

Effect of different levels of NPK and foliar application of enriched humic substances on growth and yield of tomato

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ABSTRACT

A field experiment was conducted in a silty clay loam soil (Typic haplustalf) to study the response of tomato to different levels of NPK and foliar fertilization of enriched humic substances. The experiment was carried out in split plot design. The treatments consisted of three levels of NPK (75%, 100%, 125% of recommended dose of NPK) and eleven sub treatments which includes S₀-control, S₁-Humic acid (HA) 0.2%, S₂-Polycarboxylic acid (PCA) 0.2 %, S₃- Naphthalene acetic acid (NAA) 50 ppm, S₄- Micro nutrient mixture, S₅- HA + NAA, S₆- PCA + NAA, S₇- NAA+NM, S₈- HA+NM, S₉- PCA+NM, S₁₀-HA+NM +NAA (enriched HA), S₁₁- PCA +NM+ +NAA (Enriched PCA). The sub treatments were applied through foliar application. Tomato var-S- 22 was grown as test crop. The observation on growth, yield, yield attributes were recorded and the soil samples collected were analysed for available N, P and K. The results revealed that foliar application of micronutrients and NAA enriched PCA to the plants supplied with 125% NPK recorded the highest fruit yield, at the same level without causing any nutrient depletion in post harvest soil. Though foliar application of enriched PCA to the plants supplied with 100% NPK improved the yield at par with treatment receiving 125% NPK and enriched PCA foliar spray, the depletion of NPK in post harvest soil is noticed. Therefore it is concluded that increased dose of 25% NPK is required when foliar application of growth stimulants are applied to tomato so as to compensate the increased nutrient removal.

Key words : NPK, Tomato, Foliar fertilization.

INTRODUCTION

Tomato (*Lycopersicon esculentum* .Mill) is one of the most important vegetable crop cultivated all over the world. It responds well to fertilizer application and foliar spray of growth stimulants. It requires heavy dose of inorganic fertilizer to maximize the production. Humic substances (Humic acid and Polycarboxylic acid), an elixir to plants, have long been known to scientist on account of its influence on nutrient availability in soil and growth promoting effects on crops. The recent scientific investigation revealed that low molecular weight humic substances are directly taken up by plants and influence the plant metabolism. (Schinitzer and Khan, 1972). In the present study an attempt was made to find out the influence of foliar application of two humic substances viz, humic acid and polycarboxylic acids extracted from lignite and enriched with NAA and micronutrients on the growth and yield of tomato grown under different levels of NPK in a silty clay loam soil.

MATERIALS AND METHOD

A field experiment was carried out in silty clay loam soil having pH 7.34, EC 0.92 dsm⁻¹, organic carbon 4.7 g kg⁻¹, available NPK of 196, 80, 420 kg/ha⁻¹ respectively. The experiment was carried out in split plot design with three replications. The treatments consisted of three main treatments M₁- 75% recommended dose(R.D) of NPK, M₂- 100% R.D of NPK, M₃-125% R.D of NPK, eleven sub treatments. The sub treatments were applied through foliar spray which includes S₀ –control, S₁- Humic acid 0.2%, S₂ Polycarboxylic acid (PCA) 0.2 %, S₃- NAA 50 ppm, S₄- Micro nutrient mixture, S₅-HA + NAA, S₆- PCA + NAA, S₇- NAA+NM, S₈-HA+NM, S₉- PCA+NM, S₁₀-HA+NM +NAA (enriched HA), S₁₁-PCA +NM+ NAA (Enriched PCA). Tomato

var-S22 was grown as test crop. The required quantity of N, P₂O₅ and K₂O were applied through urea, super phosphate, muriate of potash respectively. Humic acids were extracted from lignite by differential solubility technique in alkali and acid. The polycarboxylic acids were prepared by treating lignite with 11N HNO₃. The micro nutrient mixture are prepared by mixing ZnSO₄ 0.1%, FeSO₄ 0.1%, MnSO₄ 0.1%, CuSO₄ 0.05%, H₃BO₃ 0.05% and NH₄ (MoO₄)₂ 0.01% foliar spray were given on 30th and 50th days of transplanting. Growth and yield parameters and yield of tomato were recorded. The post harvest soil samples collected were analyzed for available N, P and K. (Jackson, 1975).

RESULTS AND DISCUSSION

In the present study, a field experiment was conducted with three levels of NPK (75% NPK, 100% NPK and 125% NPK), and eleven foliar spray treatments. The humic substances, NAA and micronutrients are applied through foliage both individually and in combination. Application of graded level of NPK gradually increased the growth and yield parameters of tomato. Foliar application of enriched humic substances to NPK applied plants more favourably improved the growth and yield of tomato. The results of the experiment clearly revealed that when no foliar spray was given, the crops responded well even for higher dose of NPK (125% recommended dose). But the same level of response is obtained at 100% NPK when foliar sprays of enriched humic substances were applied. The foliar application of enriched humic substances to 100% NPK applied treatments also produced a comparable fruit yield with 125% NPK, but post harvest nutrient status was considerably reduced. Similar observation was again clearly observed in the treatment receiving 75% NPK with enriched

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