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Effect of post emergent herbicides and foliar nutrition on weed control, productivity and quality of greengram

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Abstract

A field experiment entitled "Effect of Post-emergence Herbicides and Foliar Nutrition on Weed Control, Productivity and Quality of Greengram" was conducted during *Kharif* 2025 at College of Agriculture, Navile, Shivamogga, Karnataka, to evaluate the combined effect of post emergent herbicide and foliar nutrition on weed management, crop productivity and quality of greengram. Among the Weed management practices, the weed-free (W_2) and Propaquizafop 2.50% + Imazethapyr 3.75% @ 125 g ha⁻¹ at 20 DAS (W_3) recorded the lowest weed density and highest WCE (100% and 87.58%), and were statistically on par in growth, yield attributes, seed yield over weedy check (W_1). Among the foliar nutrition treatment, Pulse Magic @ 1% at 10 DAF (F_3) recorded higher growth and yield parameters over Pulse Booster and DAP. Among the interaction W_3F_3 recorded the highest net returns (₹58,896 ha⁻¹) and benefit: cost ratio (2.62), whereas the weed-free treatment combined with Pulse Magic (W_2F_3) produced the highest seed and haulm yields which is on par with W_3F_3 (Propaquizafop 2.50% + Imazethapyr 3.75% @ 125 g ha⁻¹ applied at 20 DAS followed by a foliar spray of Pulse Magic @ 1% at 10 days after flowering).

Keywords: Greengram, post emergent herbicide, foliar nutrition, weed control efficiency, weed index, seed yield.

Introduction

Greengram (*Vigna radiata* L.) is one of the most important pulse crops grown in India because of its high nutritional value, short duration and ability to enrich the soil fertility through biological nitrogen fixation. It is an excellent source of protein (about 24%), carbohydrates, vitamins and essential minerals, making it an important component of balance human diet. In India, greengram occupies an area of 5.624 mha with a production of 2.069 mt and average productivity of 368 kg ha⁻¹ (2025-26). In Karnataka, it is grown over an area of 4.18 lakh ha with a production of 1.52 lakh tonnes and productivity of 364 kg ha⁻¹ (2025-26). (DAC&FW, GoI, UPAg 2025-26).

Weed infestation during the early growth period is one of the major factor limiting the greengram productivity. Weeds compete aggressively with the crop for moisture, nutrients, light and space resulting in the yield losses of 40- 60 per cent. Although manual weeding is effective, but nowadays labour are becoming increasingly scarce and expensive. Therefore, post-emergence herbicides act as an economically alternative approach for broad-spectrum weed control thereby improving crop growth and productivity.

Basal fertilizer application alone may not be sufficient to meet the crop nutrient demand during flowering and pod development, often leads to flower drop, poor pod setting and reduced yield. Foliar nutrition at critical growth stages enhances nutrient use efficiency, maintains photosynthetic activity, improves nutrient uptake and ultimately contributes to better growth, yield and grain quality. Therefore, integrating effective post-emergence herbicides with suitable foliar nutrition offers a promising strategy to enhance the weed control, nutrient uptake, productivity and quality of greengram.

Materials and Methods

The field experiment entitled "Effect of Post-emergence Herbicides and Foliar Nutrition on Weed Control, Productivity and Quality of Greengram" was conducted during *Kharif* 2025 at the College

of Agriculture, Navile, Shivamogga, Karnataka. The experiment was laid out in a Factorial Randomized Complete Block Design (FRCBD) with 12 treatment combinations comprising of four weed management practices and three foliar nutrition treatments, which is replicated three times. The weed management treatments include, Weedy check (W_1), Weed free (W_2), Propaquizafop 2.50% + Imazethapyr 3.75% @ 125 g ha⁻¹ (W_3), and Fomesafen 11.1% + Fluazifop-p-butyl 11.1% @ 220 g ha⁻¹ (W_4), were applied at 20 DAS, and foliar nutrition treatments consisting of DAP 2% (F_1), Pulse Booster 1% (F_2) and Pulse Magic 1% (F_3) were sprayed 10 days after flowering. Standard agronomic practices were followed throughout the crop growth period. Observations on weed parameters, growth, yield attributes, yield, and quality were recorded. The experimental data obtained were analysed using analysis of variance (ANOVA) for Factorial RCBD as described by Gomez and Gomez (1984) [5].

