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Effect of Vermicompost and Calcium silicate to reduce the Soil Salinity on Growth and Oil determinations of Marjoram plant

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Abstract: This study was carried out during the two successive growing seasons of 2012/2013 and 2013/2014 at the farm of Soils, Water and Environ. Res. Inst., Agric., Res. Center in Sahl El-Hossynia Agric. Res. Station Farm in EL-Sharkia Governorate; Egypt, to investigate effects of vermicompost at 0,6,8 and 10 m^3/fed. on growth, essential oil %, essential oil yield and its components and chemical compotition of marjoram (Majorana hortensis L.) at four levels of calcium silicate at (0,10,15and 20 kg/fed).

Gradual and significant increases in plant height, number of branches, fresh & dry weights per plant, essential oil percentage, and essential oil yield per plant were recorded with vermicompost at 8 m^3/fed. Also, 8 m^3/fed. vermicompost produced the highest percentages of main components of the essential oil(Linalool, Terpinen-4-ol,β-Phyllandrene and Limonene).While the highest percentages of Sabinene and α-Phyllandrene resulted under the effect of 10m^3/fed vermicompost. Also, vermicompost treatments increased total carbohydrates%, nitrogenase and dehydrogenase activities nutrient contents of N, P, K and Ca. While reduced the Na and proline content compared to the control.

As for calcium silicate ($CaSiO_3$) enhanced the above mentioned traits of growth and essential oil. The highest percentages of Linalool, Terpinen-4-ol, β-Phyllandrene and Limonene were recorded in essential oil extracted from plants treated with $CaSiO_3$ at 15 kg/fed. While the highest percentages of Sabinene and α-Phyllandrene resulted under the effect of 20 kg/fed $CaSiO_3$ comparing to control. On the other hand, the lowest percentages of Linalool, Terpinen-4-ol and β-Phyllandrene resulted under the treatment with 15 kg/fed $CaSiO_3$. In addition that, the treatment of $CaSiO_3$ at 15kg/fed. increased total carbohydrates%, nitrogenase and dehydrogenase activities and nutrient contents of N, P, K and Ca but decreased Na content and proline content compared to the control.

Interaction treatments of vermicompost at the rate of 8 m^3/fed., combined with 15 kg/fed. $CaSiO_3$ resulted in significant increases in the above mentioned traits (plant growth, essential oil determinations). Also, the same treatment gave the highest values of the Terpinen-4-ol and Limonene. While the and combined between 8 m^3/fed vermicompost and $CaSiO_3$ at 20 kg/fed showed the highest values of the β-Phyllandrene content. Also, the highest values of the Linalool was obtained in the plants which treated by 10 m^3/fed vermicompost and $CaSiO_3$ at 15 kg/fed. In addition, the highest total carbohydrates%, nitrogenase and dehydrogenase activities and nutrient contents of N, P, K and Ca were recorded when using 8 m^3/fed. of vermicompost and $CaSiO_3$ at 15 kg/fed. On the opposite, the all tested treatments gave the lowest proline and Na content compared to the control.

Key words : *Majorana hortensis L.*, vermicompost, calcium silicate, *Terpinen-4-ol, β-Phyllandrene* chemical composition and essential oil components.

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