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Deeksha Singh
M.Sc. (Ag) Scholar, Department of Agronomy, FASAI, Rama University, Kanpur, Uttar Pradesh, India

Ravikesh Kumar Pal
Assistant Professor, Department of Agronomy, Faculty of Agriculture Science and Allied Industries, Rama University, Kanpur, Uttar Pradesh, India

Sumit Raj
Teaching Associate, Soil Conservation and Water Management, CSA University, Kanpur, Kanpur, Uttar Pradesh, India

Durgesh Kumar Maurya
Assistant Professor, Department of Agronomy, Faculty of Agriculture Science and Allied Industries, Rama University, Kanpur, Uttar Pradesh, India

Subrata Pal
M.Sc. (Ag) Scholar, Department of Agronomy, FASAI, Rama University, Kanpur, Uttar Pradesh, India

Siddharth Kumar
Ph.D. (Ag) Scholar, Department of Vegetable Science, CSA University, Kanpur, Uttar Pradesh, India

Kuldeep Maurya
Teaching Associate, Department of Agricultural Economics and Statistics, CSA University, Kanpur, Uttar Pradesh, India

Corresponding Author:
Durgesh Kumar Maurya
Assistant Professor, Department of Agronomy, Faculty of Agriculture Science and Allied Industries, Rama University, Kanpur, Uttar Pradesh, India

Integrated weed management in chickpea (*Cicer arietinum* L.)

Deeksha Singh, Ravikesh Kumar Pal, Sumit Raj, Durgesh Kumar Maurya, Subrata Pal, Siddharth Kumar and Kuldeep Maurya

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Abstract
A field experiment was conducted during rabi season of 2023-24 on loamy sand of in the rural area of Kanpur district of Mandhana, located 10 km from Kanpur in Uttar Pradesh to Integrated weed management in Chickpea (*Cicer arietinum* L.). The soil was normal in pH of 7.65, electrical conductivity (EC) of 0.24 dSm^{-1}, organic carbon content of 0.42%, and available nutrients including nitrogen (N), phosphorus (P), and potassium (K) at levels of 215.95, 19.55, and 149.55 kg ha^{-1}, respectively. The experiment was laid out during Rabi season of 2023-24. The experiment consisted of 12 treatment combinations, was laid out in Randomized Block Design (RBD) with three replications.

Keywords: IWM, chickpea, imazethapyr

Introduction
Pulses are a significant commodity crop category that provide high-quality protein to supplement cereal proteins for the nation's sizable vegetarian population. Despite being the world's greatest producer of pulse crops, growing pulses develops a system in their root nodules to fix atmospheric nitrogen, largely meeting their nitrogen needs. Choudhary (2018) [7].
In 1951, there were 60 grams of pulses available per person each day; by 2014, that amount has dropped to a tentative 47.2 grams. This clearly demonstrates how the availability of pulses is impacted by population expansion on a per capita basis. Das and associates (2020) [9].
An essential component of Indian agriculture are pulses. One of the most significant rabi season pulse crops farmed in India is chickpea (*Cicer arietinum* L.), sometimes referred to as Bengal gram or gram. It makes up 33% of the country's pulse acreage and 47% of the country's overall pulse output (Dubey, 2018) [11]. The states that produce the most chickpeas in the nation include Madhya Pradesh, Rajasthan, Uttar Pradesh, Haryana, Maharashtra, and Karnataka, which together account for 60% of the country's land and 90% of its output. (Ahlawat *et al*., 2015) [1] In India, 8.35 million hectares of chickpeas were grown between 2015 and 2016, yielding a total of 9.38 million tons of output with an average productivity of 859 kg/hectare (Directorate of Economics & Statistics, DAC& FW, 2018) [3]. Chickpeas are a rich source of calcium, iron, niacin, vitamin B, and vitamin C in addition to being a highly digestible source of protein (19.5%) in the diet. Additionally, 100 grams of seeds give 396 kcal of energy (Donald, 1962) [10].
With the advent of herbicides, a variety of weeds in pulses may now be efficiently controlled at a reasonable cost. The use of imazethapyr as post-emergence at 0.1 kg ha^{-1} (Singh *et al*., 2003) [14], pendimethalin as pre-emergence at 1.0 kg ha^{-1} (Tewari *et al*., 2003 and Vaishya *et al*., 2005) [13, 15], clodinafop-propargyl 15 WP as post-emergence at 0.03 kg ha^{-1} (Marwat *et al*., 2004) [12], and oxyfluorfen (600 g)
Numerous researchers from around the nation have found that using ha^{-1} as a weed management treatment (Yousefi and Rahimian, 2007) [16] effectively controlled annual broad-leaved and grassy weeds in chickpea fields.
As an alternative to manual or mechanical weeding in chickpea, pre-emergence treatment of pendimethalin @ 1.0 kg ha^{-1} may be used. This method has been reported to provide a net return of Rs. 6312 ha^{-1} and a B:C ratio of 1:3.16 (Dungarwal *et al*., 2002) [8].

