
**E-ISSN:** 2618-0618
**P-ISSN:** 2618-060X

NAAS Rating (2025): 5.20
www.agronomyjournals.com
2025; 8(9): 1077-1081
Received: 10-06-2025
Accepted: 13-07-2025

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# Effect of weed management practices on yield attributes, yield and weed biomass of mungbean (*Vigna radiata* L.) in *Vertisol* of Chhattisgarh palins

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**DOI:** https://www.doi.org/10.33545/2618060X.2025.v8.i9o.3898

## Abstract
A field experiment was conducted at Instructional cum Research Farm, Indira Gandhi Krishi Vishwavidyalaya, Raipur (C.G.) during *kharif* 2021 and 2022. The soil of the experimental field was clay (*Vertisols)* in texture, neutral in reaction, medium in organic carbon, low in available nitrogen, medium in available phosphorus and high in available potassium. Experiment was laid out in randomized block design with three replications, consisted of $T_1$-Imazethapyr 10% SL (Dose-55 a.i. g ha$^{-1}$), $T_2$- Fluazifop-p-butyl 13.4% w w$^{-1}$ (Dose-250 a.i. g ha$^{-1}$), $T_3$-Propaquizafop 2.5% w w$^{-1}$ + imazethapyr 3.75% w w$^{-1}$ ME (ready mix) (Dose-83.3 a.i. g ha$^{-1}$), $T_4$- Acifluorfen-sodium 16.5% EC + clodinofop-propargyl 8% EC (ready mix) (Dose-210 a.i. g ha$^{-1}$), $T_5$- Fomesafen 11.1% w w$^{-1}$ + fluazifop-p-butyl 11.1% w w$^{-1}$ (ready mix) (Dose-440 a.i. g ha$^{-1}$), $T_6$-Hand weeding twice at 20 and 40 DAS, $T_7$- Weed free (HW at 20, 40 and 60 DAS) and $T_8$-Unweeded check.
The weed flora of the experimental site was dominated with *Echinocloa colona, Dinebra retroflexa, Parthenium hysterophorus, Celosia argentea, Cyperus* sps. and others. Results revealed that all the yield attributing characters and yield was highest under fomesafen 11.1% w w$^{-1}$ + fluazifop-p-butyl 11.1% w w$^{-1}$ (ready mix) (Dose-440 a.i. g ha$^{-1}$) ($T_5$) which was at par with propaquizafop 2.5% w w$^{-1}$ + imazethapyr 3.75% w w$^{-1}$ ME (ready mix) (Dose-83.3 a.i. g ha$^{-1}$) ($T_3$) and acifluorfen-sodium 16.5% EC + clodinofop-propargyl 8% EC (ready mix) (Dose-210 a.i. g ha$^{-1}$) ($T_4$). Similarly, weed biomass was also significantly reduced in these treatments over others. However, WCE was higher in these treatments than the unweed check.

**Keywords:** Fomesafen, fluazifop-p-butyl, mungbean, weed biomass and weed control efficiency

## Introduction
Mungbean is an important protein rich food legume crop. The mungbean, alternatively known as the greengram, mash, mung, is originated from the Indian subcontinent and is mainly cultivated in East, Southeast and South Asia. In India it occupied 458 thousand hectare area with a production of 2509 tones & productivity of 548 kg ha$^{-1}$during 2019-2020 (Indiastat). In Chhattisgarh mungbean area, production and productivity were 10.64 thousand hectare, 4.14 tonne and 389 kg ha$^{-1}$ respectively (India stat, 2019-2020). It is the cheapest source of dietary protein and can be grown in all the seasons of the year as seed crop and fodder crop. Mungbean contains 24-25% protein, 56% carbohydrates and 1.3% fat, 124 mg/100 g Calcium and consumed both as whole grain as well as dal and also used as an ingredient in both savory and sweet dishes. It is a soil building crop which fixes atmospheric nitrogen through symbiotic action and can also be used as green manure crop adding 35 kg N ha$^{-1}$. Mungbean has proven to be invaluable in crop rotation helping in improving soil texture and fertility and conserve natural resources providing long term sustainability in agricultural productivity. It can utilize limited soil moisture and nutrients more efficiently than cereal crops and for that reason farmers have chosen it to grow under highly adverse conditions. Weeds cause severe losses (up to 40-68 per cent) in mungbean due to its short stature. They compete with the crop for resources like nutrient, moisture and light. High temperature coupled with frequent rains during growing period infests the crop heavily with weeds which adversely affect the productivity of this crop.

