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Effect of weed management on growth and yield of green gram (*Vigna radiate* L) under medium land situation of Manipur

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Abstract
Weeds are the main factors that have an adverse impact on mung bean growth, quality and yield in rainy seasons. As a short-duration crop, it faces intense competition from the early stages of growth to harvest. The critical period of crop weed competition in mung bean was the first 25-30 days, and if the weeds did not manage at this stage, they could reduce yields by 50-90%. Therefore, it is necessary to understand the best weed management strategies to achieve higher growth and yield. Progressive agricultural transformations in the field of intensive use of herbicides have gained status in recent years due to easy, affordable, timely and effective control of weeds. Consequently, taking into account the above information, the present study aims to evaluate the impact of different herbicide practices in mung beans to better manage herbs, increase productivity and maximize profitability. In the field laboratory study carried out during the *Kharif* season in 2023, different herbicides were used to control weeds in the mung bean. Nine treatments and three replications were tested using randomized block design. On field and in the laboratory, collected samples were determined for crop weed competition, yield attributes, yield. Among the treatment of weeds control, hand weeding at 20 and 35 DAS can achieve maximum weed control efficiency, number of pods per plant, number of pods per cluster, number of seeds per pod, yield of seeds, N,P,K uptake by crop at harvest followed by Oxyflurofen @ 150 g /ha (PE-2 DAS) + Hand weeding (35 DAS).

Keywords: Mung bean, herbicide, nutrient uptake, seed yield, weeds

Introduction
Pulses are playing an important role in Indian economy as well as socio-economic condition. Due to their high protein content (20–25%), pulses make up roughly 14% of the total amount of protein required for Indian diets. Although the Indian Council of Medical Research (ICMR) recommends that a minimum of 70 g/capita/day be consumed, only 35.8 g/person/day are really available (Chopra, 2018) [2]. Pulses are primarily planted as a crop, catch crop, cover crop, intercrop, and green manure crop that enhance soil fertility and fixes atmospheric nitrogen as well as improves soil fertility.

Mung bean (*Vigna radiate* L.) a short duration leguminous crop. Its cultivation is mainly confined in Rajasthan, Andhra Pradesh, Maharashtra, Tamil Nadu, Madhya Pradesh, Gujarat, Haryana and Bihar. It serves as very important source of protein, vitamins and minerals predominantly in developing countries. Mung bean contains about 51.6% carbohydrate, 26 to 27% protein, 4 to 5% minerals and 3 to 4% vitamins (Kaul, 1982) [10].

Weeds are ubiquitous in nature but their presence in cropped area especially in rainy season crops like green gram act as major limiting factor in achieving the potential yield. The dominating weed flora in green gram in rainy season comprises *Cynodon dactylonm, Cyperus rotundus, Echinochloa colona, Ecchinochloa crusgalli* etc. among monocot weeds and *Commelina bengahalensis, Parthenium hysterophorus* and *Trianthema portulacastrum* among dicot weeds (Kundu *et al*., 2009) [14].

One of the main causes of the notable yield drop in mung bean planted during the rainy season is weeds (Gupta *et al*., 1990) [8]. According to Choudhary *et al*. (2016) [4], heavy weed competition during the first 25–30 days (Raghvani *et al*., 1985) [19] can reduce yield by 50–90%, depending on the cultivars (spreading or erect type), weed flora and density, soil moisture level, soil types, and other environmental factors. Therefore, in order to achieve improved development and a higher yield, it is necessary to learn effective weed management techniques. The weed infestation can be controlled by mechanical methods such as hand weeding (HW) and intercultural operations, however the timely availability, labor expenses, and incessant rains many a times hampers the field operations (Nath *et al*., 2016) [17]. Due to their improved efficacy, affordability, and simplicity of application, herbicides have become increasingly important in agriculture in recent years (Butter *et al*., 2008) [1]. As a result, chemical weeding becomes essential in certain circumstances and is a viable substitute for hand weeding. Chemical weed management provides a weed-free environment for up to 30 to 35 days during the early growing stage, making it a great substitute for both mechanical and human weeding (Dungarwal *et al*., 2003; Das and Yaduraju, 2011) [6, 5]. Therefore, keeping above facts in view, the present study was undertaken to assess the effect of weed management on growth and yield of green gram under medium land situation of Manipur in rainy season with better efficacy, higher productivity and profitability margins.