Materials and Methods

A field experiment was conducted during rabi season of 2023-24 on loamy sand of in the rural area of Kanpur district of Mandhana, located 10 km from Kanpur in Uttar Pradesh to Integrated weed management in Chickpea (*Cicer arietinum* L.). The soil was normal in pH of 7.65, electrical conductivity (EC) of 0.24 dSm^{-1}, organic carbon content of 0.42%, and available nutrients including nitrogen (N), phosphorus (P), and potassium (K) at levels of 215.95, 19.55, and 149.55 kg ha^{-1}, respectively. The experiment was laid out during Rabi season of 2023-24. The experiment consisted of 12 treatment combinations, was laid out in Randomized Block Design (RBD) with three replications. T_1 Imazethapyr + imazamox (PRE) @ 70 g a.i ha^{-1}, T_2 Imazethapyr + imazamox (POE) at 3-4 leaf stage @ 70 g a.i ha^{-1}, T_3 Imazethapyr (POE) at 3-4 leaf stage @ 75 g a.i ha^{-1}, T_4 Quizalofop ethyl (POE) at 3-4 leaf stage @ 60 g a.i ha^{-1}, T_5 Clodinofop (POE) at 3-4 leaf stage @ 60 g a.i ha^{-1}, T_6 Pendamethalin (PE) @ 1000 g a.i ha^{-1}, T_7 Pendamethalin (PE) @ 1000 g a.i. ha- 1 + Imazothapyr (POE) @ 75 g a.i ha^{-1}, T_8 Oxyfluorfen (PE) @ 200 g a.i ha^{-1}, T_9 Oxyfluorfen (PE) @ 200 g a.i ha^{-1} + Quizalofop (POE) @ 60 g a.i ha^{-1}, T_{10} 1 Hand Weeding at 35-40 DAS, T_{11} Weed Free, T_{12} Weedy Check data were gathered on five plants chosen from each plot.

Results and Discussion

Yield attributes

Number of pods plant^{-1}

With the exception of pendimethaline @ 1000 g a.i. ha^{-1} and pendamethalin (PE) @ 1000 g a.i. ha^{-1} + imazothapyr (POE) @ 75 g a.i. ha^{-1}, the maximum number of pods per plant was observed. Arya and associates (2022) [4].

The application of pendimethaline at 1000 g a.i. ha^{-1} and imazothapyr (POE) at 75 g a.i. ha^{-1} was comparable to pendimethaline at 1000 g a.i. ha^{-1} among the herbicide treatments, but it resulted in a noticeably larger number of pods per plant. The same outcome was reported by Butter *et al.* (2018) [5].

Test weight (g)

After receiving weed-free treatment, the test weight increased to 18.70 g. One hand weeding at 35–40 DAS was then conducted. Chaudhari and associates (2016). The herbicide treatments that produced the highest test weight (18.62 g) in their respective years were Pendamethalin (PE) + Imazothapyr (POE) @ 1000 g a.i. ha^{-1} + @ 75 g a.i ha^{-1}, followed by Oxyfluorfen (PE) + Quizalofop (POE) @ 200 g a.i ha^{-1} + @ 60 g a.i ha^{-1}.

Grain and stover yield (q ha^{-1}) and harvest index

Although the output from the weed-free treatments (T_{11}) was comparable to that of T_9 and T_7, it was noticeably greater than that of the other weed-control treatments.

