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Influence of Seed Treatment with Indole Acetic Acid on Mungbean Cultivation

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Abstract: The study was carried out in the Field Laboratory of the Department of Crop Botany, Bangladesh Agricultural University, Mymensingh during the period from October 2000 to February 2001 to evaluate the influence of seed treatment with Indole Acetic Acid (IAA) by the concentration of 50 ppm, 100 ppm and 200 ppm on the growth, yield and yield contributing characters of two modern mungbean (*Vigna radiata* L.) varieties viz. Barimoog-4 and Barimoog-5. The two-factor experiment was laid out by Randomized Complete Block Design (RCBD) with 3 replications. In the experimental, seed treatment with 100 ppm IAA resulted the highest plant height, leaf area, leaf area index and number of seeds pod^{-1} (7.73). On the other hand, seed treatment with 200 ppm IAA resulted the highest Relative Growth Rate (RGR), Crop Growth Rate (CGR), Net Assimilation Rate (NAR), total dry matter, number of pods plant^{-1} (16.30), pod length (5.59 cm), fresh weight of pod plant^{-1} (13.00 g), dry weight of pod plant^{-1} (9.65 g), 1000-seed weight (40.10 g), seed yield plant^{-1} (4.99 g), harvest index (38.48). In addition, among the mungbean varieties, Binamoog-5 performed better than that of Binamoog-4.

Key words: Mungbean, *Vigna radiata*, Indole acetic acid, seed treatment, growth, yield

INTRODUCTION

Mungbean (*Vigna radiata* L.) is an important pulse crop of global economic importance. It ranks first position in price, fourth in acreage and sixth in production in Bangladesh (BBS, 2001). Mungbean covers an area of 55,100 ha and production was about 36,000 metric tons (BBS, 2001). Mungbean has a special importance in intensive crop production system of the country for its short growing period (Ahmed, 1989). Mungbean contains 51% carbohydrate, 26% protein, 10% moisture, 4% mineral and 3% vitamin. Hence, mungbean is the best of all pulses on nutritional point of view (Khan, 1981; Kaul, 1982). Mungbean is deep-rooted plant, opens up soil by penetrating root system where the roots decay and improve aeration. Moreover, it increases soil fertility through biological nitrogen fixation (Hoque, 1989). The average yield of mungbean in Bangladesh is about 570 kg ha^{-1}, which is much lower than that of India and some other countries of the world. The crop has received very little attention by the researchers in comparison to other cereals and grain crops. Indole Acetic Acid (IAA) is one of the important plant growth regulators, which can manipulate a variety of growth and developmental phenomena in various crops. A foliar application of IAA has bean found to increase plant height, number of leaves/plant, fruit size with consequent enhancement in seed yield in different crops like groundnut (Lee, 1990), cotton (Kapgate *et al*., 1989) and cowpea (Khalil and Mandurah, 1989). Research on pre-sowing seed treatment of mungbean is very limited. In view of above facts, the present research work was designed to evaluate the influence of pre-sowing seed treatment with indole acetic acid on the growth, yield and yield contributing characters of two modern mungbean varieties viz., Barimoog-4 and Barimoog-5.

MATERIALS AND METHODS

The experiment was conducted at the Field laboratory of the Department of Crop Botany, Bangladesh Agricultural University, Mymensingh during the period from October, 2000 to February, 2001. There were four treatments viz., (I) T_1= Control (untreated), (ii) T_2= 50 ppm IAA, (iii) T_3= 100 ppm IAA and (iv) T_4= 200 ppm IAA. Two mungbean varieties viz., (I) V_1= Barimoog-4 and (ii) V_2= Barimoog-5 were used in the experiment. The land was prepared by three ploughing followed by laddering. The stubbles were removed from the land. The two-factor experiment was laid out by Randomized Complete Block Design (RCBD) with three replications. The two varieties were considered as the factor A and the treatments were

