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Effect of Plant Growth Promoters and Growth Retardants on Growth Parameters of Mustard (*Brassica juncea* L.)

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ABSTRACT

A field experiment was conducted during Rabi 2015-2016 to study the effect of plant growth promoters and growth retardants on growth parameters of mustard (Brassica juncea L.) at the research field of Dept. of Biological Sciences, SHIATS, Deemed to be university, Allahabad. The experiment consisted of plant growth promoters and growth retardants i.e., GA_3, NAA, Cycocel and Ethrel. The growth promoters and growth retardants at concentrations of 100, 200 and 300ppm as foliar treatments. The experiment was laid out in RBD with three replications and the treatments were imposed at 30, 45, 60, 75 and 90 DAS. Among the all treatments application of NAA @ 100ppm has significantly increased total leaf area (cm^2) per plant, leaf area index per plant, crop growth rate (CGR), relative growth rate (RGR). Cycocel @ 300ppm was found beneficial in decreasing leaf area (cm^2) and leaf area index per plant.

Key words: *Mustard, GA_3, NAA, Cycocel, Ethrel, Growth Parameters.*

INTRODUCTION

Mustard crop belongs to genus *Brassica* and family Cruciferae and tribe Brassicacea[6]. It was introduced from southern Europe to Asia and Africa[3]. It is widely grown in Europe (rank first), China (rank second), Indian sub-continent (rank third) and Canada[13]. The four most widely cultivated species for oilseed and vegetable production are *B. rapa* (L)., *B. juncea* (L)., *B. napus* (L)., and *B. carinata*[9,8,11]. The genus includes many economically important crops which provide edible roots, stems, leaves, flowers and seeds. Among the *Brassica* crops, oilseed has the highest economic value[9]. Mustard is a major rabi crop in India. In India cultivation of mustard is between October-November and February-March. Major growing areas are Rajasthan, Uttar Pradesh, and Haryana. Rajasthan and Uttar Pradesh are the major mustard producing states in India. Broadly seven varieties of mustard and rapeseed are grown in India. Most popular varieties grown in Indian subcontinent are *Brassica juncea*, *Brassica rapa* and *Brassica napus.* (www.nmoop.gov.in).

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Indian mustard (*Brassica juncea* L.) is a fast growing plant which produces a high biomass even in heavy metal polluted soils. While increase in world population, demand for high quality oilseeds. Mustard are annually grown on about 36.15 million hectares in the world and provide 71.09 million tons of oilseed production and with an yield of 1970 kg/hectare. In India it occupies an area of 6.4 million hectares, production of 8.02 (million tons) and yield of 1262 kg/hectare, respectively during the year 2013-2014, (www.drmr.res.in). It is grown as vegetable, oil, fodder, condiment and green manure purposes. It is an important oil seed crop of the world after soya beans[4]. Plant growth promoters and growth retardants have great potential in increasing agricultural production and help in removing many of the barriers imposed by genetics and environment. They play an important role in mitigating stress, increasing flower set, yield and physiological efficiency of the crop.

MATERIAL AND METHODS

The field experiment was conducted during *Rabi* season 2015-2016, Department of Biological Sciences, Sam Higginbottom Institute of Agriculture, Technology and Sciences, Deemed-to-be University, (formerly known as Allahabad Agricultural Institute-AA-IDU). The experiment was laid out in randomized block design with thirteen treatments replicated thrice. The gross plot size for each treatment was 2×1m. Mustard seeds were sown at a spacing of 45×15m. The thirteen treatments are one is control remaining are GA_3 100, 200, 300ppm, NAA 100, 200, 300ppm, Cycocel 100, 200, 300ppm and Ethrel 100, 200, 300ppm spray. All the treatments were given in the form of foliar spray at 30 days after sowing. The plants were sprayed by hand sprayer. The data on the growth parameters were recorded from a sample of five plants taken randomly at different intervals (30 before spraying, 45, 60, 75 and 90 DAS). The growth parameters were recorded in five plants randomly selected in each treatment. Significantly differences were observed for growth parameters like leaf area (cm^2) per plant, leaf area index per plant, crop growth rate (CGR), relative growth rate (RGR).