Results and Discussion

The experimental field was infested with a mixed weed flora, broad-leaved weeds like (*Trianthema portulacastrum*, *Parthenium hysterophorus*, *Commelina benghalensis* and *Portulaca oleracea*), grasses (*Digitaria spp.* and *Cynodon dactylon*) and sedges (*Cyperus rotundus* and *Cyperus esculentus*). A similar weed flora has also been reported in greengram (Dungarwal *et al.*, 2003) [4]. Weed density at 35 DAS significantly influenced by weed management practices (Table 1). The weed-free treatment (W_2) recorded the lowest density (0.71 weeds m⁻²), whereas the weedy check (W_1) recorded the highest (7.57 broad-leaved weeds, 7.82 grasses and 7.31 sedges m⁻²). Among the herbicidal treatment, Propaquizafop 2.50% + Imazethapyr 3.75% @ 125 g ha⁻¹ (W_3) recorded significantly lower density of broad-leaved weeds, grasses and sedges (2.48, 2.25 and 2.00 m⁻², respectively) than Fomesafen 11.1% + Fluazifop-p-butyl 11.1% @ 220 g ha⁻¹ (W_4) (3.36, 3.88 and 3.60 m⁻²). This might be attributed due to the complementary mode of action of propaquizafop and imazethapyr, while propaquizafop effectively control the grassy weeds through ACCase inhibition, Imazethapyr suppresses broad-leaved weeds and sedges by inhibiting the ALS enzyme, resulting in broad spectrum weed control (Khairnar *et al.*, 2014) [7]. While foliar nutrition and its interaction with weed management had no significant effect, since spraying was done at 10 days after flowering.

Weed management practices significantly influenced both weed control efficiency (WCE) and weed index (WI) (Table 2). The weed-free treatment (W_2) recorded 100% WCE along with the lowest weed index (2.99%), whereas the weedy check (W_1) registered the lowest WCE (7.49%) and the highest weed index (59.79%). Among the herbicidal treatments, Propaquizafop 2.50% + Imazethapyr 3.75% @ 125 g ha⁻¹ (W_3) proved more effective than Fomesafen 11.1% + Fluazifop-p-butyl 11.1% @ 220 g ha⁻¹ (W_4) by recording significantly higher WCE (87.58%) and a lower weed index (4.88%), compared with 84.43% and 6.38%, respectively (Table 2). This improved performance may be attributed due to rapid foliar uptake and residual activity of the herbicide combination, which provided sustained weed suppression during the crop's critical growth period (Suryavanshi *et al.*, 2018) [13].

Among the foliar nutrition treatments, Pulse Magic @ 1% (F_3) recorded the highest WCE (72.22%) and the lowest weed index (15.00%). Although foliar nutrition does not directly control weeds, improved crop nutrition likely enhanced crop vigour, improved nitrogen and phosphorous uptake balanced supply of macro and micronutrients along with plant growth regulator resulted in reduced weed index. (Al-Ziady *et al.*, 2021) [2]. The

interaction between weed management and foliar nutrition was non-significant for WCE but significant for weed index. Among the herbicidal combinations, W_3F_3 recorded the lowest weed index, whereas W_1F_1 recorded the highest (63.78%). The lower weed index under W_3F_3 can be attributed to the effective suppression of weeds by the post-emergence application of Propaquizafop + Imazethapyr at 20 DAS, which reduced crop-weed competition during the early growth stages. The subsequent application of Pulse Magic @ 1% at 10 days after flowering further improved crop growth by supplying phosphorus, potassium, micronutrients and growth-promoting substances during the reproductive stage, when nutrient demand is high. This combination enabled the crop to utilize available resources more efficiently, resulting in higher seed yield and a weed index comparable to the weed-free treatment (Rajarithnam *et al.*, 2025) [9].