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considered as the levels of factor B. There were altogether eight treatment combinations. So the total numbers of plots were 24 and the size of unit plot was 2×1 m. The block-to-block and plot-to-plot distance was 1m and 0.5 m, respectively. The land was fertilized at 6 ton cowdung ha^{-1}, 66 kg ha^{-1} urea, 82 kg ha^{-1} TSP and 33 kg ha^{-1} MP. The fertilizers were applied at final land preparation (BARC, 1997). Seed rate was 25 kg ha^{-1}. Seeds were soaked in IAA solution as per treatments for 3 h. In case of control, seed were soaked only in water. Seeds were sown in line sowing method maintaining 2 to 3 cm depth. Line to line and seed to seed distance was 30 cm and 15 cm and 2 seeds were placed in each point. The young plants were irrigated by water cans. Moreover, first weeding and second weeding followed by thinning was done at 15 and 45 days after sowing. Besides, Dimecrone 50 EC was sprayed at 1 L ha^{-1} to prevent pod borer infestation. The first crop sampling was done on 25 days after sowing and it was continued up to 55 days after sowing at 10 days interval. At the time of each harvest, five plants were selected from each plot and leaf area, plant height, number of leaves per plant was recorded separately at each harvest. Physiological parameters like Leaf Area Index (LAI), Crop Growth Rate (CGR), Relative Growth Rate (RGR), Net Assimilation Rate (NAR) and total dry matter were also measured (Hunt, 1978). In addition, different yield contributing characters viz., number of pods $plant^{-1}$, pod length, fresh weight of pod $plant^{-1}$, dry weight of pod $plant^{-1}$, number of seeds pod^{-1}, thousand seed weight, seed yield/plant, seed yield was recorded and harvest index was measured (Donald, and Humblin, 1976). The collected data were statistically analyzed and the treatments mean were compared by DMRT (Gomez and Gomez, 1984).

RESULTS AND DISCUSSION

Influence of seed treatment with IAA on morphological characters of mungbean was recorded at 10 days interval from 25 to 55 days after sowing (Table 1). It was revealed that seed treatment with IAA had stimulatory effect on plant height. The application of 200 ppm IAA had superiority influence over 50 and 100 ppm IAA. It indicates that, plant height increase proportionately the increasing of the concentration of IAA in seed treatment from 50 ppm to 200 ppm. IAA induced higher plant height was reported earlier in soybean (Reena *et al*., 1999), grasspea (Rahman *et al*., 1989) and groundnut (Lee, 1990). The stimulatory effects of IAA on plant height in the present experiment agree well with the above findings. However, The maximum number of leaves $plant^{-1}$ was achieved by 50 ppm IAA at 35 and 55 DAS and 100 ppm IAA at 25 and 45 DAS. It means that the maximum number of leaves vary in between 50 ppm to 100 ppm from 25 to 55 DAS. In case of leaf area, 200 ppm IAA had the majority of higher leaf area throughout the earlier growth stages (25 and 35 DAS). But in the later two stages (45 and 55 DAS), the highest leaf area was found at 100 ppm IAA. Deotale *et al*. (1998) reported that when soybean seeds were treated with 0-150 ppm GA_3, the highest leaf area was obtained with 100 ppm. This finding is evident that plant growth regulators have influence on leaf area in pulses. The effect of IAA on leaf area index was significant at all the growth stages. The highest LAI was found at all the growth stages expect 25 DAS with 100 ppm IAA.

Influence of varieties on morphological characters of mungbean was studied at 10 days interval from 25 to 55 days after sowing (Table 2). Significant variation in plant height between the two varieties was found at different growth stages. Barimoog-5 had the highest plant height and always remains higher than that of Barimoog-4 in all growth stages. It was in agreement with the result of Thakuria and Saharia (1990) who reported that plant height differed among the varieties. However, higher number of leaves was found in Barimoog-4. The highest leaf area per plant was produced in Barimoog-5 at all stages expect 45 and 55 DAS. Similarly, Barimoog-5 had the highest leaf area index at all growth stage. The superiority of the varieties to each other seems to be due to its genotypic influence.

