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Weed management through herbicides in urdbean for sustainable agriculture

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Abstract
A field experiment was conducted on weed management through herbicides in urdbean during *kharif* seasons of 2014 and 2015 at Main Agricultural research station, UAS, Dharwad. The experiment was laid out in randomized block design with three replications. The treatments included were; T1 Un weeded control, T2 HW at 20 & 40 DAS, T3 to T11 were different pre and post emergent herbicides applied independently and in combination and T11 was weed free check. Pooled data of two years indicated that weed free check was on par with hand weeding twice and pre-emergent herbicides pendimethalin @ 1 kg/ha and Alachlor 50 EC @2 kg/ha and post emergent herbicides Fenoxaprop p ethyl @ 50 g/ ha, and Imazethapyr @ 40 g a.i./ha.

Keywords: Pre-emergent herbicide, post emergent herbicide, weed management

Introduction
Weeds are a major impediment to crop production through their ability to compete for resources and their impact on product quality. In the agro ecosystems, ideal environmental conditions provided for optimal crop productivity are being exploited by the associated weeds. Weeds are responsible for heavy yield losses in all the crops. Weeds not only cause huge reductions in crop yields but also increase cost of cultivation, reduce input efficiency, interfere with agricultural operations, impair quality, act as alternate hosts for several insect-pests, diseases, affect aesthetic look of the ecosystem, native biodiversity, as well as affect human and cattle health. Weeds are known to account for nearly one third of the losses due to various biotic stresses.

Weed management at early stages of crop growth is essential in pulses. Emerging of weeds in pulses begins simultaneously with the crop, leading to severe competition between the crop and weeds (Kandasamy, 2000) [2]. When pulses are raised during monsoon season, weeds emerge in succession almost throughout the crop season because of favourable environmental condition and frequent rains (Govindra Singh, 1993) [1]. Weeds not only reduce the yield but also act as silent robbers of scare and essential nutrients and moisture. Weed infestation causes around 50 per cent yield reduction in blackgram (Sumachandrika *et al.*, 2002) [3]. It is serious issue under the condition of shortage of pulses for the human consumption in India and is importing around 2 M tonnes of pulses every year, as the major population is being vegetarian. Due to scarcity of labourers and cost involvement herbicides are getting importance in short duration pulse like urdbean where time is very short for the crop (80-90 days). Hence, there is a need to study the effect of post emergent and pre-emergent herbicides on growth and yield of urdbean.

Material and methods
A field experiment was conducted on weed management through herbicides in blackgram during *kharif* seasons of 2013 and 2014 at Main Agricultural research station, UAS, Dharwad. The geographical co-ordinates of Dharwad are 15° 26' N latitude and 75° 7' E longitude and an altitude of 678 m above mean sea level. It is located in the Northern Transition Zone (Zone–8) of Karnataka. The soil of the experimental site was clayey in nature and having available N, P_2O_5 and K_2O of 211, 13.6 and 340.6 kg/ha, respectively. Organic carbon (%) and pH of the soil were respectively 0.52% and 7.2.The experiment was laid out in randomized block design with three replications. The treatments included were; T1 Un weeded control, T2 HW at 20 & 40 DAS, T3 Pendimethalin 30 EC @ 1 kg a.i. /ha (PE), T4 Quizalofopethyl 5% EC @ 37.5 g a.i. /ha (POE), T5 Chlorimuronethyl 25% WP @ 4 g /ha (POE), T6 Fenoxaprop-p-ethyl 9.3%EC @ 50 g /ha (POE), T7 Quizalofopethyl @ 37.5 g /ha (POE)+ Chlorimuronethyl @ 4 g /ha (POE), T8 Fenoxaprop p ethyl @ 50 g /ha (POE) + Chlorimuronethyl @ 4 g /ha, T9 Imazethapyr 10% SL @ 25 g a.i. /ha (POE), T10 Imazethapyr

@ 40 g a.i. /ha (POE), T11 Alachlor 50 EC @ 2 kg a.i. /ha, T12 Weed free check pre-emergent herbicides were applied on the same day of sowing and post emergent herbicides were applied at 20 days after sowing.

