



Effects of Foliar Application of Organic Extracts on Growth of Lemon (*Citrus Limon*)

Dr. S.J.Aruna** and E.Kanmani*

Department of Microbiology, College of Agricultural Technology, Theni

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Abstract

The new concept Urban Horticulture which enforces growing family sufficient food in urban and peri A field experiment was conducted at the College of Agricultural Technology, Theni. The trial was conducted in citrus crop in the campus, to study the effect of foliar spray of organic extracts of plants. The field experiment consisted of three treatments viz., Azolla, Neem and Garlic extract. Nitrogen pollution from agriculture is a major challenge facing our society today. Biological nitrogen fixation is key to combat the damage that is caused by synthetic nitrogen. Foliar spray of Azolla, Neem and Garlic extracts increase the growth parameters in citrus tree. They are ideal candidates for fast nitrogen fixation and increase the macro nutrient level in plants. This study aimed to investigate the optimal growth enhancement due to the foliar spray of azolla, neem and garlic extracts. The growth conditions that were investigated included the growth parameters and biological analysis. These foliar spray solutions directly influence of growth in citrus plants.

Keywords: Azolla, Garlic, Neem Spray and Growth Parameters

Introduction:

Citrus fruit is a great source of naturally occurring nutrients, such as sugars, organic acids, and vitamin C, which are beneficial and important components of a healthy diet. Citrus trees (*Citrus spp.*) considered one of the major fruits worldwide, due to continuous and excessive use of synthetic fertilizers, there is a severe hazard to human health and to environment. The integrated fertilizing system in citrus orchards contributes to improve crop production through eco-friendly nutrient supply, producing healthy fruits, enhancing the plant tolerance to biotic stresses, increases growers' profits, and sustains natural resources. But now a days many factors influence reduction of growth and yield.

Organically produced vegetables, fruits, and rice have high demand in the market (Gopinath and Jayalakshmi, 2018). Organic farming is one of the best farming methods to decrease the cost of production and gives you the best quality of a product without any chemical or toxic substance (Kumar,



2020). Further, sustainability in agriculture production refers to the capacity to remain productive while maintaining the soil fertility.

This study is aimed at studying the influence of the organic extracts of Azolla fern, Neem leaf and Garlic bulb extract in the citrus crop. There are various benefits of biofertilizers as they increase supplement of various nutrients, eco-friendly, cost-effective, improve fruit quality, and help plant to tolerate stress conditions (Ortaş, 2012). Using organic and bio fertilizers considered a key tool for sustainable horticulture crop production system, it offers improving soil health, increasing crops, and enhancing fruit quality, minimizing costs, and sustains natural resources. Organic and Biofertilizers must be a part of the integrated fertilizing system with synthetic fertilizers to improve the soil characters and sustain horticultural crop productivity (Pathak et al., 2017).

Materials and method

The study was conducted in the Lemon field established in the College of Agricultural Technology. The organic extracts of Azolla fern, Neem leaf and Garlic bulb sprayed on weekly intervals from third month of planting of the saplings. After six months of spray, the leaf sample collected for the analysis of growth parameters like as Leaf area, leaf fresh and dry weight, and biochemical analysis, chlorophyll content, chlorophyll stability index and relative water content. Randomized block design was followed.

Leaf area were measured by leaf area meter (CI-203 CA) while leaf area index (LAI) and leaf area duration calculated to know the photosynthetic efficiency of the plant by following the method given by Watson (1947). Chlorophyll content (chlorophyll a, chlorophyll b and total chlorophyll) of the leaves was measured by the method described by Barnes et al. (1992).

Treatment details:

Table 1: The treatments

S.No	Treatment details
1.	T ₁ -Control
2.	T ₂ -Azolla extract only (20% aqueous extract)
3.	T ₃ -Neem extract only (20% aqueous extract)
4.	T ₄ -Garlic extract only (20% aqueous extract)
5.	T ₅ -Azolla+ Neem extract (20% aqueous extract)
6.	T ₆ -Azolla+ Garlic extract (20% aqueous extract)

**Result and discussion****Table 2: Effect of foliar spray on leaf characters of lemon**

S. No	Treatments	Leaf area (m ²)	Leaf fresh weight (g)	Leaf dry weight (g)
1.	T ₁	105	9.12	5.25
2.	T ₂	120	14.45	6.58
3.	T ₃	110	12.23	7.98
4.	T ₄	115	10.75	7.21
5.	T ₅	160	20.56	10.50
6.	T ₆	130	15.34	8.28
Total		740	82.45	45.8
S. Ed (0.05)		0.63	0.52	0.125

The results in Table (2) showed a significant increase in all treatments compared to the control. Significant increase in the leaf area, fresh weight and leaf dry weight, was observed. Spray of Azolla+Neem extract (20%) recorded maximum the leaf area (160 cm²), fresh weight (20.56 g) and dry weight (10.50 g). Application of organic extract influence of vegetative growth compared to the control. The organic extract may have high level of organic substances which enhance the nitrogen source (Sadik, K et al.,2011).

It may be due to the fact that this extract contains substances similar to plant hormones such as Auxin and cytokinn, as well as growth-promoting substances such as amino acids, proteins and vitamins that have a role in encouraging cell division and elongation, which caused the stimulation of the increase and efficiency of the process of carbonation and thus improving the vegetative growth of the plant Osman et al (2010), the strength of the vegetative and root growth of seedlings as a result of spraying with this extract may be due to the presence of amino acids in Azolla extracts, which have a physiological role in changing the osmotic potential within the plant tissues by reducing the water effort, which increases the cell's ability to absorb water and dissolved nutrients in it and this is positively reflected in an increase Plant growth (Spinelli et al. 2010)

Table.3 Effect of foliar spray on Biochemical characters

S. No	Treatment	Total Chlorophyll content (mg/g)	Chlorophyll stability index (%)	Relative water content (%)
1.	T ₁	0.380	80	75
2.	T ₂	1.25	85	80
3.	T ₃	1.35	92	77
4.	T ₄	1.85	90	82
5.	T ₅	2.22	97	90
6.	T ₆	1.96	95	85
Avg		1.17	89.00	81.50
S.Ed(0.05)		0.11	0.16	0.59



The results in Table (3) showed a significant increase in the chlorophyll content, chlorophyll stability index, and relative water content, The foliar spray of Azolla+Neem extract (20%) increase the total chlorophyll content (2.22 mg/g), chlorophyll stability index (97%) and relative water content (90%) compared to the control. Foliar application of organic extracts increased all the photosynthetic compounds significantly within the plant system resulting improved physiological growth with reduced leaf drop. Nitrogen accelerates metabolites translocation and increases photosynthesis by increasing the activity of carbonic anhydrase (Qiao et al. 2009).

Conclusions

The field trial on lemon with foliar spray of organic extracts of Azolla, Neem and Garlic was studied. Various observations were taken from the field. The observations implied that the foliar application of Azolla fern +Neem leaf (20% aqueous extract) resulted in better leaf characters and the biochemical characters.

However further studies on the influence of the foliar extracts on the yield parameters are essential for confirming their influence on the growth of the plant.

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