Interaction effect of seed treatment with IAA and varieties on morphological characters of mungbean was recorded at 10 days interval from 25 to 55 days after sowing (Table 3). The tallest plants were found in V_2T_4 at all counting dates. However, maximum number of leaves was found in V_1T_3 at 25 DAS and V_2T_2 at other counting dates. On the contrary, maximum leaf

Table 1: Influence of seed treatment with IAA on morphological characters of mungbean

	Plant height (cm)				Number of leaves $plant^{-1}$				Leaf area $plant^{-1}$ (cm^2 $plant^{-1}$)				Leaf area index			
Treatments	25 DAS	35 DAS	45 DAS	55 DAS	25 DAS	35 DAS	45 DAS	55 DAS	25 DAS	35 DAS	45 DAS	55 DAS	25 DAS	35 DAS	45 DAS	55 DAS
T_1	19.70c	25.65a	29.13b	29.43c	4.15b	5.22d	6.26c	6.91d	45.84c	128.32d	155.50d	166.62d	0.08b	0.23c	0.28d	0.30d
T_2	19.86bc	25.59a	29.76a	30.92b	4.26a	5.87a	7.26b	8.30a	53.43b	133.80c	165.87c	181.82c	0.10a	0.24bc	0.30c	0.33c
T_3	20.16ab	24.61c	30.12a	31.00b	4.27a	5.73b	7.74a	8.15b	60.11a	183.35a	214.87a	240.98a	0.11a	0.33a	0.39a	0.43a
T_4	20.39a	25.10b	30.13a	31.59a	4.10b	5.62c	7.44b	7.80c	60.17a	153.39b	186.67b	204.05b	0.11a	0.28b	0.34b	0.37b

T_1 = Control, T_2 = 50 ppm IAA, T_3 = 100 ppm IAA and T_4 = 200 ppm IAA

Value with different letter (s) within a column differs significantly at 5% level of significant (DMRT)

Table 2: Influence of varieties on morphological characters of mungbean

	Plant height (cm)				Number of leaves plant^{-1}				Leaf area plant^{-1} (cm^2 plant^{-1})				Leaf area index			
Varieties	25 DAS	35 DAS	45 DAS	55 DAS	25 DAS	35 DAS	45 DAS	55 DAS	25 DAS	35 DAS	45 DAS	55 DAS	25 DAS	35 DAS	45 DAS	55 DAS
V_1	19.25b	23.85b	28.66b	29.67b	4.24a	5.64a	7.06b	7.83a	46.81b	129.99b	200.19a	225.95a	0.08b	0.23b	0.29b	0.31a
V_2	20.80a	26.62a	30.90a	31.79a	4.15b	5.57b	7.28a	7.75b	62.97a	169.43a	162.262b	170.78b	0.11a	0.31a	0.36a	0.41b

V_1 = Barimoog-4 and V_2 = Barimoog-5, Value with different letter (s) within a column differs significantly at 5% level of significant (DMRT)

Table 3: Interaction effect of seed treatment with IAA and varieties on morphological characters of mungbean

	Plant height (cm)				Number of leaves plant^{-1}				Leaf area plant^{-1} (cm^2 plant^{-1})				Leaf area index			
Interactions	25 DAS	35 DAS	45 DAS	55 DAS	25 DAS	35 DAS	45 DAS	55 DAS	25 DAS	35 DAS	45 DAS	55 DAS	25 DAS	35 DAS	45 DAS	55 DAS
V_1T_1	20.00c	26.95bc	30.00c	30.31d	4.11cd	5.20d	6.20d	6.94f	41.61c	112.31d	140.65e	155.33f	0.08c	0.20c	0.25e	1.94f
V_1T_2	19.50d	24.81d	29.33d	30.89c	4.28b	5.77b	6.50d	7.80d	41.28c	113.06d	144.83e	153.72f	0.07c	0.20c	0.26e	2.26c
V_1T_3	18.90e	21.71e	28.33e	29.31e	4.43a	5.87ab	7.87ab	8.50b	51.01b	145.88c	185.62bc	191.32d	0.09b	0.26b	0.33bc	2.38b
V_1T_4	18.58e	21.91e	26.98f	28.19g	4.12cd	5.73b	7.68b	8.10c	53.32b	148.72bc	177.95cd	182.75e	0.10b	0.27b	0.32cd	3.00a
V_2T_1	19.39d	24.33d	28.25e	28.55f	4.18bc	5.23d	6.31d	6.88f	50.07b	144.33c	170.35d	177.91e	0.09b	0.26b	0.31d	1.54g
V_2T_2	20.21c	26.35c	30.19c	30.95c	4.24b	5.96a	8.02a	8.80a	65.58a	154.53bc	190.91b	209.91c	0.12a	0.28b	0.34b	2.05e
V_2T_3	21.42b	27.50b	31.90b	32.68b	4.10cd	5.58c	7.60b	7.80d	69.21a	220.82a	244.11a	290.64a	0.12a	0.40a	0.44a	2.25c
V_2T_4	22.19a	28.29a	33.27a	34.99a	4.07d	5.50c	7.20c	7.50e	67.02a	158.05b	195.39b	225.35b	0.12a	0.28b	0.35b	2.18d