Weed management practices significantly influenced pods per plant, pod length, seeds per pod and 100-seed weight (Table 4). The weed-free treatment (W_2) recorded the highest values for pods per plant (27.07), pod length (10.00 cm), seeds per pod (11.38) and 100-seed weight (6.34 g), which is statistically on par with W_3 (26.31, 9.81 cm, 11.01 and 6.08 g, respectively). Both treatments were significantly superior to W_4 and W_1 . This improvement might be attributed due to reduced crop-weed competition during the reproductive stage, resulting in better flower retention, pod set and improved source-sink relationships (Ali *et al.*, 2013) [11]. Among the foliar nutrition treatments, Pulse Magic @ 1% (F_3) recorded significantly higher values for all yield attributes, including pods per plant (24.46), pod length (9.71 cm), seeds per pod (11.08) and 100-seed weight (5.79 g), followed by Pulse Booster @ 1% (F_2) and DAP @ 2% (F_1). The improvement under Pulse Magic may be due to an adequate supply of phosphorus during flowering, which enhanced pollen viability and fertilization, thereby improving pod and seed development (Venkatesh and Basu, 2011) [15].

The interaction effect was significant for pods per plant, pod length and seeds per pod. The combination W_2F_3 recorded the highest values and remained statistically on par with W_3F_3 . This response might be attributed to the combined effect of effective weed control and timely foliar nutrition, which improved assimilate partitioning towards pod and seed development (Rajarithnam *et al.*, 2025) [9]. Weed management practices significantly influenced seed yield and haulm yield (Table 5). The weed-free treatment (W_2) recorded the highest seed yield (1340 kg ha⁻¹), haulm yield (1553 kg ha⁻¹) and protein content (22.56%), and which is statistically on par with W_3 (1314 and 1550 kg ha⁻¹; 21.31%, respectively). Both treatments were significantly superior to W_4 and W_1 , with the weedy check recording nearly 59% lower seed yield. The higher productivity under W_2 and W_3 may be attributed to effective weed control, which reduced competition for moisture, nutrients and light, resulting in better translocation of photosynthates to developing pods and seeds. Improved nitrogen availability under reduced weed competition also contributed to higher seed protein content (Verma and Kushwaha, 2019) [16]. Among the foliar nutrition treatments, Pulse Magic @ 1% (F_3) recorded significantly higher seed yield (1174 kg ha⁻¹) and haulm yield (1412 kg ha⁻¹) than DAP @ 2% (F_1). The improvement may be due to rapid absorption of foliar-applied nutrients and their efficient translocation to developing pods. The balanced supply of macro and micronutrients, together with phosphorus and plant growth regulators in Pulse Magic, enhanced pod filling, seed development and protein synthesis (Venkatesh and Basu, 2011) [15]. The interaction effect was significant for seed and haulm yield, with W_2F_3 recording the

highest values (1382 and 1583 kg ha⁻¹), followed closely by W₃F₃ (1337.66 and 1560.33 kg ha⁻¹), while W₁F₁ recorded the lowest yields (500 and 804 kg ha⁻¹). The higher yield under W₂F₃ and W₃F₃ may be attributed to the combined effect of effective weed suppression and balanced foliar nutrition, which improved source-sink relationships and seed filling (Al-Ziady *et al.*, 2021) [2].

Among the weed management practices, the weed-free treatment (W₂) recorded the highest gross returns (₹95,368 ha⁻¹). However, W₃, recorded the highest net returns (₹57,538 ha⁻¹) and B:C ratio (2.60), followed by W₄ (₹55,701 ha⁻¹ and 2.53), while the lowest returns were recorded under W₁ (₹4,524 ha⁻¹ and 1.13) (Table 6). The higher profitability of W₃ might be attributed to lower labour and cultivation costs associated with a single herbicide

