



ISSN (E): 2277-7695
 ISSN (P): 2349-8242
 NAAS Rating: 5.23
 TPI 2023; 12(8): 917-919
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www.thepharmajournal.com

Received: 02-06-2023
 Accepted: 05-07-2023

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Effect of integrated weed management on yield and economics of black gram

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Abstract

The field experiment was conducted at research farm of School of Agriculture, ITM University, Gwalior Madhya Pradesh. The main objective of the study was to assess the effects of weed management on yield and the economics of black gram. The experiment was laid out in Single split plot design (SSP) with twelve treatments and three replications the treatment detail is V₁ - T₉, V₂ - KUB-22, V₃ - KRISHNA and four treatment that is T₀ - Control (Unweeded), T₁ - Weed Free Check, T₂ - Pendimethalin at 1.0 kg ai ha⁻¹ + hand weeding @ 40 DAS, T₃ - Imazethapyr at 1.0 kg ai ha⁻¹ (@ 15 DAS+ hand weeding @ 40 DAS. Based on the results of this experimentation it is concluded that higher yield and economical production along with efficient weed management in *Kharif* black gram under Gwalior agro-climatic condition. The results revealed that the application of variety Krishna with Imazethapyr at 1.0 kg ai ha⁻¹ at 15 DAS + hand weeding at 40 DAS showed a significant positive impact on grain yield (Kg ha⁻¹), straw yield (Kg ha⁻¹) and gross monetary return, net return and B:C ratio.

Keywords: Black gram weeds, IWM and economics

Introduction

Black gram is a self-pollinated yearly harvest having a place with leguminaceae family and supplies a significant portion of protein necessity of veggie lover populace of the country. It is one of the significant heartbeat crop filled in India, being a brief span crop it suits well in the editing framework, as it clears field well in time offering the chance to many winter season crops like mustard, lentil and so forth filled in flooded and rainfed circumstance. Dark gram is filled in around 46.07 million ha of region with efficiency of 501 kg ha⁻¹ in India (Anonymous, 2021)^[6]. Also dark gram is filled in around 3.93 million ha, with efficiency of 929 kg ha⁻¹ in India (Anonymous, 2021)^[6]. Beats are a wellspring of beneficial protein to day to day counts calories in light of oats and bland nourishment for a transcendently vegan populace and for the people who can't bear the cost of costly creature protein. Beats are thusly frequently viewed as unfortunate man's meat. They additionally give energy, fundamental minerals, nutrients and a few mixtures considered gainful for good wellbeing. Vegetables possess an exceptional spot in human nourishment with protein (24%), starches (59.6%), fat (1.5%), minerals (3.2%) and it likewise contains 154 mg calcium, 9.1 mg iron and 38 mg beta-carotene per 100 g of dal (Gowda and Kaul, 1982)^[9] their development enhances soil by adding nitrogen and further develops the physical, synthetic and natural soil properties.

Among different creation factors, weeds assume a crucial part in impacting dark gram yield. Weeds contend with the assets like supplement, dampness and light. High temperature combined with incessant downpours during developing period invades the harvest intensely with weeds which antagonistically influence the efficiency of this yield. An underlying time of 20-40 days is exceptionally basic (Mundra and Maliwal, 2012)^[5]. The yield loss of dark gram because of weeds has been accounted for to the degree of 27 to 90% relying on type and power of weed greenery (Chaudhari *et al.*, 2014)^[3]. Dark gram is invaded with various classifications of weeds. Among wide leaved weeds *Parthenium hysterophorus*, *Phyllanthus niruri*, *Amaranthus viridis*, *Celosia argentea*, *Cleome viscosa*, *Trianthema portulacastrum* *Digera arvensis*; among green *Echinochloa* spp., *Setaria glauca*, *Elusine indica*, *Dectyloctenium aegyptium*, *Cynodon dactylon* and among sedges *Cyperus rotundus*, *Cyperus difformis* rule.

