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SHORT COMMUNICATION

EFFECT OF 28-HOMOBRASSINOLIDE ON MORPHOPHYSIOLOGICAL AND YIELD PARAMETERS OF SESAME

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An investigation was carried out to study the influence of 28 – homobrassinolide on morphological, growth, biochemical and yield parameters of sesame (*Sesamum indicum* L.). The plants were sprayed with 0.5 mg/l homobrassinolide on 30, 45 and 60 DAS. Among the treatments, the plants treated with homobrassinolide thrice recorded higher values for all the parameters. The total chlorophyll, soluble protein, sugars and catalase activity were found to be maximum in the HBR treated plants. The application of HBR enhanced the total dry matter production, number of capsules per plant, number of seeds per capsule, capsule weight and 1000 seed weight.

***Key words*: Homobrassinolide, morphophysiology, *Sesamum indicum*, yield.**

After the discovery of brassinolide, a polyhydroxy-steroidal lactone with remarkable plant growth promoting activity (Grove *et al.* 1979), a number of related compounds called brassinosteroids (BRs) were identified in a number of plants (Kim 1991). Brassinosteroids occured at low concentrations in all plants tested so far and are considered essential for normal growth and development (Sasse 1997). Exogenous application of brassinosteroids elicit several physiological and biochemical responses from single cells to whole plant (Mandava *et al.* 1981, Yopp *et al.* 1981, Mandava 1988, Cutler *et al.* 1991). Sairam (1994) reported that brassinosteroid induced plant growth was associated with increased metabolic processes like photosynthesis. Brassinosteroids were found to enhance the growth and yield of groundnut (Vardhini and Rao 1998). In the present study, the effect of HBR on morphological, growth, biochemical and yield parameters of sesame was investigated.

The present investigation was undertaken to study the influence of 28-homobrassinolide on morphological, growth, biochemical and yield parameters of sesame (*Sesamum indicum* L.). Field experiments were conducted at plant breeding farm, Department of Agricultural Botany, Annamalai University, Tamil Nadu during 2005. 28-homobrassinolide was purchased from Sigma – Aldrich, Bangalore.

Sesame plants were raised in plots of 4m x 4m with spacing of 30 cm between the rows. Normal cultural operations were followed as per the recommendations. The plants were sprayed with 0.5 mg/l of 28-homobrassinolide on 30, 45 and 60 DAS as per the following schedule of treatment. T_1 – Water spray, T_2 – HBR @ 0.5 mg/l at 30 DAS, T_3 – HBR @ 0.5 mg/l at 45 DAS, T_4 – HBR @ 0.5 mg/l at 60 DAS, T_5 – T_2 + T_3, T_6 – T_2 + T_4, T_7 – T_3 + T_4, T_8 – T_2 + T_3 + T_4.

The experiments were conducted in randomized block design with three replications. Observations were recorded from ten plants per treatment of each replication. Sampling was done one week after the spray for morphological, growth, biochemical and yield parameters.

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The leaf area index was calculated as per the formula of Williams (1946), specific leaf weight by Pearce *et al.* (1968), crop growth rate by Watson (1958) and net assimilation rate by Williams (1946). Chlorophyll content was estimated by the procedures of Yoshida *et al.* (1971). Soluble protein was estimated by the method of Lowry *et al.* (1951). Sugar content was estimated by the procedure suggested by Somogyi (1952). The catalase and peroxidase activity were assayed by the procedures suggested by Sadasivam and Manickam (1996). Oil content was estimated in Nuclear Magnetic Resonance (NMR) unit and expressed in percentage. All the yield parameters were recorded at the time of harvest.

All the morphological, growth, biochemical and yield parameters (tables 1 and 2) recorded higher values when compared to control (water spray). Among the treatments, the plants treated with homobrassinolide thrice i.e., on 30, 45 and 60 DAS recorded higher values for all the parameters. Exogenous application of brassinosteroids, might have helped in better rooting, enhanced uptake of more nutrients and initiation of various physiological and biochemical processes ultimately leading to increased morphological and growth parameters like plant height, number of branches and number of leaves, specific leaf weight, crop growth rate, net assimilation rate and relative growth rate contributing to higher total

Table 1. Effect of 28-homobrassinolide on morphological, growth and biochemical parameters of sesame on 30, 45 and 60 DAS