application, while maintaining yields comparable to the weed-free treatment (Rajarithnam *et al.*, 2025) [9]. Among the foliar nutrition treatments, Pulse Magic @ 1% (F₃) recorded the highest net returns (₹44,557 ha⁻¹) and B: C ratio (2.14), compared with DAP @ 2% (F₁) (₹38,940 ha⁻¹ and 2.02, respectively). This may be due to the greater yield response obtained with Pulse Magic, resulting in improved economic efficiency (Muthal *et al.*, 2016) [8]. The interaction effect was significant, with W₃F₃ recording the highest net returns (₹58,896 ha⁻¹) and B: C ratio (2.62) among all treatment combinations. This could be attributed to the combined advantage of an effective, low-cost herbicide and balanced foliar nutrition, which maximized yield while minimizing production costs (Rajarithnam *et al.*, 2025) [9].

Table 1: Weed density of BLW, Grasses and Sedges at 35 DAS as influenced by the application of post emergent herbicides and foliar nutrition on greengram

Treatments	Weed density(no. m ⁻²)		
	BLW	Grasses	Sedges
W: Weed Management			
W ₁ - Weedy Check	7.57*(56.89)	7.82 (60.77)	7.31 (53.00)
W ₂ - Weed free	0.70 (0.00)	0.70 (0.00)	0.70 (0.00)
W ₃ - Propaquizafop 2.50% + Imazethapyr 3.75% @ 125 g ha ⁻¹ at 20 DAS	2.48 (5.67)	2.25 (4.55)	2.00 (3.51)
W ₄ - Fomesafen 11.1% + Fluazifop-p-butyl 11.1% @ 220 g ha ⁻¹ at 20 DAS	3.36 (10.80)	3.88 (14.59)	3.60 (12.44)
S. Em. (±)	0.92	1.24	1.09
C.D at 5%	2.69	3.65	3.20
F: Foliar application			
F ₁ : DAP @ 2% at 10 days after flowering	4.41 (18.96)	4.70 (21.58)	4.34 (18.30)
F ₂ : Pulse booster @ 1% 10 days after flowering	4.39 (18.71)	4.58 (20.52)	4.24 (17.50)
F ₃ : Pulse magic @ 1% 10 days after flowering	4.23 (17.35)	4.28 (17.83)	4.05 (15.92)
S. Em. (±)	0.80	1.11	0.94
C.D at 5%	NS	NS	NS
Interaction (WxF)			
W ₁ F ₁	7.84 (61.00)	8.09 (65.00)	7.51 (56.00)
W ₁ F ₂	7.56 (56.66)	7.94 (62.66)	7.33 (53.33)
W ₁ F ₃	7.31 (53.00)	7.50 (54.66)	7.10 (49.66)
W ₂ F ₁	0.70 (0.00)	0.70 (0.00)	0.70 (0.00)
W ₂ F ₂	0.70 (0.00)	0.70 (0.00)	0.70 (0.00)
W ₂ F ₃	0.70 (0.00)	0.70 (0.00)	0.70 (0.00)
W ₃ F ₁	2.35 (5.00)	2.48 (5.66)	2.24 (4.53)
W ₃ F ₂	2.61 (6.33)	2.27 (4.67)	1.95 (3.32)
W ₃ F ₃	2.48 (5.66)	1.96 (3.33)	1.78 (2.68)
W ₄ F ₁	3.21 (9.83)	4.01 (15.66)	3.63 (12.66)
W ₄ F ₂	3.61 (12.50)	3.91 (14.78)	3.72 (13.33)
W ₄ F ₃	3.25 (10.06)	3.72 (13.34)	3.43 (11.33)
S. Em. (±)	1.59	2.15	1.88
C.D at 5%	NS	NS	NS

Note: DAS – Days after sowing; BLW- Broad leaf weeds; NS – Non-significant

* - Transformed values ($\sqrt{x + 0.5}$), figures in the parentheses indicate original values

Table 2: Weed control efficiency and Weed index as influenced by the application of post emergent herbicides and foliar nutrition on greengram.

