Indian J. Agron. **40** (3) : 434–438 (September 1995)

Effect of fertilizer, weed control and row spacing on summer blackgram (*Phaseolus mungo*)

M. MISHRA[1] AND A. MISRA[2]

Department of Agronomy, College of Agriculture, Orissa University of Agriculture and Technology, Bhubaneshwar 751 003

Received: July 1994

ABSTRACT

A field experiment conducted in 1989 and 1990 showed that there was no significant influence of fertility levels (50, 100 and 150%) on the grain yield of summer blackgram (*Phaseolus mungo* L.), though 50% recommended dose produced maximum net profit (Rs 886/ha) and net profit per rupee (0.28). Weed-free condition resulted in the maximum grain yield (7.37 q/ha), followed by chemical + mechanical method (6.77 q/ha) and farmers' practice (5.50 q/ha). However, the net profit (Rs 1,500/ha) and the net return per rupee invested (0.46) were the highest with chemical + mechanical method. Though no significant difference existed with varying row spacings, the net profit (Rs 1,000) and the net return per rupee invested (0.33) were higher with 30 cm row spacing.

Increase in cost of inputs like seeds, fertilizers, and labour necessacitates to develop suitable management practices for the farmers to sustain agricultural production. Pannu *et al.* (1989) have stressed on utilization of appropriate package of practices for getting higher yield and profit to the farmers. Since research work on this aspect in summer blackgram is lacking, an experiment was conducted to test the effect of fertilizer levels, weed-control methods and row spacings in summer blackgram.

MATERIALS AND METHODS

The experiment was conducted during 1989 and 1990 in split-split plot design with 3 fertility levels [50, 100 and 150 of the recommended dose (20, 40 and 0 kg/ha of N, P and K respectively)] in the main plots, 5 weed-control methods, viz. chemical (fluchloralin @ 1.0 kg ai/ha pre-plant incorporation 1 day before sowing), chemical + mechanical (fluchloralin @ 1.0 kg ai/ha + 1 hoeing and weeding at 15 days after sowing), farmer's practice (twice hoeing and weeding at 15 and 30 days after sowing), weed free and unweeded control, in the subplots; and 3 row spacings (10, 20 and 30 cm) in the sub-subplots with 3 replications. The soil was moderately drained, acidic (pH 5.8) loamy in texture with low organic carbon (0.09%), total nitrogen (287 kg/ha) and high in available phosphorus (40 kg/ha) and potassium (145 kg/ha). 'T 9' blackgram was sown in the second week of February after harvest of groundnut with seed rate of 25, 50 and 75 kg/ha for 30, 20 and 10 cm row spacing respectively and the plants were thinned to maintain 5 cm plant-to-plant spacing 10 days after germination. Full dose of N (urea) and P (single superphosphate) and K (muriate of potash was applied basal, and the crop

Present address: [1]National Agricultural Research Project, Ghumsar-Udayagiri 762 100; [2]Former Professor

Table 1. Weather conditions during the growth of summer blackgram

Month	Temperature (°C)		Rainfall (mm)		Rainy days		Humidity (%)*	
	1989	1990	1989	1990	1989	1990	1989	1990
Feruary	25.15	25.50		59.80		7	58.5	72.0
March	28.25	26.70	4.20	119.80	3	7	60.0	77.0
April	31.65	29.65	4.20	130.70	2	7	64.5	76.0

*Average

was harvested 65 days after sowing. The weather was dry and hot in 1989, whereas it was moist with abundant summer rains in 1990 (Table 1). The crop was irrigated as and when necessary, depending on the rainfall. Data were recorded on growth and yield characters.

RESULTS AND DISCUSSION

Fertility levels (50,100 and 150% dose) did not significantly influence the seed yield of summer blackgram in both the years. The increase in growth and yield attributes like root length, plant height, pods/plant and 1,000-seed weight at higher fertility levels were not manifested in the grain yield due to reduction of crop stand, nodulation and seeds/pod, which resulted in grain yield more or less same as that of lower fertility (50% dose). The fodder yield increased due to increase in plant height at higher fertility levels. Similar findings were reported by Ramalinga Swamy and Bajaj (1989). An increase in fertilizer (150% dose) on the other hand resulted in significant increase in dry weight of weeds and cost of cultivation, and as a result lower fertility (50%) recorded maximum net return per rupee invested due to lower cost involvement.

