

Effect of a plant vitamin on the growth of the tomato plant (*Lycopersicon esculentum*)

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Abstract

The research was carried out to study the effect of a plant vitamin on growth of the tomato plant and the resultant residue levels in the tomato fruit. The field experiment was designed according to the Randomized Complete Block Design (RCBD). Several growth parameters were monitored to determine the growth rate of tomato plants. The macro, micro and trace element contents were determined after the fruits were harvested. The statistical analysis was carried out to analyze the results.

Analysis of the growth parameters indicates that the plant vitamin does not help to increase the growth rate in tomato plant and in the tomato fruit. Results also reveal an increase in N, P, Ca and Zn levels in the tomato fruits.

1. Introduction

To meet the food demand for the increasing population the productivity has to be intensified. Soil is the main nutrient source for plant growth and the quality of the produce. It contains many macro and micronutrients. Continuous cropping in the same piece of land decreases the soil fertility gradually. Therefore synthetic fertilizers and organic manures/fertilizers were introduced to enhance the growth of the plant and to maximize the crop yields.

The plant vitamin foliar spray that was used in the study consists of extracts derived from the brown algae (*Ascophyllum nosodum*). Use of biostimulants can enhance the effectiveness of conventional mineral fertilizers hence seaweed liquid fertilizers stimulate the growth and yield of plants [1].

Seaweeds are one of the most important marine resources of the world, being used as manure in agriculture for centuries. It is reported that the seaweed extract contains major and minor plant nutrients, amino acids, vitamins, cytokinins, auxin and abscisic acid like growth promoting substances which stimulate the growth of the plant. It is also reported that seaweed sprays had an effect on crops under stress conditions [1]. Research with regard to the topic has been carried out in many other countries including some Asian countries [1-3] but not in Sri Lanka. Therefore the aim of this study was to determine the effect of the plant vitamin on the growth of the tomato plant and the resultant residue levels in the tomato (*Lycopersicon esculentum*) fruit.

2. Methodology

The field experiment was carried out at Yakkala in a home garden. Experimental design was arranged in a Randomized Complete Block Design with four replicas (Control, Test 1, Test 2 and Test 3). Each plot was 6 meters in length and 3.5 meters wide in similar environmental condition. Tomato seed germination was done at the initial stage while preparing the beds. Tomato seeds were purchased from agricultural research centre in Gannoruwa, Peradeniya. Germination was initiated in a seed tray. After the 3 weeks of germination tomato seedlings were placed in prepared beds. Starting from the 5th week of germination, foliar spray was applied to test plant except to the control. Treatment was carried out during 10 day intervals until the fruits matured. After one week of application of the plant vitamin, growth parameters such as plant height, number of leaves, and perimeter of the stem were measured. Measurements were taken once a week.

Ripened fruits were collected from the plants and labeled. After harvesting those were cleaned and dried in an oven at 80 °C for 12 hrs. Then the fruit samples were ground and the powder was kept in air tight polyethylene bags after labeling until analysis. For the determination of nitrogen (N) in each fruit, seaweed and plant vitamin Kjeldhal method [4] was performed. Phosphorous (P) determination was performed using the molybdo-vanadate method [5]. Atomic absorption spectroscopy was used to determine the metals K, Ca, Mg, Fe, Zn and Cu.

The difference between the control and the test plants was statistically analyzed using the Mann-Whitney test for all the results at a 95.0% confidence level.

3. Results and Discussion

The results obtained for the analysis of N, P (as P₂O₅), K (as K₂O), Fe, Zn, Cu, Ca, and Mg in the seaweed and the plant vitamin are given in the table 1. Results indicate that K (as K₂O), is the most abundant element in seaweed and there is no Ca. The contents of N, P (as P₂O₅), Fe, Zn, Cu, and Mg were present in low levels (0.001% - 1.000%) in the seaweed. According to the results plant vitamin contains lower levels of macro and micro nutrients than the seaweed. The results obtained for the above elements in the tomato fruits are given in figure 1.

Table 1: Percentages macro and micro nutrients in seaweed and plant vitamin

Sample	N%	P% (as P ₂ O ₅)	K % (as K ₂ O)	Fe%	Zn%	Cu%	Ca%	Mg%
Seaweed	0.13 ±0.02	0.109 ±0.007	14.4 ±0.5	0.52 ±0.02	0.001 ±0.000	0.001 ±0.000	0.000 ±0.000	0.49 ±0.05
Plant vitamin	0.087 ±0.003	0.005 ±0.001	1.570 ±0.008	0.062 ±0.001	0.001 ±0.000	0.000 ±0.000	0.001 ±0.000	0.049 ±0.007

