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## Influence of various nutrient management practices on growth, yield, quality and economics of Chandrasur (*Lepidium sativum* L.)

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### Abstract

The present investigation was conducted to evaluate the “Influence of various nutrient management practices on growth, yield, quality and economics of Chandrasur (*Lepidium sativum* L.)” under the agro-climatic conditions of Chhattisgarh. The field experiment was conducted during the rabi season of 2025-26 at the University Farm, Indira Gandhi Krishi Vishwavidyalaya, Raipur (C.G.). The experiment comprised eight nutrient management treatments with three replications and was laid out in a randomized block design (RBD). The nutrient management treatments included different combinations of recommended dose of fertilizers (RDF), farmyard manure (FYM), biofertilizers and organic liquid inputs. Among the treatments, application of 75% RDF @ 60:45:30 kg ha<sup>-1</sup> N:P<sub>2</sub>O<sub>5</sub>:K<sub>2</sub>O + 25% FYM @ 3 t ha<sup>-1</sup> (T<sub>8</sub>) recorded superior performance for major growth attributes. The treatment recorded the highest plant height at 30, 60, 90 DAS and at harvest), as well as the highest number of primary branches plant<sup>-1</sup>). It also recorded the maximum number of leaves plant<sup>-1</sup> and dry matter accumulation at the different growth stages. The control treatment (T<sub>1</sub>) recorded the lowest values for the major growth attributes. The superior performance of 75% RDF @ 60:45:30 kg ha<sup>-1</sup> N:P<sub>2</sub>O<sub>5</sub>:K<sub>2</sub>O + 25% FYM @ 3 t ha<sup>-1</sup> may be attributed to the complementary effects of inorganic fertilizers and FYM, which ensured a readily available as well as sustained supply of nutrients and improved the soil environment for better nutrient uptake and plant growth. The study indicates that integrated application of 75% RDF @ 60:45:30 kg ha<sup>-1</sup> N:P<sub>2</sub>O<sub>5</sub>:K<sub>2</sub>O + 25% FYM @ 3 t ha<sup>-1</sup> (has considerable potential for improving the growth and productivity of Chandrasur under the conditions of Chhattisgarh.

**Keywords:** Chandrasur, *Lepidium sativum* L., nutrient management, integrated nutrient management, RDF, FYM, growth, yield, quality, economics

### Introduction

Chandrasur (*Lepidium sativum* L.), commonly known as garden cress, is an underutilized but highly nutritious seed spice and medicinal herb belonging to the family Brassicaceae. The crop has been used in Ayurveda and folk medicine for centuries due to its health-promoting effects, particularly in enhancing haemoglobin levels, supporting bone health, increase the milk production in lactating women and milch animal, improving digestive functions and also used to treatment of menstrual disorder. (Doke and Guha 2014) [3]. Chandrasur is believed to have originated in the Mediterranean and Middle Eastern regions, from where it spread to India and other Asian countries (Ghosh, 2005) [4]. In India, it is cultivated in Gujarat, Maharashtra, Madhya Pradesh, Rajasthan, Uttar Pradesh and also in chhattisgarh mainly cultivated for research purpose under varied agro-climatic conditions. In Chhattisgarh, rice harvesting takes place during October-November month and due to delayed harvesting, the available window for sowing the subsequent crop becomes very limited. Under such conditions, farmers prefer short-duration crops like Chandrasur, which can be successfully grown with residual soil moisture and minimal inputs. The crop mature within 110-120 days. Adoption of integrated nutrient management practices, which combine the judicious use of organic manures with inorganic fertilizers, is critical to sustaining soil fertility and enhancing yield potential of chandrasur, thereby ensuring its economic and medicinal importance across diverse agro-climatic zones.

Organic farming improves soil organic carbon, accessible nutrient content, microbial population and enzymatic activity, making it more sustainable for organic crop production (Dahiphale) 11. Adding different organic origin nutrients in the soil such as organic manure, bio-fertilizer and FYM will be effective in further improving productivity sustainably. *Ghanjeevamrit* and *jeevamrit* indigenous components/supplements have a greater load of microorganisms, which helps in the mineralization of essential macro and micronutrients elements that aid in plant availability and uptake. These formulations are incredibly rich in microorganisms that proliferate in the soil easily and help in boosting the microbial processes and their activity (Palekar S., 2006)<sup>[11]</sup>.

