

Effect of Planting and Weed Control Methods on Weed Growth and Seed Yield of Blackgram

Suresh Kumar, N. N. Angiras and Rupinder Singh

Department of Agronomy

CSK Himachal Pradesh Krishi Vishvavidyalaya, Palampur-176 062 (H. P.), India

ABSTRACT

Planting blackgram on raised beds recorded significantly lower weed number and dry matter, thus resulting in significantly higher seed yield over ridge and conventional planting. The minimum weed number and dry matter accumulation were recorded following the application of pendimethalin at 0.75 kg ha⁻¹ supplemented with one hand weeding at 45 days after sowing. Pendimethalin at 0.75 kg ha⁻¹ in integration with one hand weeding 45 days after sowing resulted in significantly higher seed yield of blackgram than other weed control treatments. Uncontrolled weeds, on an average, caused 48.1% reduction in the seed yield of blackgram.

INTRODUCTION

Blackgram is an important crop among **kharif** pulses and is usually grown on marginal and sub-marginal lands without weed management. Presently not only the productivity and production are diminishing but area is also squeezing under this crop. Among various reasons like hungry and discarded soils, lack of promising cultivars, improper fertilization, pest and disease, poor weed management is one of the most important yield limiting factors. Weeds reduce yield of blackgram to the extent of 78% (Gogoi *et al.*, 1992) and sometimes lead to the total failure of crop. Mechanical/manual weeding is normally tedious, labour consuming and costlier. Integrated weed management, which includes manual weeding, herbicides and different planting methods, can prove more economical and beneficial. Under high rainfall situation water stagnation usually causes yellowing and higher weed competition thereby reducing the yield of the blackgram. Conventionally the crop is sown under flat bed conditions, however, under present investigation efforts were made to explore the feasibility of growing blackgram on ridges and raised beds by keeping almost the recommended spacing. Therefore, the present study was carried out to investigate integrated effect of planting and weed

control methods on weed management vis-à-vis productivity of blackgram.

MATERIALS AND METHODS

Field experiment was conducted during **kharif** seasons of 2004 and 2005 at the Research Farm of Department of Agronomy, CSK Himachal Pradesh Krishi Vishvavidyalaya, Palampur. The soil of the experimental field was silty clay loam in texture, acidic in reaction (pH 5.6) and medium in available nitrogen, phosphorus and potassium, respectively. The experiment with 18 treatments (Table 1), replicated thrice, was conducted in split plot design. The treatments consisted of three planting methods (ridge planting, raised bed planting and conventional planting) in main plots and six weed control methods (unweeded, pendimethalin at 1.5 kg ha⁻¹, pendimethalin at 0.75 kg ha⁻¹+1 HW (45 DAS), alachlor at 1.5 kg ha⁻¹, alachlor at 0.75 kg ha⁻¹+1 HW (45 DAS) and hand weeding twice (25 and 45 DAS) in sub-plots. Blackgram variety PDU-1 was planted during second week of July in rows 30 cm apart using a seed rate of 20 kg ha⁻¹ during both the seasons. Ridges and raised beds were raised manually for about 15 cm. Ridge planting comprised planting of single row of blackgram at ridge top, whereas in case of raised bed two rows were planted

Table 1. Effect of planting and weed control methods on weed density (No. m⁻²) in blackgram

