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WEED MANAGEMENT IN MUNGBEAN (*Vigna radiata* (L.) R. Wilczek) USING DIFFERENT METHODS AND ROW SPACING

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ABSTRACT

A research project was initiated in 2009 at National Agricultural Research Centre, Islamabad to find out mechanical means of weed control in mungbean crop. Mungbean variety NM-06 was sown at varied row spacing. Different methods were employed to control weed flora. The experiment was laid out in a randomized complete block design with three replications. Besides fresh and dry weight of weeds, the data were recorded on various growth and yield parameters of mungbean plants. Results revealed significant variation in various plant traits and weeds population due to different row spacing and weed management practices. Among the various weed control methods, once manual weeding with hand-pulled terphali, a three angular tine device in 35 cm row spacing produced significantly higher yield of 649 kg ha^{-1} compared to control treatment (No weeding) with grain yield of 216 kg ha^{-1} .The data further revealed that maximum decrease in weed density of 75 %, in weed fresh and dry weight of 31 and 45 %, respectively occurred in 60 cm row spacing using tractor-pulled device when compared to control. The results suggest that use of hand-pulled terphali keeping row spacing at 35 cm seems an economical, safe and environment friendly way of weed control and improves grain yield in mungbean.

Key words: Mungbean, row spacing, weed management, weed density

INTRODUCTION

Mungbean is an important *kharif* (summer) pulse crop of Pakistan, grown on an area of 246 thousand hectares with total production of 178 thousand tons during 2007-08 (Govt. of Pakistan, 2008). The average grain yield of crop in this year was around 723 kg ha^{-1}. The potential of the crop is not realized due to many factors. Pulses for long time have been grown with poor management practices resulting in poor yields. Proper seed bed and land preparation are important for adequate germination of seed, crop establishment and

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good yields. Weeds infestation is one of the major factors lowering yield in pulses in Pakistan (Rehman and Ullah, 2009).

Weeds compete with main crop for space, nutrients, water and light. It is also recognized that a low weed population can be beneficial to the crop as it provides food and habitat for a range of beneficial organisms (Bueren *et al.* 2002). However, the aim of weed management should be to maintain weed population at a manageable level. Weeds above critical population thresholds can significantly reduce crop yield and quality. Weed management in pulses is a big challenge for farmers who intend to grow chemical free crop and food. Therefore, present experiment was conducted to evaluate some mechanical weed control practices using varying row spacing to improve seed yields by reducing cost of production.

MATERIALS AND METHODS

The study was conducted at National Agricultural Research Centre, Islamabad during summer 2009 using mung variety, NM-06. The experiment comprised of five treatments including weedy control, 35 cm row spacing + hand weeding, 35 cm row spacing + hand-pulled *terphali*, 45 cm row spacing + tractor-pulled device and 60 cm row spacing + tractor-pulled device. Effort was made to control weeds in mungbean using hand/mechanical devices with different spaces between rows. The treatments were applied once at 25 days after sowing (DAS). Data on weeds density, fresh and dry weight of weed flora were taken at 35 DAS while on other plant traits like plant height, number of pods plant^{-1}, number of grains pod^{-1}, 1000-grain weight, aerial biological yield and grain yield were recorded at maturity. The data were analyzed statistically with the help of computer software MSTAT-C. The means were separated through Least Significant Difference (LSD) method at 5% level of probability (Steel and Torrie, 1984).

RESULTS AND DISCUSSION

Maximum reduction of 59.10% in weeds density occurred in plots where row spacing was kept at 35 cm and weeds were controlled using hand-pulled *terphali*, 47.71% in plots with row spacing of 45 cm using tractor-pulled weeder and minimum of 25.01% in plots with 60 cm space between rows using tractor-pulled device compared with weedy control. There were significant differences in weed density for *terphali* and tillage operations. On the average tillage operations showed lower weed flora in pulses compared to control and these results were in certainty with the findings of (Hassan *et al.* 1995; Ahmad *et al.* 1990; Singh and Singh, 1998).

Maximum decrease in weed fresh 77.1% and dry weight 74.3% were recorded in plots with 35 cm row spacing with *terphali* compared to control, while 71.6% and 59.7% in weeds fresh and dry weight was recorded in plots with 45 cm row spacing + tractor. Whereas weeds fresh and dry weight was also reduced in tractor driven plots with 60 cm row spacing but reduction was only 69.2% and 54.9% and in case of hand weeding 78.7% and 70.7%, respectively. Singh and Singh (1998) also reported that tillage operations resulted in decreased weed flora in pulses.

Dry weight of weeds is a better criterion of weed crop competition than weeds density; higher fresh and dry weight of weeds reflects more utilization of soil and environmental resources. Data of weeds density, fresh and dry weight in all weed control treatments showed significant decrease as compared to control. These results are in accordance with the findings of Naeem *et al.* (2000) who reported decrease in weeds dry weight resulted in tillage operations. It is also observed that mungbean showed significant increase in plant height and number of pods plant^{-1}. Increase in plant height and number of pods plant^{-1} is inversely proportional to weeds density and dry weight and similar is the case with the number of grains pod^{-1}. Production capacityof mungbean can be determined by the number of pods plant^{-1} (Khan *et al.* 2008). Data indicated that with the decrease in weeds biomass number of pods plant^{-1} increased.

