**Optimization of phosphorus level on yield and economics of beetroot (*Beta vulgaris* L.) under Balaghat (M.P.) region**

**ABSTRACT**

This study aimed to explore how different levels of phosphorus influence the growth, yield and economics of the beetroot variety Golden Lalima conducted at the Horticulture Department's field within the School of Agriculture Science, Technology and Research at Sardar Patel University in Balaghat, Madhya Pradesh, during the Kharif season of 2023. The experiment utilized a Randomized Block Design (RBD) featuring eight treatments, each replicated three times. The findings from this investigation indicated that the treatment T5, which included nitrogen at 120 kg/ha, phosphorus at 180 kg/ha, and potassium at 100 kg/ha, significantly enhanced vegetative growth, achieving a plant height of 52.93 cm at harvest and an average of 23.33 leaves per plant. Additionally, it positively impacted yield attributes, with a root length of 13.58 cm, a root diameter of 7.69 cm, a root weight of 192.77 grams and a root yield of 30.05 tons per hectare. T5 also yielded the highest net return and an impressive benefit-cost ratio of 3.08. Therefore, applying phosphorus at a rate of 180 kg/ha is recommended to boost crop productivity and improve the overall quality of beetroot in the Balaghat region.

**Keywords:** Beetroot, Phosphorus and Benefit cost ratio*.*

**INTRODUCTION**

Beetroot (vernacular name: Chukundar), botanically known as *Beta vulgaris* (L.) is one of the well-known plants belonging Amaranthaceae family includes approximately 1400 species divided into 105 genera. Also known as sugar beet are members of this family are dicotyledonous. It is an erect annual herb with tuberous root stocks. There are basically four varieties of Beetroot namely known as Detroit dark red, Crimson Globe, Crosby Egyptian and early Wonder. It ranks among the ten most potent vegetables with respect to antioxidant property. It is a diploid cross-pollinated dicot plant species with chromosome number 2n=2x=18 (**Kadam *et al.*, 2018**). The beetroot (*Beta vulgaris* L.) is the taproot (bulb) portion of the beet plant. It is grown in temperate countries and biennial plant. The beetroot and its juice are freely consumed for its great taste, nutritional benefit, and flavor content. At present its productivity is 20-25 t/ha fruit per year in India. As per National Institute of Nutrition (**Choudhary, 2013**), nutritional composition of beetroot constituted Moisture (87.7g), Protein (1.7g), Fat (0.7g), Mineral (0.8g), Crude fibre (0.9g), Carbohydrates (8.8g), Calories (43Kcal), Calcium (18.3 mg/100g), Phosphorus (55 mg/100g) and Iron (1.19 mg). Beetroot has excellent physiological properties. Its macro- and micro biomolecule content is remarkable, and its vitamin content is high. Its vitamin A and C content is substantial, and its vitamin B is outstanding. Vitamin B1 (thiamine), vitamin B2 (riboflavin), and vitamin B3 (niacin) can be found in most root vegetables with dark green leaf, such as in beetroot. Beetroot is also used as a coloring agent and in medicinal applications, other than as a food. Beetroot is an excellent folate source and a good manganese source (USDA nutritional database, 2014). The area under production of beetroot in India is estimated to be around 23.68 million hectares and production is 199.88 million metric tons (**NHB, 2021**). Phosphorus is also one of the important macronutrients play a vital role in crop growth as it is involved in several key plant cellular activities like energy transfer, photosynthesis, transformation of sugars and starches and transfer of genetic characteristics from one generation to the next. It also promotes root proliferation that increases root volume and improves soil nutrient exploration. Phosphorus shortage restricted the plant growth and remains immature (**Lodhi *et al.,* 2019**). The effect of phosphorus on the formation and translocation of carbohydrates, roots development, nodulation, growth and other agronomic characters are well recognized. Phosphorus induces earliness in flowering and fruiting including seed formation. Again, secondary mechanism of interference was the absorption of phosphorus from the soil through luxury consumption, increasing the tissue content without enhancing smooth biomass accumulation (**Santos *et al*., 2004**). Researching the optimization of various phosphorus levels on the growth and yield of beetroots is crucial due to phosphorus's essential role in plant development. Phosphorus significantly influences root formation, energy transfer, and overall plant vigour, which are vital for achieving high yields and quality in beetroot crops. Given the variability in soil phosphorus availability and plant uptake efficiency, determining the optimal phosphorus levels can lead to more efficient fertilizer use, reducing costs and environmental impact. Moreover, optimized phosphorus application can enhance bulb size, improve storage quality, and increase marketability. This research is essential for sustainable agricultural practices, ensuring food security, and supporting farmers with precise nutrient management guidelines.

