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RESPONSE OF SUMMER SESAME (*SESAMUM INDICUM*) TO BIOFERTILIZER AND GROWTH REGULATOR

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ABSTRACT

A field experiment was conducted during the summer season of 1997 and 1998 to study the effect of biofertilizer (Phosfert, bioplin and vitormone) and growth regulator (protein hydrolysate) on growth and productivity of sesame (*Sesamum indicum* L.). Use of biofertilizer or growth regulator alone showed significant improvement in plant height and number of branches/plant. It tended to increase the yield components such as number of capsules/plant, number of seeds/capsule and 1000-seed weight and so also the seed yield over those obtained without having any biofertilizer or growth regulator treatment (control), but the differences were not significant. Combined use of biofertilizer and growth regulator, however, recorded further improvement in growth attributes, which in turn resulted in significant increase in the entire above yield components and ultimately the seed yield over no application. Use of biofertilizer and growth regulator together brought about 32 to 34.6 % yield increase over control.

Sesame (*Sesamum indicum* L.) is an important oilseed crop grown widely in India during *kharif* and summer seasons under relatively low inputs level and thus produces low yield. One of the reasons of low productivity is that no definite nutrient management programme is followed for this crop. This is not because of its inability to make good use of the added nutrients but it can be grown with less amount of expensive fertilizer than many other tropical crops (Ninan, 1989). Biofertilizers are thus considered to be the alternative to the use of fertilizers which apart from their soaring costs, are also enhancing in pollution hazards of our environment (Pandey and Kumar, 1989). Internal hormonal imbalance can be corrected by exogenous application of suitable growth regulator for further improvement in growth and productivity of the crop with balanced nutrient application (Jung, 1991). Therefore an investigation was undertaken to evaluate the effect of biofertilizer and growth regulator on growth and productivity of summer sesame grown at moderate fertility level.

A field experiment was conducted during the summer season (March - May) of 1997 and 1998 at the farm of the Institute of Agriculture (Palli Siksha Bhavana), Visva-Bharati, Sriniketan (32° 39′ N latitude, 87° 42′ E longitude and 58.9m above the mean sea level), West Bengal. The soil of the experimental field was lateritic sandy-loam (Ultisol), having pH 6.1, total nitrogen 0.049%, available phosphorus 20 kg/ha and available potassium 165 kg/ha. The experiment was laid out in randomised block design with eight biofertilizer and growth regulator treatments (control, phosfert 2.0 L/ha, vitormone 2.0 L/ha , bioplin 2.0L/ha, protein hydrolysate 2.0 L/ha, phosfert + vitormone, phosfert + protein hydrolysate and bioplin + protein hydrolysate) replicated thrice in 5m x 3m plots. Sesame cv. 'Rama' was sown at 30cm apart rows on 1st week of March during both the years. It received 25 kg each of N, P_2O_5 and K_2O/ha at sowing and another 25kg N/ha at 25 days after sowing (DAS). One irrigation at 7 DAS after biofertilizer spray during both the years and another irrigation at branching (25 DAS) in 1997 and at peak flowering (45 DAS) in 1998 were given as the crop received favourable rainfall during both the years(182.8 mm in 1997 and 183.7 mm in 1998). The crop received one hand weeding along with thinning at 22 DAS during both the years. Phosfert (a biofertilizer containing phosphate solubilising bacteria)and bioplin(a biofertilizer containing micro organisms of Azotobacter genus responsible for atmospheric N_2 fixation and solubilising insoluble phosphate) were sprayed with 500L water/ha at 7 DAS. Vitormone(a biofertilizer containing micro organisms of Azotobacter genus capable of living on leaf surface and responsible for atmospheric N_2 fixation and secretion of plant growth substances) and protein hydrolysate (a plant growth regulator containing several amino acids) were sprayed over leaves @ 1.0 L/ha with 500 L water/ha each at 30 and 50 DAS. Observations

Table 1: Effect of Biofertilizer and growth regulator on growth and productivity of summer sesame

