

Effect of mechanical weeding on weed infestation and yield of irrigated black gram and green gram

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ABSTRACT

A field experiment was conducted to study the effect of mechanical weeding on weed infestation and yield of black gram cv VBN 4 and green gram cv VBN 2 under irrigated condition. The treatments consisted of mechanical weeding (60 x 5 cm and 60 x 10 cm), manually operated weeder (30 x 10 cm), hand weeding twice under 30 x 10 cm, weed free plot and an unweeded control. The results revealed that lower weed biomass, lesser weed population, higher weed control efficiency and lower weed index were observed under hand weeding twice 30 x 10 cm followed by mechanical weeding in both green gram and black gram. The effect of mechanical weeding on these weed parameters were on at par and significantly higher than manual operated weeder. Higher number of pods/plant and grains/pod were produced under hand weeding followed by mechanical weeding. The highest grain yields were registered by hand weeding twice under 30 x 10 cm spacing in both the crops.

Key words: Mechanical weeding, Black gram, Green gram

Black gram and green gram are the important pulse crops in Tamil Nadu which are grown under irrigated, rainfed and rice fallow conditions. Weeds compete for water, nutrients and space and cause up to 45 per cent yield loss in blackgram (Yadav *et al.* 1997). The control of weeds during critical period of crop weed competition is very important so as to avoid yield loss. The initial growth being very slow, the crop suffers from severe weed competition up to 35 days after sowing (DAS) which causes yield reduction and, therefore, two hand weeding were essential (Singh 1993). Herbicide use may prove uneconomical due to low yield potential of green gram (Reddy 2004). Mechanical weeding is preferred in crop production because herbiury to crop plants (Pandian and Nalliah Durairaj 2004). The success of mechanical weeding depends upon the kind of implements used and stage of the weed growth whicicide application is expensive, selective and may cause in jury during operation (Gupta 1998). Hence, it is very much essential to select suitable type of weeder for pulses. Therefore, this experiment was carried out to study the suitability of mechanical weeding in green gram and black gram.

MATERIALS AND METHODS

A field experiment was conducted on weed control in irrigated blackgram CV *Vamban 4* and greengram CV *Vamban 2* during late winter (January to April) season of 2008 at Killikulam (Tamil Nadu). Six treatments consisted with T₁ – Sowing in 60 x 5 cm + mechanical weeding, T₂ - Sowing in 60 x 10 cm + mechanical weeding, T₃ - Sowing

in 30 x 10 cm + mechanical weeding, T₄ - sowing in 30 x 10 cm + hand weeding, T₅ – Weed free (2 hand weeding at 20 and 35 DAS) and T₆ – unweeded control were tested on both crops in Randomised Block Design with four replications. The soil of the experimental field was clay loam in texture, slightly acidic in reaction (pH 6.2) and analyzing medium in available N and P and low in available K content. Both crops were sown in gross plots of 5.0 x 4.0 m for each treatment. A uniform dose of fertilizers and irrigation were given to all plots. Diesel operated mechanical weeder was used with crops sown in 60 cm rows apart at 20 and 35 days after sowing DAS, while Star make manually operated weeder was used in crop sown in 30 cm rows apart at the same time. Sowing of crops was done in 30 cm rows apart under T₅ and T₆. In weed free plot regular hand weeding was done as and when needed. Observations on weed parameters and yield attributes as well as yield of crops were recorded.

RESULTS AND DISCUSSION

Effect on weeds

The predominant weeds were *Cyperus rotundus*, *Trianthema portulacastrum*, and *Boerhavia diffusa* besides other grassy weeds in unweeded plots of the experimental plots. The weed dry matter production (DMP) was the lowest with T₄ - hand weeding twice under 30 x 10 cm spacing in both the crops during 30 and 45 days growth stages, but differences were not significant over mechani-cal weeding under either 60 x 5 cm (T₁) or 60 x 10 cm (T₂) (Table 1). Similar weed population with these

treatments may have resulted into comparable DMP. The use of manually operated weeder under 30 x 10 cm spacing had significantly higher DMP due to higher weed population/m² in both the crops at both the stages of observation than the former treatments. Higher weed control efficiencies were associated with hand weeding followed by mechanical weeding in both the crops. Two hand weeding under 30 x 10 cm spacing recorded weed control efficiency of 85.7 and 83.7 in black gram and 85.8 and 86.0 in green gram during 30 and 45 DAS, respectively but values were at par to those recorded with mechanical weeding under 60 x 5 cm and 60 x 10 cm at 45 DAS in both the crops. Diesel operated mechanical weeder was useful in controlling weeds in wide spaced field crops like cotton, maize and tapioca (Pandian and Nalliah Durairaj 2004).

