delayed flowering (73.50) occurred in those plants that were not fertilized (Control) (Table 2). The results showed that higher fertilizer doses caused early flowering. Varis and George (1985) also found that high nitrogen level caused early flowering in case of tomato.

A significant effect of different doses of organic and inorganic fertilizer was observed on total number of flowers produced per plant. The plants from treatment T_4 (1250, 120, 36, 90, kg cow dung, N, P, K per ha) gave the maximum number of flowers per plant (38.50) while treatment T_0 (Control) gave minimum number of flowers per plant (32.50) (Table 2).

The effect of different doses of organic and inorganic fertilizers showed highly significant variation on days to first fruiting. The plant fertilized with T_4 (1250, 120, 36, 90, kg cow dung, N, P, K per ha) treatment produced early fruiting (78.50) and delayed fruiting (84.50) was occurred T_0 (Control) treatment (Table 2).

A significant effect of different doses of fertilizer was observed in number of fruits produced per plant. The plants from treatment T_4 (1250, 120, 36, 90, kg cow dung, N, P, K per ha) gave the maximum number of number of fruits (34.84) per plant while treatment T_0 (Control) gave minimum number of number of fruits (23.98) per plant (Table 2).

Table 3. combined effect of varieties and organic and inorganic fertilizer doses on the yield and yield components of brinjal

Variety x treatment	Plant height (cm) 110 DAT	No. of leaves 110 DAT	No. of branches 110 DAT	No. of flowers/ plant	Days required for first flowering	Days required for first fruiting	No. of fruits/ plant	Fruit length (cm)	Fruit breadth (cm)	Fruit weight (g)	No. of fruits/ plant	Yield (Kg/plant)	Yield (Kg/plot)
V_1T_0	70.76	205.65	16.56	34.33	72.00	83.33	25.67	10.50	8.30	45.00	25.67	1.50	14.08
V_1T_1	78.91	207.46	17.86	37.33	67.33	76.33	33.13	12.03	9.33	48.00	33.13	1.96	22.99
V_1T_2	76.67	219.76	17.67	40.33	70.00	79.67	33.85	13.23	11.23	51.00	33.85	2.12	26.21
V_1T_3	84.13	216.86	18.63	38.33	70.67	81.67	35.97	12.67	9.30	53.00	35.97	2.74	27.35
V_1T_4	89.45	223.65	19.29	42.67	66.67	75.67	44.00	13.40	10.33	53.33	44.00	2.90	28.30
V_2T_0	71.87	195.67	13.87	30.67	75.00	85.67	22.30	12.20	8.33	45.00	22.30	1.45	14.80
V_2T_1	73.37	201.23	16.34	38.00	71.67	84.33	27.61	11.07	9.17	49.33	27.61	1.53	19.23
V_2T_2	77.19	215.78	15.87	35.33	71.33	80.33	32.20	12.87	10.97	53.00	32.20	1.78	22.30
V_2T_3	81.57	212.45	16.91	34.33	72.00	81.33	33.68	13.10	11.53	52.67	33.68	1.96	23.36
V_2T_4	85.32	217.87	17.05	37.67	69.33	77.67	31.58	13.60	9.20	60.00	31.58	2.80	25.90
$LSD_{0.05}$	2.32	2.15	0.36	1.07	1.97	1.68	1.37	0.47	0.44	1.58	1.37	0.28	1.44
$LSD_{0.01}$	3.18	2.95	0.50	1.46	2.70	2.30	1.88	0.64	0.61	2.17	1.88	0.39	1.98
Level of significance	**	**	**	**	**	**	**	**	**	**	**	**	**

** = Significant at 1% level of probability, NS= Not significant, DAT= Days After Transplanting

V_1 = Uttara, V_2 = Kajla.T_0 = Control, T_1 = Only organic-100% (Cow dung – 5000 kg per ha), T_2 = Organic- 75% (Cow dung – 3750 kg per ha) +inorganic - 25% (40,12,30 kg N, P, K per ha), T_3 = Organic-50% (Cow dung – 2500 kg per ha) +inorganic - 50% (80,24,60 kg N, P, K per ha), T_4 = Organic-25% (Cow dung - 1250 kg per ha) + inorganic -75% (120,36,90 kg N, P, K per ha)