Materials and Methods

The field experiment was conducted at College of Agriculture, Central Agricultural University, Imphal, Manipur situated at 24º80' N latitude and longitude of 93º89' E with an altitude of 775.1 m above mean sea level. The experimental area comes under the Eastern Himalayan Region (II) and the agro climatic zone is Sub-Tropical Zone (NEH-4) of Manipur during the *kharif* season of 2023. With nine treatments and three replications, the experiment was set out using randomized block design. The treatments were: T_1-Oxyflurofen @ 150 g/ha (PE-2 DAS), T_2-Oxyflurofen @ 150 g/ha (PE-2 DAS) + Fenoxoprop-ethyl @ 100 g/ha (PoE-20 DAS), T_3-Oxyflurofen @ 150 g/ha (PE-2 DAS) + Clodinafop-Propargyl @ 100 g/ha (PoE-20 DAS), T_4-Oxyflurofen @ 150 g/ha (PE-2 DAS)+ Hand weeding (35 DAS), T_5-Clodinafop-Propargyl @ 100 g/ha (PoE-20 DAS) + Rice husk @ 10 tons/ha, T_6-Fenoxoprop-ethyl @ 100 g/ha (PoE-20 DAS) + Rice husk @ 10 tons/ ha, T_7-Rice husk @ 10 tons/ ha, T_8-Hand weeding at 20 & 35 DAS, T_9-Weedy check. The soil chemical properties of the experimental field were pH of 5.11, organic carbon content 1.26%, available nitrogen (257.15 kg/ha), available phosphorus (P_2O_5) (19.16 kg/ha) and available potassium (K_2O) (235.47 kg/ha). The minimum and maximum temperatures recorded during the period under review were 21.70 0C and 29.95 0C with an average rainfall of 153.55 mm and average sunshine of 4.53 hours respectively. The recommended dose of fertilizers 20 kg N (urea), 40 kg P_2O_5 (single super phosphate) and 20 kg K_2O (murate of potash) was applied at the time of sowing (20:40:20 kg NPK/ha). 20 kg seed of mung bean (Variety: shikha) was sown by mannual at 30 cm row spacing. Later on, desirable plant population was maintained by thinning out extra plants and maintaining 10 cm plant spacing. The treatment-wise herbicide application was done using knapsack sprayer fitted with a flat-fan nozzle with water volume of 500 L/ha. Hand weeding was done at 20 and 35 days after sowing as per treatment. Adequate measures to taken to control the insects-pests and disease. One irrigations were given to the crop at 14 DAS. Data on species-wise weed count and weeds dry weight were recorded at 20, 40 and 60 DAS using a quadrate measuring 50 × 50 cm in each plot. For dry weight, the weed samples were first sun-dried and then in an oven at 70 °C temperature for 72 hrs. The data on yield attributes (no. of pods/plant, no. of pods/cluster, no. of seeds/pod and test weight) and yield were recorded according to the standard process at the time of harvesting five plants per treatment. Nutrient uptake by crop are obtained by multiplying dry matter yield (kg/ha) and nutrient content (%).

Nutrient uptake (kg/ha) = Nutrient concentration in plant (%) × Dry matter (kg/ha) / 100

The data on weed parameters, and yield parameters were analyzed using a variation analysis technique (ANOVA) for randomized block design given by Gomes and Gomes (1984) [7].

