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EFFECT OF POTASSIUM AND ZINC ON THE YIELD OF TOMATO UNDER VARIED SOIL GROUPS OF TAMILNADU

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ABSTRACT

Pot experiment conducted in four major soil groups of TamilNadu viz., Alluvial (Entisol), Black (Vertisol), Laterite (Ultisol), and Red (Alfisol) to study the effect of K and Zn on the yield of Tomato with three levels of K (0, 50 and 100 kg/K/ha) and Zn (0, 50 and 100 kg $ZnSO_4$/ha) revealed that the application of 100 kg K_2O/ha and 50 kg $ZnSO_4$/ha was found to be adequate for obtaining higher yield. The laterite soil registered the highest yield of tomato followed by black, alluvial and red soils.

Key Words : Potassium, Zinc, Tomato yield, soil groups.

Tomato is one of the important vegetable crops grown throughout the world under varied soil conditions. It is understood that the yield and quality of tomato fruits are largely influenced by the application of fertilizers. Though the studies are conducted on the nutrient requirement of tomato, information relating to its performance in diversified soil types and yield are meagre. Keeping in view of this, an attempt was made in this present investigation to bring about the effect of application of K and Zn on a different soils of Tamil Nadu on the yield of tomato.

MATERIALS AND METHODS

A pot experiment was conducted with tomato variety IM-39 in four major soil groups of TamilNadu viz., Alluvial, Black, Laterite and Red. Bulk soil samples were collected from the four locations, representing the above four major soil groups. The textural classes of the soils, viz, Alluvial, Black, laterite and Red were sandy clay loam, sandy clay, sandy clay loam and sandy loam respectively. Alluvial (120 kg K/ha) and Red (250 kg K/ha) soils had medium K status whereas Black (460 kg K/ha) and Laterite (680 kg K/ha) soils had high K status. All the soils were deficient in available Zn except the Laterite soil.

The treatments tried were three levels of K (0, 50 and 100 kg K_2O/ha as KCl) and three levels of Zn (0, 50 and 100 kg $ZnSO^4$ /ha) in all possible combinations aggregating to nine, in completely randomised Block Design with two replications in four major soil groups viz., Alluvial (S1), Black (S2), Laterite (S3) and Red (S4).

Two healthy seedlings were maintained per pot and the fertilizers were added as per the

S. No.	Locations	Soil group	Soil order	Soil series
1.	Karaikal (Nedungadu)	Alluvial	Entisol	Kalathur
2.	Coimbatore (Field No.37 TamilNadu Agrl. University, Farm)	Black	Vertisol	Periyanaicken-palayam
3.	Nilgiris (Ootacamund)	Laterite	Ultisol	Nanjanad
4.	Coimbatore (Pappanaickenpalayam)	Red	Alfisol	Somayanur

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treatments and the plants were grown adopting all package of practices.

The number of fruiting points were counted at fruiting stage. Fully ripened fruits were harvested periodically and the yield was recorded for the total number of nine pickings. After final picking, the plants were harvested above soil portions for recording the drymatter yield of stalk.

RESULTS AND DISCUSSION

Number of fruiting bodies:

As the fruiting points are the reflections of the fertilization and fruit set, fruiting point was monitored in order to assess the influence of K and Zn on the yield parameter.

Application of K significantly increased the number of fruiting points (Table. 1). The increase in fruiting points might be due to increased K availability which was evidenced by the significant positive correlation obtained between the different fractions of K in the soil and fruiting point in the same experiment (Omar Hattab, 1982).

Application of Zn increased the fruiting points (Table 1). The increased fruiting points due to Zn application was due to more Zn availability as observed in this experiment (Omar Hattab and Ramanathan, 1989).

Table 1. Effect of Potassium and Zinc on the number of fruiting points, fruit yield and dry matter yield of Tomato

Treatment	Number of fruiting points	Fruit yield g/pot	Dry matter yield g/pot
Ko	12	170	13.4
K50	15	196	15.7
K100	17	126	18.6
SED	0.78	8.03	0.6
CD	2.00	16.0	1.0
ZnO	13	186	13.5
Zn 50	15	104	15.7
Zn 100	17	206	18.5
SED	0.78	8.03	0.6
CD	2.00	16	1.0
S1	15	172	14.6
S2	13	204	14.8
S3	17	242	13.0
S4	13	171	16.3
SED	0.89	9.27	0.7
CD	2.0	19.0	1.0
S XK CD	3.0	32.0	3.0
S X Zn CD	3.0	-	-
K X Zn CD	3.0	-	-

Laterite soil recorded the highest number of fruiting points followed by the alluvial soil. The black and red soils registered less number of fruiting points but were on par. The soil groups together with K or Zn application were found to affect the number of fruiting points significantly. Irrespective of the soils used for the study, the application of K increased the fruiting points indicating the role of K on the formation of fruiting points.

At all levels of applied Zn, K application recorded higher number of fruiting points than Ko and almost the same trend could be seen under all the levels of K due to Zn application.

Tomato Yield:

Application of K increased the yield of tomato fruits. The K application at the rate of 100 kg K_2O/ha recorded the highest yield, followed by 50 kg K_2O/ha. Potassium is essential for a number of metabolic activities of the plant and provides resistance to plant pest and diseases, thereby recorded increased yield (Adams *et al.*, 1978; Jaramille *et al.*, 1978). Further this was corroborated with increased fruiting points and potassium uptake at the level of 100 kg K_2O/ha as registered in the same experiment (Omar Hattab, 1982).

Application of Zn increased the yield of tomato significantly (Table 1). Application of $ZnSO_4$ at 100 and 50 kg/ha recorded higher yield of tomato, which were on par and significantly superior to control, indicating the need for the application of 50 kg $ZnSO_4$/ha for higher yield. On account of its specific role in the metabolic activities, Zn application helped to increase the yield in tomato (Mahapatra and Kibbeh, 1971; Malick, 1976).

Laterite soil recorded higher yield than the black soil and lower yields were recorded in alluvial soils and red soils. The yield trends in different soils could be attributed to the inherent fertility status of that soils.

Application of K at 100 kg K_2O/ha recorded the highest yield in all the soils except laterite soil, where the effect of K was not pronounced. The laterite soil being very rich in available K comparatively did not increase the yield due to K application.

The interesting phenomenon observed in the interactions between soils and K levels was that at lower levels of K, the soils showed a trend of independence revealing the importance of K for fruit yield as revealed from the marked variations in the available K status of the initial soil and at higher levels of K, the difference in the yield of tomato got evened out. It was again note worthy, that a similar trend of interaction between K and soils could be observed on the number of fruiting points, which revealed a close relationship between fruit yield and number of fruiting points ($r=0.614^{**}$).

Dry Matter Yield of Stalk:

The drymatter yield of stalks of tomato increased correspondingly with increased level of K application. Zinc application also increased the drymatter yield. The increase in drymatter yield could be attributed to the increase in the plant height and vegetative growth due to Zn application, as observed by Mahapatra and Kibbeh (1971) and Malick (1976).

The laterite soil recorded the highest drymatter yield followed by red soil.

At all the levels of K tried, the laterite soil showed increasing trend in the drymatter yield followed by red, black and alluvial soils. In contrast to the fruit yield, the drymatter yield of stalk in different soils at lower levels of K showed an uniform trend compared to higher levels of K. This kind of variations in the fruit yield and drymatter yield of tomato in different soils at varying levels of K could be due to the influence of differential distribution and translocations of K in plant parts.

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