Treatment	Dose (kg ha ⁻¹)	<i>P. dichotomiflorum</i>		<i>E. colona</i>		<i>C. benghalensis</i>		<i>C. iria</i>		<i>P. alatum</i>		<i>A. conyzoides</i>	
		2004	2005	2004	2005	2004	2005	2004	2005	2004	2005	2004	2005
Planting methods													
Ridge planting		3.01 (8)	3.19 (9)	3.34 (10)	3.91 (14)	2.86 (7)	3.33 (10)	2.98 (8)	3.40 (10)	2.93 (7)	3.48 (11)	14.10 (207)	12.88 (175)
Raised bed		2.47 (5)	2.74 (6)	2.89 (7)	3.27 (10)	2.43 (5)	2.96 (7)	2.36 (4)	2.87 (7)	2.50 (5)	3.14 (9)	12.23 (159)	10.79 (127)
Conventional method		3.02 (8)	3.35 (10)	3.20 (9)	3.80 (13)	3.06 (8)	3.51 (11)	3.02 (8)	3.45 (11)	2.97 (7)	3.53 (11)	14.22 (207)	13.04 (175)
LSD (P=0.05)		0.19	0.39	0.20	0.19	0.14	0.16	0.22	0.45	0.22	0.29	1.28	1.39
Weed control methods													
Unweeded		3.58 (12)	4.01 (15)	4.25 (17)	4.83 (22)	3.17 (9)	3.76 (13)	3.61 (12)	4.14 (16)	3.18 (9)	3.99 (16)	17.96 (322)	16.51 (272)
Pendimethalin	1.5	2.79 (7)	2.99 (8)	3.06 (8)	3.71 (12)	2.82 (7)	3.28 (9)	2.71 (6)	3.23 (10)	2.73 (6)	3.53 (11)	13.96 (196)	12.82 (166)
Pendimethalin	0.75 + HW 45 DAS	2.52 (5)	2.61 (5)	2.75 (6)	3.12 (9)	2.70 (6)	3.05 (8)	2.44 (5)	2.82 (7)	2.42 (5)	2.80 (7)	10.74 (116)	9.48 (91)
Alachlor	1.5	2.58 (5)	3.18 (9)	3.09 (8)	3.73 (13)	2.70 (6)	3.39 (10)	2.93 (7)	3.5 (11)	3.07 (8)	3.93 (14)	16.15 (261)	15.02 (226)
Alachlor	0.75 + HW 45 DAS	2.63 (6)	2.80 (6)	3.07 (8)	3.40 (10)	2.73 (6)	3.17 (9)	2.37 (4)	2.37 (6)	2.62 (6)	3.07 (8)	11.60 (136)	10.28 (108)
Two hand weedings	25 & 45 DAS	2.89 (7)	2.98 (7)	2.65 (6)	3.15 (9)	2.56 (5)	2.93 (7)	2.67 (6)	2.90 (7)	2.77 (6)	3.10 (8)	10.69 (115)	9.30 (88)
LSD (P=0.05)		0.19	0.26	0.23	0.24	0.23	0.21	0.11	0.19	0.24	0.37	0.99	1.11

Values in parentheses are the means of original values.

on 60 cm raised bed. In conventional methods, seeds were sown on well prepared flat surface. All the recommended package of practices were adopted to raise the experimental crop. All the herbicides were applied immediately after sowing of the crop with power sprayer using flat fan nozzle at a spray volume of 700 l. Weed density and dry weight were recorded at the harvest.

RESULTS AND DISCUSSION

The predominant weeds of the experimental field in weedy plots at 60 DAS were *Ageratum conyzoides* (39.4%), *Cyperus iria* (14.6%), *Echinochloa colona* (13.8%), *Commelina benghalensis* (12.1%), *Polygonum alatum* (11.4%) and *Panicum dichotomiflorum* (8.8%).

Effect on Weeds

Raised bed planting caused significant reduction in the density of weed species, whereas other two methods of planting behaved statistically alike (Table 1). All the weed control treatments were significantly superior to weedy check in reducing the density of all the weeds. Pendimethalin at 0.75

kg ha⁻¹ in integration with one hand weeding at 45 DAS resulted in significantly lower density of all the species, except *C. iria* during 2005, where density was minimum with alachlor at 0.75 kg ha⁻¹ + 1 HW 45 DAS. However, this treatment remained statistically similar with alachlor at 0.75 kg ha⁻¹+1 HW 45 DAS in case of *A. conyzoides*, *P. alatum*, *C. iria* and *P. dichotomiflorum* during both the seasons. The minimum total weed count and dry matter were recorded with raised bed planting. Raised bed planting resulted in weed control efficiency of 27.9 and 26.5%, respectively, over conventional planting. Among different weed control methods, integration of one hand weeding (45 DAS) with pendimethalin at 0.75 kg ha⁻¹ resulted in significantly lower total weed density and total dry matter during both the seasons; however, this treatment behaved statistically alike with alachlor at 0.75 kg ha⁻¹+1 HW (45 DAS) in case of total weed dry matter during 2005. Highest weed control efficiency of 92% was recorded with pendimethalin at 0.75 kg ha⁻¹+one hand weeding (45 DAS).

