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Influence of sequential application of weedicides on weed management and yield of black gram (*Vigna mungo* L.)

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Abstract

A field experiment was carried out at the of Krishi Vigyan Kendra, Pratapgarh MPUAT, Udaipur during *kharif*, 2025 to study the “Influence of sequential application of weedicides on weed management and yield of black gram (*Vigna mungo* L.). The experiment was laid out in randomized block design comprising of 12 treatments replicated thrice. The experimental field was heavily infested with various grassy, sedges and broad-leaved weeds but the dominance of grassy weeds was observed. Among pre-emergence weedicides, diclosulam showed more effectiveness in controlling weeds as compared to pendimethalin. In case of post-emergence weedicides, fomesafen + fluzifop p-butyl were found to provide higher control of sedges, grasses and broad-leaved weeds, respectively in comparison to other PoE weedicides. Due to severe crop-weed competition, 61.13 per cent yield reduction was noticed in weedy check plot (T_1) as compared to weed free plot (T_2). The results revealed that weed free treatment (T_2) resulted in the maximum seed (1595mk g ha⁻¹) and haulm yield (2354 kg ha⁻¹). Among weedicide treatments, fomesafen + fluzifop p-butyl g ha⁻¹ at 20 DAS (T_{12}) provided the maximum weed control efficiency (71.52%), seed yield (1441 kg ha⁻¹) and haulm yield (2259 kg ha⁻¹).

Keywords: Weed managment, sequential application, fomesafen, fluzifop p-butyl, yield

Introduction

Black gram (*Vigna mungo* L. Hepper) is popularly known as “Urd”, is one of the important pulse crop cultivated worldwide in tropical and subtropical regions of the world. The crop is resistant to adverse climatic conditions and improves the soil fertility by fixing atmospheric nitrogen in the soil. It has wide adaptability and can be grown through round the year in different agro-ecological regions of the country. It contains 48.0 per cent carbohydrates, 22.3 per cent protein, 154 mg calcium, 9.1 mg iron, 1.4 g fat, 0.37 g riboflavin and 0.42 mg thiamine in per 100 g (Asaduzzaman *et al.*, 2010) [1]. It is consumed in the form of “dal” (whole or split, husked and un-husked) and in a variety of ways across from North to South India. In India are prepared of different regular and popular dishes like vada, idle, dosa, halwa and imarti in combination with other food grains.

Hand weeding is effective against most of the weeds that becomes difficult due to dependence on labour. Hence, the use of pre-emergence or early post emergence weedicides along with their combinations with other weedicides are to be studied for wide spectrum of weed control in black gram. Recently, weedicides used for weed control include pre-emergence application of pendimethalin and post emergence application of most of these weedicides provide only a narrow spectrum of weed control. Therefore, there is need to have alternate weedicides having broad spectrum weed control to prevent weed shift as well as possible development of weedicide resistance. Identification of alternate strategy such as new weedicides and weedicide combinations with different mode of action like fomesafen + fluazifop-p-butyl, propaquizafop + imazethapyr and sodium-acifluorfen + clodinafop-propargyl may be need of the hour to tackle the problem of weed infestation in black gram. If farmers fail to apply pre-emergence weedicides after sowing of urd bean due to any reason, the use of post-emergence weedicides becomes the only viable weed management option. In recent years, a combination of fluazifop-p-butyl and fomesafen has been

found effective in managing both annual and perennial grasses as well as broad-leaved weeds in various pulse and oilseed crops. Fluazifop-p-butyl, an acetyl-CoA carboxylase (ACCase) enzyme inhibitor, specifically targets grassy weeds, whereas fomesafen, a protoporphyrinogen oxidase (PPO or PROTOX) inhibitor, is effective against annual broad-leaved weed species (Silva *et al.*, 2007)^[10].