Current weed science consolidates essential and applied sciences in the investigation of weeds, commonly characterized as plants that are questionable or obstruct the exercises or government assistance of people. In spite of the fact that weeds have been related with human movement starting from the start of harvest development, the historical backdrop of weed

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science matches the historical backdrop of cutting edge horticulture and is under 100 year old. From an early accentuation on compound weed control, the field of weed science presently coordinates preventive, mechanical, synthetic, social and organic estimates in the administration of weeds. Weeds make enormous financial misfortunes horticulture and normal assets as far as yield misfortune, loss of land utility, wellbeing related issues and the expenses of control.

Attributable to desperation of planting in blustery season, by and large ranchers don't have any significant bearing pre-development herbicides, which cause ensuing weighty pervasion of weeds. So ranchers are doing rehashed manual weeding and intercultural activity prompting increment the expense of development other than making obstruction to fixing and case improvement in groundnut. The issue can be additionally irritated by erratic atmospheric conditions as well as rising cost and shortage of homestead workers (Singh *et al.*, 2022)^[7].

Step by step, weed control through herbicides is expanding and promoting among ranchers. Since, weed control through manual strategy is tedious and drawn-out and turn out to be exorbitant because of inaccessibility of work in top period and work charges are additionally high because of moving of horticultural works to businesses for better and guaranteed compensation.

The adequacy of herbicides generally relies on the environment, weed synthesis and thickness of weeds with pre-planting or pre-development use of herbicides. The weeds can be controlled right from the germination stage coming about into a weed free climate from beginning phase of harvest, however ensuing flushes of weeds that show up at later phase of yield development can't be controlled really, under this present circumstance, the coordinated weed control technique involving herbicides related to manual weeding or entomb development would give more successful weed control and at last give what is going on to trim development (Mansoori *et al.*, 2015)^[8].

Materials and Methods

The experiment has been conducted at School of Agriculture, Department of Agronomy, ITM University, Gwalior (M.P.) during *kharif* season of 2021-22. Details of the materials used, procedures followed and the techniques used during the present investigation are described in this chapter under the following heads.

Experimental site

The experiment was laid out in research field at the School of Agriculture, Department of Agronomy, ITM University, Gwalior (M.P.) during *kharif* season of 2021-22. Explore was directed having genuinely uniform geography with delicate slant and sufficient seepage. Gwalior is arranged in Brace zone at the scope of 26°.14' North and longitude 78.19' east in Madhya Pradesh. This Locale goes under damp sub-heat and humidity with outrageous atmospheric condition having warm and dry summer and cold winter. For the most part, storm set during the last seven day stretch of June.

Yearly precipitation goes from 700 to 800 mm, the vast majority of which falls during last June to the center of September. In this space winter downpours are periodic and questionable. During trimming season the mean month to month maximum (40.1 °C) and least (21.7 °C) temperature

were kept in the period of April and January, separately winter precipitation (0.87 mm) was likewise recorded during crop season

Yield parameters

Biological yield (kg ha⁻¹): To ascertain natural yield, you should decide the weight or volume of the biomass or bioenergy created and partition it by the area or volume of land or water used to deliver it.

Grain yield (kg ha⁻¹): The produce of each net plot was gathered independently and dried grain yield was recorded. The grain yield per net plot was then changed over into hectare premise.

Straw yield (kg ha⁻¹): The plants subsequent to depriving of seeds were saved for sun drying in a similar plot. After complete drying, feed was weighted and consequently the qualities were changed over on hectare premise.

Economics parameters

Gross returns (₹ ha⁻¹): Grain and straw yield of various medicines were changed over into gross returns (₹ ha⁻¹) based on winning business sector cost.

Net returns (₹ ha⁻¹): Net returns for every treatment were determined by deducting the complete expense of development including treatment cost from the gross returns.