In comparison to the other herbidal weed control methods, the herbicide treatments that produced the significantly higher grain yield, stover yield, and harvest index were sequential spraying pendimethalin at 1000 g a.i./ha (PE) followed by imazethypr (POE) at 75 g a.i. ha^{-1}. During both years of experimentation, however, sequential spraying Oxyfluorfen (PE) at 200 g a.i. ha^{-1} followed by Quizalofop ethyl (POE) at 3–4 leaf stage @ 60 g a.i. ha^{-1} were equally effective. In comparison to a single herbicide treatment, either pre- or post-emergence, pendimethalin administered as pre-emergence yielded grain, stover, and harvest index that were much higher while remaining on par with T_2 and T_{10}. With weedy check treatments, the lowest grain production (9.35 qha^{-1}) was observed, which is noteworthy.

Similar to grain yield, the stover yield showed a similar pattern of results being higher (29.06 qha^{-1}), with the stover yield from the weed-free plot being on par with that of T_9 and T_7 but much greater than that of the other treatments. The results of the integrated herbicide application showed that the stover and harvesxt index were much higher than those of the other weed control treatments, but the sequential spraying of pendimethalin at 1000 g a.i. ha^{-1} and imazethypr at 75 g a.i. ha^{-1} yielded results that were comparable to T_9.

When treated as pre-emergence, pendimethalin @ 1000 g ha^{-1} considerably increased the stover yield and harvest index compared to when applied alone, either pre- or post-emergence. Out of all the weed management treatments, weed check had the lowest stover output (18.35 q ha^{-1}) in the corresponding years.

Table 1: Effect of weed control treatments on yield contributing characters of chickpea

Treatments	Number of pods plant^{-1}	Test weight
Imazethapyr + imazamox (PRE) @ 70 g a.i ha^{-1}	30.80	17.59
Imazethapyr + imazamox (POE) at 3-4 leaf stage @ 70 g a.i ha^{-1}	32.10	17.31
Imazethapyr (POE) at 3-4 leaf stage @ 75 g a.i ha^{-1}	29.00	17.33
Quizalofop ethyl (POE) at 3-4 leaf stage @ 60 g a.i ha^{-1}	25.80	16.85
Clodinofop (POE) at 3-4 leaf stage @ 60 g a.i ha^{-1}	27.60	17.29
Pendamethalin (PE) @ 1000 g a.i ha^{-1}	38.30	17.81
Pendamethalin (PE) @ 1000 g a.i. ha^{-1} + Imazothapyr (POE) @ 75 g a.i ha^{-1}	39.50	18.62
Oxyfluorfen (PE) @ 200 g a.i ha^{-1}	34.60	16.79
Oxyfluorfen (PE) @ 200 g a.i ha^{-1} + Quizalofop (POE) @ 60 g a.i ha^{-1}	36.50	17.82
1 Hand Weeding at 35-40 DAS	36.20	16.99
Weed Free	40.50	18.70
Weedy Check	22.50	17.82
SEm±	1.22	0.17
C.D. at 5%	3.58	NS

Table 2: Effect of weed control treatments on yield contributing characters of chickpea

Treatments	Grain yield (q/ha)	Straw yield (q/ha)	Harvest index
Imazethapyr + imazamox (PRE) @ 70 g a.i ha^{-1}	15.30	24.48	36.55
Imazethapyr + imazamox (POE) at 3-4 leaf stage @70 g a.i ha^{-1}	14.10	24.79	36.58
Imazethapyr (POE) at 3-4 leaf stage @ 75 g a.i ha^{-1}	13.85	24.07	36.52
Quizalofop ethyl (POE) at 3-4 leaf stage @ 60 g a.i ha^{-1}	13.70	22.81	36.48
Clodinofop (POE) at 3-4 leaf stage @ 60 g a.i ha^{-1}	13.10	23.83	36.50
Pendamethalin (PE) @ 1000 g a.i ha^{-1}	15.25	27.60	36.70
Pendamethalin (PE) @ 1000 g a.i.ha^{-1}+ Imazothapyr (POE) @ 75 g a.i ha^{-1}	16.90	29.06	36.77
Oxyfluorfen (PE) @ 200 g a.i ha^{-1}	14.30	25.86	36.63
Oxyfluorfen (PE) @ 200 g a.i ha^{-1} + Quizalofop (POE) @ 60 g a.i ha^{-1}	16.00	26.42	36.67
1 Hand Weeding at 35-40 DAS	14.95	26.35	36.66
Weed Free	17.40	29.88	36.80
Weedy Check	9.35	18.35	33.75
SEm±	0.57	1.04	1.36
C.D. at 5%	1.66	3.32	NS

