

Response of green gram under different weed management practices

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ABSTRACT

A field experiment was conducted at Anbil Dharmalingam Agricultural College and Research Institute, Tiruchirappalli during *summer*, 2021 to evaluate the performance of different weed management practices in green gram. The study comprised of eleven weed management practices with different combination *viz.*, pre emergence, post emergence and hand weeding were tested. Total weed density, weed dry weight, weed control efficiency and yield of green gram were recorded. The results revealed that the lowest total weed density, total weed dry weight, higher weed control efficiency, grain and haulm yields were registered in application of PE Pendimethalin+ Imazethapyr 1 kg/ha *fb* POE Fluazifop-p-butyl +Fomesafen 313 g/ha and it was followed by PE Pendimethalin + Imazethapyr 1 kg/ha *fb* POE Acifluorfen sodium + Clodinofof propargyl 187.5 g/ha.

Key words: Green gram, Herbicides, Weed control efficiency, Weed management, Yield.

Introduction

Pulses are rich source of protein which comes under legume family. Green gram is one of the major pulse crop grown in rainy season. However, early maturing varieties are cultivated on spring and summer season. India stands third position in production of green gram after chickpea and pigeon pea. In India, green gram is grown in an area of 4.7 m.ha with a production of 2.4 mt and an average productivity of 516 kg/ha (Indiastat, 2019). Weed infestation is one of the major constraint in green gram production as it competes with crops for nutrient, light, water and space. Potential yield loss in green gram due to weed infestation was around 30-80 per cent (Algotar *et al.*, 2015).

The critical period of weed competition in green gram was reported as two to four weeks after sow-

ing (Utomo, 1988). Weeds impose major problem during initial growth period, because the early emerging weeds are more competitive than late emerging weeds (Rajib Kundu *et al.*, 2011). Effective weed management practices could be adopted to develop weed free environmental condition in green gram cultivation. Commonly used weed control methods are manual and cultural, due to non-availability of labour and increase in labour wages have made the farmers to look for alternate method of weed control practices.

One of the best choice for controlling weeds is through application of herbicides at appropriate level and it is an economically viable option. These herbicides are controlling weeds in very broad spectrum with appropriate application and it greatly reduces the chemical load in the environment (Ramesh and Rathika, 2015). The combination of pre

and post emergence herbicide formulations helps to manage weed flora in green gram. Hence, the present investigation was carried out to find out suitable weed management practices on weed control and productivity of green gram.

Materials and Methods

A field experiment was conducted at Anbil Dharmalingam Agricultural College and Research Institute, Tiruchirappalli, Tamil Nadu during Summer, 2021. The experimental field was located at 10° 45' N latitude, 78°36' E longitude and at an altitude of 85 m above MSL. The soil of the experimental field was sandy clay loam in texture, classified as *Vetric Ustrophept* with pH 8.9 and EC 0.45 dS/m. The experimental soil was low in available nitrogen, medium in available phosphorus and high in available potassium.

The field experiment was laid out in randomized block design (RBD) with three replications and eleven treatments. The treatments comprised of pre emergence (PE) application of Diclosulam at 17.5 g/ha, Pendimethalin + Imazethapyr 1 kg/ha, post emergence (POE) application of Fluazifop-p-butyl + Fomesafen 313 g/ha, Acifluorfen sodium + Clodinofof propargyl 187.5 g/ha, PE Diclosulam 17.5 g/ha *fb* POE Fluazifop-p-butyl + Fomesafen 313 g/ha, PE Pendimethalin + Imazethapyr 1 kg/ha *fb* POE Fluazifop-p-butyl + Fomesafen 313 g/ha, PE Diclosulam 17.5 g/ha *fb* POE Acifluorfen sodium + Clodinofof propargyl 187.5 g/ha, PE Pendimethalin + Imazethapyr 1 kg/ha *fb* POE Acifluorfen sodium + Clodinofof propargyl 187.5 g/ha, PE Pendimethalin 1 kg/ha *fb* HW on 30 DAS; HW on 20 and 40 DAS and unweeded control (UWC). The variety used for the experiment was VBN 4.

Total weed density and weed dry weight were recorded at 15, 30 and 45 days after sowing (DAS) by adopting standard procedure. Weed control efficiency of each treatment was worked out on the basis of weed dry matter using the formula suggested by Mani *et al.* (1973). At harvest stage, the grain and haulm yields were recorded. All the recorded data were analyzed statistically as per the method suggested by Gomez and Gomez (1984).