Use of propaquizafop + imazethapyr combination found effective in pulses. Imazethapyr is a systemic, post emergence weedicide, absorbed by the roots and foliage with translocation in the xylem and phloem and accumulate in the meristematic regions. The use of this weedicide controlled major annual and perennial grasses and broad-leaved weeds in leguminous crops (Dixit and Varshney, 2007)^[12]. Propaquizafop is a selective post emergence weedicide used to control wide range of annual and perennial grasses in broad-leaved crops. After foliar application of the weedicide, it is absorbed by the leaves and translocated from the foliage *via* the phloem to the growing points of the leaves and roots of the weeds. Treated plant ceases growth within 3-4 days, show chlorosis on the younger plant tissues followed by a progressive collapse of the entire plant after 10-20 days later. Sodium-acifluorfen controls many annual broad-leaved weeds and several grasses. Clodinafop-propargyl is a broad spectrum graminicide with activity on many annual and perennial grass weed species under different climatic conditions. The combined application of sodium-acifluorfen + clodinafop-propargyl results in broad spectrum weed control (Rao, 2018)^[7].

Current literature on weed management in black gram has examined various weedicide options; however, there is a significant research gap concerning weedicide mixture strategies specifically tailored for effective weed management in black gram fields. Utilizing weedicides and their ready-mix combination could offer a viable alternative for managing weeds (Marimuthu *et al.*, 2024)^[6].

Materials and Methods

The experiment was carried out at the Krishi Vigyan Kendra, Pratapgarh MPUAT, Udaipur during *kharif*, 2025. The soil of the experimental field was clay-loam in texture, moderately alkaline in reaction with low level of available nitrogen, medium level of available phosphorus and high level of available potassium. The experiment was laid out in randomized block design comprising of 12 treatments replicated thrice. The treatments evaluated were: weedy check (T₁), weed free (T₂), hand weeding at 20 and 40 DAS (T₃), pendimethalin @ 1000 g ha⁻¹ (T₄), diclosulam @ 20 g ha⁻¹ (T₅), imazethapyr @ 75 g ha⁻¹ at 20 DAS (T₆), fomesafen @ 250 g ha⁻¹ at 20 DAS (T₇), fluzifop p-butyl @ @ 250 g ha⁻¹ at 20 DAS (T₈), fomesafen + propaquizafop @ 252+78 g ha⁻¹ at 20 DAS (T₉), propaquizafop + imazethapyr @ 50 + 75 g ha⁻¹ at 20 DAS (T₁₀), sodium-acifluorfen + clodinafop-propargyl @ 140 + 70 g ha⁻¹ at 20 DAS (T₁₁) and fomesafen + fluzifop p-butyl g ha⁻¹ 20 DAS (T₁₂). As a test crop black gram variety kota urd-4 was shown during the last week of June, 2025 with crop geometry 30 cm x 10 cm. Spraying of pre-emergence weedicides viz., pendimethalin and diclosulam was done two days after the sowing of crop.

Grassy, sedges and broad-leaved weed count was taken at 60 DAS from two randomly selected spot in each plot by using a quadrat of 0.5 m x 0.5 m and then expressed as number m⁻². Weeds were removed from 0.5 m x 0.5 m area inside the quadrat at 60 DAS and then dried under shades for 24 hours followed by oven drying at 65 °C to obtain a constant weight and was expressed in g m⁻². Weed data were subjected to square root transformation ($\sqrt{X + 0.5}$) to normalize their distribution. Weed control

efficiency (%) was computed on the basis of total dry weight. The crop was harvested manually during the last of September.

Results and Discussion

Weed Density

The experimental site was heavily infested with mixed flora of grasses, sedges and broad-leaved weeds chiefly consisted of *Echinochloa colona*, *Cynodon dactylon*, *Cyperus rotundus*, *Amaranthus viridis*, *Parthenium hysterophorus*, *Phyllanthus niruri*, *Convolvulus arvensis*, *Echinochloa crus-galli*, and *Digera arvensis*, where the dominancy of grassy weeds was observed. The sum of grassy, sedges and broad-leaved weeds was included in total weed density.

