

*5<sup>th</sup> International Eurasian Congress on*

**‘Natural Nutrition,  
Healthy Life & Sport’**

*02-06 October 2019, Ankara, Turkey*

**PROCEEDINGS BOOK  
Vol: II (2019)**

*‘Road to Conscious Healthy Life’*

*Editors*

**Prof.Dr. Mehmet Rüstü Karaman**

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## **Evaluation of Relationships Between Essential Oils and Microbial Activity**

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**Abstract:** In many studies, it has been determined that essential oils have significant stimulatory effects on soil respiration, that some essential oil components have immediate effects and that some essential oil components have effects after a certain time. Essential oils have been reported to cause intense breathing, high oxygen consumption and thus oxygen limitation according to their active ingredients and thus lead to the predominance of facultative bacteria in metabolic processes. However, the effects of essential oils on other microorganisms in the soil are related to the chemical composition of the essential oil and the growth state of the cell and may vary according to the amount of active substance. In some studies, it has been shown that while essential oils negatively affect the development of some microorganisms in soil, some microorganisms affect their activities positively. For this purpose, in this study, the effects and mechanisms of action of different essential oil components on microbial activity in soil have been evaluated.

**Key words:** Essential oil, microorganisms, soil, plant

### **1. Introduction**

Essential oils are complex mixtures obtained in different ways from the leaves, fruits, bark and root parts of plants (Grassmann and Elstner, 2003; Oussalah et al., 2006). Essential oils, also called essential oils, are a colorless or light yellow colored, volatile, strong-smelling, natural product. They show different properties than oils in terms of the characteristics they contain (Biçer et al., 2003; Kılıç, 2008). Most of the compounds present in their structures are terpenoids (isoprenoids), mostly

monoterpenes and sesquiterpenes. Composition and amounts of essential oils; the type of the plant, which part of the plant is obtained, the mode of production, climate and geographical location of the region varies depending on the changes (Couladis et al., 2002; Burt, 2004; Baydar, 2005). Some plant families containing essential oils include Apiaceae (Mayonnaiseae), Asteraceae (Chamomile), Brassicaceae (Brassicaceae), Iridaceae (Lamiaceae), Lamiaceae (Ballibaceae) Pineaceae, Rosaceae, Rutaceae, Zingiberaceae (Gingerfish) (Öztürk et al., 2002; İşcan et al., 2002; Grassmann and Elstner, 2003).

## **2. Effects of Essential Oils on Microorganisms Activity**

Essential oils have antiseptic and bacteriostatic properties. Essential oils from some spices and herbs may be alternatives to unnatural preservatives due to their bacteriostatic activity. Essential oils are mostly synthesized in aboveground parts of plants, especially in leaves, bunches, buds, fruits and seeds. Essential oils do not consist of a single substance and usually consist of tens or even hundreds of different components. In the use of these compounds, pathogens have an important role in preventing or delaying the development (Uçan, 2008). Bacteriostatic properties of essential oils may be against fungi and yeasts (Grassmann and Elstner, 2003). In some studies, effects of essential oils on microorganisms were determined. Mansour et al. (1986), 14 plant species belonging to the Labiatae family at different concentrations (0.1%, 0.5%, 10%, 15% and 20%) by dissolving the essential oils with acetone applied to bean leaves and fed on these leaves *T. cinnabarinus* determined the mortality values. According to the results, the most effective essential oils were *Lavandula latifolia* Medikus, *Lavandula angustifolia* Miller (Labiatae), *Melissa officinalis* Linnaeus (Labiatae), *M. piperita*, *Salvia fruticosa* Miller (Labiatae), *Ocimum basilicum* Linnaeus (Labiatae) and *R. officinalis*. In parallel with these results, it was observed that the essential oil solution in the leaf was still effective for 7 days.

Akin et al. (2010) determined that the leaf essential oils of myrtle plant show antimicrobial activity against some gram negative (-) and gram positive (+) bacteria. In this study where eucalyptol was detected as the main component of the plant essential oil of Mersin, other important components were found to be linalool, alpha-terpineol and limonene.

Many studies have shown that essential oils always have stimulating effects on soil respiration. Some of them have immediate effects, while others are after a certain time. This is due to the increase in the size of soil bacterial populations and the composition of soil microbial communities (Vokou et al., 1984; 2002). Although the effects of essential oils on the size, composition and activity of soil microbial populations have been studied extensively, their effects on soil processing mediated by specific enzymes are largely unknown (Chalkos 2010). Antifungal agents were investigated in some plants with Lauraceae family. The most effective essential oil,

respectively, *Cinnamomum zeylanicum* (cinnamon), *Aniba rosaeodora* and *Sassafras albidum* and *Laurus nobilis* stated that in this study, the high activity of cinnamon essential oil and antifungal activity was found to cause oxygenated compounds in the content (Simic et al., 2004). *Staphylococcus*, *Enterococcus* and *Ocimum basilicum* essential oil has been found to be active against *Pseudomonas* bacteria (Opalchenova and Obreshkova, 2003).

Capsaicin, which is the main ingredient of most of the genus *Capsicum* plants, has a high antimicrobial effect against microorganisms, particularly *Bacillus subtilis* and *Saccharomyces cerevisia* (Kurita et al., 2002). The researchers have stated that many plants have antimicrobial activity. Nychas (1995) reported that thyme, sage, rosemary, clove, coriander, garlic and onion essential oils show antimicrobial activity. Phenolic compounds found in essential oils have been shown to be effective in reducing the effectiveness of microorganisms in some studies. In the study of Kızıl et al. (2014), known as thyme seven plant species (*Origanum onites*, *O. vulgare* var. *hirtum*, *O. vulgare* var. *gracile*, *O. syriacum*, *Satureja hortensis*, *Thymbra spicata* and *Thymus vulgaris*) expression showed high antimicrobial activity of essential oil.

#### 4. Conclusion

As a result of the literature studies, it was determined that essential oils obtained from different plants had a significant effect on microorganism activity. Depending on the amount of active substance in the volatile oil content, depending on the different plant species, the activity may vary. After determining the content and active ingredients of essential oils to be used for antimicrobial activity, it will be appropriate to test their activity on different microorganism species.

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