RESULTS AND DISCUSSION

The present study entitled "Effect of plant growth promoters and growth retardants on growth parameters of mustard (*Brassica juncea* L.)*."* was conducted in the department of Biological sciences, Sam Higginbottom Institute of agriculture technology and Sciences, (Deemed – to – be University) Allahabad, India.

The growth parameters was recorded from 30 to 90 DAS at 15 days intervals. The effect of plant growth promoters and growth retardants such as GA_3, NAA, Cycocel and Ethrel at different concentrations on mustard. The maximum total leaf area (cm^2) per plant was recorded at 90 DAS in T_5: NAA 100ppm (573.56) when compared to the other treatments and control. The present study was supported by the findings of Yogita *et al.*[14], who observed increased the total leaf area (cm^2) per plant by application of NAA respectively after 60 to 90 days after sowing of the crop. The minimum total leaf area (cm^2) per plant was recorded at 90 DAS in T_{10}: Cycocel 300ppm (447.48). The present study was supported by the finding of Gollagi *et al* [5],who observed that the application of Cycocel at 65 days after planting on chilli not increased the total leaf area (cm^2) per plant. The maximum leaf area index per plant was recorded at 90 DAS in T_5: NAA 100ppm (0.84) followed by when compared to the other treatments and control. The present study was supported by the findings of Ramesh *et al.*[7], who observed increased the leaf area index per by application of NAA respectively after 60 to 90 days after sowing of the crop. The minimum leaf area index per plant was recorded at 90 DAS in T_{10}: Cycocel 300ppm (0.66). The present study was supported by the finding of Soad *et al.*[10], who observed that the application of Cycocel at 82 days after sowing on field bean had decreased the leaf area index per plant. The maximum crop growth rate

(CGR) was recorded at 90 DAS in T_5: NAA 100ppm (7.36) when compared to the other treatments and control. The present study was supported by the findings of Upadhyay *et al.*[12], who observed increased the crop growth rate (CGR) by application of NAA respectively after 60 to 70 days after sowing of the crop. The maximum relative growth rate (RGR) was recorded at 90 DAS in T_5: NAA 100ppm (0.037) when compared to the other treatments and control. The present study was supported by the findings of Upadhyay *et al.*[12], who observed increased the relative growth rate (RGR) by application of NAA respectively after 60 days after sowing of the crop.

Table 1.

Treatments	**Total leaf area (cm^2) / plant**		**Leaf area index (LAI) / plant**		**Crop growth rate (CGR)**		**Relative growth rate (RGR)**	
	45 DAS	**90 DAS**	**45 DAS**	**90 DAS**	**46-60 DAS**	**76-90 DAS**	**46-60 DAS**	**76-90 DAS**
T_1 : Control	232.20	471.54	0.23	0.67	2.22	4.41	0.040	0.033
T_2 : GA_3 100ppm	237.00	473.07	0.35	0.70	2.63	5.47	0.042	0.035
T_3 : GA_3 200ppm	257.03	495.19	0.38	0.73	2.45	5.10	0.041	0.035
T_4 : $GA_3$300ppm	384.20	528.89	0.56	0.78	3.25	6.91	0.042	0.036
T_5 : NAA 100ppm	416.03	573.56	0.61	0.84	3.36	7.36	0.043	0.037
T_6 : NAA 200ppm	245.25	474.66	0.36	0.70	2.57	5.23	0.041	0.034
T_7 : NAA 300ppm	242.05	472.96	0.24	0.69	2.59	5.41	0.041	0.035
T_8 : Cycocel 100ppm	248.05	472.23	0.36	0.69	2.62	5.51	0.041	0.035
T_9 : Cycocel 200ppm	235.50	453.09	0.34	0.69	2.68	5.55	0.041	0.034
T_{10} : Cycocel 300ppm	230.31	447.48	0.34	0.66	2.87	5.69	0.042	0.034
T_{11} : Ethrel 100ppm	349.43	496.63	0.52	0.73	2.84	6.04	0.041	0.035
T_{12} : Ethrel 200ppm	243.70	474.14	0.36	0.69	2.37	5.15	0.040	0.035
T_{13} : Ethrel 300ppm	239.90	477.27	0.35	0.70	2.56	5.24	0.041	0.034
F- test	S	S	S	S	S	S	S	S
SE. d (±)	5.11	5.63	0.01	0.01	0.05	0.06	0.000	0.000
C.D. (5%)	10.54	11.62	0.02	0.02	0.10	0.12	0.001	0.000