With respect to weed index, lower values were observed under hand weeding followed by mechanical weeding indicating minimum yield reduction in these treatments in both the crops. Hand weeding twice with 30 x 10 cm recorded lower weed index of 13.6 and 15.7 in green gram and black gram, respectively. The yield reduction with mechanical weeding under either 60 x 5 cm or 60 x 10 cm was minimum than that of manually operated weeder under 30 x 10 cm in both the crops. This might be due to better weed control efficiencies with lower weed DMP and weed population.

Effect on crops

Different weed control methods exerted their marked influence on yield attributes in black gram and green gram (Table 2). Hand weeding twice with 30 x 10 cm spacing produced higher number of pods/plant and grain/pod than mechanical weeding and manually operated weeder in both the crops, but values of grains/pod were comparable with each other. Superiority in yield attributes under hand weeding and mechanical weeding was attributed to less weed population and weed biomass coupled with higher weed control efficiencies under these treatments.

Among the four weed control methods, significantly maximum grain yield of 980.2 and 1082.2 kg/ha were registered by hand weeding twice under 30 x 10 cm spacing in green gram and black gram, respectively. The grain yields under mechanical weeding with either 60 x 5 cm and 60 x 10 cm were almost similar and these were significantly higher than that of obtained by manually operated weeder. The yield improvements under mechanical weeding than unweeded control were 118.8 and 103.6% with 60 x 5 cm and 60 x 10 cm in green gram and 115.9 and 101.9% in black gram, respectively. Increased grain yields under hand weeding and mechanical weeding was attributed to effective weed control by these treatments which was evident from superiority in yield attributes due to lower weed population and weed biomass.

Table 1. Effect of mechanical weeding on weed characters of black gram and green gram at 30 and 45 days after sowing

Treatments	Blackgram							Greengram						
	Weed population (no./m ²)		Weed DMP (kg/ha)		Weed control efficiency (%)		Weed index (%)	Weed population (no./m ²)		Weed DMP (kg/ha)		Weed control efficiency (%)		Weed index (%)
	30	45	30	45	30	45		30	45	30	45	30	45	
60 x 5 cm + mechanical weeding (T ₁)	202.4	173.6	66.4	539.7	74.1	75.1	39.9	195.3	180.5	552.6	540.4	75.4	77.8	37.0
60 x 10 cm + mechanical weeding (T ₂)	187.3	171.7	581.8	536.0	70.7	75.2	43.6	186.8	175.8	560.2	541.8	75.1	77.7	42.3
30 x 10 cm + manually operated weeder (T ₃)	307.8	289.2	1315.3	1215.5	39.9	43.9	57.3	317.2	302.8	1306.4	1289.9	41.9	46.9	58.3
30 x 10 cm + hand weeding twice (T ₄)	124.8	147.3	312.2	352.3	85.7	83.7	15.7	110.6	132.4	320.0	342.7	85.8	86.0	13.6
Weed free (T ₅)	-	-	-	-	-	-	-	-	-	-	-	-	-	--
Unweeded control (T ₆)	618.5	651.6	2188.2	2165.4	-	-	-	628.7	666.1	2250.5	2430.2	-	-	71.6
LSD (P=0.05)	49.4	55.8	188.5	220.2	10.1	16.3	-	49.4	55.8	211.5	209.6	13.2	15.9	--

DMP - Dry matter production

Table 2. Effect of mechanical weeding on yield attributes and grain yield of green gram and black gram

Treatments	Green gram			Black gram		
	Pods/ plant (no)	Grains / pod (no)	Grain yield (Kg/ha)	Pods/ plant (no)	Grains / pod (no)	Grain yield (Kg/ha)
60 x 5 cm + mechanical weeding (T ₁)	13.8	5.1	617.6	11.2	5.0	652.1
60 x 10 cm + mechanical weeding (T ₂)	15.2	6.7	565.9	11.7	6.2	609.8
30 x 10 cm + manually operated weeder (T ₃)	10.9	4.8	408.7	7.3	4.4	462.5
30 x 10 cm + hand weeding (T ₄)	12.7	7.0	852.3	9.8	6.5	910.4
Weed free (T ₅)	18.2	7.2	980.2	13.6	6.8	1082.2
Unweeded control	7.1	4.1	278.3	6.0	3.8	302.5
LSD (P=0.05)	2.5	0.51	58.4	3.1	0.53	54.7

REFERENCES

- Gupta OP. 1998. *Weed management : principles and practices*. Agrobotanica publications, Bikaner: 64-68.
- Pandian BJ and Nalliah Durairaj S. 2004. *Hand book on weed science, irrigation management and dry farming*. Tamil Nadu Agricultural University, Agricultural College and Research Institute, Killikulam : 34-39.
- Reddy SR. 2004. *Agronomy of field crops*. Kalyani Publications, New Delhi : 359-364
- Singh S.S. 1997 *Crop management under irrigated and rainfed condition*. Kalyani Publications, New Delhi : 164-171
- Yadav RP, Yadav KS and Srivastava UK. 1997. Integrated weed management in black gram. *Indian Journal of Agronomy* **42** (2): 24-26.