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RESEARCH PAPER

Weed management in cowpea [*Vigna unguiculata* (L.) Wasp.] under rainfed conditions

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Abstract : A field experiments was conducted for two consecutive *Kharif* seasons of 2012 and 2013 at Rajasthan Agricultural Research Institute, Durgapura, Jaipur to study the effect of weed management practices on cowpea under rainfed conditions. Results revealed that application of imazethapyr + imazemox @ 40 g ai/ha at 20 days after sowing (DAS) recorded lowest dry weight of both monocot and dicot weeds with highest weed control efficiency (84.8%). However, maximum seed yield (9.04 q/ha), net returns (Rs. 24718/ ha) and B:C ratio (3.46) was obtained under application of imazethapyr @ 40 g/ha at 20 DAS.

Key Words : Cowpea, Resource management, Pod yield, B : C ratio

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INTRODUCTION

Cowpea [*Vigna unguiculata* (L.) Walp.], popularly known as 'chanwla' is grown during *Kharif* season in arid and semi-arid regions of country for various purposes *viz.*, green pods as vegetable, split grains as 'dal' is used for various delicious preparations. Its straw is a valuable fodder for milch cattle. A good crop of cowpea fully covers the ground and hence, checks soil erosion and water loss from the field. During rainy season the crop suffers severely due to weed infestation resulting into wide range reduction in crop yield. The critical period of crop weed competition in cowpea has been identified as 20-30 days after sowing and presence of weeds beyond this period causes severe reduction in yields.

Hence, weed control needs to be undertaken during initial period of crop growth. Though the hand weeding is a well proven effective method of weed control, but non-availability of labour and the cost incurred in it is very high.

Keeping in view the fact, the present experiment was conducted to find out suitable and cost effective weed management practice to manage weeds during the critical period of crop weed competition.

MATERIAL AND METHODS

The field experiment was carried out at Research Farm of Rajasthan Agricultural Research Institute, Durgapura, Jaipur (Rajasthan) on cowpea cultivar RC-101 during two *Kharif* seasons of 2012 to 2013. Durgapura lies between $26^{0}51'$ North latitude and

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$75^0$47'east longitude and at an elevation of 390 m. It falls under semi arid climatic conditions, which is characterized by the features of hot dry summers and cool dry winters. The rainfall of the locality is often erratic and ill-distributed ranging from 500-600 mm along with an occasional long dry spells or frequent heavy rainy days during rainy season. The mean daily maximum temperature ranges from 22.0 to 40.6 ^{0}C and daily minimum temperature ranges from 8.3 ^{0}C to 27.3 ^{0}C. The relative humidity ranges between 80 to 95 per cent during rainy season, which goes upto 100 and 20 to 30 per cent during winter and summer seasons, respectively. The soil type of the experimental field was loamy sand with sand (87.7 %), silt (5.6%), clay (7.7%), 8.3 pH, 0.24 per cent organic carbon and 143.3, 33.0, and 223.6 kg/ha available N, P_2O_5 and K_2O, respectively.

The present investigation comprised of seven treatments [T_1 – Imazethapyr @ 40 g/ha at 20 DAS, T_2 - Quizalofop-p-ethyl @ 37.5 g/ha at 20 DAS, T_3 – Fenoxaprop-p-ethyl @ 50 g/ha at 20 DAS, T_4 – Imazethapyr + imazemox @ 40 g/ha at 20 DAS, T_5 – Pendimethalin @ 0.75 kg/ha as PE, T_6– One hand weeding at 20 DAS, T_7 – weedy check] were evaluated under Randomized Block Design with three replications. The crop was sown on 15th and 19th July of 2012 and 2013 at a crop geometry of 30x10 cm with a seed rate of 20 kg/ha. A uniform basal dose of 20 kg N, 40 kg P_2O_5/ha was applied at the time of sowing. Weed dry weight at harvest was recorded by using a quadrate of 0.25 m^2 and then weighed for both monocot and dicot weeds separately after oven drying. Weed control efficiency (WCE) was calculated as per formula suggested by Patil and Patil (1983). The net monetary returns and B:C ratio were also calculated for each treatment.

