

Original Research Article

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## Effect of Weed Management Practices on Yield and Economics of Summer Green Gram (*Vigna radiata* L.)

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### ABSTRACT

#### Keywords

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The study was conducted at Instructional cum Research Farm, S.G. College of Agriculture and Research Station, Jagdalpur, Dist-Bastar (C.G.) during summer season 2021. The experiment was laid out in Randomized Complete Block Design (RBD) with three replication and consists of eight treatments. The soil of experimental field was Inceptisols, with acidic in reaction (pH-7.1), organic carbon was medium, available N was low and available P and K was medium. Result revealed that two hand weeding highest significantly in plant height, grain yield, gross return, net return and B:C ratio to other herbicide treatments. A non significant difference between plat emergences, haulm yield and harvest index were observed. Form the study it can be concluded that farmers can go for post emergence application of Sodium acifluorfen 16.5% + clodinafop propargy 8% (165+80 g ha<sup>-1</sup>) for better weed management and higher seed yield.

### Introduction

Green gram (*Vigna radiata* L.) belongs to the family leguminosaeae, also known as green gram; it is the fourth most widely produced pulses crop in India after chickpea, pigeonpea and blackgram. It can be grown during both rainy and summer seasons. Being a short duration crop, it fits well in traditional rice-wheat cropping systems and provides farmers with additional income. Being a leguminous crop, it can play a major role in nitrogen fixation from 20-80 kg ha<sup>-1</sup> (Hayat *et al.*, 2008), thus improving system sustainability. Green gram grains contain 22-28%

protein, 60-65% carbohydrates, 1.0-1.5% fat, 3.54.5% fibre and 4.5-5.5% ash (USDA 2019). It is also a rich source of aromatic amino acids, leucine, isoleucine and tryptophane (Bhatty 1982). India stands first in production and consumption of pulses, green gram is the main source of dietary protein for vegetarian population and contains high amount of vitamins and minerals. A legume crop plays a vital role as they provide food, feed and also maintains the soil environment by biological nitrogen fixation. Green gram like other legume crops enrich the soil nutrient status as it possesses root nodules which contain nitrogen fixing bacteria. Green gram is

grown mainly as a *Kharif* season crop, though in certain states it is grown in summer and *Rabi* seasons mainly as a second crop after paddy (Singh *et al.*, 1970). Pandya (1973) opined that green gram can be grown successfully during spring as well as summer under irrigated conditions. The global production of green gram is around 2.5 Mt from about 5 Mha with productivity around 500 kg ha<sup>-1</sup>. In India, the area under green gram is 3.8 Mha with an annual production of 1.56 Mt. Average productivity is 413 kg ha<sup>-1</sup> (Reddy and Reddi, 2016). Chhattisgarh is an important state as it contributed about 8 per cent of the total annual pulses area, production and productivity in Chhattisgarh about 40.70 lakh ha, 19.01 lakh ton and 467 kg ha<sup>-1</sup> respectively (Ministry of Agriculture. 2018).

## Materials and Methods

A field experiment was conducted during summer season of 2021 at Research Farm, S.G. College of Agriculture and Research Station, Jagdalpur, Bastar. The soil of experimental field was Inceptisols, with acidic in reaction (pH-7.1), organic carbon was medium, available N was low and available P and K was medium. The experiment was laid out in Randomized complete Block Design (RBD) with three replications. Eight treatment comprised of Fenoxaprop-p-ethyl 9.3% EC@ 54g ha<sup>-1</sup> at 20-25 DAS, Oxyfluorfen 23% EC@ 250g ha<sup>-1</sup> at 20-25 DAS, Imazethapyr 10% SL@ 100g ha<sup>-1</sup> at 20-25 DAS, Imazethapyr + imazamox 70 % WG 100g ha<sup>-1</sup> at 20-25 DAS, Quizalofop-p-ethyl 5% EC@ 50g ha<sup>-1</sup> at 20-25 DAS, Sodium acifluorfen 16.5% + clodinafop propargy 8% (165+80g) ha<sup>-1</sup> at 20-25 DAS, Two hand weeding at 20 and 40 DAS and Absolute control. The green gram variety 'IPM 205-7' was sown on 28 January 2021 at a row spacing of 30 cm using 25 kg ha<sup>-1</sup>. The crop was fertilized with 20 kg N, 40 kg P<sub>2</sub>O<sub>5</sub> and 20 kg K<sub>2</sub>O ha<sup>-1</sup>. Entire dose of fertilizer through Urea, SSP and MOP was applied as basal dressing in furrows. Plant to plant spacing however was maintained by thinning at 20 DAS. The crop was protected from insect - pest through spray of chloripyriphos @ 1.5 liter ha<sup>-1</sup>.