Data presented in Table 1 indicate that different weed management practices resulted in significantly lower density of grassy weeds in comparison to weedy check. The maximum reduction of grassy weed density was observed under the application of fomesafen + fluzifop p-butyl @ 220 + 220 g ha⁻¹ at 20 DAS (T₁₂) which was statistically at par with the application of propaquizafop + imazethapyr @ 50 + 75 g ha⁻¹ at 20 DAS (T₁₀). The decline of total grasses under sodium acifluorfen + clodinafop-propargyl @ 140 + 70 g ha⁻¹ at 20 DAS (T₁₁) was 73.35 per cent over weedy check (9.27 m⁻²). In case of sedges, application of diclosulam @ 20 g ha⁻¹ resulted in the minimum density (3.35 m⁻²) which was statistically at par with T₆ and T₁₀. This might be because sedges propagated by rhizomes and disruption by hand weeding encouraged increased growth of below-ground rhizomes. Since weeds continuously emerge during the crop growth period, post-emergence weedicides help in eliminating weeds at later stages. Due to of weedicides effectiveness, crop experiences less competition from weeds, which favours the crop in efficient utilization of nutrients, moisture, light and space. Consequently, a substantial improvement in growth and yield attributes occur, which is ultimately reflected in higher yield of the crop This is in conformity with the findings of Reddy *et al.* (2021)^[9]. The maximum reduction of broad-leaved weed was noticed under the application of fomesafen + fluzifop p-butyl @ 220 + 220 g ha⁻¹ at 20 DAS (T₁₂) which was statistically at par with T₁₀ and T₁₁, accounting for 74.38, 73.69 and 73.69 per cent lower weed count, respectively over weedy check (8.59 m⁻²).

Data show that application of propaquizafop + imazethapyr @ 50 + 75 g ha⁻¹ at 20 DAS (T₁₀) recorded the least count of total weed with 66.12 per cent reduction over weedy check (14.08 m⁻²). However, its outcome was statistically at par with diclosulam @ 20 g ha⁻¹ and fomesafen + fluzifop p-butyl @ 220 + 220 g ha⁻¹ at 20 DAS (T₁₂) and superior over rest of the treatments. Application of diclosulam @ 20 g ha⁻¹ and fomesafen + fluzifop p-butyl @ 220 + 220 g ha⁻¹ at 20 DAS (T₁₂) recorded 65.83 per cent reduction of total weed population in comparison to weedy check. This might be due to the effectively suppressed weed density because the prevalent weed flora was highly susceptible to these pre-mix weedicide combinations. These weedicides inhibit protoporphyrinogen oxidase (PPO) and acetyl-CoA carboxylase (ACCase) enzyme activity, leading to chlorosis, bronzing, desiccation, and necrosis in susceptible weeds species. The present findings are in conformity with those of Elankavi *et al.* (2019)^[5], Singh *et al.* (2019)^[9] Dhayal *et al.* (2022)^[3] and Dhakad *et al.* (2023)^[4].

Weed Dry Matter Accumulation

It is evident from data (Table 2) that fomesafen + fluazifop p-butyl @ 220 + 220 g ha⁻¹ at 20 DAS (T₁₂) recorded the lowest dry matter accumulation of grassy weed which was statistically at par

with T₁₀, T₁₁ and T₉ showing 62.85, 47.32, 45.87 and 44.41 per cent reduction over weedy check (11.08 g m⁻²), respectively. Application of diclosulam @ 20 g ha⁻¹ (T₅) provided significantly lower dry matter accumulation of sedge i.e., *Cyperus rotundus* (1.96 g m⁻²) over weedy check ((3.56 g m⁻²). But its effect was found to be statistically at par with T₆, T₁₀ and T₁₂. Like weed density, treatments comprising of hand weeding also recorded statistically higher dry matter accumulation of sedges as compared to weedy check. In reducing the dry matter accumulation of broad-leaved weed, fomesafen + fluazifop p-butyl @ 220 + 220 g ha⁻¹ at 20 DAS (T₁₂) showed the superior results with 50.70 per cent reduction over weedy check (10.00 g m⁻²). However, the effect was statistically at par with propaquizafop + imazethapyr @ 50 + 75 g ha⁻¹ at 20 DAS (T₁₀) and sodium acifluorfen + clodinafop-propargyl @ 140 + 70 g ha⁻¹ at 20 DAS (T₁₁) showing 49.10 and 47.70 per cent lower value than weedy check.

The maximum reduction of total weed dry matter accumulation was noticed under fomesafen + fluazifop p-butyl @ 220 + 220 g ha⁻¹ (T₁₂). The next best weedicide treatment was propaquizafop + imazethapyr @ 50 + 75 g ha⁻¹ at 20 DAS (7.92 g m⁻²), which stood statistically at par with sodium acifluorfen + clodinafop-propargyl @ 140 + 70 g ha⁻¹ at 20 DAS (8.14 g m⁻²) and fomesafen + propaquizafop @ 252 + 78 g ha⁻¹ at 20 DAS (8.34 g m⁻²).