Length of fruits at harvest due to different doses of organic and inorganic fertilizers showed significant variation. Plants treated with fertilizer dose T_3 (2500, 80, 24. 60, kg cow dung, N, P, K per ha) produced the longest fruit (13.25 cm) and the control treatment produced the shortest fruit (11.35 cm) (Table 2). The above results in respect of fruit length were in conformity with the result of Mertia and Chauhan (1970).

Application of different doses of organic and inorganic fertilizers caused significant influence on the breadth of fruits of brinjal. The maximum breadth of fruit (11.10 cm) was found with the T_2 (3750, 40, 12, 30, kg cow dung, N, P, K per ha) treatment and the minimum (8.32 cm) was from T_0 (Control) treatment at harvest (Table 2). The breadth of fruit showed 0.0+2 a general trend of gradual increase with the increasing rate of fertilizer. Same trend was observed by Mertia and Chauhan (1970).

Different doses of organic and inorganic fertilizers caused significant effects on weight of individual fruit. The highest weight of individual fruit (56.50 g) was recorded from the T_4 (1250, 120, 36, 90, kg cow dung, N, P, K per ha) treatment and lowest (45.00 g) was obtained from T_0 (control) treatment at harvest (Table 2). The results clearly indicated that weight of individual fruit was increased with the increasing rates of fertilizers. It was possible that increased vegetative growth resulted in more favorable nutritional condition of the plants, which resulted in more weight of individual fruit. These results were in conformity with the findings Ganakumari and Satyanarayana (1970) reported that nitrogen level significantly increased the individual fruit weight. They found an increased fruit weight up to 280 kg N/ha.

The different doses of fertilizers had significant effect on the yield per plant. The maximum yield per plant (2.77 kg) was recorded from the T_4 (1250, 120, 36, 90, kg cow ung, N, P, K per ha) treatment and minimum (1.47 kg) was obtained from T_0 treatment (control) at harvest (Table 2). The result is partially similar with the result of Nandekar and Swarkar (1990) that the highest yield was recorded in the plant having 280 kg N/ha. The effect of different doses of organic and inorganic fertilizer was found significant in respect of yield per plot. The maximum yield per plot (26.62 kg) was recorded with the T_4 (1250, 120, 36, 90, kg cow dung, N, P, K per ha) treatment and the minimum yield per plot (14.44 kg) was found from the T_0 (control) treatment at harvest (Table 2). The result is partially similar with the result of Nandekar and Swarkar (1990). They recorded an increasing individual fruit weight by using of higher NPK doses.

There was a significant effect of the different doses of organic and inorganic fertilizers on the yield per hectare. The highest yield (52.82 ton) was obtained from T_4 (1250, 120, 36, 90, kg cow dung, N, P, K per ha) treatment, while the lowest yield of fruits per hectare (28.65 ton) was recorded in the T_0 (control) treatment (Fig. 1). The results revealed that the fruit yield of brinjal was increased gradually with increasing in fertilizer doses. Several authors reported such increasing yield with increased levels of fertilizer. Umrani and Khot (1972) found the maximum yield at 112 kg N per ha and the minimum from that of the control.

3.3 Combined effect of varieties and organic and inorganic fertilizer doses on the yield and yield components of brinjal

From the result, it was found that the combined effect of different varieties and fertilizer doses was significant on plant height at 30, 50, 70 ,90 and 110 DAT. The highest plant height (89.45 cm) was recorded from the treatment combination of V_1T_4 (Uttara and 1250, 120, 36, 90, kg cow dung, N, P, K per ha and the lowest plant height (70.76 cm) was found in the treatment combination of V_1T_0 (Uttara and Control) at 110 DAT (Table 3). Plant height showed a general trend of gradual increase with the increasing levels of fertilizer. The taller plants at the higher doses of fertilizers were found possibly due to the plants received more nutrients which might have encouraged more vegetative growth. Fertilizer doses contain important element like nitrogen, phosphorus, potassium, sulphur, zinc and boron which help in carry out many important physiological activities which enhance the vegetative growth in plant body. The result was similar with the result of Mertia & Chauhan (1970) and Singh & Maurya (1992).