Effect on Crop

Among different planting methods, raised

Table 2. Effect of planting and weed control methods on weeds and seed yield of blackgram

Treatment	Dose (kg ha ⁻¹)	Total weed count (No. m ⁻²)		Total weed dry matter (g m ⁻²)		Seed yield (kg ha ⁻¹)	
		2004	2005	2004	2005	2004	2005
Planting methods							
Ridge planting		15.5 (249)	15.9 (264)	6.4 (50)	6.6 (53)	1309	1154
Raised bed		13.3 (187)	13.8 (200)	5.7 (38)	5.9 (41)	1515	1361
Conventional method		15.6 (250)	16.1 (266)	6.7 (54)	6.9 (56)	1204	1050
LSD (P=0.05)		1.12	1.08	0.40	0.50	172	146
Weed control methods							
Unweeded		19.5 (383)	20.1 (406)	10.3 (106)	10.6 (112)	981	735
Pendimethalin	1.5	15.1 (232)	15.7 (249)	8.1 (66)	8.4 (70)	1291	1140
Pendimethalin	0.75+ HW 45 DAS	11.9 (144)	12.3 (153)	2.9 (8)	3.1 (8)	1701	1599
Alachlor	1.5	17.2 (298)	17.9 (320)	8.9 (80)	9.2 (85)	1206	1039
Alachlor	0.75+HW 45 DAS	12.9 (168)	13.2 (178)	3.8 (13)	3.9 (14)	1347	1224
Two hand weedings	25 & 45 DAS	12.1 (147)	12.4 (156)	3.6 (12)	3.7 (13)	1531	1392
LSD (P=0.05)		0.9	0.95	0.60	0.67	172	171

Values in parentheses are the means of original values.

bed planting recorded significantly highest seed yield of blackgram which was 16.8 and 27.7% higher than ridge and conventional methods of planting. However, the latter two plantings produced similar yields. Tomar *et al.* (2000) have also reported significantly highest yield in raised seed bed planting in **rabi** crops. Uncontrolled weeds resulted in 48.1% reduction in seed yield of blackgram (Table 2). All the weed control treatments yielded significantly higher than the weedy check. The seed yield recorded with pendimethalin at 0.75 kg ha⁻¹ in integration with one hand weeding was similar to hand weeding twice (25 and 45 DAS) during 2004 only and significantly higher than other weed control treatments. Similar results have also been reported by Ramanathan and Chandrashekharan (1998) and Rathi *et al.* (2004). The results of the present investigation show that in order to obtain higher seed yield of blackgram, crop should be planted on

raised beds and associated weeds should be managed with pendimethalin at 0.75 kg ha⁻¹ in integration with one hand weeding at 45 days after sowing.

REFERENCES

- Gogoi, A. K., H. Kalita, A. K. Pathal and J. Deka, 1992. Crop-weed competition in rainfed blackgram. *Indian J. Weed Sci.* **24** : 81-83.
- Ramanathan, S. P. and B. Chandrashekharan, 1998. Weed management in blackgram (*Phaseolus mungo*). *Indian J. Agron.* **43** : 318-320.
- Rathi, J. P. S., A. N. Tewari and M. Kumar, 2004. Integrated weed management in blackgram (*Vigna mungo* L.). *Indian J. Weed Sci.* **36** : 218-220.
- Tomar, S. S., G. P. Tembe and S. K. Sharma, 2000. Productivity and economic analysis of raised sunken bed technology for increasing agricultural production in black soils of central Madhya Pradesh. *JNKVV Res. J.* **33** : 25-33.