

Original Research Article

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Effect of Foliar Application of GA₃, on Yield and Quality of Indian Mustard [*Brassica juncea* (L.) Czern. & Coss.] Under Sodic Soil

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ABSTRACT

The investigation entitled “Effect of foliar application of GA₃, on yield and quality of Indian mustard [*Brassica Juncea* (L.) Czern. & Coss.] under sodic soil” was conducted during *rabi* season, 2016-2017 at the Main Experiment Station (MES) Farm of Narendra Deva University of Agriculture and Technology, Kumarganj, Faizabad-224 229 (U.P.) in randomized block design with eight treatments, three replications and variety Narendra rai (NDR-8501). Various concentrations of GA₃ (15ppm, 30ppm, 45ppm, 60ppm, 75ppm, 90ppm, 125ppm) were taken along with untreated control. Sprayed was done at 30 DAS. Yield contributing traits were taken as number of siliquae plant⁻¹, length of siliqua plant⁻¹, number of seeds siliqua⁻¹, seed yield plant⁻¹, yield quintal ha⁻¹ after harvest. Foliar sprayed of different concentrations of GA₃ increased yield and quality characters of mustard crop. Yield and quality contributing traits were maximum recorded with foliar sprayed of GA₃ 125ppm followed by foliar sprayed with GA₃ 90ppm over rest of the treatments including control, during the investigation.

Keywords

GA₃, Growth and yield.

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Introduction

The Indian mustard (*Brassica juncea* L.) is an important oilseed crop belongs to family Cruciferae, the oilseed crop play an important role in agriculture economy of India. Our country is the largest oil economy in the world after the U.S., China and Brazil in term of vegetable oil. India occupies the second position in area after China and third position in production in the world after China and Canada. In India, it is the second most important edible oilseed crop after groundnut sharing 25-30 percent Indian oilseed economy. The share of oilseeds is 14.1 % out of the total cropped area, in India, rapeseed-mustard accounts for 3% of it. Mustard seed

is the second largest produced oilseed in the world with an area of 37.0 m ha, with the production of 63.09 m tones and productivity of 11.90 q ha⁻¹. India contributes 28.3 % and 19.8 % in world acreage and production.

India produced around 7.4 mt of rapeseed-mustard next to China (11-12 mt) and EU (10-13 mt) with significant contribution in world rapeseed industry. Among the entire oilseed crops producing states in India, in U.P. the area under cultivation was 6.39 lakh ha with production of 7.9 lakh metric tonnes and productivity of 12.36 q ha⁻¹ (2015-2016) (Anonymous, 2016).

Gibberellic acid (GA₃) is a phytohormone that is needed in small amounts at low concentration to accelerate plant growth and development. So, favorable condition may be induced by applying growth regulators like GA₃ exogenously in proper concentration at a proper time in a specific crop. Gibberellic acid is such a plant growth regulator, which can manipulate a variety of growth and development phenomena in various crops. GA₃ enhances growth activities to plant, stimulates stem elongation (Lee, 1990), and increases dry weight and yield (Deotale *et al.*, 1998 and Maske *et al.*, 1998).

Materials and Methods

The Main Experiment Station (MES) of the Narendra Deva University of Agriculture and Technology, (Narendra Nagar) Kumarganj, Faizabad (U.P.) during *Rabi* season of 2016-17 “Effect of foliar application of GA₃, on yield and quality of Indian mustard [*Brassica Juncea* (L.) Czern. & Coss.] under sodic soil” The experimental site is situated at the main Experiment Farm of university on the Faizabad Raibareli road, at a distance of 42 km from Faizabad city and 23 km away from Jagdishpur.

In the present study, Variety Narendra rai (NDR-8501) was taken as experimental materials to find out the response of plant growth regulators (GA₃) on morpho-physiological, yield and c quality on tributing traits of mustard. In randomized block design with eight treatments, three replications and variety Narendra rai (NDR-8501). Various concentrations of GA₃ (15ppm, 30ppm, 45ppm, 60ppm, 75ppm, 90ppm, 125ppm) were taken along with untreated control.

Sprayed was done at 30 DAS. Yield contributing traits were taken as number of siliquae plant⁻¹, length of silique plant⁻¹, number of seeds silique⁻¹, seed yield plant⁻¹,

yield quintal ha⁻¹ after harvest. Foliar sprayed of different concentrations of GA₃ increased yield and quality characters of mustard crop.

Results and Discussion

Plant height

Statistically significant plant height was recorded in all the treatments over control. Maximum plant height was recorded with foliar sprayed with GA₃ 125ppm (24.95, 69.09, 182.10 and 190.44) at 40, 60, 80 DAS and at maturity stage, respectively, followed by foliar sprayed of GA₃ 90ppm over control.