Results and Discussion

Weed dynamics

The field trial was attentively monitored during crop growth stages to look the presence of different weed species at the particular stage. It was found that three types of weeds were present in experimental field i.e. grasses weeds, sedge weeds and broad leaved weeds. A total of seventeen weed species, belong to eight different families including seven grasses, two sedges and eight broadleaf weeds were observed. The dominant weeds were among the grassy weeds *Cynodon dactylon*, *Echinochloa colona* and *Panicum repens* were the most prominent weeds. The broadleaf weed viz., *Amarnthus viridis*, *Digera arvensis*, *Trianthema portulacastrum* and *Portulaca oleracea* were prominent. *Cyperus rotundus* was the prominent sedge. Similar botanic compositions of weeds were also reported by Poornima *et al*. (2018) [18].

Grassy weeds

At 20 DAS lowest grasses weed count was recorded in the Oxyflurofen @ 150 g/ha (PE-2 DAS) + Clodinafop-Propargyl @ 100 g/ha (PoE-20 DAS) (11.67) and highest was recorded in the Weedy check (23.00) which was at par with the Hand weeding at 20 and 35 DAS (22.33). At 40 and 60 DAS lowest number of grasses weed was recorded in the Hand weeding at 20 and 35 DAS (2.33) & (10.67) followed by Oxyflurofen @ 150 g/ha (PE-2 DAS) + Hand weeding (35 DAS), (3.00) & (11.67) While, highest was recorded in the Weedy check (33.67) & (39.33). Oxyflurofen having broad spectrum activity on weeds, control all type of weed during initial growing period of crop and later on Hand weeding control most of grassy weeds. Similar result was also recorded by Kundu *et al*. (2009) [14].

Sedge weeds

At 20 DAS it was observed that the lowest sedges weed count was recorded in Oxyflurofen @ 150 g/ha (PE-2 DAS) + Clodinafop-Propargyl @ 100 g/ha (PoE-20 DAS) (0.67) followed closely by Oxyflurofen @ 150 g/ha (PE-2 DAS) + Fenoxoprop-ethyl @ 100 g/ha (PoE-20 DAS), (1.00) which did not differ significantly from each other. The highest sedges weed count/m^2 was recorded in control (5.00) which was at par with the Hand weeding at 20 and 35 DAS (4.67). At 40 & 60 DAS the lowest was recorded in the Hand weeding at 20 and 35

DAS (0.33) & (0.67) which was at par with the Oxyflurofen @ 150 g/ha (PE-2 DAS) + Hand weeding (35 DAS), (0.67) & (1.33) and followed by Oxyflurofen @ 150 g/ha (PE-2 DAS) + Clodinafop-Propargyl @ 100 g/ha (PoE-20 DAS). The highest sedges weed count/m^2 was recorded in the Weedy check (4.33) & (7.33).

HW was effectively control sedge weed over chemical control because of successfully destroying the rhizome of sedge. The rhizome of sedge not suppressed by herbicides but same time by HW uprooted the whole weed plant entirely. Ultimately this leads to kept minimum sedge population throughout growing period. The extraordinary reduction in sedge weed population at different stages might be due to efficient weed control in particular treatments either manual or chemical or both. These results were harmonies with findings of Kaur *et al*. (2009) [11].

Broad leaved weeds

At 20 DAS it was observed that the lowest broad leaved weed count/ m^2 was recorded in Oxyflurofen @ 150 g/ha (PE-2 DAS) + Clodinafop-Propargyl @ 100 g/ha (PoE-20 DAS) (1.00) followed closely by Oxyflurofen @ 150 g/ha (PE-2 DAS) + Fenoxoprop-ethyl @ 100 g/ha (PoE-20 DAS), (1.67) which did not differ significantly from each other. The highest broad leaved weed count/m^2 was recorded in control (10.67). At 40 & 60 DAS the lowest was recorded in the Hand weeding at 20 and 35 DAS (2.33) & (3.33) which was at par with the Oxyflurofen @ 150 g/ha (PE-2 DAS) + Hand weeding (35 DAS), (3.33) & (4.67). The highest broad leaved weed count/m^2 was recorded in the Weedy check (15.67) & 22.33). Hand weeding at 20 and 35 DAS recorded minimum dicot weeds throughout growing period because of two HW at 20 and 35 DAS of crop growth, kept field free from weeds. Same time excellent reductions in dicot weed population by combination of chemical and manual weeding and broad-spectrum activity of Oxyflurofen. Oxyflurofen inhibit the growth of dicot weeds due to membrane disruption due to solutes leakage from cells with some synergic effects with clodinafop-propargyl.