Treatments	Plant height (cm)		Branches/plant		Capsules/plant		Seeds/capsule		Test weight (g)		Seed yield (kg/ha)			Per cent increase
	1997	1998	1997	1998	1997	1998	1997	1998	1997	1998	1997	1998	Pooled	
Control	63.6	55.2	3.2	3.0	21.0	18.0	48.0	50.2	2.88	2.80	922	820	871	-
Phosfert (2.0 L/ha)*	68.8	60.6	4.3	4.1	23.0	20.6	50.8	52.6	3.08	3.14	1064	966	1015	16.5
Vitormone (2.0 L/ha)	69.4	61.0	4.5	4.2	23.6	21.2	51.3	53.2	3.09	3.16	1087	975	1031	18.4
Bioplin (2.0 L/ha)	69.0	60.4	4.4	4.2	24.1	20.8	50.9	53.0	3.10	3.15	1095	985	1040	19.4
Protein hydrolysate (2.0 L/ha)	69.1	60.6	4.5	4.3	24.0	20.9	51.0	52.8	3.13	3.16	1078	980	1029	18.1
Phosfert+Vitormone	73.8	66.3	5.4	5.6	26.8	23.8	53.9	56.8	3.24	3.28	1221	1125	1173	34.6
Phosfert+Protein hydrolysate	74.2	67.1	5.5	5.7	26.5	24.0	53.3	55.9	3.25	3.30	1202	1112	1157	32.8
Bioplin+Protein hydrolysate	74.0	66.8	5.6	5.6	26.6	23.6	54.0	56.5	3.24	3.29	1198	1104	1151	32.1
S Em (±)	1.5	1.7	0.31	0.35	1.5	1.4	1.5	1.6	0.06	0.08	60	57	60	-
C. D. at 5%	4.4	5.2	0.94	1.06	4.6	4.2	4.5	4.9	0.19	0.24	181	175	179	-
CV (%)	3.7	5.0	11.5	13.5	10.3	11.2	4.9	5.0	3.5	4.5	9.5	9.0	9.8	-

* Phosfert and bioplin @ 2.0 L/ha with 500 L water/ha were applied at 7 days after sowing; vitormone and protein hydrolysate @ 1.0 L/ha with 500 L water/ha were applied at 30 and 50 days after sowing.

on plant height, number of branches/plant, number of capsules/plant, number of seeds/capsule, test weight (1000-seed weight) and seed yield were recorded at maturity.

Growth attributes : Plant height and branch production increased significantly due to the application of biofertilizer or growth regulator over no application (control) during both the years (Table 1). Combined application of biofertilizer and growth regulator showed further increase in plant height and number of branches/plant over no or single application of either biofertilizer or growth regulator. Positive effect of biofertilizer on improving crop growth was due to increase in nitrogenase activity by vesicular arbuscular mycorrhizae (Rajapakse and Miller, 1985) and synthesis of growth promoting substances by phosphate solubilising bacteria (Gaur, 1990). Growth regulator was responsible for rapid cell multiplication resulting in vigorous growth by increasing plant height and branch production (Singarave *et al.*, 1993; Ghosh *et al.*, 1997).

Yield Components : Use of biofertilizer and growth regulator alone did not cause much effect on increasing the number of capsules/plant and number of seeds/capsule over no application (Control), but test weight (1000-grain weight) of sesame increased significantly due to the application of either biofertilizer or growth regulator over no application during both the years (Table 1). Combined application of biofertilizer and growth regulator recorded the maximum increase in all the above yield components of sesame and were significantly superior to control treatment ; but the difference in the above yield components between the treatments consisting of single application of either growth regulator or biofertilizer and combined application of both of them were not significant in any of the two years' study. Vigorous growth of the crop due to the use of biofertilizer and growth regulator was mainly responsible for increasing the yield components of sesame. The results corroborate the findings of Sontakey *et al.* (1991) and Tripathy *et al.* (1996).

Crop productivity: A trend similar to that of yield components was also observed in crop productivity (Table 1). When biofertilizer and growth regulator used alone though caused 16.5 to 19.4 % yield increase over control but the

difference in seed yield between the above treatments was not significant in any of the two years and so also in pooled analysis. Application of biofertilizer and growth regulator together recorded the highest seed yield which was significantly superior to what obtained in control plot (32.1 to 34.6% increase over control). However, the differences in seed yield between the treatments of only biofertilizer or growth regulator application and their combined application were not significant. This was also confirmed in pooled analysis. Vigorous growth of the crop with improved yield components by the use of biofertilizer and growth regulator were mainly responsible for increased yield of sesame. This is in conformity with the findings of Singarave *et al.* (1993) and Tripathy *et al.* (1996).

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