Treatments	WCE (%)	WI (%)
W: Weed Management		
W ₁ - Weedy Check	7.49	59.79
W ₂ - Weed free	100	2.99
W ₃ - Propaquizafop 2.50% + Imazethapyr 3.75% @ 125 g ha ⁻¹ at 20 DAS	87.58	4.88
W ₄ - Fomesafen 11.1% + Fluazifop-p-butyl 11.1% @ 220 g ha ⁻¹ at 20 DAS	84.43	6.38
S. Em. (±)	1.17	0.82
C.D at 5%	54.19	2.39
F: Foliar application		
F ₁ : DAP @ 2% at 10 days after flowering	67.76	21.70
F ₂ : Pulse booster @ 1% 10 days after flowering	69.62	18.83
F ₃ : Pulse magic @ 1% 10 days after flowering	72.22	15.00
S. Em. (±)	1.53	0.71
C.D at 5%	NS	2.07
Interaction (W x F)		

W ₁ F ₁	0.00	63.78
W ₁ F ₂	6.63	62.92
W ₁ F ₃	15.81	52.65
W ₂ F ₁	100.00	5.87
W ₂ F ₂	100.00	3.09
W ₂ F ₃	100.00	0.00
W ₃ F ₁	87.00	7.04
W ₃ F ₂	87.32	4.41
W ₃ F ₃	88.42	3.19
W ₄ F ₁	84.13	10.09
W ₄ F ₂	84.49	4.87
W ₄ F ₃	84.66	4.17
S. Em. (±)	3.06	1.41
C.D at 5%	NS	4.14

Note: DAS – Days after sowing; NS – Non- significant

Table 4: Yield parameters as influenced by the application of post emergent herbicides and foliar nutrition on greengram.

Treatments	Number of pods per plant	Pod length (cm)	Number of seeds per pod	100 Seed weight (g)
W: Weed Management				
W ₁ - Weedy Check	14.08	7.89	7.33	4.02
W ₂ - Weed free	27.07	10.00	11.38	6.34
W ₃ - Propaquizafop 2.50% + Imazethapyr 3.75% @ 125 g ha ⁻¹ at 20 DAS	26.31	9.81	11.01	6.08
W ₄ - Fomesafen 11.1% + Fluazifop-p-butyl 11.1% @ 220 g ha ⁻¹ at 20 DAS	24.96	9.41	10.80	5.81
S. Em. (±)	0.30	0.08	0.17	0.11
C.D at 5%	0.87	0.23	0.51	0.34
F: Foliar application				
F ₁ : DAP @ 2% at 10 days after flowering	22.07	8.90	8.95	5.37
F ₂ : Pulse booster @ 1% 10 days after flowering	22.78	9.23	10.36	5.53
F ₃ : Pulse magic @ 1% 10 days after flowering	24.46	9.71	11.08	5.79
S. Em. (±)	0.26	0.06	0.15	0.10
C.D at 5%	0.75	0.19	0.44	0.29
Interaction (W x F)				
W ₁ F ₁	13.90	7.13	6.78	3.76
W ₁ F ₂	14.06	8.06	7.39	3.96
W ₁ F ₃	14.26	8.46	7.81	4.33
W ₂ F ₁	25.53	9.80	10.00	6.20
W ₂ F ₂	27.20	9.90	11.31	6.36
W ₂ F ₃	28.46	10.30	12.85	6.46
W ₃ F ₁	25.33	9.56	9.58	5.86
W ₃ F ₂	25.86	9.70	11.33	6.03
W ₃ F ₃	27.73	10.16	12.11	6.33
W ₄ F ₁	23.50	9.10	9.45	5.63
W ₄ F ₂	24.00	9.23	11.40	5.76
W ₄ F ₃	27.36	9.90	11.54	6.03
S. Em. (±)	0.51	0.12	0.29	0.19
C.D at 5%	1.50	0.37	0.87	NS

Note: DAS – Days after sowing; NS – Non-significant

Table 5: Seed yield and Halum yield of greengram as influenced by the application of post emergent herbicides and foliar nutrition

