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AUTHORS: Ch M Shamshad Ahmad Shahid Javed BUTT

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**EFFECT OF NKP ON SOME YIELD COMPONENTS  
OF TOMATO (*Lycopersicon Esculentum* Mill.)**

**Ch. M. Shamshad AHMAD**

**Department of Horticulture  
University Of Arid Agriculture,  
Associate Professor, Department of  
Senior Lecturer and doctoral Horticulture,  
Rawalpindi-PAKISTAN**

**Shahid Javed BUTT**

**Trakya University,  
Scholar, Faculty of Agriculture,  
59030 Tekirdağ - TURKEY**

**ABSTRACT:** Two varieties of tomato (*Lycopersicon esculentum* Mill.), namely Roma VFN and Napoli Gwoza, were grown in plots receiving urea, superphosphate, and muriate of potash separately at the rate of 90, 40 and 40 kg/ha, respectively. Application of urea delayed flowering and fruit setting in both the varieties, but demonstrated positive influence on all the yield components namely, average number of fruit set, weight of fruits harvested/plant, average weight of individual fruit and average fruit yield/ha. Application of superphosphate and muriate of potash did not show any significant influence on these, compared to the control (zero fertilizers). Results of superphosphate treatment were slightly higher than of muriate of potash and control. Among the two varieties the average yield of Roma VFN was significantly higher than that of Napoli Gwoza with urea and superphosphate treated plots.

**Keywords:** NPK, tomato (*Lycopersicon esculentum* Mill.) plant, characteristics, yield.

## **INTRODUCTION**

Tomato is an important vegetable crop all over the world. Several research workers (Houghtaling, 1935; Weaver, 1972; Steward, 1975; Fawusi, 1977; and Singh, 1978) have discussed various factors influencing tomato yield of this crop in this area. Low yield in the area may be attributed to several factors operating singly or in combination, such as nutritional deficiency, pest and diseases, inadequate irrigation, and time of plantation, etc. The improvement of tomato yield with the application of these elements has been reported by various authors (Besford and Maw, 1975; Adam et al., 1978; Bhatnagar and Pandita, 1978; Asi and Amjad, 1985; Mehta and Saini, 1986).

The present investigations were designed to determine the effect of application of NPK on some of the yield components of tomato raised under the conditions prevailing in Rawalpindi, during dry season.

## MATERIALS AND METHODS

The effect of NPK on yield components of two varieties of tomato was determined by applying these fertilizers separately. The levels of fertilizers applied were as follows:

Urea	90kg/ha
Superphosphate	40kg/ha
Muriate of potash	40kg/ha

Fertilizer application was splitted into two doses. Half of the total quantity of each of the fertilizers was applied two weeks after tarslanting the seedlings and the remaining half quantity, was applied three weeks after the first application. Ring method was followed for fertilizer application (Anonymous, 1980).

The two varieties of tomato grown on 10th of October 1992 at the Department of Horticulture, Arid Agriculture (Ex. Barani Agriculture, college), Rowalpindi-PAKISTAN were selected for the experiment. The varieties were Roma VFN and Napoli Gwoza. The experiment was set up in a split plot design. There were four treatments, i.e.:

TO	No fertilizer (control)
T1	N 90 kg/ha
T2	P 40kg/ha
T3	K 40kg/ha

The experimental field was divided into four blocks representing the replications. Each block was divided into main plots each receiving one variety. Each main plot was sub-divided into four sub-plots. Each sub-plot received one treatment. Treatments and varieties were assigned to the plot by randomization. There were 32 sub-plots. Each sub-plot measured 3 m x 2.4 m. The alleys between blocks, main-plots and sub-plots were 1.5 m, 1 m and 60 cm, respectively.

Three weeks old tomato seedlings were transplanted in the experimental field. Four row having five tomato sedlingis in each of the row were planted in each sub-plot, while the row to row and plant to plant distances were 60cm. The plants were uniformly irrigated once daily. Comparative effects on yield components were determined on the basis of the following observations:

- (1) Number of days required for flowering and fruit ripening
- (2) Number of fruit set/plant

- (3) Number of fruit harvested/plant
- (4) Weight of harvested fruit/plant
- (5) Weight of individual fruit
- (6) Yield/ha (based on average yield treatment)

The data were statically analysed and DMRT was applied according to Gomez and Gomez, 1976.

## RESULTS

The results of the experiment are shown in Table 1.

### Period required for flowering and fruit ripening

Average time for flowering required for plants of both the varieties in treatment T1(N) was 38 days after transplanting, this was significantly higher than that required for other treatments. The results of the rest of the treatments did not differ from each other significantly. Similar results were obtained with the average time required for ripening of fruits. Application of nitrogen delayed fruit ripening in both the varieties significantly. Although minimum time was required for ripening in control plots (42 days after planting) this result did not show any significant differences as compared with the results of other two varieties receiving P and K only.

### Number of fruit set/harvested per plant

The highest average fruit set per plant (i.e., 36) was recorded for the variety Roma VFN in treatment T1 (N) and the lowest in variety Napoli Gwoza (20) in treatment receiving no fertilizer (control). With treatment T2 the mean number of fruit set per plant in roma VFN was non-significantly different from those due to treatment T1 in both the varieties and also from those of Napoli Gwoza with treatment T2. Treatment T2, however, showed significantly higher numbers of fruit set than in T3 (K) and TO (control in both the varieties). There were non-significant differences between these latter two treatments except Napoli Gwoza in TO which showed significantly less fruit set than rest of the treatments.

