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Effect of herbicides on yield of chickpea (*Cicer arietinum* L.)

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Abstract

Present investigation entitled Effect of herbicides on yield of chickpea (*Cicer arietinum* L.) was carried out at Agriculture Research Station, Badnapur. Situated at 409 m above mean sea level at 19°50' latitude and 47°53' longitudes with an altitude of 520 meters. The soil was clayey in texture, low in phosphorus moderate in available nitrogen and high in potassium.

Experimental results revealed that yield attributes viz., no. of pod plant⁻¹, pod yield plant⁻¹, seed yield plant⁻¹, seed index, seed yield ha⁻¹, straw yield ha⁻¹ was significantly influenced due to various weed management treatments. Weed free treatment and application of Pendimethalin 38.7% CS (1 kg/ha) + one hoeing at 30-35 DAS recorded significantly superior seed yield, Whereas, weed check recorded lowest yield attributes as well as seed and straw yield.

Keywords: Chickpea, herbicide, yield

Introduction

Chickpea (*Cicer arietinum* L.) popularly known as "Gram" or "Bengal gram" is most important and premier pulse crop of India. Chickpea has been well recognized as a valuable source of protein particularly in the developing countries where majority of the population depends on the low-priced food for meeting its dietary requirements. Its magnitude of significance is more among Indians due to their reliance on vegetarian diets besides limited buying capacity of more than 200-250 million (27%) people living below the poverty line. Like any other pulses, supplementation of chickpea with cereal based diets is considered one of the possible solutions to the problems associated with protein energy malnutrition (PEM). The daily availability of 14 gm chickpea is source of approximately 2.3% (56 K cal.) energy and 4.7% (2.7 gm) protein to Indian population besides being a major source of calcium and iron (10-12%).

Chickpea is the third most important grain legume in the world after dry beans and dry peas at global level. Its cultivation is mainly confined to Asia with 90% of the global area and production. Besides Asia, it is also grown in North and Central America, the Mediterranean region, the West Asia and North Africa (WANA) region and Eastern Africa. Recently, the crop has expanded in new niches such as Australia and Canada.

Among the pulse, the chickpea is a first important *Rabi* pulse crop of the region. In 2016-2017 estimated area and production of Chickpea in India is 9.90 million ha and 9.12 million tone. The productivity is 969 kg /ha (2016-2017). In 2017-2018 estimated area and production of Chickpea in Maharashtra is 19.88 lakh ha and 18.81 lakh tone. In Maharashtra, highest chickpea crop is grown on 19.29 lakh ha with the highest production of 19.41 lakh tones (2016-2017). The productivity is also highest during 2016-2017 (1006 kg/ha). Percentage of area increased during this year as compared to previous year is 10.81% of India and 2.96% area in Maharashtra respectively. Maharashtra is having 14.69% contribution in the area with 13.74% production share of the nation (average of last ten years).

Weeds effect on growth, yield and quality of crop plants and reduce the soil fertility, available soil moisture and nutrients and also compete for space and sunlight with the crop plants. Weeds pose severe competition to chickpea crop under rainfed as well as irrigated conditions. Losses in seed yield due to weeds have been estimated 40-87% (Saxena *et al.* 1976, Ahlawat *et al.* 1981, Yadhav *et al.* 1983, Vaishya *et al.* 1999) ^[5, 1, 7, 6] in view of this present investigation was carried out to study performance of herbicides in chickpea.

Materials and Methods

The present field experiment was conducted during *Rabi* season of 2018-19 at the Experimental Farm of Agronomy at Agriculture Research Station, Badnapur, Jalna (Maharashtra), Vasant Rao Naik Marathawada Krishi Vidyapeeth Parbhani. The initial soil sample analysis the experimental plot was clayey in texture, moderate in available nitrogen (180.36 kg ha⁻¹), low in available phosphorus (14.36 kg ha⁻¹), high in available potassium (460.59 kg ha⁻¹). The soil was slightly alkaline in reaction (7.96 pH). The experiment was laid out in Randomized Block Design with three replications. The treatments were (T₁) - Pendimethalin 30 EC (1.0 kg/ha) PE + one hoeing at 25-30 DAS, (T₂) Pendimethalin 38.7 CS (1.0 kg/ha) PE, (T₃) - Pendimethalin 38.7 CS (1.0 kg/ha) PE + one hoeing at 30-35 DAS, (T₄) Fenoxypyr ethyl 9.3% w/w (60 g/ha) POE at 25-30 DAS, (T₅) Pendimethalin 30 EC + Imaze 2% (RM. 1.0 kg/ha) PE, (T₆) Pendimethalin 30 EC + Imaze 2% (RM. 1.0 kg/ha) PE + one hoeing at 30-35 DAS, (T₇) Pendimethalin 38.7 CS (1.0 kg/ha) PE + Imazethapyr 2% (Tank mix 1.0 kg/ha), (T₈) One hoeing at 30-35 DAS, (T₉) Weed Free (two hand weeding at 25-30 DAS and 30-35 DAS) and (T₁₀) Weed check.

