

# Effect of Different Levels of Foliar Spray of Water-soluble Fertilizer NPK on Growth, Yield and Quality of Prickly Lettuce.

## ABSTRACT

A trial was conducted to evaluate the foliar application of fertilizer on growth, yield & quality of prickly lettuce at Vegetable Research farm, Department of Horticulture, SHUATS. The objectives of this study were to find out suitable combination of water-soluble fertilizer of nitrogen, potassium and phosphorus for growth, yield and quality of prickly lettuce and to estimate the economics of the various treatments. The experiment was laid out in randomized block design (R.B.D) with 3 replications and 8 treatments.

Results revealed that treatment T4 performed best in terms of growth parameters viz; plant height, leaf area, number of leaves per plant, plant spread, leaf area, yield parameters viz; yield per plant, yield per hectare and quality parameters viz; TSS and ascorbic acid.

Keywords: Prickly Lettuce; *Lactuca serriola*; NPK; vegetable foliar spray.

## 1. INTRODUCTION

Prickly Lettuce, a native to the Mediterranean region is. The plant is sometimes called wild lettuce, China lettuce or compass plant because the leaves on the main stem are held vertically in a north-south plane, perpendicular to direct sunlight.

It is an annual or biennial plant in the family Asteraceae. It has a slightly fetid odor and is commonly considered a weed of orchards, roadsides and field crops. It is the closest wild relative of cultivated lettuce (*Lactuca sativa* L.) and is the wild progenitor of cultivated lettuce (*Lactuca sativa*).

It can be eaten as a salad, although it has something of a bitter taste. Young leaves can be eaten raw or cooked. Older leaves can be steamed. While unsubstantial, its roots have been used as a coffee substitute.

Prickly lettuce is highly drought tolerant. Its taproot extends 3 feet or more, and it can therefore tolerate drying of the low layer. Prickly lettuce has greater taproot length per unit plant weight, number of lateral roots per unit taproot and lateral number near the bottom of the taproot compared to cultivated lettuce. The leaves orient vertically in a north-south plane, which allows maximum photosynthesis early and late in the day while reducing overheating and water stress at mid-day. The objectives of this study were to find out suitable combination of water-soluble fertilizer of nitrogen, potassium and phosphorus for growth, yield and quality of prickly lettuce and to estimate the economics of the various treatments.

## 2. MATERIALS AND METHOD

The experiment was conducted during winter season of the year 2023 in Vegetable Research field, Department of Horticulture, Naini Agricultural Institute, Sam Higginbottom University of Agricultural Technology and Sciences, Prayagraj. The area is situated on the South of Prayagraj on the right bank of Yamuna at Rewa road at a distance of about 6 km from Prayagraj city. The experiment was laid out in randomized block design (R.B.D) with 3 replications. Prickly lettuce were cultivated in the field at a

spacing of 45cm x 30cm in plot of 1.5 x 1.5 size. Plants were selected at random from each plot as representative sample for recording the data. The observations recorded were 1. Growth parameters (Plant height, Number of leaves per plant, plant spread, leaf area) 2. Yield Parameters (yield per plot, yield per hectare) 3. Quality parameters (TSS and Ascorbic acid) 4. Economics of various treatments (cost of cultivation, gross return, net return, cost:benefit ratio),

Table no 1 shows the details of the various material used and methods adopted in carrying out experiment :-

TREATMENT NOTATION	SOLUTION	TIMES OF APPLICATION
T <sub>0</sub>	Control (no Fertilizer)	
T <sub>1</sub>	Full NPK	N-Two split doses P and K –once at the time of transplanting
T <sub>2</sub>	30mg/L N through liquid fertilizer 19:19:19 + basal dose 25:15:15g	25 times
T <sub>3</sub>	60mg/L N through liquid fertilizer 19:19:19 + basal dose 25:15:15g	12 times
T <sub>4</sub>	90mg/L N through liquid fertilizer 19:19:19 + basal dose 25:15:15g	8 times
T <sub>5</sub>	120mg/L N through liquid fertilizer 19:19:19 + basal dose 25:15:15g	7 times
T <sub>6</sub>	1500mg/L N through liquid fertilizer 19:19:19 + basal dose 25:15:15g	6 times
T <sub>7</sub>	1800mg/L N through liquid fertilizer 19:19:19 + basal dose 25:15:15g	5 Times

Formulas Used:-

a) **Cost of Cultivation**(Rs.)

The cost of cultivation of each treatment was calculated separately taken into consideration all the cultural practices followed in the cultivation of Prickly lettuce.

b) **Gross Return** (Rs/ha)

The Gross Return was calculated separately by using the following formula

$$\text{Gross return} = \text{Yield (kg/ha)} * \text{Selling Price}$$

c) **Net Return** (Rs/ha)

The net profit treatment was calculated separately by using the following formula

$$\text{Net return} = \text{Gross return} - \text{total cost of cultivation.}$$

d) **Benefit: Cost Ratio**

Benefit: cost ratio was calculated by dividing gross return by cost of cultivation.

$$\text{B:C ratio} = \frac{\text{Net returns (Rs ha}^{-1}\text{)}}{\text{Total cost of cultivation (Rs ha}^{-1}\text{)}}$$

Table no 2. Performance of different treatment combinations of different levels of foliar spray of water soluble fertilizer N.P.K on growth , yield , and quality of Prickly Lettuce.