Results and discussion

Pooled data of two years indicated that weed free (2290 kg/ha) situation was statistically on par with farmers' practice (2128 kg/ha) and pre-emergent herbicide pendimethalin @ 1 kg/ha (1922 kg/ha) and post emergent herbicides Quizalofop ethyl @ 50 g/ ha (1973 kg/ha) and Imazethapyr @ 50 g a.i. /ha (1812 kg/ha). Since maintaining weed free situation is not practical, herbicides were compared with two farmers' practice of two intercultivations with one hand weeding treatment (2 IC+HW). Number of pods/plant, yield /plant, net returns, weed dry weight, weed control efficiency and weed index value of these herbicides were also statistically on par with farmers' practice. Among different herbicides, Imazethapyr @ 80 g/ha (T4 and T7) was having lethal effect on chickpea which reduced the yield considerably (1473 kg/ha) as compared to other herbicides (1812 to 2290 kg/ha) and its weed control efficiency was also not better than other herbicides. Residual effect study of these herbicides on germination of succeeding crops indicated that eventhough Imazethapyr at lower dose i.e @ 50 g/ha recorded on par yield (1812 kg/ha) with 2 IC+HW it was having toxic effect on wheat and sorghum germination if they were sown in the same field immediately after the harvest of chickpea which had sprayed with Imazethapyr @ 50g/ha and 80 g/ha. Hence through this study it can be concluded that under labor scarcity situation, pre-emergent herbicide Pendimethalin 30 EC @ 1 kg/ha and post emergent herbicide Quizalofop @ 50 g/ha are cost effective and profitable measures for weed management in chickpea.

Pooled data of two years indicated that weed free check was on par with hand weeding twice and pre-emergent herbicides pendimethalin @ 1 kg/ha and Alachlor 50 EC @ 2 kg a.i.ha/ha (793 and 801 kg/ha, respectively) post emergent herbicides Fenoxaprop p ethyl @ 50 g/ ha (789 kg/ha) and Imazethapyr @ 40 g a.i./ha (810 kg/ha).Yield parameters like No. of pods/plant, yield/plant were also on par in these treatments. When we consider monetary benefits viz., net returns obtained from these herbicides (Rs.20720-22493/ha) was also on par with the weed free check (Rs.22920/ha). Apart from this weed control efficiency of these herbicides (83.3-84.9 %) was also comparable with weed free check (96.4%).The results are corroborative with that of Velayudham (2007) [4].

It can be concluded from this study that pre-emergent herbicides Pendimethalin 30 EC 1 kga.i./ha and Alachlor 50 EC @2 kg/ha and post emergent herbicides Imazethapyr 10% SL@ 40g a.i. /ha and Fenoxaprop p ethyl 9.3%EC @ 50 g/ ha can be used effectively against weeds in urdbeen for increasing its productivity without raising its cost of cultivation.

Table 1: Grain Yield and yield parameters, economics and weed control efficiency of urdbean as influenced by pre and post emergent herbicides

Treatments	Grain Yield (kg/ha)	Number of pods/plant	Yield/plant (g)	Gross returns (Rs/ha)	Net returns (Rs/ha)	B:C ratio	weed dry weight (g/25 sq cm)	Weed control efficiency (%)
Un weeded control	494	10.84	2.13	19747	11097	2.28	31.54	7.1
HW at 20 & 40 DAS	850	20.67	3.76	33973	22123	2.86	8.10	86.2
Pendimethalin 30 EC @ 1 kg a.i.. /ha (PE)	793	17.94	3.42	32093	20844	2.85	12.88	83.3
Quizalofopethyl 5% EC @ 37.5 g a.i. /ha (POE)	759	15.08	2.74	30373	20181	2.98	19.33	61.9
Chlorimuronethyl 25% WP @ 4 g. /ha (POE)	512	9.07	1.65	20467	10869	2.13	26.96	37.7
Fenoxaprop-p-ethyl 9.3%EC @ 50 g. /ha (POE)	789	17.60	3.08	31547	21369	3.15	14.13	74.2
Quizalofopethyl @ 37.5 g. /ha (POE) + Chlorimuronethyl @ 4 g. /ha (POE)	485	14.45	2.63	19413	8873	1.84	14.74	72.9
Fenoxaprop p ethyl @ 50 g. /ha (POE) + Chlorimuronethyl @ 4 g. /ha	534	14.25	2.59	21373	11101	2.08	8.94	84.9
Imazethapyr 10% SL @ 25 g a.i. /ha (POE)	716	14.73	2.68	28653	18984	2.96	11.22	80
Imazethapyr @ 40 g a.i. /ha (POE)	810	17.85	3.42	32413	22493	3.14	11.23	83.3
Alachlor 50 EC @ 2 kg a.i./ha	801	18.76	3.49	32020	20720	2.83	14.60	74.4
Weed free check	876	22.15	3.90	35040	22920	2.92	2.20	96.4
SEm±	30	1.60	0.17	1011	1011	0.11	1.62	4.8
CD at 5%	88	4.67	0.49	2952	2952	0.32	4.73	14

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