Conclusion

In terms of weed control efficiency, the application of pendimethalin @ 1000 g a.i. ha^{-1} (PE) fb imimethapyr @ 75 g a.i. ha^{-1} (POE) outperformed the other treatments. Chickpea economics and grain production were greater when oxyfluorfen (200 g a.i. ha^{-1}) and fb quizalofop ethyl (60 g a.i. ha^{-1}) were used (POE). Therefore, it can be said that Pendimethalin @ 1000 g a.i. ha^{-1} (PE) + imzethapyr @ 75 g a.i. ha^{-1} (POE) showed preferable for generating a greater grain yield of chickpea

References

1. Ahlawat IPS, Gangaiah B, Singh O. Production potential of chickpea (*Cicer arietinum*)-based intercropping systems under irrigated conditions. Indian J Agron. 2015;27(1):27-30.
2. Anonymous. Directorate of Economics and Statistics, Department of Agriculture and Co-operation, GOI, New Delhi; c2014.
3. Anonymous. Directorate of Economics and Statistics, Department of Agriculture and Co-operation, GOI, New Delhi; c2018.
4. Arya RL. Integrated weed management in chickpea + mustard intercropping system under rainfed condition. Indian J Agron. 2022;49(2):98-100.
5. Butter GS, Aggarwal N, Singh S. Efficacy of different herbicides in chickpea (*Cicer arietinum* L.). Indian J Weed Sci. 2018;40:314, 169-171.
6. Chaudhari VD, Desai LJ, Chaudhari SN, Chaudhari PR. Effect of weed management on weeds, growth and yield of summer greengram (*Vigna radiata* L.). The Bioscan. 2016;11(1):531-534.
7. Choudhary BM, Patel JJ, Delvadia DR. Effect of weed management practices and seed rates on weeds and yield of chickpea. Indian J Weed Sci. 2018;37:271-272.
8. Dungarwal HS, Chaplot PC, Nagda L. Chemical weed control in chickpea. Indian J Weed Sci. 2002;34(3-4):208-212.
9. Das PK, Sethi AK, Jena MK, Patra RK. Response of French bean (*Phoseolus vulgaris*) to irrigation regimes and nitrogen levels. Indian J Agron. 2020;37(4):835-837.
10. Donald CM. In search of yield. J Aust Inst Agric Sci. 1962;238:171-178.
11. Dubey SK, Kumar A, Singh D, Pratap T, Chaurasiya A. Effect of different weed control measures on performance of chickpea under irrigated condition. Int J Curr Microbiol App Sci. 2018;7:3103-111.
12. Marwat KB, Khan H, Zahid IA. Efficacy of different herbicides for controlling grassy weeds in chickpea (*Cicer arietinum* L.). Pak J Weed Sci Res. 2004;10(314):139-143.
13. Tewari AN, Tewari SN, Rathi JPS, Singh B, Tripathi AK. Effect of cultural and chemical methods on weed growth and grain yield of dwarf pea. Indian J Weed Sci. 2003;35(1-2):49-52.
14. Singh RN, Sharma AK, Tomar RKS. Weed control in chickpea under late sown condition. Indian J Agron. 2003;48(2):114-116.
15. Vaishya RD, Fayaz M, Srivastava VK. Integrated weed management in chickpea. Indian J Agron. 2005;9:34-38.
16. Yousefi AR, Alizadeh HM, Rahimian H. Broad leaf weed control in chickpea (*Cicer arietinum* L.) with pre-and post-emergence herbicides; c2007. p. 560-564