



## Changes in yield and growth of green Mint (*Mentha spicata* L.) Under foliar application of urea and soil application of vermicompost

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### ABSTRACT

A field experiment was laid out in agricultural research farm, city Namin, Ardabil province, Iran in 2013. Experiment was conducted in a randomized complete block with seven treatments and three replication. Foliar spray treatments urea solution at a rate of 1, 2 and 3% (in two stages, the first stage a month after transplanting when they had reached 10 cm in height to 20 days after the first stage and second stage), soil application of vermicompost fertilizer at a rate of 5, 10 and 15 tons per hectare and control. Results showed that, plant height in 3% foliar urea was obtained. Also, the maximum stem diameter and the lowest foliar treatment with 3% were obtained in the control. However, maximum of fresh weight per cent foliar treatments and the lowest yield was observed in the control treatment. In final results showed that, Maximum leaf area was obtained by treatment with 2% urea foliar spray of 3% was shared with the group. The lowest leaf area in the control area was estimated.

**Key words:** Mint, Urea and vermicompost

### INTRODUCTION

Aromatic plants and spices have great importance for food, cosmetics and pharmaceutical industries. Their use have taken place since ancient times, and despite many of them were substituted by synthetic ones, the demand for natural products is increasing (Guillén, et al, 1996). Mint have been used as spices and teas after drying, while the essential oil is utilized in cosmetics and pharmaceuticals. The essential oils contents in different species is influenced by genetic material, culture conditions and environment (Charles et al, 1990). Green Mint (*Mentha spicata* L.) or spearmint green belonging to the families *Lamiaceae*, is a perennial herb, herbaceous, persistent, with stems and leaves of the opposite Four teeth were covered with shaggy has no petiole. Purple flowers and spiral round the stem end have gathered, dark red fruit, mint, small capsule and seed largely lacking power plant vegetation (Omidbeygi, 2011). Mint during the growth and production of active ingredients, the amount of food and nutrients it needs.

Research shows that appropriate amounts of nitrogen significantly increased the essential oil of peppermint (Omidbeygi, 2011). Nitrogen is an element essential to plants and elements such as carbon, oxygen, hydrogen and sulfur combine even more valuable materials such as amino acids, nucleic acids, alkaloids and bases are produced. There chlorophyll as a place for light absorption and synthesis related to this element for plant growth and development is vital. If the nitrogen available to plants than the limit may cause disturbances in the vital processes of plants that may be in different forms such as high growth, reduce, delay or even stop the growth may increase the incidence (Stewart et al, 2000). The positive effect of vermicompost on the growth of plants, including vegetables, ornamental plants and flowers in the greenhouse and field conditions compared with combinations of soil and soilless culture media (Atiyeh et al, 2001). In the present study, we focused on effect of foliar spray of urea and soil application of vermicompost on yield and growth of green Mint.

## MATERIALS AND METHODS

This experiments was laid out in agricultural research farm, city Namin, Ardabil province, Iran in 2013. Experiment was conducted in a randomized complete block with seven treatments and three replication. Foliar spray treatments urea solution at a rate of 1, 2 and 3% (in two stages, the first stage a month after transplanting when they had reached 10 cm in height to 20 days after the first stage and second stage ), soil application of vermicompost fertilizer at a rate of 5, 10 and 15 tonnes per hectare and control. The rhizome bud cant row with 33cm between rows and 33 cm, with a density of 10 plants per square meter were planted. During the shooting of five randomly picked after growth period from the soil surface to the terminal bud was measured by a ruler and measured in centimeters. The mean leaf area per repeating four leaves of plants after harvesting and leaf area meter model meter of the device was measured  $\Delta T$  model. After the drying period the temperature in the shade and dry weight of precedent dried plants were weighed using a digital scale g. Stem diameter of five randomly selected samples taken from the bottom, middle and end of the stem caliper and they came out. After drying in an oven at 72 ° C during 24 h and dry weight was measured using a digital scale g. The statistical analyses to determine the individual and interactive effects of time cultivation and weeds control methods were conducted using JMP 5.0.1.2 (SAS Institute Inc., 2002). Statistical significance was declared at  $P \leq 0.05$  and  $P \leq 0.01$ . Treatment effects from the two runs of experiments followed a similar trend, and thus the data from the two independent runs were combined in the analysis.