Primary and secondary branches

Significantly higher number of primary and secondary branches plant⁻¹ were counted in all the treatments at all stages (40, 60, 80 DAS) of crop growth over control. Higher number of primary and secondary branches plant⁻¹ was noted with foliar sprayed of GA₃ 125ppm (1.95, 6.55, 17.85. Primary branches and 9.70, 13.40 secondary branches plant⁻¹) followed by foliar sprayed with GA₃ 90ppm over rest of the treatments.

Total dry biomass plant⁻¹

All the treatments increased total dry biomass plant⁻¹ at all stages of growth. Maximum total dry biomass plant⁻¹ was recorded with foliar sprayed of GA₃ 125ppm (3.16, 12.68, 240.15 and 244.86 g) at 40, 60, 80 DAS and at harvest stages of crop respectively.

RGR and CGR

Higher RGR and CGR value was analyzed with foliar sprayed of GA₃ 125ppm RGR (39.78, 24.14 g g⁻¹ day⁻¹) and CGR (7.90, 7.01gm⁻² day⁻¹). At 40-60, 60-80 DAS respectively followed by foliar sprayed with GA₃ 90ppm over rest of the treatments.

Effect of different levels of GA₃ on some morphological, yield and yield contributing characters of mustard var. Narendra rai (NDR-8501)

Lvae of GA ₃ (ppm)	Plant Height (cm)	Primary branches	Secondary branches	Total dry biomass plant ⁻¹	RGR	CGR	Number of silique plant ⁻¹	Length of silique	Number of seeds silique ⁻¹	Test weight	Seed yield plant
Control	180.55	7.60	7.86	195.87	8.17	4.67	323.93	4.31	12.50	3.20	19.09
GA ₃ (15ppm)	185.65	10.60	10.05	218.79	12.19	5.80	342.53	5.08	13.36	3.87	21.12
GA ₃ (30ppm)	185.84	13.20	10.12	223.61	13.09	6.08	344.93	5.33	14.06	4.12	21.55
GA ₃ (45ppm)	186.34	14.46	10.37	225.11	17.16	6.60	343.93	5.15	14.46	4.03	21.74
GA ₃ (60ppm)	187.53	16.30	11.20	227.19	18.90	6.32	344.86	5.51	14.65	4.38	21.90
GA ₃ (75ppm)	186.53	15.60	12.43	229.60	20.08	6.67	345.13	5.46	14.50	4.49	22.05
GA ₃ (90ppm)	188.83	17.80	13.30	239.98	22.13	6.96	345.93	5.46	15.40	4.60	22.72
GA ₃ (125ppm)	190.44	17.82	13.40	244.86	24.14	7.01	351.46	5.75	15.33	4.70	23.52
SEm±	3.37	0.71	0.55	9.69	6.93	6.77	20.27	0.19	0.57	0.18	1.32
CD at 5%	10.01	2.12	1.67	29.38	20.76	20.29	60.24	0.59	1.69	0.53	4.01

Number of silique plant⁻¹/Length of silique/Number of seeds silique⁻¹ /Test weight/ Seed yield plant⁻¹

Among all yield contributing traits like number of silique plant⁻¹ (351.46), length of silique (5.65 cm), number of seeds silique⁻¹ (15.40), test weight (4.70g), seed yield plant⁻¹ (23.52g) were found higher with foliar sprayed of GA₃. 125ppm followed by foliar sprayed of 90ppm, over rest of treatments including control.

Yield and yield contributing traits

The mean data of the entire yield attributes viz., number of siliquae plant⁻¹ (351.46), length of silique (5.65cm), number of seeds silique⁻¹ (15.40), test weight (4.70), seed yield plant⁻¹ (23.52g) seed yield (24.00qha⁻¹), showed a significant increase over control except test weight. Maximum number of siliquae plant⁻¹, length of silique, number of seeds silique⁻¹, total dry biomass plant⁻¹, test weight, seed yield plant⁻¹ (g) (seed yield (q ha⁻¹), showed maximum increased with foliar sprayed of GA₃ 125ppm over control. The effect of seed treatment and foliar application of GA₃ at 0, 50,100 and 200 ppm and found increase in number of pods, pod length, seed yield and harvest index in mungbean. Hoque

et al., (2002). GA₃ applied on soybean in concentration 100 ppm, 200 ppm produced the highest number of branches, number of seed pod⁻¹, pods plant⁻¹, 100 seed weight and seed yield. Rahman *et al.*, (2004), application of 150 ppm GA₃ recorded maximum yield in green gram (Sumabai *et al.*, 1987; Patel *et al.*, 1998). GA₃ applied on soyabean in concentration 100 ppm, 200 ppm produced the highest number of branches, number of seed pod⁻¹, pods plant⁻¹, 100 seed weight and seed yield (Rahman *et al.*, 2004). These results are in agreement with Shah (2007) and Khan (1997).

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