Treatment	Plant height (cm)	Number of branches	Number of leaves	Leaf area index	Specific leaf weight (mg cm^{-2})	Dry matter production (g plant^{-1})	Crop growth rate (g m^{-2} day^{-1})	Net assimilation rate (mg cm^{-2} day^{-1})	Relative growth rate (g g^{-1} day^{-1})	Chlorophyll content (mg g^{-1} fresh weight)	Soluble protein (mg g^{-1} fresh weight)	Reducing sugar (mg g^{-1} fresh weight)	Non reducing sugar (mg g^{-1} fresh weight)	Catalase (Units/g tissue}	Peroxidase (Units/l)
30 DAS															
T_1	44.8	2.0	45	1.083	1.118	1.54	8.21	0.570	0.493	0.4151	8.31	4.915	3.581	2.116	2.16
T_2	58.2	3.4	57	1.101	1.344	2.85	9.16	0.632	0.504	0.4380	9.53	5.284	3.839	2.318	2.18
CD(0.05)	**7.01**	**0.19**	**4.27**	**0.002**	**0.015**	**0.62**	**0.008**	**0.01**	**0.004**	**0.008**	**0.12**	**0.04**	**0.15**	**0.003**	**0.008**
45 DAS															
T_1	64.3	5	49	1.314	5.780	3.18	8.78	0.630	0.529	0.7454	9.32	5.169	4.282	2.405	2.86
T_3	67.9	6	57	1.340	6.082	3.51	9.26	0.711	0.538	0.7945	10.77	5.319	4.464	2.781	2.91
T_5	74.9	6	64	1.384	6.114	3.84	9.54	0.732	0.552	0.8639	11.16	5.443	4.622	2.916	2.93
CD(0.05)	**4.86**	**0.74**	**9.8**	**0.011**	**0.032**	**1.78**	**0.125**	**0.015**	**0.01**	**0.02**	**0.23**	**0.11**	**0.14**	**0.165**	**0.15**
60 DAS															
T_1	74.6	5.8	61.8	1.382	6.49	20.79	10.09	0.697	0.595	1.2251	9.76	7.492	6.881	3.121	3.
T_4	82.5	7.9	79.4	1.443	7.45	21.26	10.26	0.747	0.603	1.3056	10.16	8.122	7.242	3.456	3.22
T_6	89.5	8.3	82.5	1.461	7.76	23.73	10.39	0.797	0.605	1.3111	10.22	8.445	7.450	3.668	3.35
T_7	92.7	8.9	87.5	1.483	7.81	24.67	10.71	0.810	0.611	1.4242	10.45	9.323	8.224	3.791	3.81
T_8	111.0	10.1	98.9	1.547	7.99	29.71	11.03	0.843	0.619	1.4562	10.96	9.885	9.172	3.885	3.98
CD(0.05)	**6.08**	**1.15**	**12.8**	**0.016**	**0.038**	**2.61**	**0.144**	**0.02**	**0.005**	**0.028**	**0.43**	**0.18**	**0.34**	**0.223**	**0.18**

Table 2. Effect of 28-homobrassinolide on yield parameters of sesame.

Treatment	Number of capsules per plant	Number of seeds per capsule	Capsule weight (mg)	1000 seed weight (g)	Yield per plant (g)	Harvest index	Oil content (%)
T_1	54.00	32.9	146.26	2.03	2.76	21.09	50.16
T_2	72.66	33.8	148.41	2.41	4.63	24.46	50.84
T_3	81.33	34.0	150.18	2.62	4.87	25.43	51.10
T_4	85.33	34.6	150.24	2.78	5.03	27.31	51.30
T_5	88.66	36.8	153.61	2.55	5.21	28.48	51.62
T_6	93.67	38.3	158.53	2.63	5.33	31.09	51.86
T_7	95.33	41.2	160.24	2.88	5.47	34.52	52.25
T_8	104.66	42.2	163.36	2.94	6.37	36.28	52.46
CD (0.05)	**12.58**	**3.59**	**4.25**	**0.13**	**1.22**	**4.49**	**0.50**

dry matter production. Total chlorophyll was found to be maximum in thrice HBR treated plants @ 0.5mg/l. In general, a significant observation of increase in chlorophyll content was observed on 60th day sampling when compared to 30th and 45th day sampling. Increased chlorophyll content with plant growth regulators has been observed by many workers. Similarly HBR treated plants @ 0.5mg/l on 45 and 60 DAS recorded higher contents of reducing, non – reducing and total sugars.

Soluble protein content was also found to be increased with HBR application. Every spraying of brassinolide increased the soluble protein content when compared to control and found to be higher at 60 DAS. Brassinosteroids were found to enhance levels of nucleic acids, soluble protein and carbohydrates (Vardhini and Rao 1998). Braun and Wild (1984) also reported that BRs could enhance the rate of photosynthesis and growth in young mustard (*Brassic*a spp). BR induced plant growth was reported to be associated with increased metabolic processes like photosynthesis (Sairam 1994) and protein synthesis (Kalineh *et al.* 1985). Higher catalase and peroxidase activity were observed on 60 DAS in the plants treated thrice with 28-homobrassinolide. A similar increase in the activity of catalase and peroxidase with BR treatment was also observed and were found to be higher in 60th day sampling than 30th and 45th day sampling.

Maximum number of capsules per plant, number of seeds per capsule, capsule weight, 1000 seed weight, yield per plant, harvest index and oil content were higher in the plants treated thrice with 0.5mg/l homobrassinolide, whereas control recorded the lowest value (Table 2). This might be due to the stimulation of plant metabolism and growth by HBR spray which resulted in increased number of leaves, leaf area index and DMP. Similar finding of increased plant and fruiting points in cotton was reported by Ramraj *et al.* (1997).

Vardhini and Rao (1999) reported that foliar application of BRs increased nodulation, nitrogen fixation and nitrogenase activity in groundnut. This may be due to the fact the HBR may interact with other plant growth regulators and thereby they would have initiated several physiological and biochemical processes leading to enhanced level of these parameters. In the present investigation also, it was found that application of HBR increased total dry matter production. Maximum total dry matter production was recorded in plants treated with HBR @ 0.5 mg/l sprayed thrice on 60 DAS. The present findings also contribute for the influence of BRs on morpho – physiological, biochemical and yield parameters of sesame.

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