

## STUDY THE EFFECT OF SPRAYING WITH HUMIC ACID AND ZINC ON THE YIELD OF THE VOLATILE OIL OF *ROSMARINUS OFFICINALIS* L. AND ITS PHYSICAL PROPERTIES

Ali Adnan Zghair\*, Fatma Ali Hassan and Awatef Naama Jrry

Department of Horticultural Science and Landscape Design, College of Agriculture, Basrah University, Iraq.

\*e-mail : ali.alzibidy@gmail.com

(Received 29 March 2021, Revised 21 May 2021, Accepted 28 May 2021)

**ABSTRACT :** This experiment has been recently carried out in the wooden canopy of the Agricultural Research Station, College of Agriculture, University of Basra during the 2019/2020 season so as to study the effect of spraying with humic acid and zinc on the yield of the volatile oil of rosemary and its physical properties. According to the design of the complete random sectors with a one-time split plot design, the first factor is humic acid with three concentrations (0, 3.5, 7) ml L<sup>-1</sup>, which represents the main factor and the second factor is zinc with three concentrations (0, 25, 50)mg L<sup>-1</sup>, which represents the secondary factor. The results in fact, showed that spraying rosemary plant with humic acid concentration of 7 ml L<sup>-1</sup> gave the highest significant increase in the percentage of volatile oil (1.50%). And all the physical properties of the volatile oil, represented by the refractive index of the volatile oil, the specific density and the specific weight of the volatile oil, were increased (1.4754, 0.910 mg μl<sup>-1</sup>, 0.861), respectively. Spraying with zinc at a concentration of 50 mg L<sup>-1</sup> is given the highest significant increase in all the characteristics of the volatile oil yield, represented by the percentage of volatile oil and volatile oil yield for each plant and the productivity of hectares of volatile oil (1.49%, 0.228 g, 7.16 kg), respectively. The specific density and specific weight of the volatile oil increased (0.913 mg μl<sup>-1</sup>, 0.863), respectively. And the interaction of spraying with humic acid at a concentration of 7 ml L<sup>-1</sup> with zinc at a concentration of 50 mg L<sup>-1</sup> gave a significant increase in all the characteristics of the volatile oil yield represented by the percentage of volatile oil, yield of volatile oil for each plant and the hectare productivity of volatile oil (1.55%, 0.244 g, 7.65 kg) respectively and the specific density and specific weight of the volatile oil increased (0.922 mgul<sup>-1</sup>, 0.902), respectively.

**Key words :** Humic acid, zinc, volatile oil, *Rosmarinus officinalis* L.

**How to cite :** Ali Adnan Zghair, Fatma Ali Hassan and Awatef Naama Jrry (2022) Study the effect of spraying with humic acid and zinc on the yield of the volatile oil of *Rosmarinus officinalis* L. and its physical properties. *Biochem. Cell. Arch.* **22**, 2727-2731. DocID: https://connectjournals.com/03896.2022.22.2727

### INTRODUCTION

Rosemary plant *Rosmarinus officinalis* L, is a herbaceous plant belonging to the oral family Labiatae. Rosemary has been used since ancient times to improve and strengthen memory and is used in the treatment of epilepsy, dizziness and anti-inflammatory cases. It contains flavonoids (epignin, diosmin) as well as tannic acid and rosmarine and has an alarming effect because it contains rosemercin as well as volatile oil at 1-2% of its components are purenol, camphene, camphor and seniol (Chevalier, 2003). The cultivation of medicinal and aromatic plants in general, and rosemary plant in particular, is one of the alternative economic crops that have recently spread because of the suitability of the natural and environmental conditions for their cultivation, in addition to the good economic return resulting from

them. Therefore, attention must be paid to encouraging and developing the cultivation of this plant for its strategic role in future agricultural development. Because of includes tannins, vitamin B1, B2, B3, B6, B9, vitamin C and minerals such as calcium, iron, potassium and zinc. It is on antioxidants and contains volatile oil, which includes boronol, camphene, camphor, seniol and linalol. It also contains flavonoids and rosmarynic acid. It is used as a seasoning, appetizing and a taste enhancer and in sweets, salads, meat and their products, as well as fish and vegetables, soup work and preserve canned meat and fish products. Pure oil is used in the manufacture of cosmetics, perfumes and shampoos to strengthen hair and freshness of the skin of the face and hands in women and in the manufacture of soap and other detergents for his distinctive smell. There are many factors affecting

**Table 4 :** Effect of treatment with humic acid and zinc on the refractive index of oil, specific density and specific weight of volatile oil.