Total weed population

At 20 DAS it was revealed that Oxyflurofen @ 150 g/ha (PE-2 DAS) + Clodinafop-Propargyl @ 100 g/ha (PoE-20 DAS) (13.33) recorded significantly lowest total weed count/m^2. While the highest number of weeds were recorded under the Weedy check (38.67) and followed by the Hand weeding at 20 and 35 DAS (34.33). At 40 & 60 DAS the Hand weeding at 20 and 35 DAS (5.00) & (14.67) recorded the lowest total weed count /m^2 however it was statistically at par with the Oxyflurofen @ 150 g/ha (PE-2 DAS) + Hand weeding (35 DAS), (7.00) & (17.67). While significantly the highest number of weeds were registered under the weedy check (53.67) & (69.00). The extraordinary reduction in weed population at different stages might be due to broad spectrum activity of Oxyflurofen particular on established plants of both grasses and broad leaf weeds helps to kept field free from all types of weed. Clodinafop-propargyl and fenoxoprop-ethyl inhibit ACCase enzyme at the initial stage of fatty acid synthesis this leads to killing most of grasses weeds same time. The similar results were also reported by Kaur *et al*. (2009) [11], Kataria *et al*. (2018) [9] and Kumar *et al*. (2018) [13].

Weed control efficiency

WCE varied with time in different treatment, from the data Presented in Table 2 at 20 DAS highest WCE (%) was recorded in the Oxyflurofen @ 150 g/ha (PE-2 DAS) + Clodinafop-Propargyl @ 100 g/ha (PoE-20 DAS) (70.00%) and lowest in the Hand weeding at 20 and 35 DAS (41.09%). At 40 and 60 DAS highest was recorded in the Hand weeding at 20 and 35 DAS (85.77% and 81.17%) which was at par with the Oxyflurofen @ 150 g/ha (PE-2 DAS) + Hand weeding (35 DAS), (85.10% and 80.27%). While the lowest was observed in the Rice husk @ 10 tons/ ha at 40 and 60 DAS having 29.95% and 38.23% respectively. Application of Rice husk @ 10tons/ha was recorded lowest WCE after weed check. HW at 20 and 35 DAS was recorded highest WCE might be because of lowest weed population during initial growing period and HW records lowest weed population at critical crop-weed competition as compared to all other treatments. Similar findings were reported by Chhodavadia *et al.* (2013) [3], Mishra *et al.* (2017) [15] and Rathika *et al*. (2023) [21].

Effects of weed management practices on yield attributes, yield and profitability

The data perusal on yield attributes (Table 4) showed that two hand weeding done at 20 and 35 DAS recorded the highest no. of pods/plant, no. of pods/cluster, no. of seeds/pod and test weight (27.85 cm, 6.93, 12.17 and 36.61 g) which was at par with Oxyflurofen @ 150 g/ha (PE DAS) + Hand weeding (35 DAS). Variation in yield attributes of mung bean could be due to difference in growth parameters such as dry matter production and weed population. The DM production was outcome of growth parameters like plant height, no. of branches/ plant, no. of leaves and LAI.

Similarly, two hand weeding done at 20 and 35 DAS produced significantly highest seed yield (10 .89 q/ha) which was at par on Oxyflurofen @ 150 g/ha (PE DAS) + Hand weeding (35 DAS) (10.79 q/ha) followed by Oxyflurofen @ 150 g/ha (PE-2 DAS) + Clodinafop-Propargyl @ 100 g/ha (PoE-20 DAS) (9.95 q/ha). (Table 4). Higher growth attributes lead to higher DM production ultimately leads to higher yield. This might be because of efficient weed control by herbicides when combined with HW which finally influenced growth parameters, yield attributes and yield. Raman and Krishnamoorthy (2005) [20] were also found the similar results.