The combined effect of brinjal varieties and different doses of organic and inorganic fertilizer was significant at 30, 50, 70,90 and 110 DAT in respect of number of leaves per plant. The maximum number of leaves (223.65) was obtained from the treatment combination of V_1T_4 (Uttara and 1250, 120, 36, 90, kg cow dung, N, P, K per ha) and minimum (195.67) at V_2T_0 (Kajla and Control) (Table 3). This result is in agreement with the previous findings of Mertia & Chauhan (1970).

The combined effect of brinjal varieties and different doses of organic and inorganic fertilizer was found significant in respect of number of branches per plant. The maximum number of branches (19.29) was obtained from the treatment combination of V_2T_4 (Kajla and 1250, 120, 36, 90, kg cow dung, N, P, K per ha) at 110 DAT and the minimum number of branches (13.87) was found from treatment combination of V_1T_0 (Uttara and Control) at same DAT (Table 3).

The combined effect of brinjal varieties and different doses of organic and inorganic fertilizer was found significant in respect of days to first flowering. The early flowering (66.67) was obtained from the treatment combination of V_1T_4 (Uttara and 1250, 120, 36, 90, kg cow dung, N, P, K per ha). The delayed flowering (75.00) was found with the treatment combination of V_1T_0 (Uttara and Control) (Table 3).

The interaction effect of different brinjal varieties and different doses of organic and inorganic fertilizers with regard to the number of flowers per plant was found to be significant. The maximum number of flowers per plant (42.67) was obtained from the treatment combination of V_2T_4 (Kajla and 1250, 120, 36, 90, kg cow dung, N, P, K per ha). The minimum (30.67) number of flowers per plant was

found from treatment combination of V_1T_0 (Uttara and Control) (Table 3). From Kajla variety and optimum supply of nutrients plants produced higher number of flowers per plant.

The results clearly indicated that number of flowers was increased with the increasing rates of fertilizers. It was possible that increased vegetative growth resulted in more favorable nutritional condition of the plants, which resulted in a greater number of flowers. These results were in conformity with the findings of Rastogi et al. (1979). They found an increasing number of flower production by the application of higher levels of nitrogen and phosphorus. These results were also supported by the work of Chandrasekhram & George (1973).

The combined effect of brinjal varieties and different doses of organic and inorganic fertilizers was found significant in respect of days to first fruiting. The early fruiting (75.67) was obtained from the treatment combination to V_1T_4 (Uttara and 1250, 120, 36, 90, kg cow dung, N, P, K per ha). The delayed fruiting (85.67) was found with the treatment combination of V_1T_0 (Uttara and Control) (Table 3). Interaction effect was significant in this respect.

The interaction effect of different brinjal varieties and different doses of organic and inorganic fertilizers with regard to the number of fruits per plant was found to be significant. The maximum number of fruits (44.40) per plant was obtained from the treatment combination of V_1T_4 (Uttara and 1250, 120, 36, 90, kg cow dung, N, P, K per ha) and the minimum (25.67) was found from treatment combination of V_1T_0 (Uttara and Control) (Table 3). The results clearly indicated that number of flowers was increased with the increasing rates of fertilizers. It was possible that increased vegetative growth resulted in more favorable nutritional condition of the plants, which resulted in a greater number of fruits. These results were in conformity with the findings of Rastogi et al. (1979). They found an increasing number of fruits production by the application of higher levels of nitrogen and phosphorus.