Among different weed-control methods, chemical + mechanical method gave the maximum yield in dry summer of 1989, followed by chemical method due to maintenance of higher number of nodules/plant, pods/and seeds/pod compared with farmers' practice and weed-free condition (Table 2). This might be due to less soil disturbance in the former leading to better conservation of moisture that favoured better nodulation and growth of the crop in the dry summer. Singh and Faroda (1979) also reported similar findings. However, in 1990, when the weather was moist favouring rapid growth of weeds, frequent manual intercultural operations in the weed-free condition favoured the growth of the crop, resulting in maximum yield (7.94 q/ha) with more nodules/plant, pods/plant and seeds/pod. Chemical + mechanical method was on a par with weed-free treatment due to maintenance of weed-free condition. This is in agreement with the finding of Singh and Sharma (1987). The pooled data of yield showed superiority of weed-free condition, followed by chemical + mechanical method owing to production of lowest weed biomass in these treatments. The results confirm the findings of Sahoo and Saraswat (1988). Manual intercultural operations increased the cost of cultivation, which was highest with weed-free condition. This resulted in maximum net profit and the net profit per rupee invested from chemical + mechanical method due to its lower cost involvement in intercultural operations.

Table 2. Effect of fertility levels, weed-control methods and row spacings on growth and yield components of summer blackgram

Treatment	Plant population/m²		Root length (cm)		Nodules/plant at 40 days		Plant height (cm)		Pods/ plant		Seeds/ pod		1,000-seed weight (g)	
	1989	1990	1989	1990	1989	1990	1989	1990	1989	1990	1989	1990	1989	1990
Fertility level														
50% R	89.3	86.2	12.1	14.7	15.4	8.9	16.2	20.7	7.0	7.3	4.2	4.5	38.0	36.8
100% R	84.1	83.3	12.8	15.3	14.0	8.6	22.4	22.2	7.8	7.4	3.8	4.3	38.5	37.5
150% R	84.0	82.9	12.5	15.2	10.5	8.0	22.5	23.3	11.2	6.6	3.8	4.3	38.5	37.9
CD (P = 0.05)	NS	NS	NS	NS	3.3	0.1	1.0	0.9	0.3	0.2	0.1	0.2	NS	0.2
Weed-control method														
Chemical	93.4	90.5	12.9	13.9	15.1	8.5	20.3	20.4	10.2	6.6	4.2	4.2	35.8	35.4
Chemical + mechanical	100.7	92.1	13.4	15.5	15.5	8.7	20.7	21.4	11.0	8.5	4.4	4.6	40.9	39.3
Farmers' practice	85.0	89.3	12.5	14.0	11.3	8.7	20.9	23.9	8.9	8.4	3.9	4.5	40.7	39.2
Weed-free	88.9	94.0	12.4	12.9	13.2	9.3	18.9	19.1	8.4	9.4	3.9	4.7	41.6	39.5
Unweeded control	60.1	54.7	11.2	13.9	11.2	7.6	21.0	25.4	4.8	2.5	3.3	3.9	32.6	33.7
CD (P = 0.05)	4.9	6.7	0.4	0.6	1.4	0.3	1.0	1.1	0.4	0.2	0.1	0.1	2.4	0.9
Row spacing														
10 cm	134.1	124.4	12.4	14.6	13.0	8.3	20.6	22.9	6.6	5.9	3.3	3.8	37.5	34.7
20 cm	68.9	70.8	12.5	15.0	13.2	8.3	20.4	22.1	9.1	6.9	4.0	4.4	37.7	37.2
30 cm	54.4	57.0	12.6	15.4	13.6	8.8	20.0	21.2	10.3	8.5	4.5	5.0	39.7	40.4
CD (P = 0.05)	4.3	3.9	NS	0.4	NS	0.2	NS	0.4	0.3	0.1	0.1	0.2	1.8	0.2

R, Recommended dose

Table 3. Effect of fertility levels, weed-control methods and row spacings on dry weight of weeds, seed and fodder yields and economics of cultivation of summer blackgram

