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## Effect of herbicidal weed management on growth, yield attributes and productivity of *Lathyrus (Lathyrus sativus L.)* for Chhattisgarh

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### Abstract

The present research entitled "Effect of herbicidal weed management on growth, yield attributes and productivity of *Lathyrus (Lathyrus sativus L.)* for Chhattisgarh" was carried out at the College of Agriculture, Raipur (CG), Research-cum-Instructional Farm, during the 2020–21 Rabi season. The soil used for the experiment was sandy loam, with a pH of neutral, low available nitrogen, medium accessible phosphorus, and high potassium content. Three replications and a randomized block design were used to set up the experiment. The results of the experiment demonstrated that treatment T<sub>14</sub> significantly outperformed in terms of plant population, plant height, number of branches per plant, dry weight accumulation per plant, number of nodules per plant, and dry weight of nodules per plant, as well as crop growth rate and yield attributes, including number of seeds per plant, number of seedspod<sup>-1</sup>, seed yield (Kg ha<sup>-1</sup>), stover yield (Kg ha<sup>-1</sup>), 100 seed weight, and harvest index. Hand weeding twice, at 20 and 40 DAS, as opposed to alternative weed control techniques.

**Keywords:** herbicidal, management, attributes, *Lathyrus sativus L.*

### Introduction

According to Graham and Vance (2003) [5], pulses account for 12–15% of all arable land worldwide and contribute 30% of the total protein and nitrogen needed by humans in their diet. According to FAOSTAT (2015) [4], the 2013 worldwide pulse production, area, and yield were 73 million tonnes (MT), 80.8 million hectares (m ha), and 904 kg ha<sup>-1</sup>, respectively.

Madhya Pradesh, Chhattisgarh, Maharashtra, Bihar, Orissa, West Bengal, and Eastern Uttar Pradesh are the main states in India that grow grass peas. The overall area and production of Khesari were recorded as 5.11 lakh hectares and 4.07 lakh tonnes, respectively, during the twelfth plan (2012-2016). In terms of area and production, Chhattisgarh held the top spot with 66.68% and 60.54%), followed by Bihar with 13.10% and 16.95%. The predominant method of farming in Chhattisgarh is the "utera" system, in which grass pea seeds are sown on standing paddy fields ten to fifteen days before to harvest.

Northern India uses the drought-resistant, high-yielding legume *Lathyrus sativus* (grass pea) as food. However, the neurotoxic beta-ODAP, which causes irreversible paralysis in seeds, has hampered progress. Some low-toxin lines that might be suitable for use in foods for humans and animals have recently been produced. Future *Lathyrus* output and area are anticipated to rise with the discovery of high yielding and low ODAP lines.

Weeds are often managed using a combination of cultural, mechanical, chemical, and biological techniques, or by using each technique separately. The crop-weed competition was effectively reduced by weed management techniques such as manual weeding and hoeing, but these methods are not without limitations. For example, it can be difficult to use mechanical weeders in heavy soils and there may not be enough labour available during weeding peaks. Mechanical hand weeding can cause harm to the crop's surface feeding roots, making hand weeding a laborious and time-consuming task. Crops are severely stressed during interculture by hoe. In these circumstances, chemical weed management appears to be the most effective way to defeat the competition from weeds. Application of herbicides with a pre-emergence and pre-plant incorporation

### Materials and Methods

The experiment "Effect of herbicidal weed management on growth, yield attributes and productivity of *Lathyrus (Lathyrus sativus L.)* for Chhattisgarh" was carried out at the IGKV

