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Effect of different integrated weed management practices on weed dynamics and growth attributes of Mungbean (*Vigna radiata* L. Wilczek)

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Abstract
A field study was conducted in *kharif* season of 2014 and 2015 on Mungbean to evaluate the effect of different weed management practices upon the growth and yield attributes of Mungbean at Agriculture Research Station, Badnapur. The soil was clayey in texture, moderate in available nitrogen, low in available phosphorus, high in available potassium and moderately alkaline in reaction. The field experiment was laid out in randomized block design with nine treatments which include one pre emergence herbicides Pendamethalin (30%E.C.) @ 0.75 kg a.i. ha^{-1}, two post emergence herbicides Quizalofop ethyl (5%E.C.) @ 50 g a.i. ha^{-1}, Imazethapyr (10%S.L.) @ 40 g a.i. ha^{-1} with solely application and applied with combination of each other, one cultural treatment (HW: 10, 30, 25 DAS) with control. Sowing was date on 11th July 2014 by dibbling method at 30 x 10 cm spacing. Among the weed free plot (2HW-10 and 30 DAS) (T_9) significantly higher grain yield (994.33 kg ha^{-1}) over all of the treatment. The second best treatment was (T_7) T_2 + Hand weeding at 25 DAS (951.67 kg ha^{-1}) seed yield ha^{-1} followed by (T_4) T_2 + Quizalofop ethyl @ 50g ha^{-1} POE at 15 DAS recorded (904.33 kg ha^{-1}) seed yield ha^{-1}. Lowest seed yield was recorded by (T_8) weedy check treatment (542.33 kg ha^{-1}) seed yield.

Keywords: *Vigna radiate*, Mungbean

1. Introduction
Mungbean is the *kharif* pulse crop sowing of crop is done immediate after the onset of monsoon. Being leguminous crops they have beneficial effect on improving soil fertility through fixation of atmospheric nitrogen. Weed can cause 30-50% yield loss in the crop (Kumar *et al*. 2004) [3]. Critical period for crop-weed competition in summer mungbean is from 15 to 30 days after sowing (Singh *et al*., 1996) [4]. The control of weeds during the critical period of crop-weed competition is very important to avoid yield losses. Mechanical practices such as hand weeding and inter-culturing are effective but unavailability of labour and incessant rains during the early crop season normally limit the weeding operations. Infestation of weeds is a major constraint in achieving higher yield of summer mungbean, as these compete with crop plants for nutrients, moisture, light and space. The magnitude of reduction in yield depends upon the weed flora present, quantum of weed flora and duration of crop-weed competition (Singh and Sekhon, 2002) [5]. In Maharashtra, about 85 per cent of total cultivable area is dependent on rain, which is characterized by occurrence of more or less drought conditions, where rainfall is uncertain, ill distributed and hence cropping pattern plays an important role for stabilizing food production.
The weed flora emerge during the period of experimentation were grasses like, Dactylectinum aegyptium, Echinochloa colona and Bracharia sp., sedges like Cyperus rotundus and broad-leaved weeds like Commelina diffusa, Amaranthus viridis, Digeria arvensis, Parthenium hysterophorus and Phyllanthus niruri (Khairnar *et al*., 2014) [2].
Furthermore, weather conditions (rains) do not permit timely hand weeding due to wet field conditions. Delayed removal of weeds is not as effective in controlling weeds and obtaining higher yields as the timely removal of weeds. Under these conditions, use of herbicides offers an alternative for possible effective control of weeds. Therefore, in the present studies, effect of various herbicides was compared with hand weedings and untreated check for evaluating

weed control efficacy obtaining high yields of greengram grown during kharif seasons.

2. Material and Method

The present field experiment was conducted during *kharif* season of 2014-2015 at the Experimental Farm of Agronomy at Agriculture Research Station, Badnapur, Jalna (Maharashtra), College of Agriculture, Badnapur. Vasantrao Naik Marathawada Krishi Vidyapeeth Parbhani, to study the effect of various weed control treatments on growth and grain yield of greengram and the economics involved. The field experiment was laid out in randomized block design with three replications Nine treatments *viz*., T_1 : Pendimethalin @ 0.75 Kg ha^{-1} PE T_2 : Pendimethalin 30 EC+ Imazethapyr 2 EC @ 0.75 kg ha^{-1} PE T_3 : T_1 + Quizalofop ethyl @ 50g ha^{-1} POE at 15 DAS T_4 : T_2 + Quizalofop ethyl @ 50g ha^{-1} POE at 15 DAS T_5 : T_1 + Imazethapyr @ 40g ha^{-1} POE at 15 DAS T_6: T_1 + Hand weeding at 25 DAS T_7: T_2 + Hand weeding at 25 DAS T_8: Weedy check T_9: Weed free plot (2HW-10 and 30 DAS). Herbicides were sprayed with a knap sack sprayer fitted with a flat fan nozzle using 500 liters of water per hectare. Pendimethalin was applied immediately one day after sowing. Imazethapyr and Quizalofop ethyl applied POE at 15 DAS. In case of hand weeding, weeding was done using a khurpa.