The results on the average number of fruits harvested per plant followed almost the same pattern.

Table 1. Average values of some yield components of Roma VFN and Napoli Gwoza cultivars of tomato (*Lycopersicon esculentum* Mill) as influenced by nitrogen, phosphorous and potassium.

Yield components	Nitrogen (T1)		Phosphorous (T2)		Potassium (T3)		Control (TO)	
	Roma VFN	Napoli Gwoza	Roma VFN	Napoli Gwoza	Roma VFN	Napoli Gwoza	Roma VFN	Napoli Gwoza
Days required for flowering	38 (a)	38 (a)	27 (b)	27 (b)	27 (b)	27 (b)	29 (b)	29 (b)
Days required for fruit ripening	58 (a)	58 (a)	45 (b)	45 (b)	45 (b)	45 (b)	42 (b)	42 (b)
Number of fruits set/plant	36 (a)	30 (b)	33 (ab)	30 (b)	26 (c)	27 (c)	22 (cd)	20 (d)
Number of harvested fruits/plant	32 (a)	26 (b)	29 (ab)	26 (b)	22 (c)	22 (c)	19 (d)	18 (d)
Weight of fruits Per plant (g)	1191.3 (a)	769.1 (b)	812.2 (b)	518.5 (c)	492.9 (c)	508.5 (c)	360.1 (c)	353.2 (c)
Weight of individual fruit (g)	37.2 (a)	29.6 (b)	28.0 (b)	20.0 (c)	22.4 (c)	23.1 (c)	20.0 (c)	19.6 (c)
Yield per hectare (tons)	33.0 (a)	21.4 (b)	22.5 (b)	14.4 (c)	13.7 (c)	14.2 (c)	10.0 (c)	9.8 (c)

Note: Values in a row sharing a similar letter do not differ significantly at  $p < 0.5$

### Weight of fruits per plant

The highest average weight of fruit (1191.3g) per plant was obtained from treatment T1 (N) in variety Roma VFN (Table 1). The average fruit weight was significantly higher than the averages for both the varieties in all the other treatments. Weights of fruits in phosphorous treated soil (T2) for the variety Roma VFN was significantly higher than those of potassium treatment (T3) and the control (TO). There was no significant increase in fruit weight for Napoli Gwoza in phosphorous treated soil (T2). The lowest average weights of fruits per plant were recorded in TO (control) for both the varieties. Application of potassium did not show any significant increase in fruit weight over the control for both the varieties.

### Weight of individual fruits

The average weights of individual fruits were highest in treatment T1 (N) for both varieties. The average weight of fruits of the variety Roma VFN in the phosphorous treated soil (T2) was significantly higher than that of Napoli Gwoza. The results of the variety Napoli Gwoza in treatment T1 (N) and the variety Roma VFN in treatment T2 (P) were almost identical. Results on the average fruit weight for Napoli Gwoza in treatment T2, T3 and TO were close to each other. There was non significant differences between potassium application and control with respect to individual fruit weights of the two tested varieties.

### Yield of tomatoes per hectare

The yield of tomato per hectare was calculated on basis of the average weight of fruits obtained from individual plots. The highest average fruit yield for both varieties was obtained from treatment T1 (N). The average yield of Roma VFN treatment (T1) was significantly higher than that of variety Napoli Gwoza. The average of yield of the remaining treatments did not show any significant differences with each other except Roma VFN in treatment T2 (P).

### DISCUSSION

Delay in flowering of tomato by application of nitrogen in the form of urea are in agreement with the findings of Fawusi (1977), and Anmed and Chaudhry (1990), who observed similar delay in flowering and fruit setting of tomato in nitrogen treated soil. According to them this was effected by enhanced vegetative growth of the plants. Significant positive effects were observed for all the yield components taken into account in the course of this experiment resulting into an increase in yield of fruits. The increase in yield in nitrogen treated soil was due to combined effects of more number of fruits and better size per plant. In *Lycopersicon esculentum* Mill, cell division ceases at anthesis (Honghtaling, 1935) and subsequent fruit growth is due to cell expansion. Weaver (1972) and Steward (1975) reported that nitrogen help in cell division and cell enlargement and all the morphological parts of a plant are increased in size, especially the leaves and the fruits. Higher fruit yield in the variety Roma VFN than that of Napoli Gwoza indicated that the former was more responsive to nitrogen than the latter.

Significant yield increase was observed in Roma VFN over Napoli Gwoza raised on phosphorous treated soil, although the yield of the former was significantly less than the plants raised on nitrogen treated soil. Results of the present investigations also indicated that Roma VFN was more responsive to phosphorous fertilization than Napoli Gwoza. Results obtained from potassium treated soil as well as from soil without addition on fertilizer indicated that the tested soil had no potassium deficiency. Increased yield of tomato by addition of nitrogen to soil, as observed in the present study, suggested apparent deficiency of nitrogen from soil which might be resulted by leaching through rainfall and irrigation or even higher summer temperatures.

The results of the present investigation showed that application of nitrogen and phosphorous increased yield of tomato significantly. Singh (1978) reported that tomato is a heavy feeder of nitrogen and phosphorous. Positive response obtained in this experiment by application of nitrogen is in agreement with the findings of Singh (1978). Based on the results obtained in the present investigation it may be suggested that more detailed works

on the fertilizer application will lead to a definite conclusion for fertilizer requirements for optimum yield of tomato in this area.

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