**MATERIAL AND METHODS**

This study aimed to explore how varying levels of phosphorus influence the growth and yield of the Golden Lalima beetroot variety. It details the materials and methods used during the research, which took place at the Horticulture Department of the School of Agriculture Science, Technology and Research at Sardar Patel University in Balaghat, Madhya Pradesh, during the Rabi season of 2023. Balaghat District is situated in the south-eastern part of the Satpura Range, near the upper valley of the Wainganga River, and spans from 21°19’ to 22°24’ north latitude and 79°31’ to 81°30’ east longitude. The treatments were T0 (Control), T1 (RDF100% [NPK: 120:160:100 Kg/ha]), T2 (N @ 120 kg/ha + P @ 140 kg/ha K @ 100 kg/ha each), T3 (N @ 120 kg/ha + P @ 150 kg/ha K @ 100 kg/ha each), T4 (N @ 120 kg/ha + P @ 170 kg/ha K @ 100 kg/ha each), T5 (N @ 120 kg/ha + P @ 180 kg/ha K @ 100 kg/ha each), T6 (N @ 120 kg/ha + P @ 190 kg/ha K @ 100 kg/ha each), T7 (N @ 120 kg/ha + P @ 200 kg/ha K @ 100 kg/ha each). The number of days taken from the date of sowing to the date of 50% emergence of seedling in whole plot were recorded as days to germination. Using a metre scale, the height of five randomly chosen grafted plants from each plot was measured in centimeters at 30, 60 DAT (days after sowing) and at harvest stage, starting from the ground and ending at the tip of the shoot. Every replication's average plant height was noted and then statistically examined. Average root length was taken from randomly five roots from randomly selected plants by using measuring tape and scale, averaged, and subjected to statistical analysis. Weight of 5 fresh plant selected randomly in each treatment and replication was taken and averaged for each replication and treatments and subjected for analysis. The yield was calculated by weighing the marketable roots. The readings for all the two plants/plot were recorded. The average yield/plant was calculated by dividing the total yield of the treatments with the total number of plants in plot.The statistical analysis was conducted using **Fisher and Yates (1967)**.

**RESULTS AND DISCUSSION**

According to **Tiwari *et al.* (2022)**, One of the primary issues in crop production is phosphorus deficiency. Due to its slow diffusion and strong soil fixation, phosphorus is limited in availability. After nitrogen, phosphorus is the second most crucial nutrient for plant growth as it is an essential component of various biochemicals, including nucleic acids, nucleotides, phospholipids, and phosphoproteins. Adequate phosphorus nutrition enhances the ability of plants to perform various functions, such as photosynthesis, nitrogen fixation, flowering, seed formation, root development, and crop maturation. Research has shown that phosphorus fertilizer reduces sodium (Na+) levels in shoots, thereby improving rice survival, growth, and yield. Furthermore, phosphorus plays a vital role in the ATP molecule, which provides energy for plant activities like respiration, nutrient uptake, and translocation. Additionally, phosphorus is a crucial component in the transfer of DNA and RNA and the synthesis of proteins.

1. **Days to 50% germination**

The minimum days to 50% germination (4.98 days) was observed with treatment T5 (N @ 120 kg/ha + P@ 180 kg/ha K @ 100 kg/ha each) at par with T7 (N @ 120 kg/ha + P@ 200 kg/ha K @ 100 kg/ha each) with 5.40 days. Maximum days to 50% germination (7.09 days) was observed in T0 (control). Early germination in beetroot treated with N @ 120 kg/ha, P @ 180 kg/ha, and K @ 100 kg/ha can be attributed to the higher phosphorus application compared to the RDF100% treatment (NPK: 120:160:100 kg/ha) and other treatments with varying phosphorus levels. Phosphorus is critical for root development, energy transfer, and early plant vigour. The increased phosphorus availability likely enhanced seedling root growth and nutrient uptake efficiency, promoting quicker and more uniform germination. Additionally, the balanced supply of nitrogen and potassium in conjunction with the elevated phosphorus level could have provided an optimal nutrient environment, further supporting early growth and development in beetroot seedlings. Findings were in accordance with conclusions by **Zhu *et al.,* (2017); Reddy *et al.,* (2018)**.