Traditionally, weed control in mungbean is done by physical methods. Generally 2-3 hand weeding are required to keep the crop weed free. However, Hand weeding is expensive because it is not only time consuming but labour intensive also and with the increasing crisis of labour, exploring the possibility of herbicidal weed control in mungbean deserves attention. Therefore, the study of chemical weed management assumes a greater importance in mungbean cultivation.

**Materials and Methods:** The study was carried out at Instructional cum Research Farm, Indira Gandhi Krishi Vishwavidyalaya, Raipur (C.G.) during *kharif* 2021 and 2022. The texture of the soil of experimental field was clay (*Vertisols)* in nature, neutral in reaction, medium in organic carbon and low in available nitrogen, medium in available phosphorus and high in available potassium. Experiment was laid out in randomized block design with three replications, consisted of $T_1$-Imazethapyr 10% SL (Dose-55 a.i. g $ha^{-1}$), $T_2$- Fluazifop-p-butyl 13.4% w $w^{-1}$ (Dose-250 a.i. g $ha^{-1}$), $T_3$-Propaquizafop 2.5% w $w^{-1}$ + imazethapyr 3.75% w $w^{-1}$ ME (ready mix) (Dose-83.3 a.i. g $ha^{-1}$), $T_4$- Acifluorfen-sodium 16.5% EC + clodinofop-propargyl 8% EC (ready mix) (Dose-210 a.i. g $ha^{-1}$), $T_5$- Fomesafen 11.1% w $w^{-1}$ + fluazifop-p-butyl 11.1% w $w^{-1}$ (ready mix) (Dose-440 a.i. g $ha^{-1}$), $T_6$-Hand weeding twice at 20 and 40 DAS, $T_7$- Weed free (HW at 20, 40 and 60 DAS) and $T_8$- Unweeded check. Yield attributes as well as seed and stover yield were recorded at harvest of the crop. Number of weeds (grasses, broad leaf weeds and sedges) was counted at 20, 40, 60 DAS and at harvest. Weed control efficiency and weed index (WI) were calculated by the formulae suggested by Mani et al. (1973) [7].

$$\text{WCE (\%)} = \frac{WP_c - WP_t}{WP_c} \text{x100}$$

Where,

- WCE = Weed control efficiency (%)
- $WP_C$ = Weed population in unweeded control ($m^{-2}$)
- WPt = Weed population in treated plot ($m^{-2}$)

Weed index is the per cent reduction in crop yield under a particular treatment due to the presence of weeds in comparison to weed free plot as suggested by Gill and Kumar (1969) [3]. This is used to assess the efficacy of a herbicide. Lesser the weed index, better is the efficiency of a herbicide. It is expressed in percentage and was determined with the help of following formula:

$$\text{WI (\%)} = \frac{X - Y}{X} \text{x100}$$

Where,

- WI = Weed index (%)
- X = Crop yield from weed free plot (hand weeding twice at 20 and 40 DAS)
- Y = Crop yield from the treated plot for which weed index is to be worked out

The data obtained on various parameters were tabulated and statistically analyzed. The data on weed biomass was subjected to square root transformation i.e. before carrying analysis of variance. The levels of treatment were tested with 'F' test showing their significance and were compared by critical difference at 5% level of probability (Gomez and Gomez, 1984).