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Research-cum-Instructional Farm during the 2020–21 *Rabi* season. The area has a semi-arid to sub-humid climate. The experiment was carried out in vertisols that had neutral reactions and low, medium, and high concentrations of N, P, and K, respectively. The study employed a randomised block design with three replications and fifteen treatments, namely T<sub>1</sub>: Oxadiargyl @ 80g ha<sup>-1</sup> 0-3 DAS, T<sub>2</sub>: Metribuzin @ 350g ha<sup>-1</sup> 0-3 DAS, T<sub>3</sub>: Topramezone @19.35g ha<sup>-1</sup>, T<sub>4</sub>: Topramezone @25.8 g ha<sup>-1</sup> at T<sub>5</sub>: Topramezone @32.25g ha<sup>-1</sup>, T<sub>6</sub>: Topramezone (directed application) @25.8g ha<sup>-1</sup>, T<sub>7</sub>: Fluzifop-p-butyl 13.4% + Fomesafen 11.1% (directed application) @250g ha<sup>-1</sup>, T<sub>8</sub>: Metribuzin @ 350g ha<sup>-1</sup> fb Topramezone @ 25.8g ha<sup>-1</sup> at 0-3 DAS, T<sub>9</sub>: Metribuzin @ 350g ha<sup>-1</sup> fb Metribuzin @ 350g ha<sup>-1</sup> at 0-3 DAS, T<sub>10</sub>: Fluzifop-p-butyl 13.4% + fomesafen 11.1% @250g ha<sup>-1</sup>, T<sub>11</sub>: Sodium acifluorfen 16.5% + clodinafop propargyl 8% (directed application) @187.5g ha<sup>-1</sup>, T<sub>12</sub>: Metribuzin (directed application) @350g/ha, T<sub>13</sub>: Metsulfuron (directed application) @4g ha<sup>-1</sup>, T<sub>14</sub>: Hand weeding twice 20 & 40 DAS and T<sub>15</sub>: Control unweeded. On October 15, 2020, the *Lathyrus* variety Prateek was sowed, and on March 10, 2021, it was harvested. Various yield-attributing characteristics, such as test weight, seed yield, stover yield, pods plant<sup>-1</sup>, and seed pod<sup>-1</sup>, were collected during the crop growth period in accordance with the investigation's requirements and timetable.

## Results and Discussion

The next section includes a statistical analysis and discussion of the effects of various treatments on green pea yield characteristics and yield; In comparison to other weed management techniques,

treatment T<sub>14</sub>: Hand weeding twice, 20 and 40 DAS, had the significantly highest number of pod plant<sup>-1</sup> (12.91), number of seeds pod<sup>-1</sup> (3.80), test weight (8.43 g), seed yield (1037 kg ha<sup>-1</sup>), stover yield (1904 kg ha<sup>-1</sup>), and harvest index (35.25%). However, it was found to be on par with treatment T<sub>9</sub>: Metribuzin @ 350g ha<sup>-1</sup> fb Metribuzin @ 350g ha<sup>-1</sup>. It might be because better crop growth and photosynthate translocation in T<sub>14</sub> and T<sub>9</sub> were caused by effective weed control. Treatment T<sub>15</sub>: Unweeded control resulted in considerably lower test weight (6.40 g), seed yield (348 kg ha<sup>-1</sup>), stover yield (1313 kg ha<sup>-1</sup>), harvest index (20.97%), and number of pod plant<sup>-1</sup> (7.80) and number of seeds pod<sup>-1</sup> (2.77).

Increased pod production in treatments T<sub>14</sub> and T<sub>9</sub> may be the consequence of higher values of yield contributing characters, such as number of pods plant<sup>-1</sup>, number of seeds pod<sup>-1</sup>, and test weight, which allowed the lathyrus crop to properly use resources like nutrients, moisture, light, and space in an environment with no weed competition. Less weed competition throughout the growth and development period may have led to improved growth characteristics and a greater yield, as evidenced by the increased seed and stover yields found in the aforementioned treatments. However, an opposite trend was noted as a result of the increased weed competition in the control plot, and treatment T<sub>15</sub> showed the lowest yield. Under weed management techniques, the maximum harvest index may result from the appropriate transfer of photosynthetic from source to sink throughout the reproductive stage, increasing. This result was conformity to Singh *et al.* (2015) [6], Kalhapure *et al.* (2013) [8] and Sahoo *et al.* (2017) [10]. The findings are also in accordance with those recorded by Poonia *et al.* (2016) [9], Babu *et al.* (2014) [1], Kalhapure *et al.* (2013) [8] and Bhale *et al.* (2011) [2].