1. **Plant height**

The maximum plant height (8.68, 24.71 and 52.93 cm) at 30, 60 DAT and at harvest respectively was observed with treatment T5 (N @ 120 kg/ha + P@ 180 kg/ha K @ 100 kg/ha each) followed by T4 (N @ 120 kg/ha + P@ 170 kg/ha K @ 100 kg/ha each) with 8.06, 23.28 and 51.79 cm at 30, 60 DAT and at harvest respectively. Minimum height of plant (5.68, 17.86 and 46.46 cm) was observed in T0 (control) at 30, 60 DAT and at harvest respectively, while the remaining treatments were moderate in their growth habit. The superior plant height in beetroot treated with N @ 120 kg/ha, P @ 180 kg/ha, and K @ 100 kg/ha compared to the RDF100% treatment (NPK: 120:160:100 kg/ha) and other treatments with different phosphorus levels can be attributed to the higher phosphorus application rate. Phosphorus plays a crucial role in energy transfer, root development, and the synthesis of nucleic acids and ATP, all of which are vital for robust vegetative growth. The increased phosphorus availability likely enhanced the establishment of a strong root system, improving nutrient and water uptake efficiency. Moreover, the balanced supply of nitrogen and potassium, in conjunction with the elevated phosphorus, created an optimal nutrient environment, promoting vigorous shoot growth and overall plant stature. This nutrient synergy likely stimulated cell division and elongation, leading to better plant height. The higher phosphorus level may have also reduced the time to achieve the growth stages, contributing to taller plants. Findings were in accordance with conclusions by **Modak *et al.,* (2021); Ali *et al.,* (2022)**.

1. **Number of leaves per plant**

The maximum number of leaves per plant observed at 30, 60 DAT and harvest stage (7.51, 13.33 and 23.33 leaves respectively) was in treatment T5 (N @ 120 kg/ha + P@ 180 kg/ha K @ 100 kg/ha each) at par with T4 (N @ 120 kg/ha + P@ 170 kg/ha K @ 100 kg/ha each) with 6.67, 12.13 and 21.77 leaves observed at 30, 60 DAT and harvest stage respectively. Minimum number of leaves per plant (3.68, 9.40 and 18.00 leaves) in T0 (control) observed at 30, 60 DAT and harvest stage respectively. The increased number of leaves per plant in beetroot treated with N @ 120 kg/ha, P @ 180 kg/ha, and K @ 100 kg/ha, compared to the RDF100% treatment (NPK: 120:160:100 kg/ha) and other treatments with varying phosphorus levels, can be attributed to the enhanced phosphorus supply. Phosphorus is essential for energy transfer and the formation of key biomolecules like nucleic acids and ATP, which are crucial for cell division and leaf development. The higher phosphorus availability likely promoted robust root growth, improving nutrient and water uptake. This optimal nutrient environment, complemented by adequate nitrogen and potassium, supported vigorous vegetative growth and leaf production. Additionally, the ample phosphorus may have expedited the metabolic processes associated with leaf initiation and expansion, leading to a greater number of leaves. The balance of nutrients likely optimized photosynthetic efficiency and overall plant health, further encouraging the development of more leaves. Similar findings were reported by **Singh *et al.,* (2021)**.

1. **Days to maturity**

The minimum days to maturity (61.00 days) was observed with treatment T5 (N @ 120 kg/ha + P@ 180 kg/ha K @ 100 kg/ha each) at par with T4 (N @ 120 kg/ha + P@ 170 kg/ha K @ 100 kg/ha each) with 62.93 days. Maximum days to maturity (70.04 days) was observed in T0 (control). The early maturity of beetroot in the treatment with N @ 120 kg/ha, P @ 180 kg/ha, and K @ 100 kg/ha compared to the RDF100% treatment (NPK: 120:160:100 kg/ha) and other treatments with varying phosphorus levels can be attributed to the higher phosphorus application. Phosphorus is crucial for energy transfer, root development, and metabolic processes, including the synthesis of nucleic acids and ATP, which are vital for rapid growth and development. The increased phosphorus availability likely enhanced root system development, facilitating efficient nutrient and water uptake. This optimized nutrient environment, with balanced nitrogen and potassium, promoted faster vegetative growth and accelerated the physiological processes leading to crop maturity. The enhanced nutrient uptake and metabolic activity likely hastened the transition from vegetative to reproductive stages, reducing the overall growth cycle duration. As a result, the plants reached maturity earlier, demonstrating improved efficiency in converting nutrients into biomass and reproductive structures. Similar findings were reported by **Aryal *et al.,* (2021)**.

