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Critical period of weed competition with the growth of mungbean.

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stract

ough plant height was the maximum in weed-free plots, but differences were non-significant among plots having petition up to 30 days after emergence of mungbean. Weed competition with mungbean beyond 30 days after rgence was critical and resulted in considerable reduction in pod length. Maximum biological yield was produced in plots ntained weed-free throughout the growing season. Minimum biological yield was recorded from plots where weed petition prolonged up to 50 days after crop emergence and also up to harvesting of mungbean. Weed competition with gbean persisting for 20-30 days after crop emergence was very critical and prolonged competition resulted in substantial reduction.

oduction

mungbean (*Vigna radiata* (L) Wilczek) is prized among pulse species for its easily digestible seeds. Its uction has remained static during the past decade; as ult, the gap between supply and demand is widening. grown in Pakistan on 197.6 thousand hectares with the uction of 91.2 thousand tonnes of grain annually giving verage yield of 461.5 kg per hectare (Anon. 1998) h is much below the harvested potential of our existing ties. Proper information is not available regarding weed rol is available and benefits of applied inputs cannot be realized unless it is followed by proper weed agement programme. Weed plants are usually more essive in growth habit and suppress the growth of the gbean plant. Knowledge of weed competition is pre-isite for a research worker to plan an effective weed rol strategy.

rado (1984) concluded that weed control, regardless of duration of weeding, had appreciable influence on the ht of plants at maturity. Bean yield and hay yield per were affected by different durations of weeding (0, 2, , 5 weeks weeding). Plants weeded for four weeks emergence (WAE), produced significantly the highest . Hossain *et al.* (1990) stated that minimum tillage bined with fertilizer and one hand weeding at 21 day emergence was economical for mungbean production. ar and Kairon (1990) reported competition studies veen mungbean and *Trianthema portulacastrum* and *nochloa colonum* carried out in a sandy loam soil. imum grain yields were obtained with weed-free plots hand weeding + hoeing 30 - 40 DAS. Acosta (1991) uated that the presence of weeds throughout the ving season of cowpea (approximately 75 days), yield reduced by 75 percent in comparison with weed-free rol. Growth of weeds during the first 40 days of crop ivation reduced cowpea yields by 59 percent. ntaining plots weed-free for the first 40 days of crop ivation reduced cowpea yields to 22 percent, and in s where weeds competed for the first 10 days only, d was reduced by 6 percent. He concluded that the cal period for weed competition in cowpea is between and 40 days after emergence of the crop. Singh *et al.* (1992) studied in a field experiment that seed yields of blackgram (*Vigna mungo*), from plots un-weeded, weed-free and hand weeded 30 days after sowing were 0.65, 0.94 and 0.83 t ha^{-1}, respectively. Weed dry weight was 1.94 and 0.33 t ha^{-1} in the un-weeded control and hand-weeded plots, respectively. Varshney (1993) concluded that uncontrolled weeds reduced the seed yield of pigeonpea (*Cajanus cajan*) and greengram (*Vigna radiata*) by 46.5 and 60.5 percent respectively, compared with weed-free control throughout growing season (1960 and 491 kg ha^{-1}). Musa *et al.* (1996) found that among treatments of no weed competition, weed competition up to 15, 30, 45, 60 days after sowing and full season, weed competing full season with the crop reduced yield of mungbean 45 percent as against no weed competition.

Materials and Methods

Investigations on the critical period of weed interference on growth and physiological yield of mungbean were carried out in an experiment at the Agronomic Research Area, University of Agriculture, Faisalabad during spring of years 1992 and 1993. The experiment was conducted on a field heavily infested with weed flora comprising *Amaranthus viridis* L. (Amaranth), *Chenopodium album* L. (Goosefoot), *Convolvulus arvensis* L. (bindweed), *Cynodon dactylon* (Bermuda grass), *Cyperus rotundus* L. (Purple nutsedge), *Heliotropium europium* L. (Heliotrope), *Melilotus indica* L. (Sweet clover), *Rumex dentatus* L. (Broad leaved dock). In addition, the seeds of above weeds were broadcasted and incorporated in each plot before sowing of mungbean to ensure uniform stand of weeds. Previously the field was occupied by cotton crop. The soil of the field was sandy clay loam. After four acre inch "rouni" seed bed preparation was completed by two cultivation and one planking. Experiment had four replications and net plot measuring 1.8 x 6 metres. A mungbean variety, 'NM-54' was sown in rows 30 cm apart, comprising six mungbean rows. Experimental plots were sown manually with a single row hand drill using 25 kg seed per hectare. Three irrigations, each of 7.5 cm, were applied in addition to 47.6 and 59.5 mm rain received during the growing season of 1992 and 1993, respectively.

Table 1: Crop plant height and trifoliate size of fifth leaf as affected by different durations of weed management.