Weed Control Efficiency (WCE)

The results (Table 2) reveal that all the weed control treatments provided significantly higher WCE over weedy check. Weed free treatment (T₂) throughout the crop growing period registered 100 per cent WCE. Among weedicide treatments, the maximum weed

control efficiency (80.94%) was achieved by the application of fomesafen + fluazifop p-butyl @ 220 + 220 g ha⁻¹ (T₁₂). However, its effect was found to be statistically at par with Propaquizafop + Imazethapyr @ 50 + 75 g ha⁻¹ at 20 DAS and Sodium-acifluorfen + Clodinafop-propargyl @ 140 + 70 g ha⁻¹ at 20 DAS providing weed control efficiency of 73.09 and 71.52 per cent.

Yield

Seed and haulm yield of black gram were significantly enhanced by different weed control treatments over weedy check (Table 3). Data distinctly indicate that the maximum seed yield (1595 kg ha⁻¹) and haulm yield (2354 kg ha⁻¹) was recorded under weed free treatment (T₂). This was attributed to weed free atmosphere up to harvest with least competition for growth resources. It is well established fact that least crop weed competition during critical phases of crop growth exerts an important regulation function on complex process of yield formation due to better availability of water, space and nutrients to the crop plant (Patel *et al.* 2026) [6]. Among weedicide treatments, fomesafen + fluazifop p-butyl @ 220 + 220 g ha⁻¹ (T₁₂) registered the superior seed yield (1441 kg ha⁻¹) and haulm yield (2259 kg ha⁻¹). However, its effect was statistically at par with propaquizafop + imazethapyr @ 50 + 75 g ha⁻¹ at 20 DAS (T₁₀) and sodium acifluorfen + clodinafop-propargyl @ 140 + 70 g ha⁻¹ at 20 DAS (T₁₁) in seed yield and haulm yield. This might be due to the fact that least crop-weed competition during critical phase of crop growth exerts an important regulatory function on complex process of yield formation due to better availability of water, space and nutrients to the crop plant. It also helps in improving aeration and nutrient uptake by plant resulting in higher metabolic activity Singh *et al.* (2022) [11] and Sreekanth *et al.* (2024) [12].

Table 1: Effect of weedicides on weed density at 60 DAS

Treatments	Weed density (No. m ⁻²)			
	Grasses	Sedges	Broad-leaved	Total weeds
T ₁ : Weedy check	9.27 (85.40)	6.30 (39.26)	8.59 (73.35)	14.08 (198.01)
T ₂ : Weed free	0.71 (0.00)	0.71 (0.00)	0.71 (0.00)	0.71 (0.00)
T ₃ : Hand weeding at 20 and 40 DAS	1.85 (2.93)	1.39 (1.42)	1.66 (2.27)	2.67 (6.62)
T ₄ : Pendimethalin @ 1000 g ha ⁻¹ (PE)	2.83 (7.49)	5.63 (31.20)	2.54 (5.93)	6.72 (44.62)
T ₅ : Diclosulam @ 20g ha ⁻¹ (PE)	2.57 (6.20)	3.35 (10.75)	2.48 (5.65)	4.80 (22.60)
T ₆ : Imazethapyr @ 75g ha ⁻¹ at 20 DAS	2.81 (7.39)	3.53 (11.97)	2.51 (5.81)	5.07 (25.17)
T ₇ : Fomesafen @ 250 g ha ⁻¹ at 20 DAS	3.01 (8.58)	5.50 (29.72)	2.76 (7.12)	6.95 (45.43)
T ₈ : Fluzifop p-butyl @ 250 g ha ⁻¹ at 20 DAS	2.99 (8.45)	5.56 (30.43)	2.75 (7.08)	6.81 (45.95)
T ₉ : Fomesafen + Propaquizafop @ 252 + 78 g ha ⁻¹ at 20 DAS (Ready mix)	2.55 (6.02)	3.57 (13.56)	2.27 (4.67)	4.97 (24.25)
T ₁₀ : Propaquizafop + Imazethapyr @ 50 + 75 g ha ⁻¹ at 20 DAS (Ready mix)	2.47 (5.62)	3.53 (12.00)	2.26 (4.61)	4.77 (22.23)
T ₁₁ : Sodium-acifluorfen + Clodinafop-propargyl @ 140 + 70 g ha ⁻¹ at 20 DAS (Ready mix)	2.49 (5.68)	3.66 (12.91)	2.26 (4.62)	4.87 (23.21)
T ₁₂ : Fomesafen + Fluzifop p-butyl @ 220 + 220 g ha ⁻¹ at 20 DAS (Ready mix)	2.47 (5.59)	3.64 (12.73)	2.20 (4.35)	4.81 (22.67)
S.Em.±	0.06	0.07	0.05	0.03
C.D. (P=0.05)	0.17	0.22	0.15	0.09