Treatment	Dry weight of weeds (g)/0.5 m^2		Seed/yield (q/ha)			Fodder yield (q/ha)			Cost of cultivation (Rs/ha)**	Net profit (Rs/ha)**	Net profit/ rupee**
	1989	1990	1989	1990	Pooled	1989	1990	Pooled			
Fertility level											
50% R	3.47	4.26	6.18	5.37	5.77	10.05	14.31	12.18	3,195	886	0.28
100% R	4.37	4.38	5.15	5.29	5.22	12.04	17.23	14.63	3,364	514	0.17
150% R	4.51	4.50	6.51	5.01	5.76	12.06	19.10	15.58	3,534	690	0.17
CD (P = 0.05)	0.05	0.04	NS	NS	NS	0.15	0.69	1.29			
Weed-control method											
Chemical	4.12	4.58	7.30	3.18	5.24	11.00	13.66	12.33	2,988	754	0.25
Chemical + mechanical	3.38	3.03	7.34	6.20	6.7	11.30	19.96	16.13	3,374	1,500	0.46
Farmers' practice	5.00	4.47	5.13	5.88	5.50	14.46	21.60	18.03	3,744	464	0.12
Weed-free	1.00	1.00	6.81	7.94	7.37	11.92	15.88	13.90	4,129	978	0.27
Unweeded control	7.09	8.80	3.16	2.92	3.04	7.22	13.30	10.26	2,589	—214	—0.06
CD (P = 0.05)	0.10	0.09	1.37	0.81	NS	0.20	0.68	2.58			
Row spacing											
10 cm	4.20	4.07	7.16	4.94	6.05	14.43	18.34	16.39	3,695	787	0.22
20 cm	4.20	4.47	5.08	4.92	5.00	10.21	16.70	13.46	3,365	303	0.07
30 cm	4.29	4.58	5.60	5.81	5.76	9.21	15.60	12.41	3,034	1,000	0.33
CD (P = 0.05)	0.04	0.03	0.72	0.46	NS	0.13	NS	2.96			

R, Recommended dose

*Values in $\sqrt{x+1}$;** average data of 2 years

Closer row spacing (10 cm) gave significantly maximum yield in the dry summer of 1989 due to higher plant stand, though yield attributes were greatly affected due to inter-plant competition (Table 2). In 1990 with plenty of summer rains (Table 1), there was better development of growth characters and yield attributes with the available space of wider row spacing (30 cm) and as a result it gave highest yield (6.05 q/ha). This is in agreement with the findings of Shaharia (1988). Although closer row spacing recorded maximum average yield in both the years (Table 2), the net return and the net return per rupee invested were highest with the wider row spacing (30 cm) due to lower cost of cultivation at this spacing because of lower seed rate and cost of sowing (Table 3). Similar findings were reported by Singh and Malavia (1981) and Singh and Singh (1988).

It was concluded that application of half the recommended dose of fertilizer, chemical + mechanical method of weed control and 30 cm row spacing would help in increasing the yield of summer blackgram profitably.

REFERENCES

Pannu, R. K., Malik, D. S., Malik, R. K. and Singh, K. P. 1989. Effect of crop geometry, irrigation and weed control on growth and nutrient uptake by weeds in groundnut. *Indian Journal of Agronomy* **34** (1) : 8–13.

Ramalinga Swamy, K. and Bajaj, J. C. 1989. Studies on the nutrient uptake, yield and protein content of moong as influenced by applied fertilizers and residual biogas slurry. *Andhra Agricultural Journal* **36** (4) : 249–253.

Sahoo, K. M. and Saraswat, V. N. 1988. Mangitude of losses in the yields of major crops due to weed competition in India. *Pesticides* **24** (1) : 2–5.

Shaharia, P. 1988. Response of blackgram varieties to sowing dates and row spacing. *Indian Journal of Agronomy* **33** (3) : 261–264.

Singh, N. P. and Malavia, D. P. 1981. Response of mungbean to plant density. *Pulse News Letter* **1** (2) : 54–55.

Singh, N. P. and Sharma, D. P. 1987. Weed control studies in spring mungbean. *Legume Research* **10** (1) : 29–30.

Singh, R. C. and Faroda, A. S. 1979. Weed control in blackgram. *Indian Journal of Agronomy* **24** (1) : 102–103.

Singh, V. K. and Singh, R. P. 1988. Chemical weed control in blackgram (*V. mungo*). *Indian Journal of Weed Science* **20** (4) : 81–82.