Nutrients uptake by crops

The total nitrogen, phosphorus and potassium uptake (kg/ha) by crops at harvest was influenced significantly due to different weed control practices. The maximum values were obtained under hand weeding at 20 and 35 DAS (64.03, 7.39, 36.04) being statistically on par with Oxyflurofen @ 150 g/ha (PE-2 DAS) + Hand weeding (35 DAS). (62.02, 7.05, 34.70) and minimum value were found in weedy check. There was significant increase in total NPK uptake by green gram due to increased weed control, less competition by weeds for nutrients, higher dry matter accumulation by crops and higher grain and straw yield. These results are in conformity with the earlier findings of Chhodavadia *et al*. (2013) [3], Kataria *et al*. (2018) [9], Udhaya *et al*. (2021) [23].

Table 1: Effects of different weed management practices on grassy, broadleaf, sedge and total weed population at 20, 40 AND 60 DAS (no.).

Treatment		Grassy weeds			Sedge weeds			Broad leaved weeds			Total weeds		
		20 DAS	40 DAS	60 DAS	20 DAS	40 DAS	60 DAS	20 DAS	40 DAS	60 DAS	20 DAS	40 DAS	60 DAS
T_1	Oxyflurofen @ 150 g/ha (PE-2 DAS)	12.67 (3.63)	20.33 (4.56)	27.67 (5.31)	1.33 (1.35)	3.33 (1.96)	4.33 (2.20)	2.33 (1.68)	8.67 (3.03)	12.33 (3.58)	16.33	32.33	44.33
T_2	Oxyflurofen @ 150 g/ha (PE-2 DAS) + Clodinafop-Propargyl @ 100 g/ha (PoE-20 DAS)	12.33 (3.58)	12.67 (3.63)	24.67 (5.02)	1.00 (1.22)	2.00 (1.58)	3.00 (1.87)	1.67 (1.47)	4.67 (2.27)	9.33 (3.14)	15.00	19.33	37.00
T_3	Oxyflurofen @ 150 g/ha (PE-2 DAS)+ Fenoxoprop-ethyl @ 100 g/ha (PoE-20 DAS)	11.67 (3.49)	11.33 (3.44)	23.33 (4.88)	0.67 (1.08)	1.67 (1.47)	2.67 (1.78)	1.00 (1.22)	3.67 (2.04)	8.33 (2.97)	13.33	16.67	34.33
T_4	Oxyflurofen @ 150 g/ha (PE-2 DAS)+ Hand weeding (35 DAS)	13.33 (3.72)	3.00 (1.87)	11.67 (3.49)	1.67 (1.47)	0.67 (1.08)	1.33 (1.35)	2.67 (1.78)	3.33 (1.96)	4.67 (2.27)	17.67	7.00	17.67
T_5	Clodinafop-Propargyl @ 100 g/ha (PoE-20 DAS) + Rice husk @ 10 tons/ha	22.67 (4.81)	13.67 (3.76)	26.33 (5.18)	4.00 (2.12)	3.00 (1.78)	3.67 (2.04)	7.67 (2.86)	7.33 (2.80)	12.67 (3.63)	34.33	24.00	42.67
T_6	Fenoxoprop-ethyl @ 100 g/ha (PoE-20 DAS) + Rice husk @ 10 tons/ ha	21.33 (4.67)	13.33 (3.72)	25.00 (5.05)	3.67 (2.04)	2.67 (1.78)	3.33 (1.96)	6.67 (2.68)	6.67 (2.68)	11.67 (3.49)	31.67	22.67	40.00
T_7	Rice Husk @ 10 t/ha	20.67 (4.60)	21.33 (4.67)	28.67 (5.40)	3.00 (1.87)	3.67 (2.04)	4.67 (2.27)	6.33 (2.61)	9.33 (3.14)	13.67 (3.76)	30.00	34.33	47.00
T_8	Hand Weeding at 20 and 35 DAS	22.33 (4.78)	2.33 (1.68)	10.67 (3.34)	4.67 (2.27)	0.33 (0.91)	0.67 (1.08)	7.33 (2.80)	2.33 (1.68)	3.33 (1.96)	34.33	5.00	14.67
T_9	Weedy Check (Control)	23.00 (4.85)	33.67 (5.85)	39.33 (6.31)	5.00 (2.35)	4.33 (2.20)	7.33 (2.80)	10.67 (3.34)	15.67 (4.02)	22.33 (4.78)	38.67	53.67	69.00
SEd (±)		0.73	0.46	0.80	0.68	0.77	0.83	0.64	0.71	0.92	0.97	1.22	1.32
C.D 5%		1.54	0.97	1.69	1.44	1.64	1.75	1.35	1.51	1.95	2.05	2.59	2.8