Treatments	Crop plant height (cm)		Trifoliate size of fifth leaf (cm^{-2})	
	1992	1993	1992	1993
Mungbean alone	60.55 a	61.17 a	39.50	40.22 a
Mung-weed association for 10 DAE; then weeding	60.22 a	61.10 a	39.47	40.50 a
Mung-weed association for 20 DAE; then weeding	60.10 a	60.77 a	38.82	40.25 a
Mung-weed association for 30 DAE; then weeding	58.86 a	59.98 a	38.45	39.92ab
Mung-weed association for 40 DAE; then weeding	55.10 ab	53.50 b	36.24	38.49abc
Mung-weed association for 50 DAE; then weeding	52.47 b	52.45 b	35.91	36.08 bc
Weed competition throughout growing season	52.45 b	51.65 b	35.37	35.63 c

Means not sharing a letter in common differ significantly at 0.05 probability. DAE = Day after emergence

Table 2: Days taken to flowering and biological yield of mungbean as affected by different durations of weed management

Treatments	Days taken to flowering		Biological yield (Kg ha^{-1})	
	1992	1993	1992	1993
Mungbean alone	43.25	43.25	4090 a	4128 a
Weed competition up to 10 DAE; then weed-free	43.50	43.25	4079 a	4098 ab
Weed competition up to 20 DAE; then weed-free	44.00	43.25	4019 b	4057 b
Weed competition up to 30 DAE; then weed-free	44.00	44.25	4004 b	3952 c
Weed competition up to 40 DAE; then weed-free	45.25	45.00	3904 c	3925 c
Weed competition up to 50 DAE; then weed-free	45.50	45.25	3720 d	3777 d
Weed competition throughout growing season	45.50	45.50	3716 d	3771 d

Means not sharing a letter in common differ significantly at 0.05 probability. DAE = Day after emergence

This experiment was laid out in randomized complete block design. The experimental treatments were as mungbean alone (weed-free throughout growing season), mung-weed association for 10 DAE (days after emergence); then weeding, mung-weed association for 20 DAE; then weeding, mung-weed association for 30 DAE; then weeding, mung-weed association for 40 DAE; then weeding, mung-weed association for 50 DAE; then weeding, mung-weed association throughout growing season.

After completion of stipulated period of mungbean-weed association, the weeds were removed by hoeing. The rest of the growing period of the crop was maintained weed-free by hoeing with "kasola" and hand pulling of weeds. Irrigation and all other agronomic practices were kept normal and uniform for all the plots. The following observations were recorded during the course of these studies. Crop plant height (cm), trifoliate size of fifth leaf (cm^2), days taken to flowering and Biological yield (kg ha^{-1}). All the data collected were analysed statistically by using analysis of variance technique and multiple comparison was made where necessary to test the significance of treatment means (Muhammad, 1995).

Results and Discussion

It is evident from the data recorded in Table 1 that the effect of weed interference on plant height was not visible up to 30 DAE during both years, but thereafter, significant differences among the treatment means were observed. Weed interference with mungbean for extended period affected the plant height adversely and showed non-significant difference with plots weedy up to 50 DAE and 40 DAE in both the years. The tallest plants were recorded in plots kept weed-free throughout growing season measuring 60.55 cm and 61.17 cm during the year 1992 and 1993, respectively. Plant height was statistically at par with plants produced in plots where weed interference was maintained up to 30 DAE in both years. Shortest plant of mungbean were recorded in plots having weed competition throughout growing season during both the years. It appear from the results that competition between mungbean and weeds reduced growth of the former, which was manifested in the form of reduced plant height. Similar results were reported by Alvarado (1984).

The data presented in Table 1 show that there was non-significant effect of various duration of weed interference on trifoliate size of fifth leaf in the year 1992, whereas, significant differences among treatment means were noted during 1993. The higher values were obtained in plots where weed interference with crop was up to 40 DAE. However, all these treatments were at par with one another. The differences were attributed to weed-crop competition for environmental resources. Mungbean plants in plots with lesser environmental stress showed vigorous plant development and produced maximum trifoliate size of fifth leaf as compared to the rest of treatments. Weed interference in throughout weedy plots resulted in minimum size of trifoliate leaf i.e. 35.37 and 35.63 cm^2 during 1992 and 1993, respectively.

Data on days to flowering given in Table 2 reveal non-significant response to weed-crop interference in mungbean. No doubt earlier flowering appeared in weed-free plots throughout growing season (43.25 days against 45.50 days) in both years. Longer duration of weed interference with mungbean resulted in delayed flowering. Weed competition with crop plants throughout growing season took 45.50 days to flower in mungbean crop during 1992 and 1993.

: is clear from the data given in Table 2 that duration of
nung-weed association had significant affect on biological
ield. In 1992, the highest biological yield of 4090 kg per
ectare was recorded in plots kept weed-free throughout
rowing period. It was statistically at par with plots having
veedy conditions 10 DAE. This was followed by plots
vhere weeding was done 20 and 30 DAE both producing
imilar biological yields. Weeding 50 DAE and weedy
nroughout resulted in significantly lower biological yields.
he maximum mung-weed competition produced minimum
iological yield per hectare (3716 kg). Similar kind of trend
vas also observed in year 1993, mungbean produced
ninimum biological yield of 3771 kilogram per hectare.
esults obtained through present studies are supportive of
ne findings by Alvarado (1984)

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