## Materials and Methods

A field experiment was conducted during rabi season 2025-26 at the University Farm, Indira Gandhi Krishi Vishwavidyalaya, Raipur (C.G.), India. The soil of the experimental field was clayey loam in texture and neutral to slightly alkaline in reaction, with low available nitrogen, high available phosphorus and high available potassium. The experiment consisted of eight different nutrient management treatments involving inorganic fertilizers, farmyard manure (FYM), biofertilizers and natural farming-based nutrient sources, with three replications in Randomized Block Design (RBD). The treatments were T<sub>1</sub>: Control; T<sub>2</sub>: 100% RDF @ 80:60:40 kg N:P<sub>2</sub>O<sub>5</sub>:K<sub>2</sub>O ha<sup>-1</sup>; T<sub>3</sub>: 50% RDF @ 40:30:20 kg N:P<sub>2</sub>O<sub>5</sub>:K<sub>2</sub>O ha<sup>-1</sup> + 50% FYM @ 6 t ha<sup>-1</sup>; T<sub>4</sub>: 100% FYM @ 12 t ha<sup>-1</sup> + *Azotobacter* @ 1.5 kg ha<sup>-1</sup> + *Phosphobacter* @ 2 kg ha<sup>-1</sup>; T<sub>5</sub>: 75% RDF @ 60:45:30 kg N:P<sub>2</sub>O<sub>5</sub>:K<sub>2</sub>O ha<sup>-1</sup> + 25% FYM @ 3 t ha<sup>-1</sup>; T<sub>6</sub>: *Ghanjeevamrit* @ 1000 kg ha<sup>-1</sup> + *Jeevamrit* @ 500 litres ha<sup>-1</sup> at 15 days intervals; T<sub>7</sub>: *Ghanjeevamrit* @ 1000 kg ha<sup>-1</sup> + *Jeevamrit* @ 500 litres ha<sup>-1</sup> at 15 days intervals + 20% cow urine foliar spray at 20 days intervals; and T<sub>8</sub>: FYM @ 12 t ha<sup>-1</sup> + *Jeevamrit* @ 500 litres ha<sup>-1</sup>.

Chandrasur (*Lepidium sativum* L.) variety GA-2 was used as the test crop. The crop was sown on 18<sup>th</sup> November 2025 at a spacing of 30 × 10 cm. The crop was harvested on 10<sup>th</sup> March 2026.

The growth observations viz., plant height (cm), number of primary branches plant<sup>-1</sup> and number of leaves plant<sup>-1</sup> were recorded at different stages of crop growth at 30, 60 and 90 days after sowing (DAS) and at harvest. For recording observations, five representative plants were randomly selected and tagged in each plot, and the mean values were used for statistical analysis. The data obtained for different growth attributes were subjected to analysis of variance (ANOVA) appropriate for Randomized Block Design. The significance of treatment differences was tested at 5% probability level and critical difference (CD) was calculated wherever the treatment effect was significant.