RESULTS AND DISCUSSION

The results obtained from the present investigation as well as relevant discussion have been summarized under following heads :

Major weed flora :

The important weeds during the experimentation period were *Amaranthus, viridus, A. spinosus, Cyperus rotundus, Cyprerus iria, Digera arvensis, Commelina benghalensis and Cynodan dactylon*. Under the influence of various treatments, highest WCE (84.8) was recorded under treatment T_4 closely followed by T_1 (84.3 %). While the lowest WCE (43.0 %) was recorded under post emergence of fenaxoprop-p-ethyl @ 50 g ai/ha.

Effect on crop :

All the weed management treatment significantly influenced the seed yield of cluster bean over weedy check (Table 1). The maximum seed yield, net returns and B:C ratio (9.04 q/ha, 24718, 3.46) was recorded under application of imazethapyr @ 40 g ai/ha closely followed by application of imazethapyr+imazemox @ 40 g ai/ha (9.02 q/ha, Rs. 22779 and 3.15). While the least was recorded under weedy check (5.75 q/ha, Rs. 12275 and 2.36). The increase in pooled seed yield due to treatment T_1 and T_4 were 3.65 and 3.27 q/ha, respectively over weedy check. The increase in yield under both the treatments could be attributed to effective weed suppression during critical period of crop weed completion which might have favored better utilization of available resources. The results are in agreement with the findings of Meena and Mehta (2009) and Senthilkumar (2009).

Table 1: Screening of suitable post emergence herbicide for cowpea

Treatments	Seed yield (q/ha)			Weed dry weight (g/m^2)			Net returns (Rs./ha) mean	B:C ratio	WCE (%)
	2012	2013	Pooled	Monocot	Dicot	Total			
T_1 – Imazethapyr @ 40 g/ha at 20 DAS	8.94	9.85	9.04	36.20	48.93	85.13	24718	3.46	84.3
T_2 - Quizalofop-p-ethyl @ 37.5 g/ha at 20 DAS	7.41	8.09	7.75	41.13	256.47	297.60	18150	2.72	45.2
T_3 – Fenoxaprop-p-ethyl @ 50 g/ha at 20 DAS	6.13	8.28	7.21	43.13	266.40	309.53	16552	2.63	43.0
T_4 – Imazethapyr+Imazemox @ 40 g/ha at 20 DAS	8.52	9.52	9.02	35.40	47.00	82.40	22779	3.15	84.8
T_5 – Pendimethalin @ 0.75 kg/ha as PE	7.50	8.06	7.78	48.20	142.07	190.27	18236	2.73	65.0
T_6– One hand weeding at 20 DAS	8.15	9.81	8.98	48.77	45.93	94.70	21226	2.77	82.6
T_7 – weedy check	3.94	7.56	5.75	236.20	307.10	543.30	12275	2.36	–
S.E. ±	0.28	0.39	0.44	7.87	7.23	9.94	–	–	–
C.D. (P=0.05)	0.87	1.19	1.28	24.51	22.53	30.97	–	–	–

Effects on weeds :

All the weed management treatments significantly reduced weeds dry weight of monocot, dicot and total weeds. Howeer, application of quizalofop-ethyl @ 37.5 g/ha and fenaxoprop ethyl @ 50 g/ha failed to reduce dicot dry weeds considerably over weedy check. A minimum weed dry weight of monocot (35.40 g/m^2), dicot (47.00 g/m^2) and total weeds dry weight (82.40 g/m^2) was recorded under application of imazethapyr + imazemox @ 40 g ai/ha at 20 DAS closely followed by application of imazethapyr @ 40 g ai/ha at 20 DAS (36.20, 48.93 and 85.13 g/m^2) and both were statistically superior over rest of weed management treatments except one hand weeding (T_6) in terms of total weed dry weight. The reduction in weed dry weight due to application of imazethapyr+imazemox @ 40 g ai/ha (T_4), imazethapyr @ 40 g ai/ha (T_1) and one hand weeding (T_6) were 85.01, 84.67 and 79.35 per cent and 84.70, 84.07 and 85.04 per cent and 84.83, 84.33 and 82.57 per cent of monocot and dicot and total dry weight of weeds, respectively compared to weedy check. Results obtained are in conformity with the findings of Bhondve *et al.* (2009); Madukwe *et al.* (2012) and Patel *et al.* (2008).

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