T_1 = Control, T_2 = 50 ppm IAA, T_3 = 100 ppm IAA and T_4 = 200 ppm IAA, V_1 = Barimoog-4 and V_2 = Barimoog-5
Value with different letter (s) within a column differs significantly at 5% level of significant (DMRT)

Table 4: Influence of seed treatment with IAA on physiological characters of mungbean

	Relative growth rate (mg day^{-1})				Crop growth rate (mg cm^{-2} day^{-1})				Net assimilation rate (mg cm^{-2} day^{-1})				Total dry matter (g plant^{-1})			
Treatments	25 DAS	35 DAS	45 DAS	55 DAS	25 DAS	35 DAS	45 DAS	55 DAS	25 DAS	35 DAS	45 DAS	55 DAS	25 DAS	35 DAS	45 DAS	55 DAS
T_1	0.162a	0.127	0.084a	0.047a	0.012b	0.058d	0.109c	0.120c	0.825d	0.733c	0.776b	0.772c	0.139c	0.465d	1.070d	1.739d
T_2	0.144b	0.114	0.076a	0.043a	0.029b	0.080c	0.133b	0.136b	1.075c	0.916b	0.915a	0.812b	0.209b	0.654c	1.395c	2.151c
T_3	0.152ab	0.101	0.075a	0.023b	0.045a	0.099b	0.178a	0.082d	1.419b	0.934b	0.887a	0.410d	0.319a	0.875b	1.862a	2.314b
T_4	0.152ab	0.109	0.052b	0.046a	0.046a	0.114a	0.117c	0.178a	1.485a	1.153a	0.692c	0.938a	0.329a	0.965a	1.615b	2.601a

T_1 = Control, T_2 = 50 ppm IAA, T_3 = 100 ppm IAA and T_4 = 200 ppm IAA
Value with different letter (s) within a column differs significantly at 5% level of significant (DMRT)

Table 5: Influence of varieties on physiological characters of mungbean

	Relative growth rate (mg day^{-1})				Crop growth rate (mg cm^{-2} day^{-1})				Net assimilation rate (mg cm^{-2} day^{-1})				Total dry matter (g plant^{-1})			
Varieties	25 DAS	35 DAS	45 DAS	55 DAS	25 DAS	35 DAS	45 DAS	55 DAS	25 DAS	35 DAS	45 DAS	55 DAS	25 DAS	35 DAS	45 DAS	55 DAS
V_1	0.151b	0.110b	0.069b	0.051a	0.038a	0.086b	0.125b	0.172a	1.443a	1.032a	0.874a	1.040a	0.267a	0.745a	1.442b	2.398a
V_2	0.153a	0.116a	0.074a	0.028b	0.032b	0.096a	0.143a	0.086b	0.959b	0.836b	0.761b	0.426b	0.231b	0.735b	1.529a	2.005b

V_1 = Barimoog-4 and V_2 = Barimoog-5, Value with different letter (s) within a column differs significantly at 5% level of significant (DMRT)

area per plant and leaf area index was found in V_2T_3 at all counting dates.

