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Contribution of production factors in growth, yield and economics of blackgram (*Phaseolus mungo*)

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ABSTRACT

A field experiment was conducted during 1987–89 to assess the contribution of production factors in grain yield of blackgram (*Phaseolus mungo* L.). The grain yield (13.8 q/ha), net return (Rs 3,757/ha) and net return per rupee invested (2.15) were significantly higher on the adoption of complete package of practices (fertilizer + weed control + plant protection) compared with the grain yield (4.8 q/ha), net return (Rs. 957/ha) and net return per rupee invested (1.01) was obtained on the adoption of farmers' practices for blackgram.

Constraints of farmers' field often influence the effective use of modern technology in higher production of blackgram (*Phaseolus mungo* L.), which is usually grown as rainfed rainy-season pulse in marginal and submarginal lands without fertilizer, weed management and plant-protection measures. This results in very low productivity (4.9 q/ha) of blackgram (Singh, 1983). The present experiment was conducted to assess that contribution of production factors for increasing yield of blackgram.

MATERIALS AND METHODS

The field trial was conducted during rainy season of 1987–89 at Ranchi. The soil of the experimental plot was sandy loam with pH 6.1, deficient in nitrogen (0.04%), phosphorus (25 q/ha) and moderate in potassium (175 Rs/ha) contents. The experiment was laid out with 'T 9' blackgram in randomized block design with 8 treatments replicated 4 times. The treatments were farmers practice (sowing of seeds under upland rainfed conditions without fertilizer, weed management and plant-protection measures), fertilizer (sowing of inoculated seeds with the application of 20 kg N, 40 kg P_2O_5 and 20 kg K_2O/ha), only weed control (2 manual weedings at 25 and 45 days after sowing), plant-protection measures (soil treatment with 10% HCH @ 25 kg/ha, seed treatment with thirum @ 2.5 g/kg seed and 2 sprays with endosulfan), fertilizer + weed control, fertilizer + plant protection, weed control + plant protection and fertilizer + weed control + plant protection (complete package of practices). In all the years sowing was done in the first week of July.

RESULTS AND DISCUSSION

Growth and yield attributes

The value of all the growth and yield attributes were higher (Table 1) when the blackgram was grown with complete package of practices. The magnitude of reduction in the growth and yield-attributing

Table 1. Effect of production factors on growth and yield attributes of blackgram (mean data of 1987–89)

Production factor	Plant height (cm)	Primary branches/ plant	Pods/ plant	Seeds/ pod	1,000-seed waight (g)
Farmers' practice	26.7	3.3	15.2	3.1	32.5
Fertilizer alone	33.9	4.7	29.7	4.2	26.9
Weed control alone	29.8	4.0	25.0	4.0	35.5
Plant protection alone	28.4	3.5	20.9	3.6	35.1
Fertilizer + weed control	34.4	5.2	32.4	5.1	37.1
Fertilizer + plant protection	34.3	5.0	30.7	4.6	37.1
Weed control + plant protection	32.9	4.3	26.1	4.1	36.7
Fertilizer + weed control + plant protection	37.5	5.8	38.1	5.3	39.4
CD (P = 0.05)	0.65	0.34	0.58	0.21	0.44

characters was more when fertilizer was withdrawn from the complete package of practices. This was followed by the adoption of weed-control measures alone as well as its combination with other production factors. The data revealed that the contribution of plant-protection measures on growth and yield-attributing characters ranked third among production factors under study.

Grain yield

Production factors caused significant difference in grain yields of blackgram (Table 2). Pooled data revealed that the maximum grain yield of (13.8 q/ha) was obtained by the adoption of complete package of practices with 188% increase in yield compared with the adoption of farmers' practice. The magnitude of reduction in grain yield from the adoption of complete package of practices was only 11% when fertilizer along with weed-control measures were adopted for the production of blackgram, whereas increase in yield over farmers' practice was 156%. The reduction in grain yield from complete package of practices was maximum (50%) when only plant-protection measures were adopted for the production of the crop and its contribution in increase (%) in grain yield over the farmers' practice was the lowest (44%) among the production factors. On the adoption of single production factor fertilizer and weed control, the decrease in grain yield from the adoption of complete package of practices was 26 and 41% respectively. The data further revealed that production factor alone as well as in combinations were found significantly superior to farmers' practice. The adverse effect on growth and yield attributes of blackgram contributing towards grain yield was due to withdrawal of fertilizer and weed control from the complete package of practices. This is in conformity with the findings re-

Table 2. Grain yield of blackgram and economic return (Rs/ha) as influenced by production factors (mean data of 3 years)

Production factor	Grain yield (q/ha)	Increase in yield over farmers' practice (%)	Decrease in yield over full package (%)	Net return (Rs/ha)	Net return per rupee invested
Farmers' practices	4.8		65	957	1.01
Fertilizer only	10.2	113	26	2,667	1.91
Weed control only	8.1	69	41	1,940	1.49
Plant protection only	6.9	44	50	1,573	1.31
Fertilizer + weed control	12.3	156	11	3,257	1.97
Fertilizer + plant protection	10.3	115	25	2,570	1.66
Weed control + plant protection	8.6	79	38	1,877	1.36
Fertilizer + weed control + plant protection	13.8	188		3,757	2.15
CD (P = 0.05)	0.61			145	0.09

ported by Panwar *et al.* (1977).

Economics

The pooled mean data (Table 2) revealed that the maximum net return (Rs 3,757/ha) and net return per rupee invested (2.15) were obtained by the adoption of complete package of practices, which was also found significantly superior to rest of the production factors. The next higher values of the net return (Rs 3,257/ha) and net return per rupee invested (1.97) were obtained by the adoption of fertilizer + weed-control production factors. The net return and net return per rupee invested obtained by the adoption of single production factor fertilizer was found significantly superior to weed control and plant protection.

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