Humic (ml L <sup>-1</sup> )	Zinc (mg L <sup>-1</sup> )	Volatile oil refractive index	Specific density of volatile oil (mg µl <sup>-1</sup> )	Specific weight of volatile oil
0	0	1.4738	0.856	0.781
	25	1.4739	0.883	0.838
	50	1.4746	0.897	0.818
3.5	0	1.4746	0.898	0.831
	25	1.4736	0.930	0.867
	50	1.4734	0.922	0.868
7	0	1.4764	0.896	0.839
	25	1.4757	0.913	0.844
	50	1.4743	0.922	0.902
R.L.S.D 0.05		0.0015	0.026	0.027
Humic (ml L <sup>-1</sup> )	0	1.4741	0.878	0.812
	3.5	1.4738	0.916	0.855
	7	1.4754	0.910	0.861
R.L.S.D 0.05		0.0014	0.012	0.017
Zinc (mg L <sup>-1</sup> )	0	1.4749	0.883	0.817
	25	1.4744	0.909	0.849
	50	1.4741	0.913	0.863
R.L.S.D 0.05		0.0006	0.017	0.017

metabolism of carbohydrates, proteins, and auxins, when zinc is lacking in plants, the production of these substances decreases, which is reflected on secondary compounds, including volatile oils (Brown *et al*, 1993). Zinc also affects the primary metabolic processes, which ultimately lead to the biosynthesis of the active components of the volatile oil (Pirzad *et al*, 2013).

## REFERENCES

- Abdel-Aziz G N and Balbaa L K (2007) Influence of tyrosine and zinc on growth, flowering and chemical constituents of *Salvia farinacea* plants. *J. Appl. Sci. Res.* **3**(11), 1479-1489.
- Alam M M, Naeem M, Idrees M, Masroor M, Khan A and Moinuddin (2012) Augmentation of Photosynthesis, Crop Productivity, Enzyme Activities and Alkaloids Production in *Sadabahar Catharanthus roseus* L. through application of Diverse plant growth regulators. *J. Crop Sci. Biotech.* **15** (2), 117- 129.
- Al-Rawi K M and Khalafallah A A (1980) Design and analysis of agricultural experiments. Dar Al-Kutub for Printing and Publishing - University of Mosul, Ministry of Higher Education and Scientific Research, Iraq. 488 p.
- Amin M M A and Abbas J A (2019) Effect of bio-fertilizer, spraying with humus and fertilizing with magnesium on the quantitative and qualitative characteristics of volatile oil in the Parsley plant *Petroselinum crispum* Mill. *Syrian J. Agricult. Res.* **6**(2), 350-368.
- British Pharmacopoeia (1968) The pharmaceutical press, London. App. XIF. pp. 1273.
- Brown P H, Cakmak I and Zhang Q (1993) Form and function of Zinc plants. In Zinc in Soil and Plants. Ed. Robson A.D. Kluwer Academic Publishers, Dordrecht. pp. 94-106.
- Chevalier A (2003) Alternative Medicine: Medicinal Herbs and Medicinal plants. Translated by Omar Al-Ayoubi. Reviewed, edited and supervised by Muhammad Debs. Academia International for Publishing and Printing. Beirut- Lebanon.
- EL-Akabawy M A (2000) Effect of some bio fertilizers and farmyard manure on yield and nutrient uptake of Egyptian clover grown on loamy sand soil. *Egypt. J. Agric. Res.* **78**(5), 1811-1820.
- Guenther E (1972) The Essential Oils. Vol. 3. R.E. Krieger Publishing Company. Huntington, New York, USA. P. 701.
- Hanafy M S, Ahmed G F, EL-Zehewy A and Mohamed A H (2009) Effect of foliar spray with zinc, boron and molybdenum on the growth, yield, essential oil productivity and chemical composition of rosemary *rosmarinus officinalis* L plant. *J. Productivity and Development* **14**(1), 63-86.
- Hussain A I (2009) Characterization and biological activities of essential oils of some species of Lamiaceae. *PhD thesis*. University of Agriculture of Faisalabad .Pakistan.
- Jalayerinia N, Kalat S M N and Haghghi R S (2017) The effect of vermicompost and spraying with humic acid and fertilizer on quantitative and qualitative characteristics of rosemary. *Asian J. Biol. Life Sci.* **6**(1), 342-346.
- Mousavi M, Soleyman A and Shams M (2012) Changes in yield and yield components of three cultivar of barley under different nitrogen levels in Isfahan region. *Int. J. Agricult. Crops Sci.* **4**(19), 1433-1435.
- Pettit R E (2008) Organic Matter, Humus, Humate, Humic Acid, Fulvic Acid and Humin: Their Importance in Soil Fertility and Plant Health. [Online]. Corpus ID: 15995040.
- Pirzad A R, Tousi P and Darvishzadeh R (2013) Effect of Fe and Zn foliar application on plant characteristics and essential oil content of anise *Pimpinell anisum*. *Iranian J. Crop Sci.* **15**(1), 12 -23.
- Sarhiad M M (2012) Effect of organic fertilization and foliar application of KELPAK and ULTRAKEL on growth and Active Compound of *Apium graveolens*. Master massage. College of Agriculture, Tikrit University.