## Results and Discussion

**Growth attributes:** The plant height, number of primary

branches plant<sup>-1</sup> and dry matter accumulation increased with the progress in crop age, whereas the number of leaves increased up to 90 DAS and declined at harvest due to leaf senescence. These growth attributes significantly varied due to different nutrient management practices. Among the different nutrient management practices, application of 75% RDF @ 60:45:30 kg ha<sup>-1</sup> N:P<sub>2</sub>O<sub>5</sub>:K<sub>2</sub>O + 25% FYM @ 3 t ha<sup>-1</sup> (T<sub>5</sub>) recorded the highest plant height, number of primary branches plant<sup>-1</sup>, number of leaves plant<sup>-1</sup> and dry matter accumulation. Plant height under T<sub>5</sub> remained at par with 100% RDF @ 80:60:40 kg ha<sup>-1</sup> N:P<sub>2</sub>O<sub>5</sub>:K<sub>2</sub>O (T<sub>2</sub>) at 30 DAS and with T<sub>2</sub> and 50% RDF @ 40:30:20 kg ha<sup>-1</sup> N:P<sub>2</sub>O<sub>5</sub>:K<sub>2</sub>O + 50% FYM @ 6 t ha<sup>-1</sup> (T<sub>3</sub>) at 60 and 90 DAS, while at harvest it remained at par with T<sub>2</sub>, T<sub>3</sub> and 100% FYM @ 12 t ha<sup>-1</sup> + *Azotobacter* @ 1.5 kg ha<sup>-1</sup> + *Phosphobacter* @ 2 kg ha<sup>-1</sup> (T<sub>4</sub>). The number of primary branches under T<sub>5</sub> was at par with T<sub>2</sub>, T<sub>3</sub> and T<sub>4</sub> at 30 DAS, with T<sub>2</sub> at 90 DAS and with T<sub>2</sub>, T<sub>3</sub> and T<sub>4</sub> at harvest, while T<sub>5</sub> was significantly superior to all treatments at 60 DAS. The highest number of leaves under T<sub>5</sub> remained at par with T<sub>2</sub> at all stages, while dry matter accumulation under T<sub>5</sub> remained at par with T<sub>2</sub>, T<sub>3</sub> and T<sub>4</sub> throughout the crop growth period. On the other hand, the lowest values of these growth attributes were recorded under control (T<sub>1</sub>). The better growth under T<sub>5</sub> may be attributed to the balanced and sustained availability of nutrients through the combined application of inorganic fertilizers and FYM, which enhanced nutrient uptake, vegetative growth, leaf development and dry matter production. Similar improvement in growth and dry matter accumulation of Chandrasur due to integrated nutrient management was reported by Chouhan *et al.* (2014)<sup>[12]</sup> and Hemalatha *et al.* (2007)<sup>[6]</sup>.

## Yield and economics

Seed yield significantly varied due to different nutrient management practices. Application of 75% RDF @ 60:45:30 kg ha<sup>-1</sup> N:P<sub>2</sub>O<sub>5</sub>:K<sub>2</sub>O + 25% FYM @ 3 t ha<sup>-1</sup> (T<sub>5</sub>) recorded the highest seed yield of 17.27 q ha<sup>-1</sup>, which was at par with 100% RDF @ 80:60:40 kg ha<sup>-1</sup> N:P<sub>2</sub>O<sub>5</sub>:K<sub>2</sub>O (T<sub>2</sub>) recording 16.05 q ha<sup>-1</sup>, while it was significantly superior to 50% RDF @ 40:30:20 kg ha<sup>-1</sup> N:P<sub>2</sub>O<sub>5</sub>:K<sub>2</sub>O + 50% FYM @ 6 t ha<sup>-1</sup> (T<sub>3</sub>) and 100% FYM @ 12 t ha<sup>-1</sup> + *Azotobacter* @ 1.5 kg ha<sup>-1</sup> + *Phosphobacter* @ 2 kg ha<sup>-1</sup> (T<sub>4</sub>). The lowest seed yield was recorded under control (T<sub>1</sub>) with 7.19 q ha<sup>-1</sup>. The higher seed yield under T<sub>5</sub> may be attributed to the complementary effect of inorganic fertilizers and FYM, which provided readily available as well as sustained nutrients throughout crop growth and thereby improved yield formation. The B:C ratio was also highest under T<sub>5</sub> (3.40), followed by T<sub>2</sub> (3.30), whereas the lowest B:C ratio was recorded under control (T<sub>1</sub>) (1.82), indicating better economic efficiency of integrated nutrient management with 75% RDF + 25% FYM. Similar enhancement in seed yield and economic returns of Chandrasur under integrated nutrient management was reported by Chouhan *et al.* (2014)<sup>[12]</sup> and Rajnish Kumar and Sarvesh Kumar (2019)<sup>[8]</sup>.

