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EFFECT OF MIYODO ON GROWTH AND YIELD OF SESAME

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ABSTRACT

An experiment was conducted at the field laboratory of the Department of Crop Botany, Bangladesh Agricultural University, Mymensingh to investigate the effect of different concentrations of Miyodo on performances of sesame. The variety was BARI Til-3 and the concentrations of Miyodo were 2.0, 3.0, 4.0, 5.0 and 6.0 mg L^{-1} along with a control (distilled water). The test solutions of Miyodo were sprayed on leaves of sesame at 40 days after sowing (DAS). The experiment was laid out in a Complete Randomized Design (CRD) with three replications. In most of the cases, a gradual increase of growth and yield were noticed with the increase in concentration of Miyodo. 5 mg L^{-1} concentration was found to be the best for plant height, number of branches, number of leaves, number of flowers, total dry matter, number of capsules, number of seeds, capsule length, capsule diameter, seed weight, 1000-seed weight, and seed yield. The results of the experiment revealed that Miyodo at 5 mg L^{-1} as foliar spray had positive regulatory effect on morphological, growth, yield and yield contributing characters of sesame.
Key words: Miyodo, sesame, growth and yield.

Introduction

Sesame (*Sesamum indicum* L.) is one of the important oil seed crops widely grown in different parts of the world. The climatic and edaphic conditions of Bangladesh are suitable for cultivation of sesame crop. It is grown in both summer and winter. Sesame is rich in oil 42-50%, protein 14-20% and carbohydrate 20% (BARI, 2001). But, sesame yield is very low in Bangladesh due to lack of proper management practices (Rahman *et al.,* 1994). Miyodo is a newly marketed synthetic plant growth regulator, which was collected from Dr. Yasuo Kamuro, Marketing Director, BAL Planning Company Ltd., Ichinomiya, Japan, through the Department of Crop Botany, Bangladesh Agricultural University, Mymensingh. The producer company has been keeping its composition highly hidden due to commercial reason. Application of Miyodo has been found to increase growth and yield in soybean (Sarker, 2006) and in garlic. Changes in growth, yield and yield attributes of lentil by different growth regulators like TNZ-303, GABA, CI-IAA, GA_3 and IAA were studied by few workers (Ali, 2003), but the information regarding the effect of Miyodo on sesame is scantly. Therefore, the present research work was undertaken with the following objectives: to study the effect of Miyodo on performances of sesame and to find out the optimum concentration for desired yield.

Materials and methods

The experiment was conducted at the field laboratory of the Department of Crop Botany, Bangladesh Agricultural University, Mymensingh to investigate the effect of different concentrations of Miyodo on performances of sesame. The seeds of sesame (variety BARI Til-3) collected from the Bangladesh Agricultural Research Institute (BARI), Jaydebpur, Gazipur. The plant growth regulator Miyodo was collected from Dr. Yasuo Kamuro, Marketing Director, Bal Planning Co. Ltd., Ichinomiya, Japan, through the Department of Crop Botany, Bangladesh Agricultural University, Mymensingh. Miyodo was sprayed with six concentrations along with a control where only water was used. Thus six treatments of Miyodo were 0 mg L^{-1} (control)**,** 2mgL^{-1}, 3mg L^{-1}, 4mg L^{-1}, 5mg L^{-1} and 6mg L^{-1}. Each treatment was replicated thrice and therefore, the total no of plot was 18. The experimental was laid out in a Complete Randomized Design (CRD). All treatments were distributed in 18 plots randomly. The unit plot size was 1.5m ×1.0m. For preparation of Miyodo working solution of 2.0 mg L^{-1} and 3.0 mg L^{-1}, 4.0 mg L^{-1}, 5.0mg L^{-1} and

6.0 mg L^{-1} of original powder were prepared separately to 2L of water contained in volumetric flax and spraying was done on sesame plants at afternoon by using a hand sprayer. From each plot 3 plants were randomly selected and data were collected on morphological and growth characters at 7 days interval. The recorded data on different desired parameters under the experiment was statistically analyzed to obtain the level of significance using MSTAT-C pakage programme developed by Russel (1984). The differences between pairs of means were compared by Duncan's Multiple Range Test (Gomez and Gomez, 1984).

Results and Discussion

Effect of Miyodo on the morphological and growth characters

Plant height: The effect of different concentrations of Miyodo on plant height of sesame was statistically significant. Result revealed that plant height increased with the increase in concentration of Miyodo up to 5 mg L^{-1} and decreased with higher concentration at all growth stages. The plant height increased rapidly up to 76 DAS and there after increased slowly. The plant height was the highest at 5 mg L^{-1} at all growth stages (Table 1). In contrast, control always maintained the shortest plant height. At 90 DAS the maximum plant height was recorded in 5 mg L^{-1} (97.99cm) which was statistically similar to 6 mg L^{-1} (97.44cm), while the minimum was found in control (85.77cm). Similar result was reported by Rahman (2006) in mungbean.