Treatments	Seed yield (kg ha ⁻¹)	Halum yield (kg ha ⁻¹)
W: Weed Management		
W ₁ - Weedy Check	555.00	865.00
W ₂ - Weed free	1340.00	1553.00
W ₃ - Propaquizafop 2.50% + Imazethapyr 3.75% @ 125 g ha ⁻¹ at 20 DAS	1314.00	1550.00
W ₄ - Fomesafen 11.1% + Fluazifop-p-butyl 11.1% @ 220 g ha ⁻¹ at 20 DAS	1293.00	1453.00
S. Em. (±)	11.09	23.07
C.D at 5%	33.21	67.65
F: Foliar application		
F ₁ : DAP @ 2% at 10 days after flowering	1081.00	1248.00
F ₂ : Pulse booster @ 1% 10 days after flowering	1121.00	1367.00
F ₃ : Pulse magic @ 1% 10 days after flowering	1174.00	1412.00
S. Em. (±)	9.81	19.98
C.D at 5%	28.76	58.59
W ₁ F ₁	500.00	804.00
W ₁ F ₂	512.00	831.00
W ₁ F ₃	654.00	958.00

W ₂ F ₁	1300.00	1523.00
W ₂ F ₂	1338.00	1551.00
W ₂ F ₃	1382.00	1583.00
W ₃ F ₁	1284.33	1399.00
W ₃ F ₂	1320.00	1542.00
W ₃ F ₃	1337.00	1560.00
W ₄ F ₁	1242.00	1465.00
W ₄ F ₂	1314.00	1544.00

Note: DAS – Days after sowing; NS – Non-significant

Table 6: Economics of greengram as influenced by the application of post emergent herbicides and foliar nutrition

Treatments	COC (₹ ha ⁻¹)	Gross return (₹ ha ⁻¹)	Net return (₹ ha ⁻¹)	B:C
W: Weed Management				
W ₁ - Weedy Check	35,229	39,753	4,524	1.13
W ₂ - Weed free	47,310	95,368	48,057	2.02
W ₃ - Propaquizafop 2.50% + Imazethapyr 3.75% @ 125 g ha ⁻¹ at 20 DAS	35,957	93,496	57,538	2.60
W ₄ - Fomesafen 11.1% + Fluazifop-p-butyl 11.1% @ 220 g ha ⁻¹ at 20 DAS	36,292	91,994	55,701	2.53
S. Em. (±)	-	782.33	615.64	-
C.D at 5%	-	2294.51	1805.60	-
F: Foliar application				
F ₁ : DAP @ 2% at 10 days after flowering	38,023	76,965	38,940	2.02
F ₂ : Pulse booster @ 1% 10 days after flowering	39,004	79,872	40,867	2.05
F ₃ : Pulse magic @ 1% 10 days after flowering	39,064	83,622	44,557	2.14
S. Em. (±)	-	677.52	533.16	-
C.D at 5%	-	1987.10	1563.69	-
Interaction (W x F)				
W ₁ F ₁	34,431	35,827	1,396	1.04
W ₁ F ₂	35,640	36,695	1,010	1.03
W ₁ F ₃	35,654	46,738	11,084	1.31
W ₂ F ₁	46,674	92,524	45,850	1.98
W ₂ F ₂	47,604	95,258	47,654	2.00
W ₂ F ₃	47,654	98,323	50,669	2.06
W ₃ F ₁	35,321	91,303	55,982	2.58
W ₃ F ₂	36,251	93,989	57,737	2.59
W ₃ F ₃	36,301	95,197	58,896	2.62
W ₄ F ₁	35,669	88,205	52,536	2.47
W ₄ F ₂	36,559	93,548	56,989	2.55
W ₄ F ₃	36,649	94,229	57,580	2.57
S. Em. (±)	-	1355.04	1066.31	-
C.D at 5%	-	3974.20	3127.38	-

Note: DAS – Days after sowing

Conclusion

The present study demonstrated that application of Propaquizafop 2.50% + Imazethapyr 3.75% @ 125 g ha⁻¹ at 20 DAS followed by Pulse Magic @ 1% applied 10 days after flowering (W₃F₃) significantly improved growth, yield attributes, seed yield, haulm yield and benefit: cost ratio compared with the weedy check. Although the weed-free treatment combined with Pulse Magic (W₂F₃) recorded the highest seed and haulm yields, it remained statistically on par with W₃F₃, which recorded the highest net returns and B: C ratio among all treatment combinations. Therefore, Propaquizafop 2.50% + Imazethapyr 3.75% @ 125 g ha⁻¹ at 20 DAS followed by Pulse Magic @ 1% sprayed 10 days after flowering can be recommended as an effective, economical and labour-saving weed management strategy for enhancing the productivity and profitability of rainfed greengram.