**Table 1:** Plant height (cm) and Number of primary branches plant<sup>-1</sup> of chandrasur as influenced by various nutrient management practices at various stages of the crop

| Treatment                                                                                                                                                                 | Plant height (cm) |        |        |            | Number of primary branches plant <sup>-1</sup> |        |        |            |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|--------|--------|------------|------------------------------------------------|--------|--------|------------|
|                                                                                                                                                                           | 30 DAS            | 60 DAS | 90 DAS | At harvest | 30 DAS                                         | 60 DAS | 90 DAS | At harvest |
| T <sub>1</sub> : Control                                                                                                                                                  | 14.66             | 30.31  | 70.35  | 92.28      | 5.87                                           | 7.30   | 9.17   | 9.57       |
| T <sub>2</sub> : 100 % RDF @ 80:60:40 kg ha <sup>-1</sup> N: P <sub>2</sub> O <sub>5</sub> : K <sub>2</sub> O                                                             | 20.20             | 57.77  | 90.95  | 112.52     | 8.36                                           | 14.11  | 16.20  | 16.50      |
| T <sub>3</sub> : 50% RDF @ 40:30:20 kg ha <sup>-1</sup> N: P <sub>2</sub> O <sub>5</sub> : K <sub>2</sub> O + 50% FYM @ 6 ton ha <sup>-1</sup>                            | 18.60             | 53.98  | 87.31  | 109.93     | 8.90                                           | 12.93  | 13.60  | 15.90      |
| T <sub>4</sub> : 100 % FYM @ 12 ton ha <sup>-1</sup> + Azatobacter @ 1.5 kg ha <sup>-1</sup> + Phosphobacter @ 2 kg ha <sup>-1</sup>                                      | 18.30             | 49.72  | 82.15  | 108.69     | 8.40                                           | 12.30  | 12.50  | 15.13      |
| T <sub>5</sub> : 75 % RDF @ 60:45:30 kg ha <sup>-1</sup> N: P <sub>2</sub> O <sub>5</sub> : K <sub>2</sub> O + 25 % FYM @ 3 ton ha <sup>-1</sup>                          | 22.70             | 61.68  | 94.36  | 113.81     | 9.77                                           | 15.90  | 18.43  | 17.53      |
| T <sub>6</sub> : Ghanjeevamrit @ 1000 kg ha <sup>-1</sup> + Jeevamrit @ 500 lit ha <sup>-1</sup> at 15 days interval                                                      | 15.70             | 44.78  | 74.07  | 102.64     | 7.93                                           | 11.70  | 11.90  | 14.10      |
| T <sub>7</sub> : Ghanjeevamrit @ 1000 kg ha <sup>-1</sup> + Jeevamrit @ 500 litres ha <sup>-1</sup> at 15 days interval + 20 % Cow urine foliar spray at 20 days interval | 16.40             | 46.13  | 74.92  | 102.97     | 7.97                                           | 11.73  | 12.10  | 14.13      |
| T <sub>8</sub> : FYM @ 12 ton ha <sup>-1</sup> + Jeevamrit @ 500 lit ha <sup>-1</sup> at 15 days interval                                                                 | 17.55             | 47.62  | 76.12  | 103.29     | 8.17                                           | 11.93  | 12.30  | 14.77      |
| SEm±                                                                                                                                                                      | 0.94              | 2.67   | 3.02   | 3.07       | 0.48                                           | 0.54   | 0.73   | 0.83       |
| CD (P=0.05)                                                                                                                                                               | 2.84              | 8.09   | 9.16   | 9.32       | 1.45                                           | 1.63   | 2.23   | 2.52       |

