



EFFICACY OF WEED CONTROL PRACTICES ON WEED DYNAMICS, YIELD AND ECONOMICS OF CHICKPEA (*CICER ARIETINUM* L.)

K. C. Gupta*, Vipen Kumar and R. Saxena

AICRP on Chickpea, Rajasthan Agricultural Research Institute (SKNAU, Jobner), Durgapura, Jaipur (Rajasthan), India.

Abstract

A field experiments was conducted during two consecutive *rabi* seasons of 2013-14 and 2014-15 to study the effect of weed management practices on yield and economics of chickpea and to find out the most effective and economic weed management practice for chickpea under semi arid conditions of Rajasthan. Results revealed that two hand weeding at 25-30 and 40-45 DAS recorded minimum mean weed dry weight (81.8 g/m²), highest WCE (59.98%) and maximum chickpea seed and stover yield during both years of study while the maximum mean net monetary returns (Rs. 20208/ha) and B : C ratio (2.00) was recorded under pre-emergence application of pendimethalin 30EC + Imazethapyr 2EC. Further, among the herbicides, pre-emergence application of treatment T₃ i.e. pendimethalin 30 EC + Imazethapyr 2EC (ready mix combination) proved superior as it recorded highest mean grain and stover (11.29 and 16.62 q/ha), which were higher by 29.62 and 21.49%, respectively, over unweeded check.

Key words : Chickpea (*Cicer arietinum* L.), weed dynamics, organic carbon, herbicidal weed management.

Introduction

Chickpea is an important pulse crop of Rajasthan and grown in 1.92 m ha; producing 1.64 m tones (Anonymous, 2013-14) with an average productivity of 852 kg/ha. However, the average yield of chickpea in Rajasthan is far below from it's potential yield. Weeds are often the major biological constraints to growing legume crop successfully. Delayed or early weeding resulted into irreversible damage due to weed competition. Weed management in chickpea is particularly important as the crop is poor competitor due to it's slow early growth and short statured. Non availability of labour at critical periods at reasonable cost and their poor efficiency made herbicidal weed management in chickpea is remunerative. During recent years, herbicidal weed management in chickpea is gaining momentum for overall management of weeds with greater profitability and sustainability.

Keeping in view, the present study was undertaken to evaluate the effect of different weed control practices on weed dynamics, yield along with their economics.

Materials and Methods

The field experiment was carried out at research farm of Rajasthan Agricultural Research Institute,

Durgapura, Jaipur (Rajasthan) during *rabi* seasons of 2013-14 and 2014-15. Durgapura (Jaipur) is located at 26° 51' N latitude and 75°47' E longitude and at an elevation of 390 m above mean sea level. The soil type of the experimental field was loamy sand with sand (87.7%) silt (5.6%), clay (7.7%), pH 8.3, 0.21% organic carbon and 140.2, 34.4 and 221.0 kg/ha⁻¹ available N, P₂O₅ and K₂O, respectively. The present investigation comprised of 10 treatments viz. T₁ – pendimethalin 30 EC @ 0.75 kg a.i./ha as pre-emergence, T₂ – Pendimethalin 38.7 CS @ 0.75 kg a.i./ha as pre-emergence, T₃ – Pendimethalin 30 EC + Imazethapyr 2EC @ 0.75 kg a.i./ha (ready mix combination); T₄ - Oxyfluorfen 23.5 EC @ 0.15 kg a.i./ha; T₅ - Fenoxyprop ethyl 9 EC @ 60 g a.i./ha; T₆ – Imazethapyr 10% SL @ 20 g a.i./ha; T₇ – Imazethapyr 10% SL @ 30 g a.i./ha; T₈ – One hand weeding at 25-30DAS; T₉ - Two hand weeding (at 25-30 DAS and 40-45 DAS) and T₁₀ – weedy check. The Treatments T₁ to T₄ was applied as pre-emergence application while T₅ to T₇ was applied as post emergence i.e. 25-30 DAS. The experiment was laid out in randomized block design with three replication. The crop was sown on 06.11.2013 and 04.11.2014 using variety RSG-973. A basal dose of 20 kg N; 40 kg P₂O₅ ha⁻¹ was

*Author for correspondence : E-mail:kcguptahindaun@rediffmail.com

Table 1 : Effect of weed management practices in chickpea.