CONCLUSION

From the present investigation it is concluded that, the application of NAA @ 100ppm has recorded the highest growth rate. It could be used as a effective plant growth promoter for the growth and development. The application of growth retardants i.e., Cycocel @ 300ppm has shown decline in total leaf area (cm^2) per plant and leaf area index per plant compared to control. Cycocel @ 100, 200, 300ppm has shown higher crop growth rate (CGR) and relative growth rate (RGR) compare to control. The application of Ethrel @ 100, 200 and 300ppm has recorded higher growth rate compared to control.

REFERENCES

1. Anonymous, (2015).
2. Anonymous, (2014).
3. Downey, R. K. and Robblelen, G., Brassica species. In: Oil crops of the world. Eds. *New York.,* P. 339-362 (1998).
4. F.A.O., Food and Agriculture Organization . Production Yearbook. *Rome, Italy*., **50:** 122 (2001).
5. Gollagi, S.S., Hiremath, S.M. and Chetti, M.B., Effects of growth regulator and nutrients on growth parameters and yield in chilli. *International Journal of Agricultural Sciences.,* **5(1):** 123-125 (2009).
6. Gomezcampo, Tsunoda, S. and Hinata, K. C., Morphology and morphotaxonomy of the tribe Brassiceae in *Brassica* Crops and Wild Allies: *Biology and Breeding of Japan Scientific Society Press Tokyo.*, **30(3):** 31-34 (1980).
7. Ramesh, R. and Ramprasad, E., Effect of plant growth regulators on morphological physiological and biochemical parameters of soybean. *HELIX.*, **6:** 441-447 (2013).
8. Rakow, G., Developments in the breeding of edible oil in other *Brassica* societies. In proceeding 9th International Rapeseed Confers., *Cambridge, Henry ling Ltd. Dochester, UK.,* 410-412 (1995).
9. Raymer, P. L., Canolaan emerging oil seed crop. *In:* Janick, J. and A. Whipkey (ed.). Trends in new crops and new uses. *ASHS Press, Alexandria, VA.* 122–126 (2002).
10. Soad, A.M., Youssef, E.M., Sheref, E.L., Shalaby, T.M. and Keredy, M.S., Response of bean plants to foliar applications of CCC (2- Chloro-ethyl-trimethyl ammonium chloride)*Journal of Agricultural Sustainable Chemistry.*,**15(2):** 57-62 (1978).
11. Sovero, M., Rapeseed is a new oilseed crop for the United States. *In:* Janick, J. and J.E. Simon (ed.). New crops. *John Wiley and Sons, New Yor*k 302–307 (1993).
12. Upadhyay, R.G. and Rajeev Ranjan., Effect of Growth Hormones on Morphological Parameters, Yield and Quality of Soyabean (*Glycine max* L.) During Scenario of Climate under Mid Hill Conditions of Uttarakhand. *International Journal of Tropical Agriculture.,* **33(2):** 1899-1904 (2015).
13. Yarnell, S. H., Cytogenetics of vegetable crops-Cruciferous.*Bot. Rev*., **22:** 66-81 (1956).
14. Yogita, R., Nikam, T.D. and Dhumal, K.N., Effect of Foliar Apllication of Plant Growth Regulators on growth and essential oil components of Ajwain (*Trachyspermum ammi L.) International Journal of Seed Spices.,* **3(2):** 34-41 (2013).