Table 1. Effect of Miyodo on the morphological and growth characters of sesame

Miyodo concentration	Morphological and growth characters at different DAS					
	55 DAS	62 DAS	69 DAS	76 DAS	83 DAS	90 DAS
Plant height (cm)						
Control	37.83 c	55.55 b	71.88 c	81.32c	84.44d	85.77c
2 mg L^{-1}	38.07 bc	55.60 b	73.22 bc	82.22c	86.77cd	86.44c
3 mg L^{-1}	39.77 abc	56.92b	76.86ab	83.77bc	88.10bcd	89.77bc
4 mg L^{-1}	40.21 abc	60.55 ab	78.66a	88.32ab	90.44bc	92.55ab
5 mg L^{-1}	43.00a	65.66a	80.44a	90.55a	96.44a	97.99a
6 mg L^{-1}	42.77 ab	64.10a	79.00a	88.66ab	92.22ab	97.44a
$LSD_{(0.05)}$	4.41	4.93	4.60	5.14	4.56	6.37
CV (%)	6.03	4.54	3.30	3.30	2.80	3.84
Branch/plant (nos.)						
Control	2.66 d	2.88 c	2.99 b	3.11 d	3.19 d	3.20 c
2 mg L^{-1}	2.70 cd	2.88 c	3.06 b	3.26 cd	3.30 cd	3.30 c
3 mg L^{-1}	2.76 bc	2.99 bc	3.16 b	3.46 bc	3.65 ab	3.66 bc
4 mg L^{-1}	2.84 ab	3.21 abc	3.58 a	3.77 ab	3.88 ab	3.90 a
5 mg L^{-1}	2.87a	3.30 ab	3.60 a	3.88 a	3.90a	3.99a
6 mg L^{-1}	2.85 a	3.41 a	3.66 a	3.77 ab	3.77 ab	3.77a
$LSD_{(0.05)}$	0.08	0.36	0.39	0.32	0.35	0.34
CV (%)	1.77	6.49	6.50	4.98	5.55	5.43
Leaves/plant (no.)						
Control	38.22 b	67.44 b	82.55d	95.77 c	99.66c	-
2 mg L^{-1}	40.21 ab	68.88 b	84.99cd	99.44 bc	103.55bc	-
3 mg L^{-1}	40.21 ab	69.10 b	87.66 bcd	103.10abc	106.10abc	-
4 mg L^{-1}	44.22 a	74.55 a	90.88 bc	105.55abc	114.22ab	-
5 mg L^{-1}	46.11 a	76.88 a	92.99 ab	112.77a	116.66a	-
6 mg L^{-1}	44.88 a	77.77 a	97.55 a	110.77 ab	117.88a	-
$LSD_{(0.05)}$	5.91	5.34	6.37	11.43	11.61	-
CV (%)	7.68	4.09	3.92	6.01	5.82	-

In a column, figures having similar letter (s) do not differs significantly at $p \leq 0.05$.
DAS = Days after sowing

Number of branches: The effect of different concentrations of Miyodo had significant effect on number of branches/plant (Table 1). Results revealed that the number of branches increased with the increase in concentration of Miyodo up to 5 mg L^{-1}, except 62 DAS and 69 DAS. The maximum number of branches was found with 5 mg L^{-1} at 55 DAS, 75 DAS, 83 DAS (2.87, 3.88, 3.90, respectively) and with 6mg L^{-1} at 62 DAS and 69 DAS (3.41 and 3.66, respectively). At maturity the highest number of branches was found at 5 mg L^{-1} (3.99) which was statistically similar to 4 mg L^{-1} (3.90) and 6 mg L^{-1} (3.77). In contrast, the lowest number of branches was found in control plants at all growth stages. Rahman (2006) stated that application of different levels of Miyodo significantly increased the branches $plant^{-1}$. He detected the highest number of branches $plant^{-1}$ with the application of 5.0 mg L^{-1} of Miyodo.

Leaves/plant: The number of leaves was significantly influenced by the application of Miyodo on sesame (Table 1). The effect of different concentrations of Miyodo on the number of leaves/plant was recorded from 55 DAS to 83 DAS. The highest number of leaves was found at 5 mg L^{-1} at 55 DAS, 76 DAS and at 6mg L^{-1} showed the highest number of leaves at 62 DAS, 69 DAS and 83 DAS. In contrast, control always maintained the minimum number of leaves at all growth stages followed by 2mg L^{-1}. At 83 DAS, the maximum number of leaves was found at 6mg L^{-1} (117.88) while the minimum number of leaves was recorded in control (99.66) followed by 2 mg L^{-1} (103.55).

Number of flowers/plant: The different concentrations of Miyodo had significant effect on number of flowers/plant. The number of flowers in each individual plant is presented in Table 2. Result revealed that the number of flowers/ plant increased till 62 DAS followed by a decline. The increment of flowers varied significantly up to 5 mg L^{-1} concentration of Miyodo. The maximum number of flower was observed in 5 mg L^{-1} of Miyodo at all growth stages and the minimum flower number was found in control. The highest number of flower was found at 5mg L^{-1} at 55 DAS, 62 DAS, 69 DAS, 76 DAS and 83 DAS (9.33, 14.66, 16.22, 14.66 and 9.99, respectively). The lowest number flower was found in control at 55 DAS, 62 DAS, 69 DAS, 76 DAS and 83 DAS (6.44, 11.10, 10.99, 10.66 and 3.10, respectively).