Influence of seed treatment with IAA on physiological characters of mungbean was recorded at 10 days interval from 25 to 55 days after sowing (Table 4). The relative growth rate was maximized at 25 DAS and decreased with the advancement of crop growth in all treatments. However, crop growth rate increased gradually with the advancement of crop growth and maximized in 100 ppm IAA at 45 DAS and 200 ppm IAA at 55 DAS. Katiyar (1980) observed that application of IAA increase crop growth rate. This finding agreement with the above report. The highest NAR was obtained by 200 ppm IAA at 25, 35 and 55 DAS. But in 45 DAS obtained highest NAR by 50 ppm IAA. The highest total dry matter (2.601 g) was found at 55 DAS with 200 ppm IAA. Total dry matter of a crop is the output of net assimilation. It is mainly depended on the size of photosynthic system (Watson, 1947). In this study IAA increased the plant growth as well as the total dry matter by creating more activity of photosynthesis. Besides, Thakur and Panwar (1995) reported that IAA and GA_3 increased total dry matter in faba bean, it indicate that plant hormones can influence the total dry matter in plants.

Influence of varieties on physiological characters of mungbean on physiological characters of mungbean was recorded at 10 days interval from 25 to 55 days after sowing (Table 5). Maximum relative growth rate (RGR) was found in Barimoog-5 at 25, 35 and 45 DAS. But Barimoog-4 resulted highest RGR at 55 DAS. In case of crop growth rate, Barimoog-4 responded better than Barimoog-5 at 25 and 55 DAS. On the contrary, Barimoog-5 responded better than Barimoog-4 at 35 and 45 DAS. Barimoog-4 resulted higher net assimilation rate

Table 6: Interaction effect of seed treatment with IAA and varieties on physiological characters of mungbean

	Relative growth rate (mg day^{-1})				Crop growth rate (mg cm^{-2} day^{-1})				Net assimilation rate (mg cm^{-2} day^{-1})				Total dry matter (g plant^{-1})			
Interactions	25 DAS	35 DAS	45 DAS	55 DAS	25 DAS	35 DAS	45 DAS	55 DAS	25 DAS	35 DAS	45 DAS	55 DAS	25 DAS	35 DAS	45 DAS	55 DAS
V_1T_1	0.137d	0.140	0.081abc	0.062a	0.019d	0.058c	1.104d	0.162b	0.826f	0.815e	0.826c	1.096b	0.139g	0.461e	1.038g	1.939f
V_1T_2	0.147bcd	0.097	0.085ab	0.048ab	0.031bcd	0.066c	0.114b	0.155b	1.378c	0.926d	1.122a	1.039c	0.226f	0.594d	1.396e	2.257c
V_1T_3	0.158bc	0.110	0.063cde	0.038b	0.043abc	0.101ab	0.137bc	0.134c	1.589b	1.119b	0.831c	0.799d	0.305c	0.871b	1.630c	2.375b
V_1T_4	0.162b	0.097	0.048e	0.057a	0.057a	0.118a	0.117d	0.237a	1.981a	1.269a	0.718de	1.314a	0.398a	1.054a	1.706b	3.022a
V_2T_1	0.186a	0.120	0.086a	0.033b	0.022d	0.0158c	0.114d	0.078d	0.825f	0.651g	0.726d	0.448f	0.139g	0.469e	1.103f	1.539g
V_2T_2	0.140cd	0.130	0.067bcd	0.038b	0.026cd	0.094b	0.122cd	0.117c	0.772f	0.906d	0.709de	0.584e	0.191f	0.714c	1.394e	2.045e
V_2T_3	0.145bcd	0.097	0.087a	0.007c	0.046ab	0.098b	0.219a	0.029e	1.250d	0.750f	0.943b	0.109g	0.333b	0.880b	2.095a	2.254c
V_2T_4	0.141cd	0.122	0.055de	0.036b	0.035bcd	0.110ab	0.117d	0.118c	0.990e	1.037c	0.665e	0.562e	0.259d	0.876b	1.525d	2.180d

