Development of Economical Weed Management Strategy for Mungbean (*Vigna radiata* L. Wilczek)

Muhammad Mansoor[1], Haji Khalil Ahmad[1], Hi[illegible] [illegible]
and Muhammad Yaqoob[2]

ABSTRACT

[illegible]

Key words [illegible] weed management, allelopathy, *Acacia* [illegible]

INTRODUCTION

[illegible] (*Vigna radiata* L. Wilczek) is emerging to be an important [illegible] substitutes to meet the food needs of the large population [illegible] of short duration, nutritional superiority and [illegible] season crop facing the weeds as main competitor. Weeds [illegible] the growth and yield of crop. Modern agriculture [illegible] protection of the crop against competition from weeds [illegible] competing with crop plants for space, light, nutrients and carbon [illegible] different views about the intensity of weed losses but it is established fact [illegible] losses to crops depending upon the degree of weed infestation [illegible] of weed competition and soil and climatic conditions.

There is no specific way to control weeds of all types because of different kinds [illegible] and environmental factors influence the choice of control method to [illegible] (2002) reported that weed could be controlled by manual, cultural [illegible] methods. Although weed management practices like hand weeding and [illegible] application are effective in weed control but are uneconomical due to [illegible] 2003). Moreover the chemical weed control method is hazardous for [illegible] causes environmental pollution.

[illegible] (sorghum water extract) for weed suppression and increase [illegible] been reported in field studies by Cheema and Khaliq (2000). A[illegible] that allelopathic plants containing allelochemicals in low quantity [illegible]

[illegible] Gomal University, Dera Ismail Khan, NWFP, Pakistan
[illegible] Institute, Dera Ismail Khan, NWFP, Pakistan

[illegible] and in high amount act as herbicides. Therefore, Allelopathy has emerged as an important area of weed control research and has been accepted very recently as important ecological phenomena.

The existence of Allelopathic compounds in sorghum (*Sorghum bicolor*) and [illegible] subsequent effects on other plants inspired the idea of conducting field study to [illegible] the [illegible] of [illegible] Eucalyptus (*Eucalyptus camaldulensis*) and Acacia (*Acacia [illegible]*) water extracts [illegible] as natural herbicides to control weeds in mungbean [illegible] to study their effects [illegible] yield of mungbean in comparison with hand weeding and herbicides.

Materials and Methods

The experiment was laid out in RCBD with four replications keeping [illegible] plant to plant and row to row spacing 10 and [illegible] [illegible] was used as test variety. Fertilizer was applied [illegible] Weed samples were taken using a quadrate of 1 [illegible] [illegible] 48 hours for recording dry weed biomass. Weed management [illegible] use of herbicide before emergence of crop [illegible] [illegible] weeding was applied 10 and 35 DAS. The water extracts [illegible] chaffed herbage of the Sorghum, ground leaves of [illegible] distilled water in a ratio of 1:5 for 72 hours. It was then [illegible] extracts. The extracts were concentrated to [illegible] [illegible]

[illegible]

Treatments

[illegible]

[illegible] pre-emergence herbicide [illegible]

[illegible] 10 and 35 days after sowing)

T4 [illegible] herbicide + Two hand weeding (10 and 35 days after sowing)

[illegible] Sorghum extract (10 and 35 days after sowing)

[illegible] Eucalyptus extract (10 and 35 days after sowing)

[illegible] Acacia extract (10 and 35 days after sowing)

[illegible] of status data were recorded on weed density [illegible] Number of branches plant [illegible] Number of pods plant [illegible] [illegible] The data for the individual traits were [illegible] technique and the significant means were [illegible] [illegible] Test as outlined by Steel and Torrie [illegible]

Results and Discussion

Weed data 20 days after sowing

Weed density m^{-2}

[illegible] from the Table 1 that mean data regarding weed [illegible] by various weed management strategies [illegible] water extract application [illegible] followed by sorghum water [illegible] Control had the highest weed population of [illegible] m^{-2}. [illegible] similar results that extract application decreased the [illegible]

Fresh Weed Biomass (g m^{-2})

Analysis of the data showed that all the weed control treatments had significant effect on fresh weed biomass. The lowest fresh weight of weeds 7.56 and 7.69 g m^{-2} were recorded in plots sprayed with Acacia and Sorghum water extracts, respectively. The highest fresh weed biomass (10.79 g m^{-2}) was noted in control treatment. Cheema *et al.* (2002) reported that sorghum water extract application reduced fresh weight of weeds by 48%.

Dry weed Biomass (g m^{-2})

The analyzed data of dry weed biomass revealed that the differences between dry weeds biomass of weed management strategies and check treatment were significant, which means that weed control treatments significantly reduced the dry weight of weeds. The lowest dry weeds weight of 3.61g m^{-2} was recorded in plots sprayed with Acacia water extract followed by 4.48 and 4.51g m^{-2} in the plots which were sprayed with Sorghum water extract and pre-emergence herbicide + Two hand weeding, respectively. Cheema *et al.* (2002) also reported that extract application reduced dry weight of weed by 50%.