There was significant effect on the average length of fruit of brinjal due to the combined effect of brinjal varieties and organic and inorganic fertilizer doses. The longest fruit (13.60 cm) was found from the treatment combination of V_2T_4 (Kajla and 1250, 120, 36, 90, kg cow dung, N, P, K per ha) and the shortest length of fruit (10.50 cm) was recorded from the V_2T_0 (Kajla and Control).

The combined effects of brinjal varieties and different doses of organic and inorganic fertilizers were significant in relation to fruit breadth. The maximum breadth of fruit (11.53 cm) was observed when the plants were produced under the treatment combination of V_2T_4 (Kajla and 1250, 120, 36, 90, kg cow dung, N, P, K per ha) and the minimum breadth of fruit (8.30 cm) was obtained from the treatment combination of V_1T_0 (Uttara and Control) at harvest (Table 3).

The combined effect of brinjal varieties and different doses of organic and inorganic fertilizers had significant influence on weight of individual fruit. The maximum yield (60.00 g) was obtained from the treatment combination of V_2T_4 (Kajla and 1250, 120, 36, 90, kg cow dung, N, P, K per ha) and the minimum (45 g) was from the treatment combination of V_1T_0 (Uttara and Control) at harvest (Table 3). It might be due to more stored food materials available in them and that produced more vigorous growth with plenty of roots. These results were similar with the findings of Mertia, and Chauhan (1970) who reported that, different fertilizers level significantly increased the individual fruit weight of brinjal.

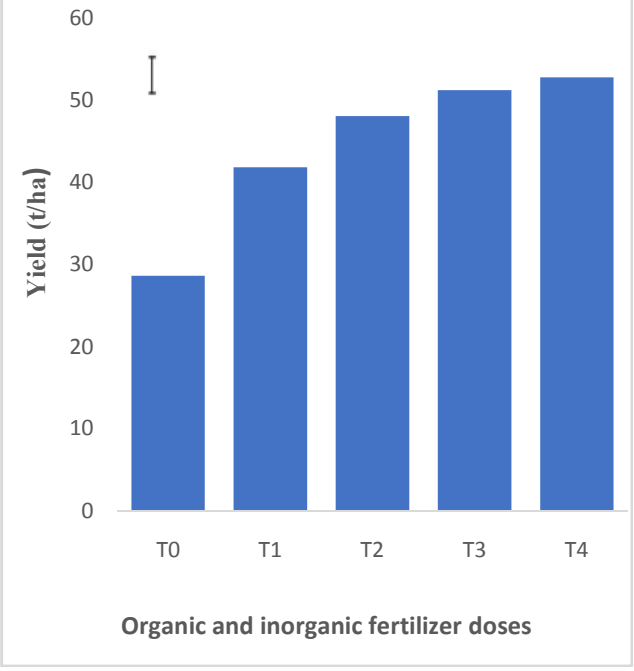

Fig. 1. Effect of organic and inorganic fertilizer doses on yield of brinjal

The combined effect of brinjal varieties and different doses of organic and inorganic fertilizers had significant effect on yield per plant. The maximum yield per plant (2.90 kg) was recorded from the treatment combination of V_1T_4 (Uttara and 1250, 120, 36, 90, kg cow dung, N, P, K per ha) and the minimum (1.45 kg) was from the treatment combination of V_2T_0 (Kajla and Control) at harvest (Table 3).

The combined effect of brinjal varieties and different doses of organic and inorganic fertilizer was found significant in respect of yield per plot. The maximum yield per plot (28.30 kg) was recorded with the treatment combination of V_1T_4 (Uttara and 1250, 120, 36, 90, kg cow dung, N, P, K per ha) and the minimum yield per plot (14.08 kg) was obtained from the treatment combination of V_1T_0 (Uttara and Control) at harvest (Table 3).