**Table 1:** The economics, harvest index, stover output, seed yield, and yield qualities of lathyrus as impacted by various weed control techniques

Treatments	Number of pods plant <sup>-1</sup>	Number of seeds pod <sup>-1</sup>	Test Weight (g)	Seed yield (kg ha <sup>-1</sup> )	Stover yield (kg ha <sup>-1</sup> )	Harvest index (%)
T <sub>1</sub> Oxadiargyl @ 80g ha <sup>-1</sup> at 0-3 DAS	11.20	3.48	8.06	841.17	1786.83	32.01
T <sub>2</sub> Metribuzin @ 350g ha <sup>-1</sup> at 0-3 DAS	10.51	3.24	7.68	768.00	1768.33	30.28
T <sub>3</sub> Topramezone @ 19.35g ha <sup>-1</sup> weed	10.21	3.13	7.57	758.33	1697.00	30.89
T <sub>4</sub> Topramezone @ 25.8g ha <sup>-1</sup>	10.04	3.03	7.43	714.37	1665.96	30.01
T <sub>5</sub> Topramezone @ 32.25g ha <sup>-1</sup>	9.76	2.93	7.37	663.00	1623.38	29.00
T <sub>6</sub> Topramezone (directed application) @ 25.8g ha <sup>-1</sup>	11.68	3.75	8.34	924.33	1851.66	33.30
T <sub>7</sub> Fluzifop-p-butyl 13.4% + Fomesafen 11.1% (directed application) @ 250g ha <sup>-1</sup>	10.33	3.20	7.62	760.17	1692.17	31.00
T <sub>8</sub> Metribuzin @ 350g ha <sup>-1</sup> fb Topramezone @ 25.8g ha <sup>-1</sup>	11.55	3.63	8.21	912.33	1843.92	33.10
T <sub>9</sub> Metribuzin @ 350g ha <sup>-1</sup> fb Metribuzin @ 350g ha <sup>-1</sup>	12.33	3.77	8.39	950.92	1881.58	33.57
T <sub>10</sub> Fluzifop-p-butyl 13.4% + fomesafen 11.1% @ 250g ha <sup>-1</sup>	8.50	2.81	6.52	593.75	1603.08	27.03
T <sub>11</sub> Sodium acifluorfen 16.5% + clodinafop propargyl 8% (directed application) @ 187.5g ha <sup>-1</sup>	10.89	3.31	7.88	781.21	1731.21	31.09
T <sub>12</sub> Metribuzin (directed application) @ 350g ha <sup>-1</sup>	11.07	3.43	7.92	819.41	1765.75	31.70
T <sub>13</sub> Metsulfuron (directed application) @ 4g ha <sup>-1</sup>	11.26	3.52	8.19	868.25	1814.92	32.36
T <sub>14</sub> Hand weeding twice at 20 & 40 DAS	12.91	3.80	8.43	1036.67	1904.21	35.25
T <sub>15</sub> Unweeded control	7.80	2.77	6.40	348.62	1313.96	20.97
S.Em±	0.57	0.24	8.06	50.65	104.87	-
CD (P=0.05)	1.65	NS	NS	146.71	303.80	-

## Conclusion

The experiment's further results showed that Metribuzin @ 350g ha<sup>-1</sup> fb Metribuzin @ 350g ha<sup>-1</sup> at 0-3 DAS was the next highest value for yield attributing characters, such as number of pod plant<sup>-1</sup>, number of seeds pod<sup>-1</sup> and test weight, seed yield, Stover yield, and harvest index, after hand weeding twice at 20 and 40 DAS.

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