References

- Ali S, Patel JC, Desai LJ, Singh J. Weed control in Kharif greengram (*Vigna radiata* L. Wilczek). Bioinfolet. 2013;10(2):458-461.
- Al-Ziady SHA, Hassan DS, Al-Mashhadani ASA. Interaction of foliar nutrients and herbicides into production. Iraqi Journal of Agricultural Sciences. 2021;52(5):1225-1237.
- Department of Agriculture, Cooperation and Farmers Welfare. Unified Portal for Agricultural Statistics (UPAg): area, production and productivity statistics 2025-26. 2025.
- Dungarwal HS, Chaplot PC, Nagda BL. Chemical weed control in mungbean (*Phaseolus radiatus* L.). Indian Journal of Weed Science. 2003;35:283-284.
- Gomez KA, Gomez AA. Statistical procedures for agricultural research. New York: John Wiley and Sons; 1984.
- Guru SK. Efficacy of some pre and post-emergence herbicides for weed management and their effects on yield and yield attributes in rainy season greengram (*Vigna radiata* L.). International Journal of Environment and Climate Change. 2024;14(7):308-315.
- Khairnar CB, Goud JV, Sethi HN. Pre and post emergence herbicides for weed management in mungbean. Indian Journal of Weed Science. 2014;46:392-395.
- Muthal YC, Deshmukh SL, Sagvekar VV, Shinde JB. Effect of foliar application of macronutrient and micronutrients on yield attributes, yield and economics of Kharif greengram (*Vigna radiata* L.). International Journal of Tropical Agriculture. 2016;34(7):2143-2148.
- Rajaratnam P, Subrahmaniyan K, Mathiyazhagan S,

- Manimaran R, Elamathi S, Dhandapani M, *et al.* Effect of seed inoculation, weed management and foliar nutrition in rice fallow blackgram for higher productivity in Cauvery Delta Zone of Tamil Nadu. *Legume Research*. 2025;48(3):474-479.
10. Rani BP, Venkateswarlu E. Evaluation of pre and post emergence herbicides in greengram (*Vigna radiata* L.) during Kharif and Rabi seasons in the uplands of Krishna zone of Andhra Pradesh. *Indian Journal of Agricultural Research*. 2022;56(3):290-296.
 11. Singh G, Kaur H, Aggarwal N, Sharma P. Effect of herbicides on weeds growth and yield of greengram. *Indian Journal of Weed Science*. 2015;47(1):38-42.
 12. Sukumar J, Kunjammal P. Effect of pre and early post emergence herbicides weed control in greengram (*Vigna radiata* L.). *Madras Agricultural Journal*. 2020;107(1-3).
 13. Suryavanshi T, Kewat ML, Lal S, Porte SS. Weed indices as influenced by propaquizafop and imazethapyr mixture in blackgram. *International Journal of Current Microbiology and Applied Sciences*. 2018;7:738-744.
 14. Thakare SS, Deshmukh JP, Shingrup PV, Pawar PM, Ghlop AN. Efficacy of different new herbicides against weed flora in soybean (*Glycine max* L.). *Plant Archives*. 2015;15(1):217-220.
 15. Venkatesh MS, Basu PS. Effect of foliar application of urea on growth, yield and quality of chickpea under rainfed conditions. *Journal of Food Legumes*. 2011;24(2):110-112.
 16. Verma L, Kushwaha HS. Evaluation of different herbicides against weeds in mungbean (*Vigna radiata* L.). *Legume Research*. 2020;43(6):866-871.