

## NPK Trial on Onion (*Allium Cepa L.*)

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**Abstract:** A field experiment was conducted to determine the optimum doze of NPK fertilizers for the onion (*Allium cepa L.*), variety Phulkara on a loamy soil. The bed size was 4.5 x 4.0 m. Six fertilizer treatments were tested in RCBD for the height of plant (cm), number of leaves plant<sup>-1</sup>, single plant weight, bulb diameter (horizontal and vertical), bulb size (volume) and yield ha<sup>-1</sup>. Compared to other fertilizer treatments, the application of 80 N + 60 P<sub>2</sub>O<sub>5</sub> + 40 K<sub>2</sub>O (kg ha<sup>-1</sup>) produced more leaves and largest bulb size and gave the highest onion yield (kg ha<sup>-1</sup>).

**Key Words:** Bulb, Onion, NPK Fertilizers, Yield

### Introduction

The onion (*Allium cepa L.*) is one of the oldest and extensively used vegetable throughout the world. It has its origin in Western Asia. This plant is mentioned in the Holy books i.e Bible and Quran. It is extensively used as condiment in the preparation of curries and pickles (Choudhary, 1979). Sliced onion, green as well as dry is also used as salad and served with meals. It has also medical use, and is extensively cultivated. In our country it is one of the major crops cultivated as a medical and cash crop to earn foreign exchange. In Sindh it is cultivated in Rabi as well as in Kharif. Several workers (Patil, 1986 and Arain, 1997) have observed that the NPK fertilizers improved vegetative growth and yield of onions. As our soils are specially deficient in N & P, thus the addition of these nutrients is considered as a major input to increase the production of onion. This study was therefore started to investigate the effect of various levels of NPK fertilizers. Onion variety Phulkara used in this study is one of the most common onion varieties of Sindh.

### Materials and Methods

A piece of loamy soil was selected for nursery development. Seed of Phulkara variety was sown in the month of December. The field was divided into three plots. Each plot was further subdivided into 6 beds of 4.5 x 4.0 m each, separated from each other by 0.3 m wide band.

The following fertilizer treatments were randomly applied as kg ha<sup>-1</sup>

Treatment	N	P <sub>2</sub> O <sub>5</sub>	K <sub>2</sub> O
T1	40	30	20
T2	40	60	40
T3	80	60	40
T4	40	0	0
T5	80	0	0
T6	80	120	80

Full dose of P<sub>2</sub>O<sub>5</sub> and K<sub>2</sub>O and 1/3 of N was broadcasted at the time of the preparation of ridges. The transplanting of nursery was completed in the month of

February at the age of 8 weeks. Row to row and plant to plant distance was 22.5 and 10 cm respectively. First irrigation was applied immediately after transplanting and the second irrigation after 4 days, and than with 7 days interval. The 2nd 1/3 dose of N applied as top dressing, 10 days after transplanting while the last 1/3 doze of N was applied 20 days after transplanting of seedlings. The crop was harvested in the first week of June.

**Observations:** When the plants were at the peak of their height, ten plants from each treatment were randomly selected to record height (cm), number of leaves plant<sup>-1</sup>, bulb diameter using vernier caliper (horizontal and vertical). Bulb size (volume) recorded by dipping the bulb in a water filled graduated cylinder and recording the rise in water level.

### Results and Discussion

**Plant Height (cm):** No significant difference between fertilizer treatments for plant height was observed (Table 1). However, the average maximum height of 39.7 was recorded for T5.

**Plant Weight:** The average maximum plant weight (63.53 g) was recorded for T3 and the average minimum plant weight (44.64 g) was recorded for T2.

Table 1: Effect of Different Fertilizer Treatments on Average Plant Height (cm), Number of Leaves Plant<sup>-1</sup> and Weight of Single Plant (g)

Treatment	Height (cm)	Number of Leaves Plant <sup>-1</sup>	Weight (g) Plant <sup>-1</sup>
T1	37.80	9.1	48.67
T2	37.73	9.5	44.66
T3	39.07	11.6	63.53
T4	38.07	10.0	54.13
T5	37.70	9.5	52.20
T6	37.93	9.8	56.73
S. E. =	+1.682	+0.513	+5.113

**Number of Leaves Plant<sup>-1</sup>:** The results are significant at 5% level. The average maximum number of leaves

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Table 2: Effect of Different Fertilizer Treatments on the Average Diameter of Bulb (horizontal), Diameter of Bulb (vertical), Size of Bulb (cm) and Yield (kg ha<sup>-1</sup>)

Treatment	Average Diameter (horizontal)	Average Diameter (vertical)	Average Bulb size	Average Yield/ha (kg)
T1	4.00	3.46	28.33	1709
T2	4.33	3.60	31.67	1942
T3	5.27	4.40	54.00	2869
T4	4.17	3.66	33.33	2036
T5	3.73	3.46	33.33	1848
T6	4.10	3.70	31.67	1981
S. E. =	± 0.249	± 0.241	± 3.626	± 428

(11.6) was observed in T3 and average minimum number of leaves (9.1) was recorded for T1 (Table-1).

**Diameter of Bulb (horizontal):** No significant difference between the treatments was observed (Table 2). The average maximum bulb diameter (horizontal) was 5.27 cm for T3, where as the average minimum bulb diameter (horizontal) was 3.73 cm respectively.

**Diameter of Bulb (Vertical):** The average diameter (vertical) of the bulb under different fertilizer treatments is given in Table-2. No significant difference in the diameter of the bulbs was reported for all treatments under study. The average maximum bulb diameter (vertical) was 4.40 cm for T3 and the average minimum bulb diameter (vertical) was 3.46 cm for T1 respectively.

**Size of the Bulb (volume):** The leaves were removed from each bulb and dipped in water in a graduated cylinder and rise in the water level was noted. The individual bulb size was calculated and reported in the Table 2. The average maximum size of 45.0 cc (Table 2) was recorded for T3, where as the average minimum size of 28.33 cm was recorded for T1 respectively. Significant difference between T3 and other treatments was noted.

**Bulb Yield ha<sup>-1</sup>:** The data in the Table 2 showed that T3 produced the average maximum yield of 2869 kg ha<sup>-1</sup>, where as the average minimum yield of 1709.00 kg ha<sup>-1</sup> was obtained from T1 respectively. A significant difference was noted between T3 and rest of the treatments. No significant difference was noted in the remaining treatments.

The treatments did not show effect on plant height, bulb diameter both vertically and horizontally and single plant weight. However, the difference was observed on the number of leaves, size or volume of bulb and bulb yield/ha.

Increase in the vegetative growth including number and length of green leaves and plant height was possibly due to the N content in the NPK fertilizer. Better growth

(plant height, number and weight of green leaves etc.) of onion plants using NPK fertilizers have also been observed by other workers including Patil (1986); Parkash and Kumar (1990). The increase in the size, diameter, and yield of onion bulb. That was possibly due to the effect of P and K. The results are also comparable with the finding of several workers including Rehman and Farouque (1976) and Singh, (1990) who observed maximum yield of onions at 150 to 200 kg N, 48 to 100 kg P<sub>2</sub>O<sub>5</sub> and 50 to 100 kg K<sub>2</sub>O ha<sup>-1</sup>.

The results obtained indicated that T3, was the best treatment for the number of leaves per plant, bulb size (volume) and bulb yield ha<sup>-1</sup>. The remaining treatments were similar in their effect on the characters under study. No significant difference of the treatments on the plant height, bulb diameter and single plant weight was observed.

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