Transformed values are given in parenthesis, which were transformed to □ X + 0.5.

Table 2: Effects of different weed management practices on weed dry weight (g), weed control efficiency (%).

Treatment		Dry weight (g)			Weed control efficiency (%)		
		20 DAS	40 DAS	60 DAS	20 DAS	40 DAS	60 DAS
T_1	Oxyflurofen @ 150 g/ha (PE-2 DAS)	5.34	12.24	16.21	58.39	32.48	41.10
T_2	Oxyflurofen @ 150 g/ha (PE-2 DAS) + Clodinafop-Propargyl @ 100 g/ha (PoE-20 DAS)	4.93	7.01	12.14	61.58	61.33	55.89
T_3	Oxyflurofen @ 150 g/ha (PE-2 DAS)+ Fenoxoprop-ethyl @ 100 g/ha (PoE-20 DAS)	3.85	6.24	11.18	70.00	65.58	59.37
T_4	Oxyflurofen @ 150 g/ha (PE-2 DAS)+ Hand weeding (35 DAS)	5.91	2.70	5.43	53.95	85.10	80.27
T_5	Clodinafop-Propargyl @ 100 g/ha (PoE-20 DAS) + Rice husk @ 10 tons/ha	6.90	9.96	14.78	46.23	45.06	46.29
T_6	Fenoxoprop-ethyl @ 100 g/ha (PoE-20 DAS) + Rice husk @ 10 tons/ ha	6.72	9.22	13.92	47.64	49.14	49.42
T_7	Rice Husk @ 10 t/ha	6.69	12.88	17.00	47.87	28.95	38.23
T_8	Hand Weeding at 20 and 35 DAS	7.56	2.58	5.18	41.09	85.77	81.17
T_9	Weedy Check (Control)	12.84	18.13	27.52	0.00	0.00	0.00
SEd (±)		0.10	0.08	0.19	0.44	0.36	0.67
C.D 5%		0.21	0.18	0.40	0.93	0.77	1.41

Table 3: Effects of different weed management practices on nutrient uptake (kg/ha) by crop at harvest.

Treatment		Nutrient uptake (kg/ha) by crop at harvest		
		Nitrogen	Phosphorus	Potassium
T_1	Oxyflurofen @ 150 g/ha (PE-2 DAS)	40.19	4.03	23.54
T_2	Oxyflurofen @ 150 g/ha (PE-2 DAS) + Clodinafop-Propargyl @ 100 g/ha (PoE-20 DAS)	51.88	5.41	29.48
T_3	Oxyflurofen @ 150 g/ha (PE-2 DAS)+ Fenoxoprop-ethyl @ 100 g/ha (PoE-20 DAS)	55.44	6.17	31.32
T_4	Oxyflurofen @ 150 g/ha (PE-2 DAS)+ Hand weeding (35 DAS)	62.02	7.05	34.70
T_5	Clodinafop-Propargyl @ 100 g/ha (PoE-20 DAS) + Rice husk @ 10 tons/ha	44.51	4.37	25.64
T_6	Fenoxoprop-ethyl @ 100 g/ha (PoE-20 DAS) + Rice husk @ 10 tons/ ha	47.21	4.65	27.26
T_7	Rice Husk @ 10 t/ha	37.74	3.32	22.93
T_8	Hand Weeding at 20 and 35 DAS	64.03	7.39	36.04
T_9	Weedy Check (Control)	24.56	2.02	15.50
SEd (±)		0.96	0.18	0.64
C.D 5%		2.02	0.37	1.36