## RESULTS AND DISCUSSION

Results showed that the effect of treatments on plant height and plant diameter is significant at the one percent level. Minimum plant height (68.8 cm) in 3% foliar urea was obtained. The maximum plant height (58.8 cm) in the control was achieved in a group with other treatments were statistically analyzed. The maximum stem diameter (3.5 mm) and the lowest foliar treatment with 3% (2.7 mm) were obtained in the control. Results the analysis of variance table experimental treatments on fresh weight and dry weight showed that the effect of treatments on both traits is significant at the one percent level of probability (table 1). Thus the maximum (941 grams per square meter) of fresh weight per cent foliar treatments and the lowest yield ( 570 grams per square meter ) was observed in the control treatment. In other words foliar urea increased two percent to about 65 percent of the fresh weight in comparison to control plants . Highest (295 grams per square meter) and lowest (217.33 grams per square meter) plant dry weight, respectively , in the application of vermicompost at 10 t ha- control treatment was achieved , which represents an increase of about 36 percent of the fresh weight of plant (figure 1). Sajnanth et al

(2004) Following the application of vermicompost increased plant growth have been reported. The results of Table Analysis of variance showed that the effect of treatments on leaf dry weight probability level and a significant number of leaves per plant is not significant. Table Analysis of variance showed that the effect of experimental treatments on leaf area is significant at the one percent level of probability (table 1). Maximum leaf area (97.93 cm) was obtained by treatment with 2% urea foliar spray of 3% was shared with the group. The lowest leaf area (74.48 cm) in the control area was estimated. Niakan et al (2004) reported that increasing nitrogen application on leaf Peppermint significantly increased. In aromatic plant such as Mint essential oils were increased with increase of leaf area (Kukini et al, 1994).

**Table 1.** Analysis of variance (mean squares) for effects foliar spray of urea and soil application of vermicompost on yield and growth of Mint

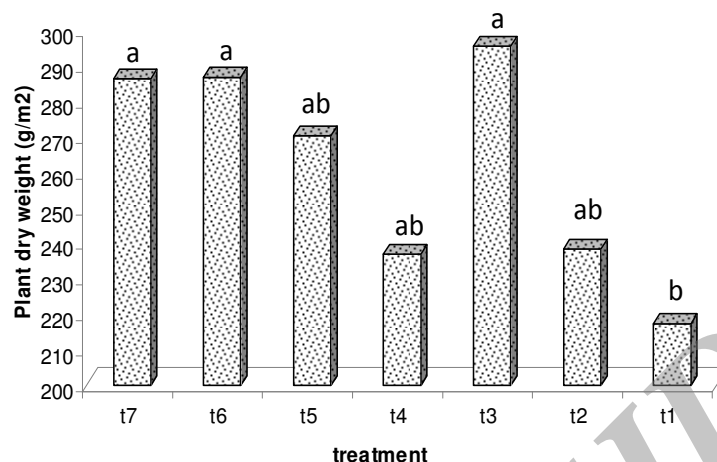
S.O.V	DF	plant height	Stem diameter	Leaf area	plant fresh weight	plant dry weight
Block	2	100.7	0.33	397.3	6871	500.9
Treatment	6	94.5**	0.3**	8457*	41472**	2782*
Error	12	27.5	0.1	7549	5635	10667
CV (%)		6.5	9.6	10.6	10.4	11.5

\* and \*\*: Significant at 5% and 1% probability levels, respectively

**Table 2.** Mean comparisons for effects effects foliar spray of urea and soil application of vermicompost on yield and growth of Mint

Treatments	plant height(cm)	Stem diameter(mm)	Leaf area(cm <sup>2</sup> )	plant fresh weight(g/m <sup>2</sup> )
control	85.8 <sup>a</sup>	2.7 <sup>b</sup>	77.3 <sup>c</sup>	570 <sup>c</sup>
5 ton vermicompost /ha	84.2 <sup>a</sup>	3.1 <sup>ab</sup>	75.5 <sup>b</sup>	645 <sup>bc</sup>
10 ton vermicompost /ha	82.9 <sup>a</sup>	3.5 <sup>a</sup>	47.7 <sup>b</sup>	738 <sup>b</sup>
15 ton vermicompost /ha	80 <sup>a</sup>	3.6 <sup>a</sup>	81.6 <sup>b</sup>	660 <sup>bc</sup>
1 percentage urea	79 <sup>a</sup>	3.1 <sup>ab</sup>	84.2 <sup>b</sup>	762 <sup>b</sup>
2 percentage urea	78 <sup>a</sup>	3.46 <sup>a</sup>	88.6 <sup>a</sup>	942 <sup>a</sup>
3 percentage urea	68.8 <sup>b</sup>	3.56 <sup>a</sup>	85.7 <sup>a</sup>	723 <sup>b</sup>

Means by the uncommon letter in each column are significantly different (p<0.05)



**Figure 1 .** Plant dry weight changes as affected by experimental treatments.

**From right to left: t1.** control **t2.** 5 ton vermicompost /ha **t3.** 10 ton vermicompost **t4.** 15 ton vermicompost /ha **t5.** 1 percentage urea **t6.** 2 percentage urea **t7.** 3 percentage urea

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