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Response of Greengram [*Vigna radiata* (L.) Wilczek] to Weed Control and Fertilizer Application under Different Planting Systems

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Greengram is one of the important pulse crops of India. Abundance of soil moisture due to continuous rains coupled with its short stature and slow initial growth subjects it to heavy weed competition during rainy (**kharif**) season. Generally unchecked weed growth causes 40-50% yield loss in greengram. Availability of nutrients is one of the most important factors determining competitive relationship between plant species. Planting of crops in flat seed bed is a common practice, however, alternate planting methods like ridge planting, broad bed and furrow (BBF) system and furrow irrigated raised bed system (FIRBS) have been found effective in solving problems relating to weeds, water management, nutrients, and of reduced germination due to soil crusting or salinity, under different situations. The benefit of these planting systems can be utilized in pulse crops since these systems help in removing excess water easily from the field. Keeping all these facts in mind, the present study was conducted at the Agronomy Research Area, Chaudhary Charan Singh Haryana Agricultural University, Hisar, during **kharif** 2002 to study interaction effects of fertilizers and weed control treatments on greengram under different planting systems.

The experiment was laid out in split plot design with three replications. The main plot treatments consisted of two planting methods (Bed planting and flat sowing) and four fertility levels viz., control (no fertilizers), 15 kg N+30 kg P_2O_5 ha^{-1}, 20 kg N+40 kg P_2O_5 ha^{-1} and 25 kg N+50 kg P_2O_5 ha^{-1}. Five weed control treatments (HW 30 DAS, pre-emergence application of pendimethalin at 1.5 kg ha^{-1}, pendimethalin at 1.5 kg ha^{-1}+HW 30 DAS, weedy and weed-free) were kept in sub-plots. *Trianthema portulacastrum* L. and *Cyperus rotundus* L. were the predominant weed species in the experimental field.

The two planting systems had no significant effect on the density and dry weight of weeds and on grain yield of greengram. Similarly, fertility levels also did not affect weed density but weed dry matter production increased with increase in fertility level (data not given). The grain yield of greengram increased significantly with the increase in fertility levels upto 20 kg N+40 kg P_2O_5 ha^{-1}, which can be attributed to significantly higher number of pods per plant. Fertility levels did not significantly increase the number of grains per pod and 1000-grain weight (data not given).

All weed control treatments effectively

Table 1. Effect of different treatments on density and dry weight of weeds

Treatment	Weed density (No. m^{-2})		Weed dry weight ($g\ m^{-2}$)
	Carpet weed	Purple nutsedge	
HW 30 DAS	3.4 (10)	12.7 (160)	9.6 (96.8)
Pendimethalin at 1.5 kg ha^{-1}	4.0 (15)	14.3 (204)	13.7 (191.4)
Pendimethalin at 1.5 kg ha^{-1}+HW 30 DAS	3.1 (8)	12.9 (165)	8.8 (77.5)
Weedy check	6.4 (40)	14.8 (219)	17.0 (291.2)
Weed-free	1.0 (0)	1.0 (0)	1.0 (0.0)
LSD (P=0.05)	0.3	1.4	0.7

Figures in parentheses represent the original values.

Table 2. Interaction effect of fertility levels and weed control on grain yield (kg ha^{-1}) of greengram

Treatment	Weed control treatments					
	HW 30 DAS	Pendimethalin at 1.5 kg ha^{-1}	Pendimethalin at 1.5 kg ha^{-1}+HW 30 DAS	Weedy	Weed-free	Mean
Fertility levels ($N+P_2O_5$ kg ha^{-1})						
0+0	1023	1114	1299	898	1346	1136
15+30	1270	1421	1608	929	1655	1377
20+40	1348	1567	1723	957	1728	1465
25+50	1397	1583	1720	960	1732	1479
Mean	1260	1421	1587	936	1615	

LSD (P=0.05) :

Fertility levels = 86

Weed control treatments = 62

Interaction :

For comparing two fertility levels at same weed control level = 140

For comparing two weed control levels at same fertility level = 133

controlled weeds and significantly reduced their density and dry weight (Table 1). Among the yield attributes, pods per plant and 1000-grain weight were increased significantly due to weed control, but number of seeds per pod was not affected. Weeds allowed to grow throughout the crop season caused 42% reduction in greengram yield. Pendimethalin at 1.5 kg ha^{-1} + HW 30 DAS being at par with weed-free produced significantly higher grain yield as compared to pendimethalin at 1.5 kg ha^{-1} or HW 30 DAS alone. The interaction effects of fertility levels and weed control treatments on grain yield of greengram were significant (Table 2). Under weedy check conditions, application of 15 kg N + 30 kg P_2O_5 ha^{-1} did not significantly increase the grain yield over that when no fertilizer was applied (Table 2). But under weed control treatments and weed-free conditions all fertility levels including 15 kg N + 30 kg P_2O_5 ha^{-1} were superior over control (no fertilizer). It might be attributed to the fact that weed-free environment provided better conditions for crop growth and nutrient uptake due to reduction in crop-weed competition. Thus, the interaction clearly indicated a synergistic relationship between weed control and fertilizer application. Interactive effect of weed control and fertilizer application has also been observed in soybean by Singh and Nepalia (1997).

REFERENCE

Singh, S. P. and V. Nepalia, 1997. Effect of weed control measures and levels of phosphorus on nutrient removal by soybean crop and weeds. *Ann. Agric. Res.* **18** : 401-403.