Table 4: Effects of different weed management practices on pod/plant, pod/cluster, seeds/pod, test weight (g), seed yield (q/ha).

Treatment		Pod/plant	Pod/cluster	Seed/pod	Test weight	Seed yield (q/ha)
T_1	Oxyflurofen @ 150 g/ha (PE-2 DAS)	23.19	4.87	9.22	34.82	8.11
T_2	Oxyflurofen @ 150 g/ha (PE-2 DAS) + Clodinafop-Propargyl @ 100 g/ha (PoE-20 DAS)	25.91	5.43	10.26	35.44	9.60
T_3	Oxyflurofen @ 150 g/ha (PE-2 DAS)+ Fenoxoprop-ethyl @ 100 g/ha (PoE-20 DAS)	26.15	5.78	10.73	35.60	9.95
T_4	Oxyflurofen @ 150 g/ha (PE-2 DAS)+ Hand weeding (35 DAS)	27.47	6.50	11.66	36.48	10.79
T_5	Clodinafop-Propargyl @ 100 g/ha (PoE-20 DAS) + Rice husk @ 10 tons/ha	23.88	5.20	9.87	34.98	8.69
T_6	Fenoxoprop-ethyl @ 100 g/ha (PoE-20 DAS) + Rice husk @ 10 tons/ ha	24.54	5.40	10.11	35.08	8.92
T_7	Rice Husk @ 10 t/ha	22.76	4.70	9.20	34.30	7.96
T_8	Hand Weeding at 20 and 35 DAS	27.85	6.93	12.17	36.61	10.89
T_9	Weedy Check (Control)	20.18	4.13	7.83	33.86	5.46
SEd (±)		0.21	0.32	0.28	0.85	0.04
C.D 5%		0.45	0.68	0.60	NS	0.09

