The Effect of Antioxidants Tocopherol and Citric Acid on Growth and Yield of the Tomato Plants (Lycopersicon Esculentum Mill.) In Plastic Houses

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Summary

This experiment was conducted out during the growing season of 2016-2017 in unheated plastic house conditions belonging to the Maymunah Horticulture Station / Agriculture Directorate of Maysan to investigate the effect the Tocopherol and citric acid on the growth and yield of tomato hybrids (Wogdan) .

The study included fifteen treatments in a factorial combinations of five treatments which were the effect spraying with (Tocopherol and citric acid) with two concentration 100 and 200 mg. L^{-1} in addition to control treatment (used water only) and applied with spraying (two, three and four times) at 15-days intervals after month of transplanting.

Factorial experiment was used with three replicates in Randomized Complete Block Design. Treatment means were compared using least significant difference L.S.D. test at a pro ability of 0.05 . Results may be summarized as follows:

1-Vegetative growth parameters :

Spraying with Antioxidant(tocopherol and citric acid) at 100 and 200 mg. L^{-1} caused significant increase plant height after 90 days from transplanting it was hi middle for treatment 128.73 cm and hi middle for spraying times 125.93 cm and the reaction 131.41 cm and diameter of stem, hi middle for treatment 11.55 mm and hi middle for spraying times 10.98 mm and the reaction 11.48 when spray with tocopherol concentration 200 mg.L^{-1} F for two spraying . While in 180 days there were 13.89 , 12.82, and 14.02 mm respectively value for reaction when spray tocopherol in concentration 200 mg.$^{L-1}$ for

three three times .Leaves number after 90 days from transplanting was hi middle for treatment 24.54 leaves and hi middle for spraying times 23.59 leaves and the reaction was 26.10 leaves . While in 180 days there were 40.23 , 38.19, and 42.12 leaves respectively value for reaction when spray citric acid in concentration 200 mg.$^{L-1}$ for two times . Leaf area after 90 days from transplanting was hi middle for treatment 68.59 Dcm^2 hi middle for spraying times 63.23 Dcm^2 and the reaction 76.63 Dcm^2 ,while leaf area after 180 days from transplanting was hi middle for treatment 124.00 Dcm2 and hi middle for spraying times 114.67 Dcm^2 and the reaction 137.50 Dcm^2 fresh, dry weight of the shoot system in the end of season compared with control treatment. Dry weight was hi middle for treatments 936.67 gm , hi middle for spraying times 833.95 gm , and the reaction 960 .00 gm when spray citric acid in concentration 200 mg.$^{L-1}$ for four times .

Spraying four times was more effective as compared to spraying two or three times in the above characteristics except stem diameter.

The interaction between spraying with Antioxidants and number of times of spraying had a significant effects on vegetative growth characteristics

2-Leaf chemical and quality characteristics :

Spraying with (tocopherol and citric acid) caused a significant increase in the concentrations of nitrogen, phosphorus and potassium , carbohydrate, chlorophyll proline as compared with the control treatment .

The increase in number of times of spraying led to significant increase in those studied characteristics. phosphorus , potassium ,

carbohydrate and proline, But none caused a significant increase in the concentrations of nitrogen and chlorophyll

The interaction between both factors was significant effect in all leaf chemical characteristics .

The pest average for treatments for nitrogen in leaves was 3.526 %, hi middle for spraying times 3.425 % ,and the reaction 3.719 when spray citric acid in concentration 200 mg. L^{-1} for four times .

Spraying with antioxidants was effect on phosphorus in leaves hi middle for treatments 0.491 % , hi middle for spraying times 0.411 %, and the reaction 0.496 when spray tocopherol in concentration 200 mg. L^{-1} for four times . While the potassium the pest average for treatments was 4.029 % , hi middle for spraying times 3.845% for four times , and the reaction 4.270 % when spray tocopherol in concentration 100 mg. L^{-1} for four times .

Concentration for carbohydrates in the leaves was 43.63 as hi average for treatments , hi middle for spraying times 42.15, and the reaction 43.99 when spray citric acid in concentration 200 mg. L^{-1} for four times . The total chlorophyll in leaves the pest middle treatments was 0.242 , hi middle for spraying times 0.239 , and the reaction 0.257 when spray citric acid in concentration 200 mg. L^{-1} for three times .

Spraying with antioxidant (tocopherol and citric acid) gave the highest values for dry matter, total soluble solids. percentage of total titratable acidity, vitamin C as compared with the control treatment.

The number of times of spraying led to significant increase in the studied characteristics except total soluble solids .

The reaction between the factors were significant in all Fruit quality parameters .

3.Flowering characteristics :

Spraying with tocopherol and citric acid caused significant increase in total inflorescences, number of flower per plant and percentage fruit set as compared with the control treatment

The number of times of spraying by tocopherol and citric acid led to significant increase in number of flower per plant and fruit setting percentage , but had no effect on number of inflorescences .

The reaction between the antioxidant and number of spraying was inducted effective significant in all characteristics

4. Yield and its components:

Spraying with (tocopherol and citric acid) caused a significant increase in fruit weight, number ,early yield and total yield.

The number of times of spraying led to significant increase in the studied characteristics.

The reaction between the two factories was inducted effective significant in all characteristics, the highest values for early yield per plant 1.734 Kg by spraying citric acid concentration 200 $mg.L^{-1}$ for three times compared 0.720 Kg by spraying two times with water only, also highest values for total yield per plant 4.070 Kg by spraying citric acid concentration 100 $mg.L^{-1}$ for three times compared 1.624 Kg in spraying two times with water only.