Results and Discussion

Effect on weed flora

Weed flora in the experimental field was composite

in nature comprising of grasses, sedges and broad leaved weeds (BLW). The dominant weed species found in that field were *Cynodon dactylon*, *Echinochloa colona*, *Chloris barbata*, *Dactyloctenium aegyptium* in grasses and *Cyperus iria*, *Cyperus roduntus* in sedges and *Trianthema portulacastrum*, *Alternanthera sessilis* among broad leaved weeds. Similar observation was also reported by Ramesh and Rathika (2020) and Srijani Maji *et al.* (2020).

Effect on total weed density and total weed dry weight

Adoption of different weed management practices significantly influenced the total weed density and dry weight (Table 1). Among the different weed management practices, at 15 DAS the lowest total weed density and dry weight were recorded in PE application of Pendimethalin + Imazethapyr 1 kg/ha which was comparable with PE Pendimethalin + Imazethapyr 1 kg/ha *fb* POE Fluazifop-p-butyl + Fomesafen 313 g/ha, PE Pendimethalin + Imazethapyr 1 kg/ha *fb* POE Acifluorfen sodium + Clodinofof propargyl 187.5 g/ha and it was followed by PE Pendimethalin 1 kg/ha *fb* HW on 30 DAS. This might be due to ready mix application of compatible herbicides with varying mode of action will effectively control weed density and weed dry weight. This is in agreement with the findings of Banerjee *et al.* (2018).

At 30 DAS, PE Pendimethalin + Imazethapyr 1 kg/ha *fb* POE Fluazifop-p-butyl + Fomesafen 313 g/ha registered lower total weed density and dry weight and it was on par with PE Pendimethalin + Imazethapyr 1 kg/ha *fb* POE Acifluorfen sodium + Clodinofof propargyl 187.5 g/ha. This might be due to combined application of pre emergence followed by post emergence herbicides which reduced the weed population and dry biomass accumulation of grasses, sedges and BLW. This is in line with the findings of Mansoori *et al.* (2015).

At 45 DAS, the lowest total weed density and dry weight were noticed in application of PE Pendimethalin + Imazethapyr 1 kg/ha *fb* POE Fluazifop-p-butyl + Fomesafen 313 g/ha and it was on par with PE Pendimethalin + Imazethapyr 1 kg/ha *fb* POE Acifluorfen sodium + Clodinofof propargyl 187.5 g/ha. This might be due to sequential application of two herbicides which could be effective for controlling the weeds at right time. These results are in conformity with the findings of Dinesh Jinger *et al.* (2016).

Table 1. Effect of weed management practices on total weed density, total weed dry weight and weed control efficiency in green gram

Treatments	Total weed density (No./m ²)			Total weed dry weight (g/m ²)			Weed control efficiency (%)		
	15DAS	30DAS	45DAS	15DAS	30DAS	45DAS	15 DAS	30 DAS	45 DAS
T ₁ - PE Diclosulam 17.5 g /ha (18.16)	4.32 (40.20)	6.38 (66.41)	8.18 (13.49)	3.74 (33.72)	5.85 (47.39)	6.92	64.0	58.0	55.2
T ₂ - PE Pendimethalin + Imazethapyr 1 kg /ha	2.80 (7.34)	5.17 (26.23)	6.67 (43.99)	2.70 (6.79)	4.87 (23.22)	5.76 (32.67)	96.5	71.1	69.5
T ₃ - POE Fluazifop-p-butyl + Fomesafen 313 g /ha (44.79)	6.73 (29.86)	5.51 (51.20)	7.19 (25.82)	5.13 (26.54)	5.20 (36.22)	6.06	45.7	67.0	65.8
T ₄ - POE Acifluorfen sodium + Clodinofofop propargyl 187.5 g /ha	6.99 (48.36)	5.94 (34.78)	7.68 (58.48)	5.41 (28.77)	5.49 (29.64)	6.42 (40.72)	37.8	63.1	61.5
T ₅ - PE Diclosulam 17.5 g /ha fb POE 313 g /ha Fluazifop-p-butyl + Fomesafen	4.62 (20.84)	4.27 (17.73)	5.02 (24.70)	3.95 (15.10)	3.72 (13.34)	4.91 (23.61)	74.3	83.4	77.7
T ₆ - PE Pendimethalin + Imazethapyr 1 kg /ha fb POE Fluazifop-p-butyl + Fomesafen 313 g /ha	3.19 (9.68)	2.91 (7.97)	3.38 (10.92)	2.89 (7.85)	2.10 (3.91)	3.13 (9.30)	93.6	95.1	91.2
T ₇ - PE Diclosulam 17.5 g /ha fb POE Acifluorfen sodium + Clodinofofop propargyl 187.5 g /ha	4.74 (21.97)	4.68 (21.40)	5.39 (28.55)	4.09 (16.23)	4.07 (16.06)	5.24 (26.96)	71.3	80.0	74.5
T ₈ - PE Pendimethalin + Imazethapyr 1 kg /ha fb POE Acifluorfen sodium + Clodinofofop propargyl 187.5 g /ha	3.23 (9.93)	3.16 (9.50)	3.82 (14.09)	3.05 (8.80)	2.49 (5.70)	3.62 (12.60)	91.1	92.9	87.9
T ₉ - PE Pendimethalin 1 kg /ha fb HW on 30 DAS (15.02)	3.94 (14.55)	3.88 (21.31)	4.67 (10.66)	3.34 (10.26)	3.28 (19.12)	4.43	86.2	87.2	81.9
T ₁₀ - Hand weeding on 20 and 40 DAS	7.11 (50.05)	3.74 (13.49)	4.21 (17.22)	5.79 (33.02)	3.07 (8.92)	4.03 (15.74)	26.4	88.9	85.1
T ₁₁ - Unweeded control	7.46 (55.15)	8.42 (70.40)	10.16 (102.73)	6.16 (37.45)	8.99 (80.32)	10.31 (105.80)	-	-	-
CD (P=0.05)	0.44	0.46	0.52	0.38	0.40	0.51	-	-	-