Table-1. Weed parameters as affected by various weed management strategies

Treatment	Weed density m^{-2}		Fresh Weed biomass (gm^{-2})		Dry Weed biomass (gm^{-2})	
	20 DAS	45 DAS	20 DAS	45 DAS	20 DAS	45 DAS
Control	7.93 a	16.59 a	10.97 a	19.60 a	7.51 a	16.58a
Pre-emergence herbicide	5.19 b	8.61 b	9.04 b	12.64 b	5.43 b	9.73 b
Hand weeding	4.45 c	5.91 d	8.12 c	9.39 d	5.01 c	6.73 c
Pre-emergence + Hand weeding	4.39 c	4.85 e	7.97 cd	7.37 e	4.51 d	4.48 d
Sorghum extract	4.15 cd	4.35 ef	7.69 d	6.25 f	4.48 d	4.34 d
Eucalyptus extract	4.46 c	7.08 c	8.37 c	11.56c	5.21 bc	8.42 b
Acacia extract	4.05 d	4.04 f	7.56 d	5.46 g	3.61 e	4.09 d
$LSD_{0.05}$	0.312	0.504	0.415	0.540	0.282	1.383
CV%	4.25	4.16	3.28	3.51	3.71	11.81

Means sharing common letter are not significantly different at alpha = 0.05.

Weed data 45 days after sowing

Weed density m^{-2}

The performance of Acacia water extract application was the best amongst all weed management strategies in controlling the weed population, with the value of 4.04 weed m^{-2}. Sorghum water extract application has very close results with 4.35 weed m^{-2}. The control treatment had the highest weed density (16.59). Similar results were obtained by Cheema *et al.* (2003) who noted that extract application gave better weed control. Khan et al. (2004a&b) have also reported the inhibitory effect of tree extracts on the germination of weeds of wheat crop.

Fresh Weed Biomass (g m^{-2})

The analyzed data of Fresh weed biomass at 45 days after sowing of mungbean revealed that all the weed management strategies had significant effect on the fresh weight of weeds. The lowest fresh weed weight of 5.46 g m^{-2} was recorded in plots sprayed with Acacia water extract followed by 6.25 g m^{-2} in the plot, which had been sprayed with the Sorghum water extract. Among all the treatments, the highest fresh weed weight of 19.60 g m^{-2} was noted in control treatment. Similar results was obtained by Bhatti *et al.*, (2000) with the application of water extract in other crops. Khan et al. (2004 a&b) have reported the inhibitory effect of tree species on associated weeds of wheat crop.

Dry weed Biomass (g m^{-2})

The statistical analysis of the data showed that all the weed control treatments had significant effect on dry weeds weight. The differences between dry weed weights of weed management treatments and control plots were significant. Three treatments i.e. Application of Acacia, sorghum water extracts and treatment with two hand weeding + Pre-emergence herbicide were statistically at par with 4.09, 4.34 and 4.48 g m^{-2}. While the highest dry weed biomass (16.58 g m^{-2}) was noted in control treatment. Water extracts resulted in reduction of weed biomass in the presence of either phytotoxic or allelopathic compounds. The results may have value in enabling weed control based on natural plant extracts. Similar results were obtained by Cheema *et al* (2002) who reported reduction of dry weed biomass in treatments where water extracts were applied.

Table-2. Mungbean yield parameters as affected by weed management strategies

Treatment	No of branches $plant^{-1}$	No of pods $plant^{-1}$	1000 grain weight (g)	Grain yield (kg ha^{-1})
Control	4.13 d	34.03 c	42.78 a	720 e
Pre-emergence herbicide	4.33 d	38.00 bc	38.31 b	1103 c
Hand weeding	4.70 c	41.18 b	39.92 ab	1125 bc
Pre-em+Hand weeding	5.16 a	55.69 a	37.68 b	1221 a
Sorghum extract	5.03 ab	42.64 b	38.25 b	1174 ab
Eucalyptus extract	4.90 bc	39.90 bc	38.74 ab	1135 bc
Acacia extract	5.23 a	58.46 a	37.86 b	1228 a
$LSD_{0.05}$	0.23	6.27	4.37	62.50
CV%	3.10	9.24	7.29	3.71

Means sharing common letter are not significantly different at alpha = 0.05.

Number of branches $plant^{-1}$

The perusal of Table-2 indicated that weed management strategies significantly differed (P=0.05) in affecting branches $plant^{-1}$. The number of branches plant ranged from 4.58 to 6.53. The highest number of branches $plant^{-1}$ (6.53) were recorded when Acacia extract was applied followed by pre-emergence herbicide + two hand weeding and Sorghum water extract application (6.19 and 6.01, respectively). The lowest branches (4.58) were obtained in control plots which were significantly less than all the weed management strategies. Similar results were reported by Cheema *et al.* (2001) they reported that with the application of water extracts number of branches were increased.

Number of Pods plant^{-1}

Data regarding number of pods plant^{-1} on given in Table-2 were found significantly different. Number of pods plant^{-1} ranged from 40.83 to 66.10. The highest number (66.10) of pods plant^{-1} were counted in the Acacia extract application followed by Pre-emergence herbicide + two hand weeding giving 62.60 pods plant^{-1}. The lowest pods (40.83) were obtained in control treatment. Cheema *et al.* (2001) also reported the increase in number of pods plant^{-1} with application of water extracts.

1000 grain weight (g)

Data regarding 1000 grain weight as affected by different weed management strategies was non-significant at P=0.05, and ranged from 39.22 to 43.28 g. The highest value (43.28 g) was observed in control treatment followed by hand weeding treatment (41.60 g), while the lowest value (39.22 g) was recorded in Pre-emergence herbicide + Two hand weeding treatment.

Grain Yield kg ha^{-1}

The data given in Table-2 shows that grain yield was significantly affected by various weed management strategies applied for weed control. It ranged from 750 to 1266 kg ha^{-1}. The highest grain yield (1266) was recorded in Acacia extract application treatment closely followed by Pre-emergence herbicide + Two hand weeding treatment with grain yield of 1253 kg ha^{-1} was obtained. While the lowest yield (750 kg ha^{-1}) was obtained in control treatment. Ali *et al.* (2004) reported similar results that water extract application increased the grain yield of crops.

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