T_1 = Control, T_2 = 50 ppm IAA, T_3 = 100 ppm IAA and T_4 = 200 ppm IAA, V_1 = Barimoog-4 and V_2 = Barimoog-5
Value with different letter (s) within a column differs significantly at 5% level of significant (DMRT)

Table 7: Influence of seed treatment with IAA on yield and yield contributing characters of mungbean

Treatments	Number of pods plant^{-1}	Pod length (cm)	Fresh weight of pod plant^{-1} (g)	Dry weight of pod plant^{-1} (g)	Number of seeds^{-1} pod	1000 seed weight (g)	Seed yield plant^{-1} (g)	Harvest index (%)
T_1	13.34c	4.63d	6.22c	5.27c	6.55c	34.20d	2.99d	34.84b
T_2	13.97b	5.04c	8.02b	6.45b	6.95b	36.59c	3.54c	36.08b
T_3	16.04a	5.47b	12.56a	9.41a	7.73a	38.35b	4.91b	37.94a
T_4	16.30a	5.59a	13.00a	9.65a	6.66a	40.10a	4.99a	38.48a

T_1 = Control, T_2 = 50 ppm IAA, T_3 = 100 ppm IAA and T_4 = 200 ppm IAA
Value with different letter (s) within a column differs significantly at 5% level of significant (DMRT)

Table 8: Influence of varieties on yield and yield contributing characters of mungbean

Varieties	Number of pods plant^{-1}	Pod length (cm)	Fresh weight of pod plant^{-1} (g)	Dry weight of pod plant^{-1} (g)	Number of seeds^{-1} pod	1000 seed weight (g)	Seed yield plant^{-1} (g)	Harvest index (%)
V_1	14.51b	5.29a	9.59b	7.10b	7.34a	31.11b	3.27b	35.25b
V_2	15.32a	5.07b	10.30a	8.29a	7.09b	43.51a	4.95a	38.42a

V_1 = Barimoog-4 and V_2 = Barimoog-5, Value with different letter (s) within a column differs significantly at 5% level of significant (DMRT)

(NAR) than Barimoog-5 at all growth stages. In contrast, Barimoog-4 resulted higher total dry matter at all growth stages except 45 DAS.

Interaction effect of seed treatment with IAA and varieties on physiological characters of mungbean was recorded at 10 days interval from 25 to 55 days after sowing (Table 6). Maximum relative growth rate was found in V_2T_1 at 25 DAS, V_1T_1 at 35 and 55 DAS and V_2T_3 at 45 DAS. The highest crop growth rate was found in V_1T_4 at 25, 35 and 55 DAS and V_2T_3 at 45 DAS. The highest net assimilation rate was found in V_1T_4 at 25 and 35 DAS, V_1T_2 at 45 DAS and V_1T_4 at 55 DAS. The highest total dry matter was found in V_1T_4 at 25, 35 and 55 DAS and V_2T_3 at 45 DAS.

Influence of seed treatment with IAA on yield and yield contributing characters of mungbean was recorded at 10 days interval from 25 to 55 days after sowing (Table 7). Yield and contributing characters varied significantly from one treatment from another. Number of pods plant^{-1} ranged from 13.34 to 16.30, where the highest count of pods plant^{-1} was made in the plots of 200 ppm IAA, which was identical to the application of 100 ppm IAA. Similarly, Lee (1990) reported that soaking groundnut seed in solutions of 50, 100 and 200 ppm IAA prior to sowing produced plants with greater number of pods per plant. Pod length was varied from 4.63 to 5.95 cm, where the tallest pod was found by the treating seed with 200 ppm IAA. The highest fresh weight of pod plant^{-1} (13.00 g) and dry weight of pod plant^{-1}(9.65 g) was found by the treating seed with 200 ppm IAA, which were identical to the application of 100 ppm IAA. But the highest count of seeds pod^{-1} (7.73) was made in the plots of 100 ppm IAA, which was identical to the application of 200 ppm IAA. Abdul *et al.* (1996) noted that the number of seeds pod^{-1} was increased by 10^{-5} M IAA. Similarly, IAA treated plants had higher number of seeds pod^{-1} compared to the control in the present study. The highest 1000-seed weight (40.10 g) was found with 200 ppm IAA and the lowest in control. The seed yield of mungbean was influenced by the treating seed with IAA. Seed yield plant^{-1} varied from 2.99 to 4.99 g, where the maximum seed yield plant^{-1} was obtained by the treating seed with 200 ppm IAA and the lowest in control. Arora *et al.* (1988) reported that application of IAA at the 50 % flowering stage increased yield per plant compared with control. Zarrin and Asghari (1998) also found that seed treatment with 10^{-6} M IAA increase seed yield plant^{-1} in soybean. The highest harvest index (38.48%) was obtained by 200 ppm IAA and the lowest in control. Khan (1997) noted that application of IAA and GA_3 had favorable influence on harvest index.