Herbicidal spray was done either as post emergence at 25 DAS as per treatment.

## Results and Discussion

### Growth attributes

Different weed control treatments had significant and non significant effect on growth and yield during crop growth stages. (Table1).

Plant emergence was recorded non significant due to different treatments. Significantly taller plant was recorded in treatment two hand weeding (T<sub>7</sub>) in all the growth stages. It might be due to less crop-weed competition. Similar result is also reported by Samant and Mohanty (2017). Significantly higher numbers of branches were recorded in treatment two hand weeding (T<sub>7</sub>). Similar result was also reported by Kundu *et al.*, (2011) and Srivastava *et al.*, (2003). Two hand weeding (T<sub>7</sub>) produced statistically higher grain yield which was found on par with the treatment Sodium acifluorfen 16.5% + clodinafop propargy 8%(165+80 g ha<sup>-1</sup>) (T<sub>6</sub>), Oxyfluorfen 23% EC @ 250g ha<sup>-1</sup> (T<sub>2</sub>) and Imazethapyr + imazamox 70 % WG 100g ha<sup>-1</sup> (T<sub>4</sub>) respectively, and lowest yield was recorded in treatment absolute control (T<sub>8</sub>).

Haulm yield and harvest index produced non significant effect due to different weed management treatments but numerically higher haulm yield was observed in treatment Two hand weeding (T<sub>7</sub>) and treatment Imazethapyr 10% SL @ 100g ha<sup>-1</sup> (T<sub>3</sub>) observed numerically higher harvest index while lowest harvest index was observed in treatment Sodium acifluorfen 16.5% + clodinafop propargy 8%(165+80 g ha<sup>-1</sup>) (T<sub>6</sub>). The increase in grain yield and straw yield was due to efficient weed management practices which is also reported by Singh *et al.*, (1991), Chand *et al.*, (2004) and Singh (2011). Harvest index was considerably influenced due to weed management practices which was also reported by Kumar *et al.*, (2017).

**Table.1** Effect of different weed control method on growth and yield of Green gram (*Vigna radiata* L.)

Treatment	Plant emergence	Plant height (cm)	Grain yield (q ha <sup>-1</sup> )	Haulm yield (q ha <sup>-1</sup> )	Harvest index (%)
T <sub>1</sub> Fenoxaprop-p-ethyl 9.3% EC @ 54g ha <sup>-1</sup>	84.00	29.58	8.72	14.05	38.24
T <sub>2</sub> Oxyfluorfen 23% EC @ 250g ha <sup>-1</sup>	85.47	28.23	10.24	15.95	36.79
T <sub>3</sub> Imazethapyr 10% SL @ 100g ha <sup>-1</sup>	82.93	32.35	8.64	13.56	43.13
T <sub>4</sub> Imazethapyr + imazamox 70 % WG 100g ha <sup>-1</sup>	83.73	34.41	9.34	15.86	41.26
T <sub>5</sub> Quizalofop-p-ethyl 5% EC @ 50g ha <sup>-1</sup>	81.60	33.04	8.37	13.03	41.96
T <sub>6</sub> Sodium acifluorfen 16.5% + clodinafop propargy 8% (165+80 g ha <sup>-1</sup> )	86.27	33.68	10.69	16.65	36.46
T <sub>7</sub> Two hand weeding 20 and 40 DAS	89.33	34.57	11.19	17.21	39.73
T <sub>8</sub> Absolute control	79.47	24.77	7.61	12.72	37.83
SEm±	5.50	1.95	0.66	2.03	1.69
CD at 0.05	NS	5.97	2.03	NS	NS
CV %	11.32	10.78	7.70	14.53	7.42