Table 2: Effect of weedicides on weed dry matter accumulation and weed control efficiency at 60 DAS

Treatments	Weed dry matter accumulation (g m ⁻²)				WCE (%)
	Grasses	Sedges	Broad-leaved	Total weeds	
T ₁ : Weedy check	11.01 (120.97)	3.56 (12.17)	10.00 (99.68)	15.26 (232.82)	0.00
T ₂ : Weed free	0.71 (0.00)	0.71 (0.00)	0.71 (0.00)	0.71 (0.00)	100.00
T ₃ : Hand weeding at 20 and 40 DAS	4.99 (24.40)	0.97 (0.44)	4.38 (18.72)	6.64 (43.56)	81.24
T ₄ : Pendimethalin @ 1000 g ha ⁻¹ (PE)	8.40 (70.09)	3.19 (9.67)	(8.65) (74.18)	11.59 (133.94)	42.31
T ₅ : Diclosulam @ 20g ha ⁻¹ (PE)	6.79 (45.56)	1.96 (3.33)	5.93 (34.65)	9.17 (83.54)	63.86
T ₆ : Imazethapyr @ 75g ha ⁻¹ at 20 DAS	7.72 (59.12)	2.05 (3.71)	6.80 (45.69)	10.44 (108.52)	53.05
T ₇ : Fomesafen @ 250 g ha ⁻¹ at 20 DAS	8.58 (73.11)	3.12 (9.22)	7.70 (58.80)	11.90 (141.13)	38.94
T ₈ : Fluzifop p-butyl @ 250 g ha ⁻¹ at 20 DAS	8.44 (70.73)	3.15 (9.43)	7.63 (57.77)	11.76 (137.93)	40.32
T ₉ : Fomesafen + Propaquizafop @ 252 + 78 g ha ⁻¹ at 20 DAS (Ready mix)	6.12 (36.95)	2.17 (4.20)	5.32 (27.86)	8.34 (69.01)	70.15
T ₁₀ : Propaquizafop + Imazethapyr @ 50 + 75 g ha ⁻¹ at 20 DAS (Ready mix)	5.80 (33.11)	2.05 (3.72)	5.09 (25.37)	7.92 (62.20)	73.09
T ₁₁ : Sodium-acifluorfen + Clodinafop-propargy @ 140 + 70 g ha ⁻¹ at 20 DAS (Ready mix)	5.96 (35.00)	2.12 (4.00)	5.23 (26.83)	8.14 (65.83)	71.52
T ₁₂ : Fomesafen + Fluzifop p-butyl @ 220 + 220 g ha ⁻¹ at 20 DAS (Ready mix)	4.09 (16.27)	2.11 (3.95)	4.93 (23.84)	6.67 (44.06)	80.94
S.Em.±	0.13	0.04	0.11	0.17	1.63
C.D. (P=0.05)	0.37	0.12	0.32	0.50	4.77