Influence of varieties on yield and yield contributing characters of two cultivars of mungbean was recorded at 10 days interval from 25 to 55 days after sowing (Table 8).

Table 9: Interaction effect of seed treatment with IAA and varieties on yield and yield contributing characters of mungbean

Interactions	Number of pods plant^{-1}	Pod length (cm)	Fresh weight of pod plant^{-1} (g)	Dry weight of pod plant^{-1} (g)	Number of seeds^{-1} pod	1000 seed weight (g)	Seed yield plant^{-1} (g)	Harvest index (%)
V_1T_1	12.78e	4.88e	6.31d	4.91d	6.60d	28.25h	2.53g	33.97
V_1T_2	13.34de	5.08cd	7.01d	5.50d	7.15c	30.02g	2.36h	34.05
V_1T_3	15.40b	5.18c	11.10b	8.08c	7.45b	32.13f	3.84e	35.67
V_1T_4	16.50a	6.01a	13.97a	9.93ab	8.16a	34.03e	4.35d	37.30
V_2T_1	13.89d	4.38f	6.13d	5.64d	6.49d	40.15d	3.46f	35.71
V_2T_2	14.59c	5.00d	9.03c	7.42c	6.75d	43.15c	4.72c	38.11
V_2T_3	16.68a	5.75b	14.01a	10.73a	8.00a	44.57b	5.98a	40.19
V_2T_4	16.10a	5.16c	12.03b	9.37b	7.15bc	46.17a	5.62b	39.67

T_1 = Control, T_2 = 50 ppm IAA, T_3 = 100 ppm IAA and T_4 = 200 ppm IAA, V_1 = Barimoog-4 and V_2 = Barimoog-5
Value with different letter (s) within a column differs significantly at 5% level of significant (DMRT)

The highest number of pods plant^{-1}, fresh weight of pod plant^{-1}, dry weight of pod plant^{-1}, 1000 seed weight, seed yield plant^{-1} and harvest index was found in Barimoog-5. On the other hand, the highest pod length and number of seeds^{-1} pod was found in Barimoog-4.

Interaction effect of seed treatment with IAA and varieties on yield and yield contributing characters of mungbean was recorded at 10 days interval from 25 to 55 days after sowing (Table 9). The highest number of pods plant^{-1}, fresh weight of pod plant^{-1} and dry weight of pod plant^{-1} was found V_2T_3. The highest pod length and 1000-seed weight was found in V_1T_4 and $V_{2,3,4}T_4$ respectively. On the other hand, the highest seed yield plant^{-1} and harvest index was found in V_2T_3.

REFERENCES

Abdul, G.B.A., M.N. El-Shourbagy and R.A. El-Naggar, 1996. Effect of IAA and GA_3 on flax (*Linum usitatissium* L.) seed yield and their metabolic constituents. Egypt. J. Bot., 35: 1-9.

Ahamed, S.U., 1989. Response of mungbean (*Vigna radiata*) to inoculation with Rhizobium as affected by phosphorus levels. MS Thesis presented to the department of Soil Science, Bangladesh Agricultural University, Mymensingh.