**Table.2** Effect of different weed control method on economics of green gram

Treatment	Gross Returns (Rs. ha <sup>-1</sup> )	Net returns (Rs. ha <sup>-1</sup> )	B:C ratio
T <sub>1</sub> Fenoxaprop-p-ethyl 9.3% EC @ 54g ha <sup>-1</sup>	66249	47021	2.45
T <sub>2</sub> Oxyfluorfen 23% EC @ 250g ha <sup>-1</sup>	77681	58772	3.11
T <sub>3</sub> Imazethapyr 10% SL @ 100g ha <sup>-1</sup>	65528	46125	2.38
T <sub>4</sub> Imazethapyr + imazamox 70 % WG 100g ha <sup>-1</sup>	71146	50967	2.53
T <sub>5</sub> Quizalofop-p-ethyl 5% EC @ 50g ha <sup>-1</sup>	63486	44033	2.26
T <sub>6</sub> Sodium acifluorfen 16.5% + clodinafop propargy 8% (165+80 g ha <sup>-1</sup> )	81064	61036	3.05
T <sub>7</sub> Two hand weeding	84875	58846	2.26
T <sub>8</sub> Absolute control	57974	39446	2.13
SEm±	4573	4167	0.18
CD at 0.05	14006	12,727	0.56
CV %	11.16	14.21	12.75

### Economics

All the weed management on economics are presented in Table 2. The data reveals that treatment two hand weeding (T<sub>7</sub>) produced significantly higher gross income which was comparable with treatment Sodium acifluorfen 16.5% + clodinafop propargy 8% (165+80 g ha<sup>-1</sup>) (T<sub>6</sub>), Oxyfluorfen 23%

EC @ 250g ha<sup>-1</sup> (T<sub>2</sub>) and Imazethapyr + imazamox 70 % WG 100g ha<sup>-1</sup> (T<sub>4</sub>). Net return produced significantly higher in treatment Sodium acifluorfen 16.5% + clodinafop propargy 8% (165+80 g ha<sup>-1</sup>) (T<sub>6</sub>) and it was found on par with two hand weeding (T<sub>7</sub>) and Oxyfluorfen 23% EC @ 250g ha<sup>-1</sup> (T<sub>2</sub>) whereas, significantly higher B: C ratio was observed in treatment Oxyfluorfen 23% EC @ 250g

ha<sup>-1</sup> (T<sub>2</sub>) and it was comparable with treatment Sodium acifluorfen 16.5+clodinafop Propargy 8 % (165+80 g ha<sup>-1</sup>) (T<sub>6</sub>) and Imazethapyr + imazamox 70 % WG 100g ha<sup>-1</sup> (T<sub>4</sub>) respectively. It was due to better weed control at low investment and higher yield Kumar *et al.*, (2017), Kumar *et al.*, (2010), Prakash *et al.*, (2006) and Singh (2011).

Maintenance of weed management practices by hand weeding resulted in lowest growth and yield with absolute control method of all types of weed control method but highest plant height, number of branches, grain yield, straw yield and harvest index of green gram as compared to herbicide treatments. At the same data showed an effective controls of weeds by post emergence application of Quizalofop-p-ethyl 5% EC @ 50g ha<sup>-1</sup> and clearly depicted decreased plant emergence, plant height, number of branches plant<sup>-1</sup>, grain yield, haulm yield and harvest index and economics but increased Sodium acifluorfen 16.5% + clodinafop propargy 8% (165+80 g ha<sup>-1</sup>) to other chemical treatments. As post emergence application of Sodium acifluorfen 16.5% + clodinafop propargy 8% (165+80 g ha<sup>-1</sup>) was statistically at par with hand weeding as well as Quizalofop-p-ethyl 5% EC @ 50g ha<sup>-1</sup>, so farmers can go for post-emergence application of Sodium acifluorfen 16.5% + clodinafop propargy 8% (165+80 g ha<sup>-1</sup>) furthermore, by this maintenance of absolute control method condition with hand weeding can also be omitted by farmers as it can save a lot of time, capital and labour which can be utilized in other agricultural operations.

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