Table 3: Effect of weedicides on seed and haulm yield of black gram

Treatments	Yield (kg ha ⁻¹)	
	Seed	Haulm
T ₁ : Weedy check	620	1233
T ₂ : Weed free	1595	2354
T ₃ : Hand weeding at 20 and 40 DAS	1560	2328
T ₄ : Pendimethalin @ 1000 g ha ⁻¹ (PE)	883	1578
T ₅ : Diclosulam @ 20g ha ⁻¹ (PE)	955	1624
T ₆ : Imazethapyr @ 75g ha ⁻¹ at 20 DAS	905	1535
T ₇ : Fomesafen @ 250 g ha ⁻¹ at 20 DAS	753	1446
T ₈ : Fluzifop p-butyl @ 250 g ha ⁻¹ at 20 DAS	792	1415
T ₉ : Fomesafen + Propaquizafop @ 252 + 78 g ha ⁻¹ at 20 DAS (Ready mix)	1024	1678
T ₁₀ : Propaquizafop + Imazethapyr @ 50 + 75 g ha ⁻¹ at 20 DAS (Ready mix)	1398	2185
T ₁₁ : Sodium-acifluorfen + Clodinafop-propargy @ 140 + 70 g ha ⁻¹ at 20 DAS (Ready mix)	1338	2162
T ₁₂ : Fomesafen + Fluzifop p-butyl @ 220 + 220 g ha ⁻¹ at 20 DAS (Ready mix)	1441	2259
S.Em.±	60	95
C.D. (P=0.05)	177	279

Conclusion

From the findings of the experiment, it was observed that sequential application of fomesafen + fluzifop p-butyl @ 220 + 220 g ha⁻¹ (T₁₂) fomesafen + fluzifop p-butyl @ 220 + 220 g ha⁻¹ (T₁₂) as PoE provided the maximum weed control efficiency as well as the highest seed and haulm yield of black gram among various weedicide treatments. Hence, it may be concluded that under the scenario of labour shortage and high labour cost, weedicide sequence fomesafen + fluzifop p-butyl will effectively control weed leading to higher yield of black gram.

References

- Asaduzzaman M, Sultana S, Roy TS, Masum SM. Weeding and plant spacing effects on the growth and yield of black gram. Bangladesh Research Publication Journal. 2010;4(1):62-68.
- Dixit A, Varshney JG. Bio-efficacy of imazethapyr against weeds in soybean. Annual Report. Jabalpur (Madhya Pradesh): National Research Centre for Weed Science; 2007. p. 7-8.
- Dhayal S, Yadav SL, Ram B, Sharma A. Effect of weedicides on associated weeds and growth of black gram (*Vigna mungo* L.). Journal of Farming Systems Research. 2022;8(1):203-207.
- Dhakad U. Weed management strategies in soybean under changing climate scenario. International Journal of Agriculture Sciences. 2023;15(6):12411-12417.
- Elankavi S, Ramesh S, Baradhan G, Suresh Kumar SM. Effect of new generation weedicides on weed parameters of black gram (*Vigna mungo* L.).
- Marimuthu S, Gunasekaran M, Parimaladevi R, Subrahmaniyan K, Byraredy VM, Mushtaq S, et al. Effective weed control through post-emergence weedicides to enhance black gram (*Vigna mungo* L.) productivity in South India. Scientific Reports. 2024;14(1):264-268.
- Rao AS. Fluzifop-p-butyl against grasses in cotton and its

- residual effect on succeeding black gram (*Vigna mungo* L.). Indian Journal of Weed Science. 2018;50(4):402-404.
8. Reddy NRM, Subramanyam D, Sumathi V, Umamahesh V, Sagar GK. Performance of ready-mix weedicides for weed control in black gram (*Vigna mungo* L.). Indian Journal of Weed Science. 2021;53(1):104-106.
 9. Singh G, Virk HK, Khanna V. Pre- and post-emergence weedicides effect on growth, nodulation and productivity of green gram (*Vigna radiata* L.). Indian Journal of Weed Science. 2019;51(3):257-261.
 10. Silva CM, Freitas SP, Rosa RCC. Efeito residual da aplicação de fluazifop-p-butil + fomesafen em solos com plantas-teste. Ciencia Rural. 2007;37:1450-1452.
 11. Singh RP, Verma SK, Singh PK, Lakra K, Singh SB, Maurya S. Effect of weedicides on growth, yield and economics of urd bean (*Vigna mungo* L.). Journal of Experimental Agriculture International. 2022;44(9):203-209.
 12. Sreekanth G, Rani BS, Reddy PM, Prasanthi A, Chandrika V, Sagar GK. Effect of pre- and post-emergence weedicides on weed growth and yield of black gram (*Vigna mungo* L.) in Andhra Pradesh. Journal of Agricultural Sciences. 2024;10(1):20-25.