Treatments	Seed yield (kg/ha)			Stover yield (kg/ha)			Weeds dry wt (g/m ²)			Mean WCE (%)	Mean Gross Returns (Rs./ha)	Mean *Net Returns (Rs./ha)	Mean B:C ratio
	2013-14	2014-15	Mean	2013-14	2014-15	Mean	2013-14	2014-15	Mean				
	Pendimethalin30EC @ 0.75kg/ha as PE	10.70	10.57	10.64	15.17	16.60	15.89	78.80	127.70				
Pendimethalin 38.7CS@ 0.75 kg/ha as PE	11.24	10.83	11.04	15.80	17.03	16.42	59.90	112.33	86.12	57.87	39654	19517	1.97
Pendi30EC + Imazethapyr 2EC @ 0.75 kg/ha as PE	11.52	11.06	11.29	16.11	17.13	16.62	56.20	107.40	81.8	59.98	40515	20208	2.00
Oxyflufen23.5EC @ 0.15 kg/ha as PE	10.06	10.30	10.18	14.37	16.37	15.37	80.80	158.30	119.55	41.51	36696	16735	1.84
Fenoxypyr ethyl 9 EC @ 60g/ha as POE	9.87	9.39	9.63	13.90	14.60	14.25	89.40	165.60	127.50	36.62	34574	14788	1.75
Imazethapyr 10%SL @ 20g/ha as POE	10.73	10.04	10.38	14.85	15.83	15.34	56.40	140.60	98.50	51.81	37263	18069	1.94
Imazethapyr 10% SL @ 30g/ha as POE	10.86	10.57	10.71	15.16	16.53	15.84	54.80	125.10	89.95	55.99	38485	19116	1.98
One HW at 25-30 DAS	11.05	11.28	11.17	15.48	17.87	16.68	64.60	102.20	83.40	59.20	40190	17524	1.78
Two HW at 25-30 & 40-45	11.94	11.77	11.86	16.74	18.37	17.56	34.40	78.90	56.65	72.28	42597	15331	1.57
Weedy check	8.57	8.85	8.71	12.95	14.40	13.68	148.20	260.60	204.40	-	31560	13494	1.75
CD (P=0.05)	1.58	1.25	-	2.01	1.75	-	9.76	37.37	-	-	-	-	-

Cost : pendimethalin30EC @ Rs. 500/l, Pendimethalin 38.7CS @ Rs. 483/700ml, pendimethalin 30EC + Imazethapyr 2EC @ Rs. 645/l, Oxyflufen 23.5EC @ Rs. 1820/l, fenoxypyr ethyl 9EC @ Rs. 371/250 ml, Imazethapyr 10% SL @ Rs. 1905/l, 1 HW Rs. 4200 for 20 mandays.

applied to every treatment. Weed control efficiency was calculated as per the formulae given below as suggested by Patil and Patil (1983).

$$\text{WCE}(\%) = \frac{\text{DMC} - \text{DMT}}{\text{DMC}} \times 100$$

Where, DMC is the dry matter of weeds in control plot and DMT is the dry matter of in treated plot.

Results and Discussion

Weeds

The predominant weeds observed in the experimental site were *Chenopodium album* (Bathua), *Chenopodium murale* (Khartua), *Cyperus rotundus* (Motha), *Cynodon dactylon* (Doob), *Melilotus alba* (Senji), *Anagalis arvensis* (Krishan neel) and *Tithonia diversifolia* L (wild sunflower) during the study. Further, analysis of weed composition suggested that broad leaved weeds were dominant compared to grassy and sedges in the present agro-ecosystem. All the weed management treatments resulted significant reduction in weeds dry weight (g/m²) at harvest than unweeded check. The least weeds dry weight of 34.40 and 78.90 g/m² and highest WCE (72.28%) was recorded under two hand weeding at 25-30 and 40-45 DAS. Ram *et al.* (2011) and Lhungdim *et al.* (2014) also reported highest WCE of 86.6% and 84.94% in pea and lentil, respectively under two hand weeding. However, among chemicals pre-emergence application of pendimethalin (30 EC) + Imazethapyr (2EC) proved superior, which recorded least mean weeds dry weight of 81.8 g/m² and highest weed control efficiency of 59.98 per cent compared to other chemicals and one hand weeding. Similar findings were also reported by Chandrakar *et al.* (2014) in rajmash.

Yield and returns

All the weed management treatments resulted in significantly higher seed and stover yield over the unweeded check (table 1) except post emergence application of Fenoxypyr ethyl due to its phytotoxic effect. The maximum seed (11.94 & 11.77 q/ha) and stover yield (16.74 & 18.37 q/ha) was recorded under two hand weeding (T₉), but was statistically at par with one hand weeding, T₃, T₂, T₁, T₆ and T₇ and was

statistically superior over rest treatments during both years of experimentation. Further, among the chemicals, pre-emergence application of treatment T₃, *i.e.* pendimethalin 30 EC + Imazethapyr 2EC (ready mix combination) proved superior as it recorded highest grain (11.52 and 11.06 q/ha), stover (16.11 and 17.13 q/ha) respectively during 2013-14 and 2014-15 closely followed by pre-emergence application pendimethalin (38.7CS). On mean basis, increases in seed and stover yield due to application of treatment T₃ and T₄ were 29.62 and 21.49 per cent and 26.75 and 20.03 per cent respectively over unweeded check. Similarly, the highest mean net monetary returns (Rs. 20208q/ha), B:C ratio (2.00) was recorded under pre-emergence application of pendimethalin + Imazethapyr closely followed by pre-emergence application of pendimethalin Extra (Rs. 19517 and 1.97) while the least (Rs. 13494/ha) was recorded under weedy check. Further, the two hand weeding recorded least B:C ratio of 1.57. Better yields and higher returns under these treatments might be due to effective control of weeds thereby enabling the crops to better growing conditions. Similar findings were also reported by Pedde *et al.* (2013).

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