Figure in the parenthesis are original value

At all stages of observation UWC registered higher total weed density and dry weight. This is in accordance with the findings of Poornima *et al.* (2018).

Effect on weed control efficiency

Adoption of different weed management practices had marked influences on weed control efficiency (Table 1). At 15 DAS, highest weed control efficiency (96.5 per cent) was recorded in PE application of Pendimethalin + Imazethapyr 1 kg/ha. At 30 DAS and 45 DAS higher weed control efficiency (95.1 per cent and 91.2 per cent) were recorded in PE Pendimethalin + Imazethapyr 1 kg/ha fb POE Fluazifop-p-butyl + Fomesafen 313 g/ha. The results revealed that application of pre emergence herbicide along with post emergence herbicide enhanced the weed control efficiency due to lower weed dry weight. This is in conformity with the findings of Nagendar *et al.* (2016) and Ramesh and Rathika (2016).

Effect on green gram

Effect on grain yield and haulm yield

Grain yield and haulm yields were significantly influenced by different weed management practices (Table 2). The highest grain and haulm yields (708 and 1602 kg/ha) were recorded by PE application of Pendimethalin + Imazethapyr 1 kg/ha fb POE Fluazifop-p-butyl + Fomesafen 313 g/ha and it was on par with PE Pendimethalin + Imazethapyr 1 kg/ha fb POE Acifluorfen sodium + Clodinofofop propargyl 187.5 g/ha (673 and 1531 kg/ha). This might be due to the cumula-

Table 2. Effect of weed management practices on grain and haulm yields in green gram

Treatments	Grain yield (kg/ha)	Haulm yield (kg/ha)
T ₁ - PE Diclosulam 17.5 g/ha	313	812
T ₂ - PE Pendimethalin + Imazethapyr 1 kg/ha	377	1047
T ₃ - POE Fluazifop-p-butyl + Fomesafen 313 g/ha	345	982
T ₄ - POE Acifluorfen sodium + Clodinofof propargyl 187.5 g/ha	332	885
T ₅ - PE Diclosulam 17.5 g/ha <i>fb</i> POE Fluazifop-p-butyl + Fomesafen 313 g/ha	445	1421
T ₆ - PE Pendimethalin + Imazethapyr 1 kg/ha <i>fb</i> POE Fluazifop-p-butyl + Fomesafen 313 g/ha	708	1602
T ₇ - PE Diclosulam 17.5 g/ha <i>fb</i> POE Acifluorfen sodium + Clodinofof propargyl 187.5 g/ha	411	1378
T ₈ - PE Pendimethalin + Imazethapyr 1 kg/ha <i>fb</i> POE Acifluorfen sodium + Clodinofof propargyl 187.5 g/ha	673	1531
T ₉ - PE Pendimethalin 1kg/ha <i>fb</i> HW on 30 DAS	544	1464
T ₁₀ - Hand weeding on 20 and 40 DAS	645	1502
T ₁₁ - Unweeded control	281	745
CD (P=0.05)	41	108

tive effect of increased levels of yield attributes which was due to lesser weed competition at critical stages and good crop stand. These results were in line with Ramesh and Rathika (2020).

Conclusion

From this field experiment, it could be concluded that pre emergence application of Pendimethalin + Imazethapyr 1 kg/ha *fb* post emergence application of Fluazifop-p-butyl + Fomesafen 313 g/ha was found to be better in controlling the weeds and increased yield in green gram.

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