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Studies on the effect of pre and post emergence herbicides on yield attributes and yield of irrigated greengram

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Abstract

To assess the effectiveness of several pre and post emergence herbicides on weeds and the productivity of greengram under irrigated conditions, a field experiment was carried out in the Vadapalai village, Villupuram district, from July to September 2021. The experimental field's weed spectrum was divided into three categories, including grasses, sedges, and broad-leaved weeds. The main sedge was *Cyperus rotundus*, while the grass weeds were *Cyanodon dactylon*, *Echinochloa colona*, and *Dactyloctenium aegyptium*. *Cleome viscosa*, *Trianthema portulacastrum*, and *Phyllanthus niruri* were among the broad-leaved weeds. The maximum yield of irrigated greengram were recorded after the application of Pendimethalin at 1 kg a.i. ha^{-1} on 3 DAS and Imazethapyr at 70 g a.i. ha^{-1} on 20 DAS due to increased yield attributes like maximum number of pods, number of seeds per pod which is due to decreased weed growth and weed population.

Key words : Weeds, Greengram, Pre emergence, Yield attributes, Yield.

Greengram scientifically known as *Vigna radiata* is a plant species in the legume family and is commonly called mung bean and moong in India. India is its primary origin and is mainly cultivated in East Asia, Southeast Asia and the Indian subcontinent. It is the third most important pulse crop in India grown in nearly 16 per cent of the total pulse area of the country. It contains protein rich seed with 20-25 per cent protein and sometimes plants are cut and ploughed into the soil to enrich soil nitrogen. According to the Government of India's 3rd advance estimates, greengram production in 2020-21 is at 2.64 million tonnes. Weed management is an important factor for enhancing the productivity of greengram as weeds compete for nutrients, water, light and space with the crop during the early growth period. Yield

losses in greengram due to weeds have been estimated to range between 30-50 per cent[5]. Weeds compete with crops for resources such as NPK, water, sunlight and space, thus reducing their yield. Naturally hardier and more competitive, they cause significant yield losses if not controlled properly. A judicious combination of chemical and cultural methods of weed control would not only reduce the expenditure on herbicides but would benefit the crop by providing proper aeration and conservation of moisture[8].

The present study entitled, "Efficacy of pre and post emergence herbicide for weed control in greengram" under irrigated conditions was carried out from July – September, 2021 at a farmer's field in Vadapalai village, Villupuram District, Tamil Nadu.The field experiment was carried out at Vadapalai village, Villupuram District, Tamil Nadu. The experiment farm is geographically located at 12°28' North Latitude and 79° 33' East Longitude and with an altitude of 120.5 m above mean sea level. The soils of the experimental field were sandy loam. The field experiment was laid out in Randomized Block Design with three replications. The treatment comprised of Pendimethalin @ 1 kg a.i. ha^{-1} on 3 DAS (T_1), Pendimethalin @ 1 kg a.i. ha^{-1} on 3 DAS + Imazethapyr @ 70 g a.i. ha^{-1} on 20 DAS (T_2), Imazethapyr @ 50 g a.i.ha^{-1} on 20 DAS (T_3), Imazethapyr + Imazamox @ 70 g a.i. ha^{-1} on 20 DAS (T_4), Pendimethalin @ 1 kg a.i. ha^{-1} PE + 1 Hand weeding at 30 DAS (T_5), Sodium Acifluorfen 16.5% + Clodinafop-propargyl 8% EC @ 750 ml ha^{-1} on 20 DAS (T_6), Sodium Acifluorfen 16.5% + Clodinafop-propargyl 8% EC @ 1000 ml ha^{-1} on 20 DAS (T_7), Hand weeding twice at 15 and 30 DAS (T_8), Unweeded control (T_9).

Yield attributes :

Weed infestation is one of the major constraints in greengram cultivation and causes 50 to 90 per cent yield loss[4]. Competition with the weeds leads to 30 to 80 per cent reduction in grain yield of greengram during summer and *Kharif* seasons while 70-80 per cent during *Rabi* season respectively[2]. Herbicide treatments have resulted in a favourable environment in increased yield components like a number of pods $plant^{-1}$, seeds pod^{-1} and hundred seed weight.