**Results and Discussion**

Yield attributes and seed yield as well as stover yield were significantly influenced by different weed management practices. Among all treatments the yield attributing characters like number of seeds $pod^{-1}$, pod length and seed index showed no significant difference. The number of pods $plant^{-1}$ was significantly higher under fomesafen 11.1% w $w^{-1}$ + fluazifop-p-butyl 11.1% w $w^{-1}$ (ready mix) (Dose-440 a.i. g $ha^{-1}$) ($T_5$) (16.77, 17.10 and 16.93 in year 2021, 2022 and mean, respectively) (Table 1) which was at par with propaquizafop 2.5% w $w^{-1}$ + imazethapyr 3.75% w $w^{-1}$ ME (ready mix) (Dose-83.3 a.i. g $ha^{-1}$) ($T_3$) and acifluorfen-sodium 16.5% EC + clodinofop-propargyl 8% EC (ready mix) (Dose-210 a.i. g $ha^{-1}$) ($T_4$). Further, weed free ($T_7$) (20.67, 23.33 22.00 in year 2021, 2022 and mean, respectively) has found to be the best with regards to number of pods $plant^{-1}$ followed by hand weeding twice at 20 and 40 DAS ($T_6$) whereas, unweeded check ($T_8$) (14.00, 13.67 and 13.83 in year 2021, 2022 and mean, respectively) resulted in the lowest number of pods $plant^{-1}$ during two years of investigation *i.e.* 2021 and 2022 and mean basis. The maximum yield of herbicidal combinations might be due to lower weed biomass and higher weed control efficiency which made more available plant spaces and lower competition among crop plant for light, water, nutrient and necessary resources that helped in more photosynthate formation, translocation and accumulation in sink which resulted in higher yield attributing characters i. e. number of pods $plant^{-1}$. These results corroborate with the findings of Kumar *et al*. (2016) [6], Rupareliya *et al*. (2018) [10] and Mishra *et al*. (2024) [8].

**Weed flora**

The weed flora observed in the experimental field mainly comprised of *Echinocloa colona, Dinebra retroflexa, Parthenium hysterophorus, Celosia argentea, Cyperus* sps. and others.

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**Table 1:** Effect of different herbicides on yield attributes of mungbean

| | No. of pods plant$^{-1}$ | | | No. of seed pod$^{-1}$ | | | Seed index (g) | | | Pod length (cm) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Treatment** | **2021** | **2022** | **Mean** | **2021** | **2022** | **Mean** | **2021** | **2022** | **Mean** | **2021** | **2022** | **Mean** |
| $T_1$ | 14.70 | 15.37 | 15.03 | 10.73 | 10.80 | 10.77 | 5.33 | 6.47 | 5.63 | 5.40 | 5.43 | 5.42 |
| $T_2$ | 14.33 | 14.67 | 14.50 | 10.33 | 10.67 | 10.50 | 5.23 | 5.93 | 5.38 | 5.37 | 5.40 | 5.38 |
| $T_3$ | 16.70 | 17.00 | 16.85 | 11.48 | 11.61 | 11.55 | 5.50 | 5.53 | 5.75 | 5.53 | 5.57 | 5.55 |
| $T_4$ | 16.60 | 16.93 | 16.77 | 11.30 | 11.33 | 11.32 | 5.33 | 6.00 | 5.50 | 5.47 | 5.50 | 5.48 |
| $T_5$ | 16.77 | 17.10 | 16.93 | 11.66 | 11.86 | 11.76 | 5.53 | 5.67 | 5.60 | 5.57 | 5.60 | 5.58 |
| $T_6$ | 17.07 | 17.40 | 17.23 | 11.87 | 11.90 | 11.88 | 5.63 | 5.67 | 5.85 | 5.83 | 5.90 | 5.87 |
| $T_7$ | 20.67 | 23.33 | 22.00 | 11.91 | 11.97 | 11.94 | 5.80 | 6.07 | 6.03 | 5.90 | 5.93 | 5.92 |
| $T_8$ | 14.00 | 13.67 | 13.83 | 9.66 | 9.56 | 9.61 | 5.07 | 6.27 | 5.67 | 4.87 | 4.93 | 4.90 |
| SEm± | 0.62 | 0.50 | 0.56 | 0.63 | 0.59 | 0.60 | 0.39 | 0.29 | 0.24 | 0.39 | 0.38 | 0.39 |
| CD (P=0.05) | 1.88 | 1.53 | 1.69 | NS | NS | NS | NS | NS | NS | NS | NS | NS |

$T_1$-Imazethapyr 10% SL (Dose-55 a.i. g ha$^{-1}$)
$T_2$- Fluazifop-p-butyl 13.4% w w$^{-1}$ (Dose-250 a.i. g ha$^{-1}$)
$T_3$-Propaquizafop 2.5% w w$^{-1}$ + Imazethapyr 3.75% w w$^{-1}$ ME (ready mix) (Dose-83.3 a.i. g ha$^{-1}$)
$T_4$- Acifluorfen-sodium 16.5% EC + Clodinofop-propargyl 8% EC (ready mix) (Dose-210 a.i. g ha$^{-1}$)
$T_5$- Fomesafen 11.1% w w$^{-1}$ + Fluazifop-p-butyl 11.1% w w$^{-1}$ (ready mix) (Dose-440 a.i. g ha$^{-1}$)
$T_6$-Hand weeding twice at 20 and 40 DAS
$T_7$- Weed free (HW at 20, 40 and 60 DAS)
$T_8$- Unweeded check