1. **Root length, Root diameter and Root weight**

The maximum root length (13.58 cm) was observed with treatment T5 (N @ 120 kg/ha + P@ 180 kg/ha K @ 100 kg/ha each) followed by T4 (N @ 120 kg/ha + P@ 180 kg/ha K @ 100 kg/ha each) with 12.37 cm. Minimum root length (7.72 cm) was observed in T0 (control). The maximum root diameter (7.69 cm) was observed with treatment T5 (N @ 120 kg/ha + P@ 180 kg/ha K @ 100 kg/ha each) followed by T4 (N @ 120 kg/ha + P@ 170 kg/ha K @ 100 kg/ha each) with 7.13 cm. Minimum root diameter (3.82 cm) was observed in T0 (control). The maximum root weight (192.77 grams) was observed with treatment T5 (N @ 120 kg/ha + P@ 180 kg/ha K @ 100 kg/ha each) at par with T4 (N @ 120 kg/ha + P @ 170 kg/ha K @ 100 kg/ha each) with 178.14 grams. Minimum root weight (114.88 grams) was observed in T0 (control). The improved root length, diameter, and weight in beetroot treated with N @ 120 kg/ha, P @ 180 kg/ha, and K @ 100 kg/ha, compared to the RDF100% treatment (NPK: 120:160:100 kg/ha) and other treatments with varying phosphorus levels, can be attributed to the higher phosphorus availability. Phosphorus is essential for root development and is a key component of ATP, which drives energy-intensive processes such as cell division and elongation. The elevated phosphorus level likely facilitated better root initiation and growth, leading to longer roots. Additionally, the balanced supply of nitrogen and potassium supported overall plant health and efficient nutrient uptake, contributing to thicker root diameters and increased biomass accumulation. The ample phosphorus may have also enhanced the synthesis of structural and storage compounds within the roots, resulting in greater root weight. This optimal nutrient environment promoted vigorous root development, allowing the plants to efficiently acquire water and nutrients, ultimately leading to enhanced root growth characteristics. Similar findings were reported by **Sapkota *et al.,* (2021); Singh *et al.,* (2021)**.

1. **Root yield per plot and root yield per hectare**

The maximum root yield per plot (5.36 kg/plot) was observed with treatment T5 (N @ 120 kg/ha + P@ 180 kg/ha K @ 100 kg/ha each) at par with T4 (N @ 120 kg/ha + P@ 170 kg/ha K @ 100 kg/ha each) with 4.82 kg/plot. Minimum root yield per plot (3.18 kg/plot) was observed in T0 (control). The maximum root yield per hectare (30.05 t/ha) was observed with treatment T5 (N @ 120 kg/ha + P@ 180 kg/ha K @ 100 kg/ha each) followed by T4 (N @ 120 kg/ha + P@ 170 kg/ha K @ 100 kg/ha each) with 28.85 t/ha. Minimum root yield per hectare (19.52 t/ha) was observed in T0 (control). The superior yield of beetroot treated with N @ 120 kg/ha, P @ 180 kg/ha, and K @ 100 kg/ha, compared to the RDF100% treatment (NPK: 120:160:100 kg/ha) and other treatments with varying phosphorus levels, is primarily due to the enhanced phosphorus availability. Phosphorus plays a vital role in energy transfer, root development, and the synthesis of key biomolecules, including ATP, nucleic acids, and phospholipids. The increased phosphorus level promoted robust root growth, enhancing nutrient and water uptake efficiency, which are critical for optimal plant development. Additionally, the balanced nitrogen and potassium levels supported healthy vegetative growth and efficient metabolic processes. This combination of nutrients likely improved the physiological and biochemical processes in the plants, leading to better photosynthesis and resource allocation. Consequently, the plants exhibited improved growth parameters such as root length, diameter, and weight, culminating in higher overall yield. The ample phosphorus specifically supported early crop establishment and maturation, further contributing to the increased yield. Similar findings were reported by **Kadam *et al.,* (2018)**.