Among the weed management practices, Pendimethalin @ 1 kg a.i. ha^{-1} on 3 DAS + Imazethapyr @ 70 g a.i. ha^{-1} on 20 DAS (T_2) recorded the highest yield attributes (Table-1). This might be due to the reduced competition for growth resources, which in turn increased the translocation of photosynthates to developing seeds. This might be due to the effective weed control throughout the crop season. These findings confirm the results of Reddy *et al*.[6] and Kumar *et al*.[9].

This was on par with Hand weeding twice at 15 and 30 DAS (T_8). The lowest number of pods $plant^{-1}$, number of seeds pod^{-1} was recorded in unweeded control (T_9). This clearly indicated the severe competition exerted by weeds on the crop in unweeded plots.

Yield :

Adoption of different weed management practices significantly influenced the grain and haulm yields of irrigated greengram. Among

Table 1. Number of pod plant^{-1}, Number of seeds pod^{-1}, Hundred seed weight (g), Grain yield (kg ha^{-1}) and Haulm yield (kg ha^{-1}) of irrigated greengram as influenced by weed management practices

Treatment Schedule	Number of pods plant^{-1}	Number of seeds pod^{-1}	Hundred seed weight (g)	Grain yield (kg ha^{-1})	Haulm yield (kg ha^{-1})
T_1 – Pendimethalin @ 1 kg a.i. ha^{-1} on 3 DAS	12.30	7.56	3.86	710	1067
T_2 – Pendimethalin @ 1 kg a.i. ha^{-1} on 3 DAS + Imazethapyr @ 70 g a.i. ha^{-1} on 20 DAS	18.10	9.66	4.01	980	1577
T_3 – Imazethapyr @ 50 g a.i. ha^{-1} on 20 DAS	10.65	6.77	3.82	646	896
T_4 – Imazethapyr + Imazamox @ 70 g a.i. ha^{-1} on 20 DAS	14.19	8.21	3.89	779	1209
T_5 – Pendimethalin @ 1 Kg a.i. ha^{-1} PE + 1 Hand weeding at 30 DAS	16.32	8.93	3.95	875	1408
T_6 – Sodium Acifluorfen 16.5% + Clodinafop-propargyl 8% EC @ 750 ml ha^{-1} on 20 DAS	9.07	5.94	3.79	572	761
T_7 – Sodium Acifluorfen 16.5% + Clodinafop-propargyl 8% EC @ 1000 ml ha^{-1} on 20 DAS	14.67	8.37	3.91	808	1256
T_8 – Hand weeding twice at 15 and 30 DAS	17.75	9.45	3.98	958	1542
T_9 - Unweeded control	7.01	5.03	3.76	493	617
SEm±	0.29	0.16	0.08	16.51	34.87
CD (P= 0.05)	0.88	0.48	NS	49.92	105.45

the different treatment combinations, Pendimethalin @ 1 kg a.i. ha^{-1} on 3 DAS + Imazethapyr @ 70 g a.i. ha^{-1} on 20 DAS (T_2) recorded the highest grain and haulm yield (Table-1). This might be due to reduced weeds and lesser competition at a critical stage of the crop which in turn favoured the crop to utilize the factors for growth and production and enhanced the well balanced source-sink capacities which are responsible for higher grain and haulm yield of irrigated greengram compared to all other treatments. These results were supported by Tamang *et al.*[12], Sobhana *et al.*[11], Sakthi *et al.*[10] and Reddy *et al.*[9].

This was on par with Hand weeding twice at 15 and 30 DAS (T_8). Unweeded control (T_9) showed the real picture of the aggressive nature of weeds on the growth of irrigated greengram. The lowest grain and haulm yield were recorded in this unweeded control (T_9). This was due to increased crop weed competition for different resources like light, moisture, space and nutrients. This is by the findings of Malliswari *et al.*[7], Tamang *et al.*,[12] and Agila *et al.*[1].

Based on the above findings, it is proved that the application of Pendimethalin

@ 1 kg a.i. ha^{-1} on 3 DAS + Imazethapyr @ 70 g a.i. ha^{-1} on 20 DAS (T_2) recorded the least weed population favouring high grain yield, haulm yield and yield attributes of greengram. It is also better at saving labour cost when compared to hand weeding twice and generated the highest benefit cost ratio. So, this weed management practice is considered to be the better recommendation to the farmers for improving the growth and yield of greengram against the weed flora.

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