The combined effect of brinjal varieties and doses of fertilizers were significant on the yield of fruits per hectare. The maximum yield of fruits per hectare (56.16 ton) was obtained from the treatment combination of treatment combination of V_1T_4 (Uttara and 1250, 120, 36, 90, kg cow

dung, N, P, K per ha) and the minimum yield per hectare (27.94 ton) was obtained from the treatment combination of V_1T_0 (Uttara and Control) at harvest (Fig. 2). Interaction effect was also significant in this respect. This result was almost in agreement with the findings of Nandekar & Swarkar (1990).

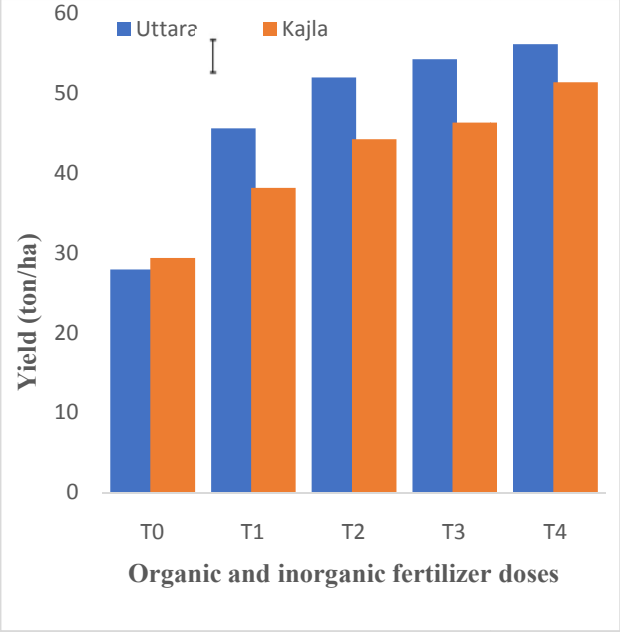

Fig. 2. Combined effect of varieties and organic and inorganic fertilizer doses on yield of brinjal.

3.4 Relationship between fertilizer doses and yield

It has been observed that yield of brinjal has significant positive correlation with fertilizer dose (r = 0.929*) (Fig. 3). This relationship indicated that higher fertilizer dose was one of the most important factors in producing higher yield in brinjal. An increase in the fertilizer dose will ultimately lead to an increase in the yield of brinjal.

4. CONCLUSION

From the present study it may be concluded that the fruit yield of V_1 (Uttara) were higher than V_2 (Kajla) that gave the best plant growth and yield. The result of the present experiment also revealed that different doses of organic and inorganic fertilizers play an important role on the growth and yield of brinjal. In respect of yield and yield contributing characters, organic and inorganic fertilizer doses exerted marked effect over the control. The combined effect of organic and inorganic fertilizers was more effective than any other single treatment. Therefore, it could be suggested that T_4 (1250, 120, 36, 90, kg cow dung, N, P, K per ha) fertilizer dose is the optimum dose for the growth and yield of brinjal.

The experiment was conducted under the Mymensingh region. Therefore, further study is necessary in other places of Bangladesh.

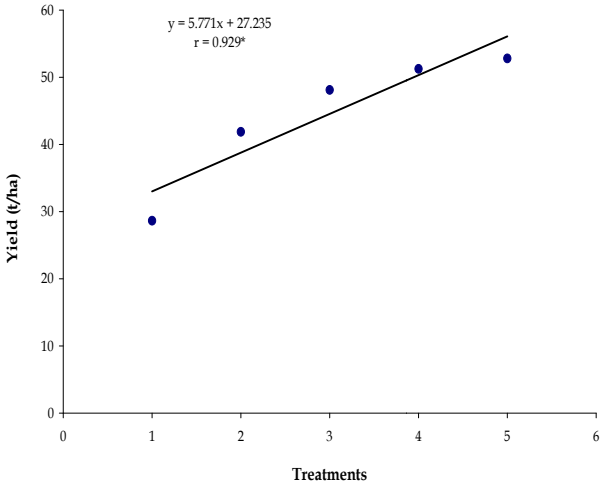

Fig. 3. Relationship between treatments and yield of brinjal

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