Table 2. Effect of Miyodo on flower performances of sesame

Miyodo concentration	Flowers/plant (no.) at different DAS				
	55 DAS	62 DAS	69 DAS	76 DAS	83 DAS
Control	6.44 d	11.10 b	10.99 c	10.66 d	3.10 c
2 mg L^{-1}	7.66 c	12.88 ab	11.44 bc	11.00 cd	5.99d
3 mg L^{-1}	7.88 bc	13.10 ab	12.66 b	11.22 cd	6.88 c
4 mg L^{-1}	8.44 b	13.99a	12.55 b	13.77 ab	7.77 b
5 mg L^{-1}	9.33 a	14.66a	16.22 a	14.66a	9.99 a
6 mg L^{-1}	7.44 c	12.44ab	12.00 b	12.55 bc	8.32 b
$LSD_{(0.05)}$	0.64	2.12	1.41	1.55	0.85
CV (%)	4.49	8.96	6.13	6.93	6.71

In a column, figures having similar letter (s) do not differs significantly at $p \leq 0.05$.
DAS = Days after sowing

Effect of Miyodo on yield and yield attributes of sesame

Number of capsule/ plant: The effect of different concentration of Miyodo on number of capsule/plant was significant (Table 3). The number of capsule $plant^{-1}$ was higher in varied levels of Miyodo treated plants as compared to control.

Number of seeds/capsule: The effect of different concentrations of Miyodo on the number of seeds $capsule^{-1}$ was significant. The highest seeds/capsule was observed in 5 mg L^{-1} (58.84). The lowest number of seeds/capsule was recorded in control (47.07) (Table 3). The present results are in agreement of Ali (20023) who found that GA_3 increased yield of sesame. Islam (2004) observed that the wheat cultivar treated with GABA (0.33 mg L^{-1}) produced the largest spike (9.00cm) followed by TNZ-303 (8.10cm) CI-IAA (7.95cm).

Capsule length (cm): The maximum length of capsule was found in 5 mg L^{-1} (2.68cm) while the minimum was found in control (2.5cm). Similar result was reported by Islam (2005) who observed increased capsule length due to GABA application in blackgram.

1000-seed weight (g): The effect of higher concentrations of growth regulators was significant in the hundred or thousand seed weight of some crops as reported by many scientists: in mungbean by Miyodo at 5.0 mg L^{-1} (Rahman, 2006), in soybean by GABA at 2.0 mg L^{-1} (Rahim, 2005).

Seed yield/plant: The highest seed yield $plant^{-1}$ was recorded at 5 mg L^{-1} (6.54g) and the lowest seed yield $plant^{-1}$ was found in control (4.14g). Sarker (2006) conducted a field experiment with Miyodo at 0.2, 0.4 and 0.6 mg L^{-1} on soybean and found that 0.6 mg L^{-1} produced the highest seed yield.

Seed yield (kg/ha): Result showed that seed yield both per plant and unit area increased due to Miyodo application compared to control.

Table 3. Effect of different concentration of Miyodo on yield and yield contributing characteristics of sesame

Miyodo concentration	No. of capsule/ plant	Capsule length (cm)	Capsule diameter (mm)	No. of seeds/ capsule	1000-seed weight (g)	Seed yield/ plant (g)	Seed yield (Kg/ha)
Control	40.55 c	2.51	5.16	42.36 d	2.47	4.14 d	988 e
2 mg L^{-1}	43.66 bc	2.53	5.18	50.69 bc	2.49	4.51 cd	1076d
3 mg L^{-1}	45.88 ab	2.55	5.20	50.40 bc	2.50	4.78 d	1141c
4 mg L^{-1}	48.33 ab	2.65	5.24	53.54 ab	2.50	5.47 b	1205b
5 mg L^{-1}	50.88 a	2.67	5.27	58.84 a	2.52	6.54 a	1361 a
6 mg L^{-1}	46.99ab	2.63	5.19	47.07 cd	2.52	5.07 bc	1110 cd
$LSD_{(0.05)}$	5.07	0.17	0.23	5.56	0.099	0.51	58.44
CV (%)	6.05	3.62	2.41	6.06	0.02	5.59	6.85

The experimental results revealed that significant variations exist within the treatments in respect of plant height, number of branches/plant, number of leaves/plant, number of flowers/plant, number of capsule/ plant, number of seeds/capsule, seed yield/plant and seed yield (kg/ha). Miyodo showed positive effect on capsule length, capsule diameter and 1000-seed weight; however the effect was statistically non-significant. Experimental results also revealed that the morphological, growth and yield contributing characters of sesame were influenced by the application of Miyodo at all growth stages up to 5 mg L^{-1} and declined thereafter.

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