1. **Economics parameters**

Maximum cost of cultivation incurred in treatment T7 (N @ 120 kg/ha + P@ 200 kg/ha K @ 100 kg/ha each) with (Rs 1,47,538 ha-1) and the minimum (Rs 1,34,422 ha-1) was recorded in treatment T0 (Control). Maximum gross returns were recorded in treatment T5 (N @ 120 kg/ha + P@ 180 kg/ha K @ 100 kg/ha each) with (Rs 4,50,711 ha-1) followed by T4 (N @ 120 kg/ha + P@ 170 kg/ha K @ 100 kg/ha each) having Rs 4,32,768 ha-1 and the minimum (Rs 2,92,850 ha-1) was recorded in treatment T0 (Control). Maximum gross returns were recorded in treatment T5 (N @ 120 kg/ha + P@ 180 kg/ha K @ 100 kg/ha each) with (Rs 3,04,351 ha-1) followed by T4 (N @ 120 kg/ha + P@ 170 kg/ha K @ 100 kg/ha each) having Rs 2,86,984 ha-1 and the minimum (Rs 1,58,428 ha-1) was recorded in treatment T0 (Control). Maximum benefit coat ratio was recorded in treatment T5 (N @ 120 kg/ha + P@ 180 kg/ha K @ 100 kg/ha each) with (3.08) followed by T4 (N @ 120 kg/ha + P@ 170 kg/ha K @ 100 kg/ha each) having 2.97 and the minimum (2.18) was recorded in treatment T0 (Control). Similar findings were reported by **Sapkota *et al.,* (2021)**.

**Conclusion**

The overall results obtained from this present investigation clearly revealed that the application of T5 (N @ 120 kg/ha + P@ 180 kg/ha K @ 100 kg/ha each) showed the better performance for vegetative growth (plant height of 52.93 cm at harvest, number of leaves per plant with 23.33 leaves), yield attributes (root length of 13.58 cm and root diameter (7.69 cm), root weight (192.77 grams), root yield (30.05 t/ha)of beetroot. T5 also recorded highest net return and one of the best benefit cost ratios of 3.08. Thus, use of phosphorus @ 180 kg/ha may be suggested for higher crop productivity along with overall betterment of beetroot under Balaghat (M.P.) conditions.

**Disclaimer (Artificial Intelligence)**

I hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc) and text-to-image generators have been used during writing or editing of this manuscript.

**Competing Interests**

Authors have declared that no competing interests exist.

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**Table 1 Effect of different levels of phosphorus on growth and earliness parameters of beetroot**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Treatment Symbols** | **Treatment combination** | **Days to 50% germination** | **Plant height (cm)** | **No of leaves per plant** | **Days to maturity** |
|  | **At 30 DAT** | **At 60 DAT** | **At harvest** | **At 30 DAT** | **At 60 DAT** | **At harvest** |
| T0 | Control | 7.09 | 5.68 | 17.86 | 46.46 | 3.68 | 9.40 | 18.00 | 70.04 |
| T1 | RDF100% [NPK: 120:160:100 Kg/ha] | 5.76 | 7.20 | 23.13 | 49.71 | 6.39 | 11.79 | 22.33 | 64.43 |
| T2 | N @ 120 kg/ha + P @ 140 kg/ha K @ 100 kg/ha each | 6.47 | 6.22 | 19.29 | 46.91 | 5.16 | 10.07 | 18.00 | 67.33 |
| T3 | N @ 120 kg/ha + P @ 150 kg/ha K @ 100 kg/ha each | 5.73 | 6.64 | 20.24 | 45.79 | 5.47 | 10.60 | 19.33 | 67.13 |
| T4 | N @ 120 kg/ha + P @ 170 kg/ha K @ 100 kg/ha each | 5.45 | 8.06 | 23.28 | 51.79 | 6.67 | 12.13 | 21.77 | 62.93 |
| T5 | N @ 120 kg/ha + P@ 180 kg/ha K @ 100 kg/ha each | 4.98 | 8.68 | 24.71 | 52.93 | 7.51 | 13.33 | 23.33 | 61.00 |
| T6 | N @ 120 kg/ha + P @ 190 kg/ha K @ 100 kg/ha each | 5.60 | 7.49 | 22.82 | 46.04 | 6.31 | 10.87 | 20.47 | 63.73 |
| T7 | N @ 120 kg/ha + P @ 200 kg/ha K @ 100 kg/ha each | 5.40 | 7.93 | 23.01 | 44.33 | 6.18 | 10.80 | 20.47 | 61.60 |
| **CD0.05** | **1.13** | **0.52** | **2.82** | **3.84** | **1.18** | **1.65** | **1.90** | **2.20** |
| **SE. m (±)** | **0.37** | **0.17** | **0.93** | **1.26** | **0.39** | **0.55** | **0.63** | **0.72** |