Benefit cost ratio: Benefit: cost proportion (B:C) for every treatment was determined by isolating gross returns by all out cost of development including treated cost.

$$B:C \text{ ratio} = \frac{\text{Gross return (Rs./ha)}}{\text{Cost of cultivation (Rs./ha}^{-1}\text{)}}$$

Result and Discussion

Table 1: Effect of integrated weed management on grain yield, straw yield and biological yield of black gram

Treatments	Grain/Seed yield (kg ha ⁻¹)	Straw/Stover yield (kg ha ⁻¹)	biological yield (kg ha ⁻¹)
Varieties			
V ₁	761.8	2275.6	3037.4
V ₂	903.4	2502.4	3405.08
V ₃	928.4	2734.0	3662.4
S.Em.±	18.95	77.47	48.21
C.D. at 5%	74.42	235.32	154.87
Weed control treatments			
T ₀	422.1	1849.6	2271.72
T ₁	1114.3	2838.9	3953.26
T ₂	911.4	2703.1	3614.49
T ₃	1010.3	2757.7	3768.0
S.Em.±	25.14	66.85	70.58
C.D. at 5%	74.70	198.64	209.70

Among the varieties V₃ produced significantly higher grain yield, straw yield and biological as compared to V₂ and V₁.

The weed control treatments significantly influenced the grain yield, straw yield and biological of black gram. Treatment T₃ recorded maximum grain yield (1010.3 kg ha⁻¹), straw yield (2757.7 kg ha⁻¹), and biological yield (3768.0 kg ha⁻¹), which was significantly higher than other treatments. However, the

minimum grain yield (422.1 kg ha⁻¹), straw yield (1849.6 kg ha⁻¹), and biological yield (2271.72 kg ha⁻¹), was recorded under T₀ respectively. The harvest under T₁ plots achieved rich development because of disposal of weeds from entomb and intra pushes other than better air circulation because of control of surface soil and in this manner, more space, water, light and supplements were accessible for the better development and improvement, which came about into predominant yield credits and thusly the best return was recorded under previously mentioned treatment. Khot *et al.* (2013) [1], Yadav *et al.* (2015) [4] additionally detailed hand weeding as a viable way for accomplishing weed free climate for better development and advancement of yield crediting qualities lastly record greatest yield of dark gram.

The communication impacts between various assortments and weed control medicines were viewed as huge in regard of grain yield of dark gram. Variety V₃ under T₁ gave highest grain yield of 1218.7 kg ha⁻¹ which was significantly superior over other treatment combinations except V₂ x T₁ and V₃ x T₃. However, variety V₁ under T₀ weed control gave minimum grain yield of 395.5 kg ha⁻¹.

Table 2: Effect of integrated weed management on economics of black gram

Treatment combination	Cost of cultivation	Gross return	Net return	B:C ratio
V ₁ T ₀	30150	50383	20233	0.67
V ₁ T ₁	39150	81486	42336	1.08
V ₁ T ₂	32070	65056	32986	1.02
V ₁ T ₃	31186	68579	37393	1.20
V ₂ T ₀	30150	50305	20155	0.66
V ₂ T ₁	39650	87791	48141	1.21
V ₂ T ₂	32070	74525	42455	1.32
V ₂ T ₃	31186	77691	46505	1.49
V ₃ T ₀	30150	51347	21197	0.70
V ₃ T ₁	40150	91716	51566	1.28
V ₃ T ₂	32070	72650	40580	1.27
V ₃ T ₃	31186	82765	51579	1.65

The maximum cost of cultivation was recorded under V₃ x T₁, while it was lowest under V₁ x T₀. Among the treatment combinations, V₃ x T₁ proved its superiority by giving highest gross and net returns. However, the second-best combination V₂ x T₁ and V₁ x T₀ giving lowest gross and net returns. The benefit per rupee of investment was more V₃ x T₃ followed by V₂ x T₃ over other combinations. A difference in net income from different Varieties has also been reported by Chaudhry *et al.* (2014) [3].

Conclusion

Based on the results of this experimentation, it is concluded that higher and economical production along with efficient weed management in *Kharif* black gram under Gwalior agroclimatic zone can be achieved by application with Imazethapyr at 1.0 kg ai ha⁻¹ at 15 DAS + hand weeding at 40 DAS. And higher value remuneration of GMR (₹ 82765), NMR (₹ 51579) and B:C ratio (1.65).

Conflict of Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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