Lowest number of pods was recorded in weedy check and maximum number of pods was recorded in the plots where weeds were minimum. These results are in certainty with Cheema *et al.* (2000) who reported that the increase in grain yield may be attributed to regulation of plant height and weed control in improving number of pods plant^{-1} and number of grains pod^{-1}. Minimum number of grains pod^{-1} was recorded in weedy check which was significantly lower in all weed control treatments. According to Raklia (1999), more weed suppression provides better crop growth for more grain formation. Similarly, Tessema and Taneer (1997) reported number of grains was affected due to weed infestation. This difference in the number of grains might be due to weed suppression which resulted in more translocation and assimilation of photosynthates towards grain formation (Borras *et al.* 2004).

Pod length was recorded maximum in plots where treatments were *terphali* (9.9 cm) and hand weeding (9.7 cm); while in plots with 45cm row spacing + tractor and 60cm + tractor, pod length was 9.2 cm and 9.6 cm, respectively compared to control (9.0 cm). This might be due to weed suppression which resulted in more translocation and assimilation of photosynthates towards reproductive growth (Borras *et al.* 2004).

Thousand grain weight was also increased with reduction in weeds dry biomass and found to be maximum (55.0 g) in plots with row spacing 60 cm + tractor followed by 54.67 g in plots with row spacing of 45 cm + tractor. Similarly, it was 51.67 g in case of hand weeding, 51.33 g in *terphali* driven plots and 50.67 g in case of control. These findings were in line with the previous research conducted by Cheema and Akther (2005) who found that 1000-grain weight increased with reduced weed infestation.

Biological yield of mungbean increased 180% in *terphali* driven plots with 35 cm row spacing, 100% in plots with 60 cm row spacing + tractor and 94% in case of hand weeding. The increase in biological yield was 85.0% in treatments where weeds were controlled with tractor using 45 cm row spacing.

Grain yield also increased up to 201% using different row spacing and weed control treatments. Increase in grain yield was 100% where weeds were controlled through tractor using 60 cm row spacing and increase in grain yield was about 85% in case of hand weeding and 45 cm row spacing + tractor compared to control. These results were in accordance with Hassan *et al.* (2003) who reported higher grain yield in tillage plots with low weed density compared to control. Khaliq *et al*. (2002) investigated the efficacy of different weed management strategies in mungbean and stated that hoeing treatments resulted in reduced weed dry weight by 79% compared to control and maximum plant height. The decrease in yield in plots with 45 and 60 cm row spacing + tractor might be due to intra-specific plant competition. As we increase row spacing, plant to plant spacing ultimately decreases which initiates competition between the plants which may affect the yield. These findings were also in certainty with Mania e*t al*. (2002) who stated that root competition inhibited root proliferation. All else equal, plant should proliferate roots in a nutrient patch devoid of roots rather than one already occupied by roots and this overlapping of roots cause competition among the plants either of the same crop or different.

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Table-1. Effect of different weeds management practices on yield and yield components of mungbean.

Treatments	Weeds density m^{-2}	Weeds fresh wt. m^{-2} (g)	Weeds dry wt. m^{-2} (g)	Plant height (cm)	No. pf pods $plant^{-1}$	No. of grains pod^{-1}	Pod length (cm)	1000 grain weight (g)	Biological yield (Kg ha^{-1})	Grain yield (Kg ha^{-1})
Control (No. weeding)	14.67a	203.7a	35.5a	54.3c	19.7bc	10.2b	9.0c	50.67b	933c	216c
35 cm row spacing + Hand weeding at 25 DAS	8.67c (40.89)	43.3c (78.7)	10.4c (70.7)	61.3b	19.0c	10.9ab	9.7a	51.67b	1813b (94)	399b (85)
35 cm row spacing + Man pulled tarphali at 25 DAS	6.00d (59.10)	46.6c (77.1)	9.1c (74.3)	65.8a	23.3a	10.6ab	9.9a	51.33b	2613a (180)	649a (201)
45 cm row spacing + tractor pulled device at 25 DAS	7.67cd (47.71)	57.7b (71.6)	14.3bc (59.7)	60.83b	22.90a	10.80ab	9.170bc	54.67a	1726.0b (85)	390b (85)
60 cm row spacing + tractor pulled device at 25 DAS	11.00b (25.01)	62.6b (69.2)	16.0b (54.9)	62.33b	20.93b	11.07a	9.560ab	55.00a	1864.0b (100)	432b (100)
LSD (P<0.05)	1.74	10.90	5.422	3.283	1.528	0.6969	0.4763	1.594	644.3	164.8

Figures given in parenthesis show percent decrease over control in case of weeds and increase in case of biological and grain yield.
DAS = Days after sowing.
LSD = Least significance difference at 5% probability level