Sowing was done by dibbling. The gross and net plot size was 3.60 x 6.20 m and 3.0 x 5.8 m respectively. The recommended dose of fertilizer was 25:50:00 kg NPK ha⁻¹ applied as per

treatments through Urea and SSP. Other cultural practices were done as per treatments. Statistical analysis of the data was carried out by using standard analysis of variance (Panse and Sukhatme 1967).

Results and Discussion

Effect of herbicides on yield and yield attributes of chickpea

In relation of yield and yield contributing attributes which were significantly influenced by different treatments are presented in table 1. number of pod plant⁻¹ (60), pod yield plant⁻¹ (17.83 g), seed yield per plant (15.67 g), Seed index (23.83 g), seed yield (2055 kg ha⁻¹), straw yield (3600 kg ha⁻¹) and biological yield (5655 kg ha⁻¹) which was found significantly improved with weed free treatment it was followed by the treatment. (T₃) pendimethalin 38.7 CS @ 1 kg ha⁻¹ + one hoeing, (T₆) Pendimethalin 30 EC + Imaze 2% @ 1 kg ha⁻¹ + one hoeing at 30-35 DAS, (T₁) Pendimethalin 30 EC @ 1 kg ha⁻¹ + one hoeing at 25 DAS – 30 DAS. Improvements in yield contributing characters and thereby increase in seed yield due to these treatments may be attributed due to significantly lower weed density which created favorable condition for better crop growth and development in crop. Similar results were reported by Rupareliya *et al.* (2017) [4] and Bhalla *et al.* (1998) [2].

Table 1: Effect of herbicides on yield and yield attributing characters of chickpea.

Treatments	Pod yield plant ⁻¹ (g)	Seed yield plant ⁻¹ (g)	Seed index (g)	Seed yield (kg ha ⁻¹)	Straw yield (kg ha ⁻¹)	Biological yield (kg ha ⁻¹)	Harvest Index (%)
T ₁ - Pendimethalin 30 EC(1.0 kg/ha) PE+ one hoeing at 25-30 DAS	15.8	14.1	18.81	1593	2939	4532	35.24
T ₂ - Pendimethalin 38.7CS(1.0 kg/ha) PE	14.77	13.34	18.7	1548	2859	4407	35.16
T ₃ - Pendimethalin 38.7 CS (1.0 kg/ha) PE + one hoeing at 30-35 DAS	17.20	14.77	19.12	1872	3590	5462	34.36
T ₄ - Fenoxypyr ethyl 9.3% w/w (60 g/ha) POE at 25- 30 DAS	14.33	12.63	18.53	1463	2635	4098	35.81
T ₅ - Pendimethalin 30 EC + Imaze 2% (RM 1.0 kg/ha)PE	14.40	13.03	18.61	1515	2673	4188	36.24
T ₆ - Pendimethalin 30 EC + Imaze 2% (RM.1.0 kg/ha) PE+ one hoeing at 30-35 DAS.	16.06	14.39	19.08	1667	2991	4657	36.23
T ₇ - Pendimethalin 38.7 CS (1.0 kg/ha) PE + Imazethapyr 2% (Tank mix 1.0 kg/ha).	15.3	13.71	18.78	1555	2869	4424	35.18
T ₈ - One hoeing at 30-35 DAS.	13.87	11.52	18.50	1407	2600	4007	35.13
T ₉ - Weed free (Two hand weeding at 25-30 DAS and 30- 35 DAS)	17.83	15.67	23.83	2055	3600	5655	36.41
T ₁₀ - Weed check	10.73	7.7	17.66	1104	2296	3400	32.99
SE ± m	0.90	0.82	0.90	77.99	222.14	278.24	1.49
C.D. at 5%	2.68	2.43	2.66	231.72	660.03	826.73	NS
General Mean	15.03	13.09	19.17	1578	2905	4483	35.28

Conclusion

The study demonstrated that effective weed management significantly enhances chickpea yield and yield-contributing attributes. The weed-free treatment (T₉) resulted in the highest values for key parameters such as pod number, seed yield, and biological yield, followed closely by treatments involving Pendimethalin with one hoeing (T₃, T₆, T₁). These results suggest that combining chemical weed control with mechanical hoeing creates favorable growth conditions by reducing weed competition, thereby improving crop performance. Effective weed control, particularly with Pendimethalin and hoeing, is essential for maximizing chickpea yield in both rainfed and irrigated conditions.

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