



زانكۆی سه‌آهه‌دین – ههولیر

Salahaddin University – Erbil

# **Growth and Essential Oil Content of Thyme (*Thymus vulgaris*) under Megastim111 Foliar Application**

Research Project

Submitted to the department of (Horticulture) in partial fulfillment  
of the requirements for the degree of B. A or BSc. in vegetable production

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2024

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## **Acknowledgement:**

To being with, I thank (Allah) for his blessing. I would like to express my thanks to my family for their support.

I also would like to offer my thanks to the head of Horticulture Department, (Dr. Jihad Sh.). I wish to express my sincere gratitude to my supervisor (Dr. Kharman Kh. Qader) for her help valuable scientific suggestion. My particular thanks to M. Soran S. and M. Sherwan M. for their support Finally, I would thank to all of my friends.

## **Abstract:**

This study was conducted at the plastic house that belongs to the Horticulture department, Agricultural Engineering Sciences College, Salahaddin University. The experiment was conducted from 5/10 /2023 to 23/3/2024 using a local cultivar of thyme plant, to study the effect of Megastim111 foliar application at concentrations (0, 5, 10 and 15 ml/L) on some selected vegetative growth characteristics and in addition to essential oil content. The obtained results were analyzed statistically using (CRD) at the significant level of 5% for field parameters.

The results showed that most vegetative growth parameters under Megastim111 foliar spray significantly increased. It was found that foliar application of 10ml/L of Megastim111 gave the highest plant height 8.33 cm and number of leaves 31.33. The largest number of branches 8.67 was obtained from 15ml/L of Megastim111 foliar application. In addition, the maximum plant fresh and dry weights were recorded by 15ml/L of Megastim111 treatment.

## 1. INTRODUCTION

Thyme (*Thymus vulgaris* L.) is a perennial plant, belongs to lamiaceae family. Due to adaptation of thyme to a wide range of environmental conditions, it grows in Southern and Central Europe, Asia, North America, and Africa. Thyme is widely used in various industries, such as in the medicinal, cosmetic, health, and food industries (Stahl-Biskup and Sáez, 2002; Naghdi and Maki, 2003; Guine and Goncalves, 2016). Essential oil of thyme has been reported to be one of top 10 of essential oils (Maghdi and Maki, 2003). The leaves of thyme used as a spice (fresh or dried) and the plant essential oil show several properties such as antibacterial, antifungal and antioxidant activities (Lee et al. 2004).

Medicinal and herbal plants, including thyme, are traditionally known for being tolerant to marginal soils and low nutrient requirements. However, the optimal management of fertilizers is essential for achieving the maximum economic yield of medicinal plants. Thyme yield can be affected by environmental factors and agricultural operations (Stahl-Biskup and Sáez, 2002).

In recent years, soil health has received substantial attention and nutrient management has shifted dramatically to the natural soil fertility and use of organic sources of nutrients as an alternative to synthetic fertilizers. The use of environment-friendly inputs of natural and organic origin resources can stimulate plant growth by improving the efficient use of synthetic fertilizers.

Among them seaweed extracts classified as bio stimulants have beneficial impacts on plant growth and development (Hernández-Herrera et al., 2014). Seaweed liquid extracts are now being used as foliar fertilizers for various plants (Karthikeyan and Shanmugam, 2016). Seaweed extracts have been reported to

have beneficial benefits on germination, root development, leaf size, and tolerance to poor soil conditions, and nutrient absorption from the soil when used in agriculture (Ali et al., 2021). Seaweeds are a valuable source of micronutrients, macronutrients, amino acids, and vitamins that may have a good impact on plant development and production (Khan et al., 2009).

Megastim111 is a unique liquid stimulant that combines the nutrients nitrogen, phosphorus, potassium, microelements, and algae extract (*Exo phyllium nodosum*), which is characterized by biological stimulation of the plant.

The current investigation was carried out to study the effect of foliar application of Megastim 111 to determine the optimal levels of selected seaweed extract to maximize studied vegetative growth parameters and essential oil yield a local variety of thyme.



## **2. MATERIAL AND METHODS:**

### **2.1 Location:**

The experiment was conducted at the plastic house that belongs to the Horticulture department, Agricultural Engineering Sciences College, Salahaddin University.

### **2.2 Selection of cultivar and seed sowing:**

A local cultivar was selected for the study. The seeds were sowed on 5/10/2023 in plastic pots filled with peat moss and soil as a material to germination. Irrigation was done regularly depending on weather conditions and development stage of plants. After about 45 days of sowing as seedlings reached the appropriate size the seedlings were transplanted to plastic pods in the plastic house.