**Table 2:** Effect of different herbicides on yields of mungbean

| | Seed Yield (Kg ha$^{-1}$) | | | Stover yield (kg ha$^{-1}$) | | | Weed index (%) | | |
|---|---|---|---|---|---|---|---|---|---|
| **Treatment** | **2021** | **2022** | **Mean** | **2021** | **2022** | **Mean** | **2021** | **2022** | **Mean** |
| $T_1$ | 602 | 685 | 644 | 1200 | 1274 | 1237 | 38.0 | 30.7 | 34.3 |
| $T_2$ | 567 | 570 | 568 | 1165 | 1233 | 1199 | 41.6 | 42.3 | 42.0 |
| $T_3$ | 743 | 770 | 757 | 1363 | 1380 | 1372 | 23.4 | 22.1 | 22.7 |
| $T_4$ | 720 | 740 | 730 | 1328 | 1343 | 1336 | 25.8 | 25.1 | 25.4 |
| $T_5$ | 772 | 810 | 791 | 1372 | 1447 | 1409 | 20.4 | 18.0 | 19.2 |
| $T_6$ | 850 | 878 | 864 | 1383 | 1450 | 1417 | 12.4 | 11.1 | 11.7 |
| $T_7$ | 970 | 988 | 979 | 1570 | 1633 | 1602 | 0.0 | 0.0 | 0.0 |
| $T_8$ | 467 | 433 | 450 | 1037 | 970 | 1003 | 51.9 | 56.2 | 54.0 |
| SEm± | 38 | 30 | 34 | 60 | 49 | 55 | - | - | - |
| CD (P=0.05) | 116 | 90 | 102 | 183 | 149 | 164 | - | - | - |

**Table 3:** Effect of different herbicides on total weed biomass (g m$^{-2}$) in different time interval in mungbean

| | Total weed biomass (g m$^{-2}$) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Treatment** | **20DAS** | | | **40 DAS** | | | **60DAS** | | | **At harvest** | | |
| | **2021** | **2022** | **Mean** | **2021** | **2022** | **Mean** | **2021** | **2022** | **Mean** | **2021** | **2022** | **Mean** |
| $T_1$ | 5.64 (31.30) | 5.13 (25.78) | 5.38 (28.47) | 5.16 (26.13) | 4.82 (22.75) | 4.99 (24.41) | 8.94 (79.49) | 7.39 (54.04) | 8.16 (66.16) | 9.31 (86.15) | 8.13 (65.54) | 8.72 (75.50) |
| $T_2$ | 5.67 (31.69) | 5.05 (24.99) | 5.37 (28.24) | 6.03 (35.86) | 6.38 (40.17) | 6.20 (37.98) | 9.54 (90.45) | 9.59 (91.38) | 9.56 (90.91) | 10.21 (103.71) | 10.37 (107.10) | 10.29 (105.40) |
| $T_3$ | 5.56 (30.41) | 4.89 (23.37) | 5.23 (26.78) | 4.79 (22.41) | 4.19 (17.09) | 4.49 (19.66) | 7.02 (48.82) | 6.08 (36.48) | 6.55 (42.43) | 7.22 (51.63) | 6.38 (40.24) | 6.80 (45.76) |
| $T_4$ | 5.53 (30.13) | 4.97 (24.15) | 5.25 (27.06) | 4.93 (23.81) | 4.47 (19.45) | 4.70 (21.58) | 7.20 (51.35) | 6.58 (42.82) | 6.89 (46.99) | 7.46 (55.09) | 6.96 (48.01) | 7.21 (51.49) |
| $T_5$ | 5.65 (31.42) | 4.90 (23.52) | 5.28 (27.33) | 4.45 (19.33) | 3.63 (12.66) | 4.04 (15.83) | 6.06 (36.23) | 4.84 (22.97) | 5.45 (29.23) | 6.35 (39.84) | 5.34 (28.02) | 5.85 (33.68) |
| $T_6$ | 5.63 (31.21) | 5.13 (25.77) | 5.38 (28.43) | 2.59 (6.22) | 2.31 (4.82) | 2.45 (5.50) | 2.37 (5.10) | 2.07 (3.79) | 2.22 (4.42) | 3.39 (11.00) | 3.14 (9.33) | 3.26 (10.15) |
| $T_7$ | 5.52 (30.01) | 4.78 (22.32) | 5.15 (26.02) | 0.71 (0.00) | 0.71 (0.00) | 0.71 (0.00) | 0.71 (0.00) | 0.71 (0.00) | 0.71 (0.00) | 0.71 (0.00) | 0.71 (0.00) | 0.71 (0.00) |
| $T_8$ | 5.31 (27.71) | 5.37 (28.35) | 5.34 (28.03) | 8.93 (79.28) | 10.12 (101.86) | 9.52 (90.22) | 12.12 (146.50) | 13.24 (174.76) | 12.68 (160.32) | 12.70 (160.84) | 13.71 (187.57) | 13.21 (173.95) |
| SEm± | 0.06 | 0.13 | 0.09 | 0.24 | 0.18 | 0.21 | 0.26 | 0.15 | 0.20 | 0.27 | 0.28 | 0.28 |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CD (P=0.05) | NS | NS | NS | 0.73 | 0.54 | 0.63 | 0.80 | 0.44 | 0.61 | 0.81 | 0.86 | 0.83 |