Arora, N., B. Kaur, P. Singh and U. Paramar, 1988. Effect of IAA and cycocel on yield contributing parameters of chickpea (*Cicer arietinum* L.). Ann. Agril. Res., 19: 279-281.

BARC, 1997. Fertilizer Recommendation Guide, Bangladesh Agricultural Research Council, Farm Gate Dhaka, pp: 53-57.

BBS (Bangladesh Bureau of Statistics), 2001. Statistical Year Book of Bangladesh. Ministry of Planning, Government of the Peoples' Republic of Bangladesh, Dhaka, pp: 124.

Deotale, R.D., V.G. Maske, N.V. Sorte, B.S. Chimurkar and A.Z. Yerne, 1998. Effect of GA_3 and NAA on morpho-physiological parameters of soybean. J. Soils and Crops, 8: 91-94.

Donald, C.N. and J. Humblin, 1976. The biological yield and harvest index of cereals as agronomic and plant breeding criteria. Adv. Agron., 28: 361-405.

Gomez, K.A. and A.A. Gomez, 1984. Statistical Procedures for Agriculture Research. 2nd Edn., John Wiley and Sons., New York.

Hoque, M.S., 1989. Role of legume in soil fertility and *Rhizobium* inoculation for increasing production. Lecture not prepared for in country training on legumes, organized by BARI and sponsored AGIN/ICRISAT, held on Sept. 9-19, BARI.

Hunt, R., 1978. Plant Growth Analysis. Studies in Biology No. 96. Edward Arnold Ltd., London, pp: 67.

Katiyar, R.P., 1980. Developmental changes in leaf area index and other growth parameters in chickpea. Ind. J. Agric. Sci., 50: 684-691.

Kapgate, H.G., N.N. Potkile, N.G. Zode and A.M. Dhopte, 1989. Persistence of physiological responses of upland cotton to growth regulators. An. Plant Physiol., 3: 188-195.

Kaul, A.K., 1982. Pulses in Bangladesh. Bangladesh Agricultural Research Council, Farm Gate Dhaka, pp: 27.

Khalil, S. and H.M. Mandurah, 1989. Growth and metabolic changes of cowpea plants as affected by water deficiency and Indole acetic acid. J. Agron. Crop Sci., 165: 160-166.

Khan, M.A.H., 1981. The effect of carbon dioxide enrichment on the pattern of growth and development in rice and mustard. Ph.D. Thesis, Royal Veterinary and Agricultural University, Copenhagen, pp: 104.

Khan, M.S.K., 1997. Effect of different levels of nitrogen on growth, yield and quality of wheat. MS Thesis, Bangladesh Agricultural University, Mymensingh, Bangladesh.

Lee, H.S., 1990. Effects of pre-sowing seed treatments with GA_3 and IAA on flowering and yield components in groundnuts. Kor. J. Crop Sci., 35: 1-9.

Rahman, M.M., M.A. Islam and M.R.K. Mondal, 1989. Effect of wave length of light and some phytohormones on the growth and yield of grasspea. Bangladesh J. Agril. Res., 14: 19-23.

Reena, T., R.D. Delotale, N. Armarkar and C.N. Chore, 1999. Influence of seed soaking in IAA and kinetin solutions of growth and yield of soybean. J. Soils and Crops, 9: 72-77.

Thakuria, A. and P. Saharia, 1990. Response of mungbean genotypes to plant density and phosphorus levels in summer. Ind. J. Agron., 35: 431-432.

Thakur, A.K. and J.D.S. Panwar, 1995. Effect of *Rhizobium*-VAM interactions on growth and yield in mungbean (*Vigna radiate*) under field condition. Ind. J. Plant Physiol., 38: 62-65.

Watson, D.J., 1947. Comparative physiological studies on the growth of field crops 11. The effect of varying nutrient supply on net assimilation rate and leaf area. Ann. Bot., 11: 375-407.

Zarrin, F. and B. Asghori, 1998. Effects of seed treatments with growth hormones and Rhizobium on the oil contents, Nitrogen fixation and yield of soybean. Pak. J. Bot., 30: 86-89.