In *kharif* season, variety BM 2003-02 was sown on 11th July 2014, in spacing of 30 x 10 cm cm apart using a seed rate of 50 kg/ha. The crop was raised as per the PAU recommendations (PAU, 2001) [7].

3. Results and discussion

3.1 Effect of IWM Practices on growth characters At harvest

Table 1.

Treatments	Plant height (cm)	branches plant^{-1}	Mean total dry matter accumulation g plant^{-1}
T_1 : Pendimethalin @ 0.75 Kg ha^{-1} PE	30.27	3.63	5.20
T_2 : Pendimethalin 30 EC+ Imazethapyr 2 EC @ 0.75 kg ha^{-1} PE	31.33	3.73	8.40
T_3: T_1 + Quizalofop ethyl @ 50g ha^{-1} POE at 15 DAS	29.73	3.67	7.40
T_4 : T_2 + Quizalofop ethyl @ 50g ha^{-1} POE at 15 DAS	32.63	3.90	10.20
T_5 : T_1 + Imazethapyr @ 40g ha^{-1} POE at 15 DAS	29.00	3.57	7.00
T_6 : T_1 + Hand weeding at 25 DAS	29.40	3.70	7.70
T_7 : T_2 + Hand weeding at 25 DAS	33.37	4.53	10.70
T_8 : Weedy check	26.63	3.50	4.60
T_9 : Weed free plot (2HW-10 and 30 DAS)	35.07	4.80	12.50
SE ± m	1.55	0.20	0.60
C.D. at 5%	4.67	0.60	1.83
General Mean	30.82	3.89	8.18

Weed free plot (2HW-10 and 30 DAS) (T9) recorded significant increase in plant height, number of branches plant^{-1} and total dry matter production plant^{-1} of mungbean. It was followed by the treatment (T7) T2 + Hand weeding at 25 DAS, (T4) T2 + Quizalofop ethyl @ 50 g ha^{-1} POE at 15 DAS. The lowest plant height, number of branches plant^{-1} and dry matter production plant^{-1} were observed in control T8 (weedy check) treatment due to more crop weed competition.

Higher plant height in treatment T_9 weed free plot (2HW-10 and 30 DAS) was maximum through growth period of mungbean due to no weed population where as lowest plant height in weedy check treatment T_8 Because it competes with the weeds for nutrients. These results are in accordance with the results reported by Vats O. P. (1976). At harvest treatment T9 weed free plot (2HW-10 and 30 DAS) was recorded higher number of branches which was at par with T7 (T2 + Hand weeding at 25 DAS) and T4. Treatment T_8 recorded minimum number of branches. Similar results were reported by Mirjha *et al.* (2013) [9].

At harvest treatment, weed free plot (2HW-10 and 30 DAS) i.e T_9 was recorded maximum plant dry matter plant^{-1} followed by T_7 and T_4 due lesser weed competition compared to control in respect with light air and nutrients Khan *et al.* (2011) [1].

3.2 Effect IWM practices on weed dynamics

Higher number of monocot and dicot weeds m^{-2} was recorded in weedy check at all the crop growth stages. All treatments effectively decreased the weed infestation compared to weedy check. Lower number of weeds m^{-2} was observed in weed free plot (2HW-10 and 30 DAS) i.e (T_9) (0) due to herbicidal and hand weeding practices and sequential application of pre and post emergence herbicide suppress the germination and growth of weeds Similar results were also reported by Patel *et al.* (2011) [6].

Table 2.

Treatments	No. of monocot weeds m^{-2}		No. of dicot weeds m^{-2}	
	15 DAS	30 DAS	15 DAS	30 DAS
T_1 : Pendimethalin @ 0.75 Kg ha^{-1} PE	17.33	22.33	15.66	17.00
T_2 : Pendimethalin 30 EC + Imazethapyr 2 EC @ 0.75 kg ha^{-1} PE	12.33	21.66	12.33	17.66
T_3: T_1 + Quizalofop ethyl @ 50 g ha^{-1} POE at 15 DAS	15.33	23.33	15.00	16.66
T_4 : T_2 + Quizalofop ethyl @ 50 g ha^{-1} POE at 15 DAS	10.33	20.00	11.33	15.33
T_5 : T_1 + Imazethapyr @ 40 g ha^{-1} POE at 15 DAS	15.33	22.66	15.33	16.68
T_6 : T_1 + Hand weeding at 25 DAS	17.00	00	15.66	00
T_7 : T_2 + Hand weeding at 25 DAS	13.00	00	13.00	00
T_8 : Weedy check	26.33	31.33	20.66	24.66
T_9 : Weed free plot (2HW-10 and 30 DAS)	00	6.33	00	07
SE ± m	1.70	1.05	1.26	1.28
C.D. at 5%	5.09	3.15	3.79	3.85
General Mean	14.11	16.40	13.22	12.77

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