**Table 2 Effect of different levels of phosphorus on yield parameters of beetroot**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Treatment Symbols** | **Treatment combination** | **Root length (cm)** | **Root diameter (cm)** | **Root weight (g)** | **Root yield per plot (kg/plot)** | **Root yield per hectare (t/ha)** |
| T0 | Control | 7.72 | 3.82 | 114.88 | 3.18 | 19.52 |
| T1 | RDF100% [NPK: 120:160:100 Kg/ha] | 11.58 | 6.73 | 176.46 | 4.46 | 27.73 |
| T2 | N @ 120 kg/ha + P @ 140 kg/ha K @ 100 kg/ha each | 10.48 | 5.03 | 149.43 | 3.70 | 22.81 |
| T3 | N @ 120 kg/ha + P @ 150 kg/ha K @ 100 kg/ha each | 10.61 | 5.38 | 163.23 | 4.09 | 24.31 |
| T4 | N @ 120 kg/ha + P @ 170 kg/ha K @ 100 kg/ha each | 12.37 | 7.13 | 178.14 | 4.82 | 28.85 |
| T5 | N @ 120 kg/ha + P@ 180 kg/ha K @ 100 kg/ha each | 13.58 | 7.69 | 192.77 | 5.36 | 30.05 |
| T6 | N @ 120 kg/ha + P @ 190 kg/ha K @ 100 kg/ha each | 10.88 | 6.09 | 162.04 | 4.06 | 26.54 |
| T7 | N @ 120 kg/ha + P @ 200 kg/ha K @ 100 kg/ha each | 11.46 | 6.57 | 161.62 | 4.16 | 27.29 |
| **CD0.05** | **1.68** | **1.02** | **9.30** | **0.49** | **1.84** |
| **SE. m (±)** | **0.55** | **0.34** | **3.07** | **0.16** | **0.61** |

**Figure 1: Graphical representation of effect of different levels of phosphorus on yield parameters of beetroot**

**Table 3. Economics as influenced by different treatments applied in Beetroot**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Treatment Symbols** | **Treatment combination** | **Cost of cultivation (Rs)** | **Gross return (Rs)** | **Net return (Rs)** | **BC ratio** |
| **T0** | Control | 1,34,422 | 2,92,850 | 1,58,428 | 2.18 |
| **T1** | RDF100% [NPK: 120:160:100 Kg/ha] | 1,45,196 | 4,16,000 | 2,70,804 | 2.87 |
| **T2** | N @ 120 kg/ha + P @ 140 kg/ha K @ 100 kg/ha each | 1,44,014 | 3,42,150 | 1,98,137 | 2.38 |
| **T3** | N @ 120 kg/ha + P @ 150 kg/ha K @ 100 kg/ha each | 1,44,608 | 3,64,592 | 2,19,985 | 2.52 |
| **T4** | N @ 120 kg/ha + P @ 170 kg/ha K @ 100 kg/ha each | 1,45,785 | 4,32,768 | 2,86,984 | 2.97 |
| **T5** | N @ 120 kg/ha + P@ 180 kg/ha K @ 100 kg/ha each | 1,46,361 | 4,50,711 | 3,04,351 | 3.08 |
| **T6** | N @ 120 kg/ha + P @ 190 kg/ha K @ 100 kg/ha each | 1,46,949 | 3,98,162 | 2,51,213 | 2.71 |
| **T7** | N @ 120 kg/ha + P @ 200 kg/ha K @ 100 kg/ha each | 1,47,538 | 4,09,369 | 2,61,832 | 2.77 |
| Selling price of Beetroot: Rs 15/kg  |