**Table 2:** Number of leaves plant<sup>-1</sup>, Dry matter accumulation (g plant<sup>-1</sup>), Seed yield (q ha<sup>-1</sup>) and B:C ratio of chandrasur as influenced by various nutrient management practices at various stages of the crop

| Treatment                                                                                                                                                                 | Number of leaves plant <sup>-1</sup> |        |        |            | Dry matter accumulation (g plant <sup>-1</sup> ) |        |        |            | Seed yield (q ha <sup>-1</sup> ) | Benefit cost ratio (B:C) |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|--------|--------|------------|--------------------------------------------------|--------|--------|------------|----------------------------------|--------------------------|
|                                                                                                                                                                           | 30 DAS                               | 60 DAS | 90 DAS | At harvest | 30 DAS                                           | 60 DAS | 90 DAS | At harvest |                                  |                          |
| T <sub>1</sub> : Control                                                                                                                                                  | 51.67                                | 73.92  | 29.12  | 9.52       | 5.18                                             | 13.03  | 18.59  | 20.10      | 7.19                             | 1.82                     |
| T <sub>2</sub> : 100 % RDF @ 80:60:40 kg ha <sup>-1</sup> N: P <sub>2</sub> O <sub>5</sub> : K <sub>2</sub> O                                                             | 69.28                                | 106.64 | 55.32  | 17.36      | 8.24                                             | 16.50  | 23.03  | 24.76      | 16.05                            | 3.30                     |
| T <sub>3</sub> : 50% RDF @ 40:30:20 kg ha <sup>-1</sup> N: P <sub>2</sub> O <sub>5</sub> : K <sub>2</sub> O + 50% FYM @ 6 ton ha <sup>-1</sup>                            | 69.11                                | 103.55 | 45.50  | 15.60      | 7.68                                             | 15.93  | 22.53  | 24.17      | 14.73                            | 2.79                     |
| T <sub>4</sub> : 100 % FYM @ 12 ton ha <sup>-1</sup> + Azatobacter @ 1.5 kg ha <sup>-1</sup> + Phosphobacter @ 2 kg ha <sup>-1</sup>                                      | 64.27                                | 100.11 | 43.69  | 14.60      | 6.98                                             | 15.30  | 21.50  | 22.83      | 14.20                            | 2.43                     |
| T <sub>5</sub> : 75 % RDF @ 60:45:30 kg ha <sup>-1</sup> N: P <sub>2</sub> O <sub>5</sub> : K <sub>2</sub> O + 25 % FYM @ 3 ton ha <sup>-1</sup>                          | 72.03                                | 112.20 | 57.79  | 18.46      | 9.14                                             | 17.23  | 23.63  | 24.93      | 17.27                            | 3.40                     |
| T <sub>6</sub> : Ghanjeevamrit @ 1000 kg ha <sup>-1</sup> + Jeevamrit @ 500 lit ha <sup>-1</sup> at 15 days interval                                                      | 60.76                                | 95.72  | 40.70  | 13.52      | 5.64                                             | 13.95  | 19.50  | 21.30      | 10.33                            | 2.23                     |
| T <sub>7</sub> : Ghanjeevamrit @ 1000 kg ha <sup>-1</sup> + Jeevamrit @ 500 litres ha <sup>-1</sup> at 15 days interval + 20 % Cow urine foliar spray at 20 days interval | 61.26                                | 96.32  | 41.78  | 13.93      | 6.14                                             | 14.43  | 19.83  | 21.63      | 10.80                            | 2.25                     |
| T <sub>8</sub> : FYM @ 12 ton ha <sup>-1</sup> + Jeevamrit @ 500 lit ha <sup>-1</sup> at 15 days interval                                                                 | 61.60                                | 99.24  | 42.78  | 14.25      | 6.74                                             | 14.58  | 21.00  | 22.37      | 11.80                            | 2.01                     |
| SEm±                                                                                                                                                                      | 3.66                                 | 3.03   | 1.68   | 0.62       | 0.33                                             | 0.44   | 0.64   | 0.78       | 0.78                             |                          |
| CD (P=0.05)                                                                                                                                                               | 11.10                                | 9.20   | 5.09   | 1.89       | 0.99                                             | 1.33   | 1.94   | 2.35       | 2.38                             |                          |

## Conclusion

Based on my research trail, the treatment combination 75% RDF @ 60:45:30 kg ha<sup>-1</sup> N:P<sub>2</sub>O<sub>5</sub>:K<sub>2</sub>O + 25% FYM @ 3 t ha<sup>-1</sup> (T<sub>5</sub>) was found to be more productive. Although the findings are based on one season further research is needed to confirm the findings and their recommendation.

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