TREATMENT NO	TREATMENT DETAIL	PLANT HEIGHT (cm) (30DAT)	NUMBER OF LEAVES (30DAT)	PLANT SPREAD (cm) (30DAT)	LEAF AREA (cm <sup>2</sup> )	YIELD PER PLANT (kg)	TOTAL YIELD (q/ha <sup>-1</sup> )
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T <sub>0</sub>	Control	14.66	10.3	14.5	35.16	10.82	21.60
T <sub>1</sub>	0 mg/L N through liquid fertilizer 19:19:19 + 50% basal dose 25:15:15g	20.83	10.6	19.83	38	11.55	23.1
T <sub>2</sub>	30 mg/L N through liquid fertilizer 19:19:19 + 50% basal dose 25:15:15g	23.66	13	15.16	36.66	11.48	22.96
T <sub>3</sub>	60 mg/L N through liquid fertilizer 19:19:19 + 50% basal dose 25:15:15g	20	11	14.83	41.16	11.82	23.64
T <sub>4</sub>	90 mg/L N through liquid fertilizer 19:19:19 + 50% basal dose 25:15:15g	23.66	14	21.67	41.16	13.06	26.12
T <sub>5</sub>	120 mg/L N through liquid fertilizer 19:19:19 + 50% basal dose 25:15:15g	19.83	11.6	20	37.08	11.7	22.78
T <sub>6</sub>	150 mg/L N through liquid fertilizer 19:19:19 + 50% basal dose 25:15:15g	19	12.6	14.16	35.66	11.07	22
T <sub>7</sub>	180 mg/L N through liquid fertilizer 19:19:19 + 50% basal dose 25:15:15g	17	11.3	15.16	36.14	11.5	23.00
	<b>F- Test</b>	S	S	S	S	S	
	<b>S.Ed(±)</b>	1.86	1.54	0.94	1.13	0.26	0.43
	<b>C.D@5%</b>	3.98	3.31	2.02	2.42	0.56	0.91
	<b>C.V</b>	12.10	15.97	6.54	3.74	14.49	4.42

\*DAT-Days After Transplanting

\*S-Satisfactory

Table no 3. Effect of different levels of foliar spray of water-soluble fertilizer N.P.K on Various treatments combinations of Prickly Lettuce .

TREATMENTS	COST OF CULTIVATION (Rs/ha <sup>-1</sup> )	TOTAL YIELD (q/ha <sup>-1</sup> )	SELLING RATE (Rs/kg)	GROSS RETURN (Rs/ha <sup>-1</sup> )	NET RETURN (Rs/ha <sup>-1</sup> )	BENEFIT COST RATIO
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T0	18640	21.60	30	64800	46160	2.47
T1	18940	23.1	30	69300	50360	2.66
T2	19000	22.96	30	68880	49880	2.63
T3	19060	23.64	30	70920	51860	2.72
T4	19120	26.12	30	78360	59240	3.10
T5	19180	22.78	30	68340	49160	2.56
T6	19240	22	30	66420	47180	2.45
T7	19300	23.00	30	69000	49700	2.57

### 3.RESULTS AND DISCUSSION

#### 3.1 Plant Height at 15 DAS

Data reveals that there was a significant effect of various treatments on plant height at 15 days after transplanting. Among different levels of NPK fertilizers T4(90 mg/L N through liquid fertilizer 19:19:19 + 50% basal dose 25:15:15g) recorded maximum height of 15.83 cm whereas minimum plant height of 10 cm was recorded in T0 (Control).

#### 3.2 Plant Height at 30 DAT

Data reveals that there was a significant effect of various treatments on plant height at 30 days after transplanting. Among different levels of NPK fertilizers T4(90 mg/L N through liquid fertilizer 19:19:19 + 50% basal dose 25:15:15g) recorded maximum height of 23.66 cm whereas minimum plant height of 14.66 cm was recorded in T0 (Control).

#### 3.3Number of Leaves per Plant

Data reveals that there was a significant effect of various treatments on number of leaves per plant. Among different levels of NPK fertilizers T4(90 mg/L N through liquid fertilizer 19:19:19 + 50% basal dose 25:15:15g) recorded maximum number of leaves per plant of 11.6 whereas minimum number of leaves per plant of 10.3 was recorded in T0 (Control).

### 3.4 Plant Spread

Data reveals that there was a significant effect of various treatments on number of leaves per plant. Among different levels of NPK fertilizers T4(90 mg/L N through liquid fertilizer 19:19:19 + 50% basal dose 25:15:15g )recorded maximum number of leaves per plant of 21.67 whereas minimum number of leaves per plant of 14.5 was recorded in T0 (Control).

### 3.5 Leaf Area

Data reveals that there was a significant effect of various treatments on leaves area. Among different levels of NPK fertilizers T4(90 mg/L N through liquid fertilizer 19:19:19 + 50% basal dose 25:15:15g) recorded maximum leaf area of 41.16cm<sup>2</sup> whereas minimum leaf area of 35.16cm<sup>2</sup> was recorded in T0 (Control).

### 3.6 Leaves Yield per plot

Data reveals that there was a significant effect of various treatments on leaves yield. Among different levels of NPK fertilizers T4(90 mg/L N through liquid fertilizer 19:19:19 + 50% basal dose 25:15:15g) recorded maximum leaves yield per plot of 13.06 kg whereas minimum leaves yield per plot of 10.82 kg was recorded in T0 (Control)

### DISCUSSION:-

It showed that combined application of nitrogen, phosphorus, and potassium resulted in significantly higher plant height, leaf number, as compared to individual nutrient treatments. Its application maintains a balanced ratio of nitrogen, phosphorus, and potassium is important for maximizing the vegetative growth and yield of prickly lettuce. And also resulted in improved leaf quality, enhanced water-use efficiency, and increased resistance to pests and diseases.

### 4.CONCLUSION

From the above experimental finding, it is concluded that the treatment T4 was found to be best in terms of growth, yield and quality. The highest B:C ratio was found in the same treatment with 3.10.

### REFERENCES

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