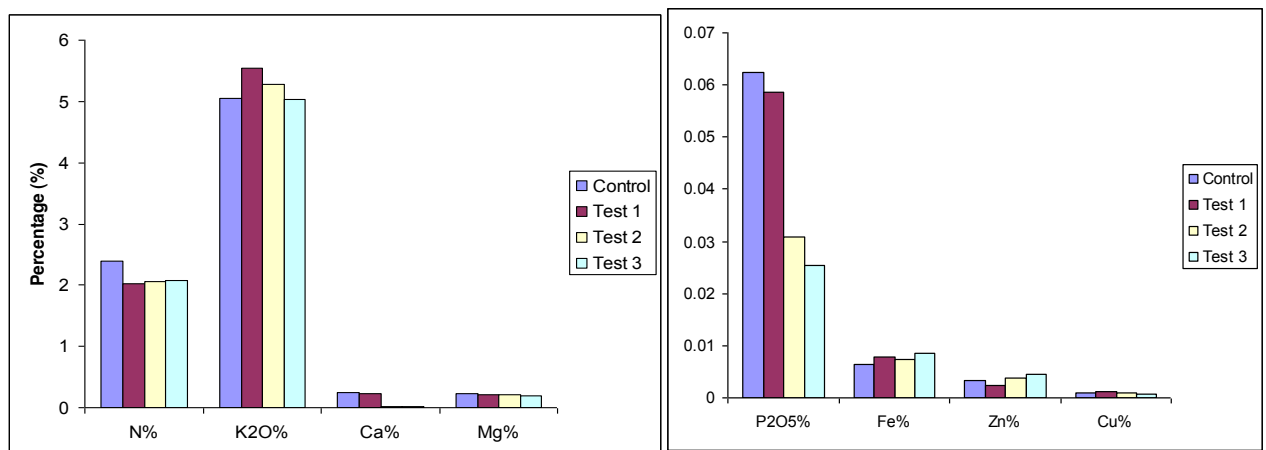


Figure 1: (a) N, Ca, Mg and K (as K₂O) contents in the tomato fruits from the four replicas. (b) P (as P₂O₅), Fe, Zn, and Cu contents in the tomato fruits from the four replicas

According to the figure 1, the levels of N, P (as P₂O₅), K (as K₂O), Fe, Zn, Cu, Ca, and Mg of the tomato fruits do not show a significant difference from the control. Therefore a statistical treatment of data was performed. The results obtained by the Mann-Whitney test in the 95.0% confidence level for the growth parameters of tomato fruits are shown in the table 2 and 3.

Table 2: Difference between population medians of control and tests for the growth parameters after 15 weeks of germination

Parameter	Control/Test 1	Control/Test 2	Control/Test 3
Plant height	N	N	N
Perimeter of the stem	N	N	N
Number of leaves	N	N	N
Number of flowers	N	N	N
Number of fruits	N	N	N

Table 3: Difference between population medians of control and tests for the growth parameters during the period of cultivation

Parameter	Control/Test 1	Control/Test 2	Control/Test 3
Time for flowering	N	N	N
Time for fruiting	N	N	N
Average weight of the fruit	N	N	N

According to the results obtained, plant growth parameters such as the plant height, number of leaves, number of flowers, number of fruits and weight of the fruits have not increased by the application of the plant vitamin. N, P (as P_2O_5), Ca and Zn contents are higher in tests compared to the control. It is likely that the N, P (as P_2O_5), Ca and Zn supplies to the fruit were through sources other than plant vitamin contains only low levels of N, P (as P_2O_5), Ca and Zn. Soil and water may have been the probable sources of the above nutrients to the fruits.

4. Conclusions

Application of the plant vitamin has no significant impact on the growth of the tomato plant and the tomato fruit. The seaweed is rich in K, Fe and Mg while plant vitamin produced using the seaweed contains lower levels of the respective elements. Ca is higher in the fruits of the test plants than in the control. The Ca uptake could have been probably from soil. There is an impact on N and P (as P_2O_5) levels of the tomato fruit caused by the plant vitamin while there was no impact on the K level. Also the plant vitamin has not increased the contents of Mg, Fe and Cu in the tomato fruit.

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Effect of *Caryota urens* L. (Kithul) treacle on serum lipid parameters of normal rats

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Abstract

Traditionally, in Sri Lanka, treacle prepared from *Caryota urens* L. (Kithul) sap has been used as a sweetener for many centuries and it has been used in sweet foods, drinks, confectionary and some medicinal preparations such as Arista. In recent studies we found that *C. urens* treacle posses anti-oxidant and anti-hyperglycemic properties as claimed in Sri Lankan ethanomedicine. Antioxidant and anti-hyperglycemic activities of natural products have shown to correlate with serum lipid profile of animal models. Therefore, in this study, we examined the effect of *C.urens* treacle on serum lipid profile using normal rats.