### **2.3 Preparation of solution:**

Megastim 111 solutions were prepared for foliar application, to prepare (5, 10 and 15 ml/L of the selected fertilizer. The (5, 10 and 15 ml) of Megastim111 was added to one liter of distilled water respectively. Foliar spray was performed at two times with 10 days interval after 30 days from transplanting. The foliar spray was carried out at early morning using a hand held sprayer until dripping.

### **2.4 Description of the Experiment:**

The experiment was consisted to study the effect of foliar application of Megastim111 on the growth and essential oil content of thyme. The experiment was laid out in complete randomized design (CRD) that included 12 treatments representing the 3 concentration of Megastim111 in addition to control with tree replicates. The experiment divided in to 3 replicates each contains 4 pots, 1 plant in each pot.

R1	R2	R3
Control	Control	Control
C5r1	C5r2	C5r3
C10r1	C10r2	C10r2
C15r1	C15r2	C15r3

R, r: Replicate

C: Concentration

### **2.5 Statistical analysis:**

The collected data on various parameters were statistically analyzed using (IBM SPSS statistics version 22) program. All experimental means was separated by Duncan multiple range test at 5% level.

### **3. 6 Experimental parameters:**

#### **3.6.1 Vegetative growth parameters:**

##### **3.6.1.1 Plant height (cm):**

The plant height of the plant from each treatment was measured by graduated ruler from ground level to apical bud.

##### **3.6.1.2 Leaf number:**

Average number of leaves per plant was counted from each treatment.

##### **3.6.1.3 Number of branches:**

The total number of branches per plant was taken in each treatment.

##### **3.6.1.4 Plant fresh weight (g):**

The fresh weight of plants was recorded for each treatment.

##### **3.6.1.5 Plant dry weight (g):**

The taken plants from each treatment oven dried at 70C<sup>o</sup> until the constant weight as described in A.O.A.C (1999).

## 4. RESULTS AND DISCUSSION

### 3.1 plant height (cm):

Foliar application of Megastim111 was affected significantly on the plant height as shown on the table (1). The highest value (6.33 cm) was recorded at 10ml/L and superior significantly on other treatments while the lowest value (5 cm) was recorded at control.

**Table 3.1 Effect of megastim111 foliar application on plant height (cm)**

Concentrations	Plant height (cm)
Control	5.00 d
5 ml/L	7.17 b
10 ml/L	8.33 a
15 ml/L	6.33 c

### 3.2 Number of leaves:

The effect of Megastim111 Foliar application on the number of leaves was significant. The highest value was recorded at 10ml/L while the lowest value was recorded at control table (2).

**Table 3.2 Effect of megastim111 foliar application on number of leaves**

Concentrations	No. of leaves
Control	7.00 b
5 ml/L	21.33 a
10 ml/L	31.33 a
15 ml/L	30.67 a

### 3.3 Number of branches:

There were significant differences among the treatments of foliar application of megastim111 on number of branches. The largest number of branches was recorded at 15ml/L while the lowest value was recorded at control table (3).

**Table 3.3 Effect of megastim111 foliar application on number of branches**

<b>Concentrations</b>	<b>No. of branches</b>
Control	1.33 c
5 ml/L	2,67 b
10 ml/L	5.33 b
15 ml/L	8.67 a

### 3.4 Plant fresh weight (g):

As shown in table (4) the effect of Megastim111 foliar application on the plant fresh weight was significant. The maximum value was recorded at 15ml/L while the minimum value was recorded at control table.

**Table 3.4 Effect of megastim111 foliar application on plant fresh weight (g)**

<b>Concentrations</b>	<b>plant fresh weight (g)</b>
Control	0.28 c
5 ml/L	1.82 b
10 ml/L	2.17 ab
15 ml/L	2.51 a

### 3.5 Plant dry weight (g):

Table (5) shows the effect of Megastim111 foliar application on plant dry weight. The effect was significant and the highest value was recorded at 15ml/L while the lowest value was recorded at control.

**Table 3.5 Effect of megastim111 foliar application on plant dry weight (g)**

<b>Concentrations</b>	<b>plant dry weight (g)</b>
Control	0.05 b
5 ml/L	0.41 ab
10 ml/L	0.29 ab
15 ml/L	0.45 a

## **4. CONCLUSIONS AND RECOMMENDATIONS**

### **4.1 Conclusions**

From the result obtained, could be concluded that the use of Megastim111 affected significantly on growth characteristics of thyme plant. Foliar applications of higher concentrations of megastim111 were most effective and considered recommendable dose because increased the studied vegetative growth characteristics.

### **4.2 Recommendations**

1. Future studies are needed regarding the cultivation of tis local cultivar and other hybrid cultivars under different environmental conditions.
2. More studies are required about the effect of the selected seaweed and other ones and their interaction.
3. Essential oil content is of great importance, as thyme considered an aromatic medicinal plant.



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