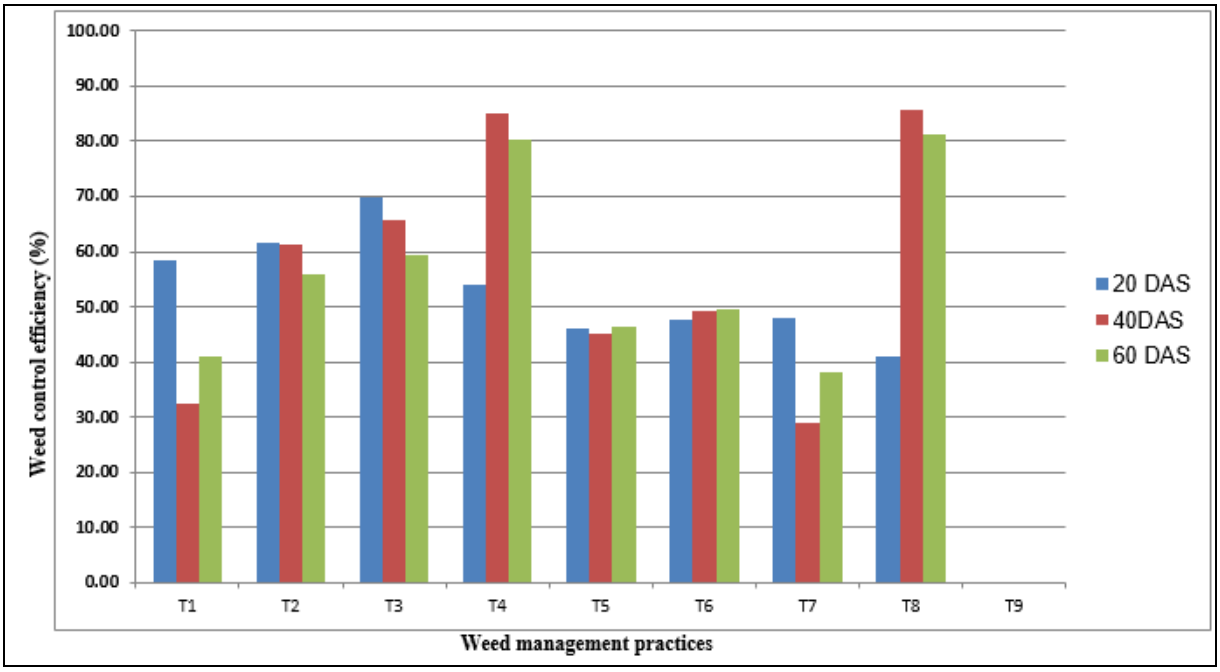

Fig 1: Weed control efficiency (%) as influenced by weed management practices

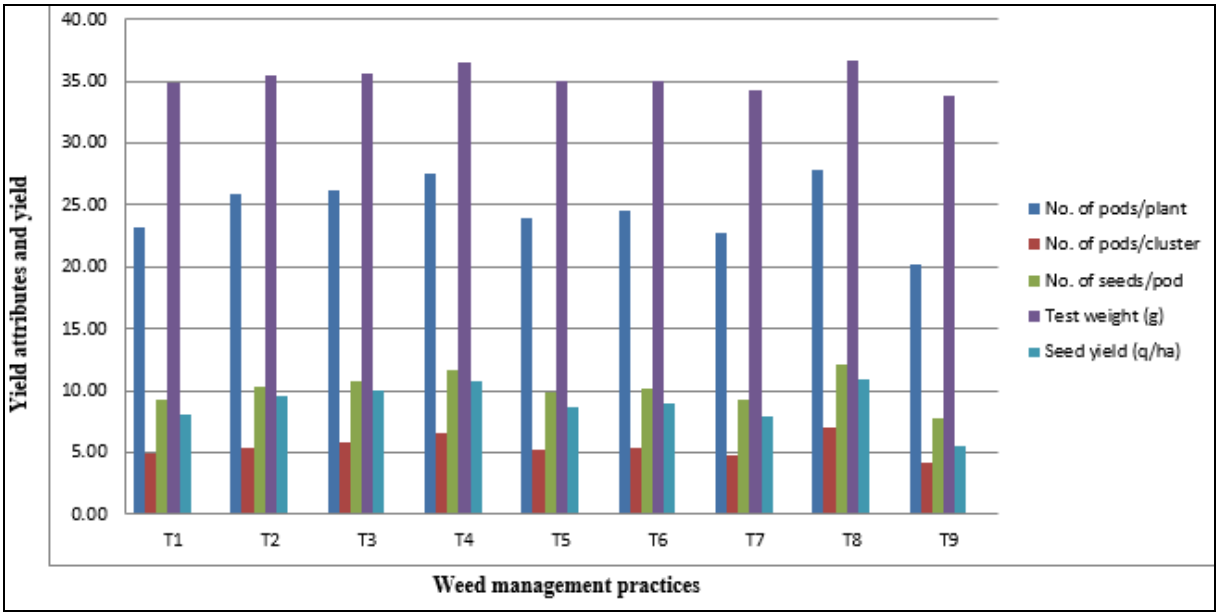

Fig 2: Yield attributes and yield of green gram as influenced by weed management practices

Conclusion

The study results conclude that the hand weeding at 20 and 35 DAS may be recommended for attaining better weed control, higher crop yields and nutrient uptake in mung bean under medium land situation of Manipur.

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