Figures in parenthesis are the original values. Data were transformed to square root transformation $\sqrt{X+0.5}$ are in bold letters
$T_1$-Imazethapyr 10% SL (Dose-55 a.i. g $ha^{-1}$)
$T_2$- Fluazifop-p-butyl 13.4% w $w^{-1}$ (Dose-250 a.i. g $ha^{-1}$)
$T_3$-Propaquizafop 2.5% w $w^{-1}$ + Imazethapyr 3.75% w $w^{-1}$ ME (ready mix) (Dose-83.3 a.i. g $ha^{-1}$)
$T_4$- Acifluorfen-sodium 16.5% EC + Clodinofop-propargyl 8% EC (ready mix) (Dose-210 a.i. g $ha^{-1}$)
$T_5$- Fomesafen 11.1% w $w^{-1}$ + Fluazifop-p-butyl 11.1% w $w^{-1}$ (ready mix) (Dose-440 a.i. g $ha^{-1}$)
$T_6$-Hand weeding twice at 20 and 40 DAS
$T_7$- Weed free (HW at 20, 40 and 60 DAS)
$T_8$- Unweeded check

**Table 4:** Effect of different herbicides on weed control efficiency (%) in different time intervals in mungbean.

| Weed control efficiency (%) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Treatment** | **40 DAS** | | | **60 DAS** | | | **At harvest** | | |
| | **2021** | **2022** | **Mean** | **2021** | **2022** | **Mean** | **2021** | **2022** | |
| $T_1$ | 67.0 | 77.7 | 72.9 | 45.7 | 69.1 | 58.7 | 46.4 | 65.1 | 56.6 |
| $T_2$ | 54.8 | 60.6 | 57.9 | 38.3 | 47.7 | 43.3 | 35.5 | 44.5 | 40.3 |
| $T_3$ | 71.7 | 83.2 | 78.2 | 66.7 | 79.1 | 73.5 | 67.4 | 77.9 | 73.1 |
| $T_4$ | 70.0 | 80.9 | 76.1 | 64.9 | 75.5 | 70.7 | 65.7 | 74.4 | 70.4 |
| $T_5$ | 75.6 | 87.6 | 82.5 | 75.3 | 86.9 | 81.8 | 75.2 | 85.1 | 80.6 |
| $T_6$ | 92.2 | 95.3 | 93.9 | 96.5 | 97.8 | 97.2 | 94.8 | 95.3 | 95.1 |
| $T_7$ | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 |
| $T_8$ | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

$T_1$-Imazethapyr 10% SL (Dose-55 a.i. g $ha^{-1}$)
$T_2$- Fluazifop-p-butyl 13.4% w $w^{-1}$ (Dose-250 a.i. g $ha^{-1}$)
$T_3$-Propaquizafop 2.5% w $w^{-1}$ + Imazethapyr 3.75% w $w^{-1}$ ME (ready mix) (Dose-83.3 a.i. g $ha^{-1}$)
$T_4$- Acifluorfen-sodium 16.5% EC + Clodinofop-propargyl 8% EC (ready mix) (Dose-210 a.i. g $ha^{-1}$)
$T_5$- Fomesafen 11.1% w $w^{-1}$ + Fluazifop-p-butyl 11.1% w $w^{-1}$ (ready mix) (Dose-440 a.i. g $ha^{-1}$)
$T_6$-Hand weeding twice at 20 and 40 DAS
$T_7$- Weed free (HW at 20, 40 and 60 DAS)
$T_8$- Unweeded check

At 20 DAS there is no significant difference among all the treatments for total weed biomass production. At 40, 60 DAS and at harvest the significant reduction in total weed biomass production was recorded (15.83, 29.23 and 33.68 g $m^{-2}$ on mean basis) (Table 3) under herbicide application of fomesafen 11.1% w $w^{-1}$ + fluazifop-p-butyl 11.1% w $w^{-1}$ (ready mix) (Dose-440 a.i. g $ha^{-1}$) ($T_5$) which was followed by propaquizafop 2.5% w $w^{-1}$ + imazethapyr 3.75% w $w^{-1}$ ME (ready mix) (Dose-83.3 a.i. g $ha^{-1}$) ($T_3$) and acifluorfen-sodium 16.5% EC + clodinofop-propargyl 8% EC (ready mix) (Dose-210 a.i. g $ha^{-1}$) ($T_4$). Further, weed free ($T_7$) has produced minimum weed biomass followed by hand weeding twice at 20 and 40 DAS ($T_6$). Whereas, unweeded check ($T_8$) resulted maximum total weed biomass production. The lower weed biomass under herbicidal treatments might be due to more detrimental effect of the herbicides for the control of weed flora.

Almost similar results were also observed by Singh *et al*. (2014), Kumar and Chinnamuthu (2014) [5], Punia *et al*. (2015) and Gelot *et al*. (2018).

Among different herbicidal treatments maximum weed control efficiency at 40, 60 DAS and at harvest were recorded under fomesafen 11.1% w $w^{-1}$ + fluazifop-p-butyl 11.1% w $w^{-1}$ (ready mix) (Dose-440 a.i. g $ha^{-1}$) ($T_5$) (82.5, 81.8 and 80.6% on mean basis) (Table 4) followed by propaquizafop 2.5% w $w^{-1}$ + imazethapyr 3.75% w $w^{-1}$ ME (ready mix) (Dose-83.3 a.i. g $ha^{-1}$)($T_3$) and acifluorfen-sodium 16.5% EC + clodinofop-propargyl 8% EC (ready mix) (Dose-210 a.i. g $ha^{-1}$)($T_4$). Furthermore, weed free ($T_7$) recorded significantly the highest weed control efficiency 100% in year 2021, 2022 and in mean also followed by hand weeding twice at 20 and 40 DAS. All herbicidal treatments were found significantly superior to unweeded check ($T_8$) regarding weed control efficiency. Among different herbicidal treatments minimum weed index was recorded under fomesafen 11.1% w $w^{-1}$ + fluazifop-p-butyl 11.1% w $w^{-1}$ (ready mix) (Dose-440 a.i. g $ha^{-1}$) ($T_5$) (20.4, 18.0 and 19.2% in year 2021, 2022 and mean, respectively) (Table 2) followed by propaquizafop 2.5% w $w^{-1}$ + imazethapyr 3.75% w $w^{-1}$ ME (ready mix) (Dose-83.3 a.i. g $ha^{-1}$) ($T_3$) and acifluorfen-sodium 16.5% EC + clodinofop-propargyl 8% EC (ready mix) (Dose-210 a.i. g $ha^{-1}$)($T_4$). The higher WCE and lower WI were recorded under herbicidal treatments due to lower crop-weed competition which reduced weed biomass accumulation compared to unweeded check ($T_8$). The similar findings were also reported by Verma and Kushwaha (2020).

## Conclusion

On the basis of the result obtained from presented field study, it can be concluded that among the various weed management practices using the herbicidal treatment fomesafen 11.1% $ww^{-1}$ + fluazifop-p-butyl 11.1% $ww^{-1}$ (ready mix) @ 440 a.i.g $ha^{-1}$ at 20 DAS (ready mix) as post emergence ($T_5$) recorded significantly higher yield attributes, seed yield, stover yield, weed control efficiency and minimum weed biomass and weed index over the others. Weed free ($T_7$) however, proved to be best regarding these parameters and the poorest value was obtained from unweeded check ($T_8$) for mungbean. The similar findings also reported by Verma and Kushwaha (2020).

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