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**‘Natural Nutrition,
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**PROCEEDINGS BOOK
Vol: II (2019)**

‘Road to Conscious Healthy Life’

Editors

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Effect of Essential Oils on Nitrogen Availability

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Abstract: Due to its geographical location, Turkey has to have suitable conditions for the growth of many products. However, the insufficient amount of agricultural areas in our country and the small amount of products taken from the unit area reveal the necessity of applying new techniques in agricultural production. Especially, nitrate fertilizers applied as product enhancers, depending on the plant type and soil properties either increases the vegetative parts by increasing the quality, or washed and fixed in the soil is transformed into a form that plants can not take. For this purpose, in this research, using volatile oils to reduce and / or prevent the disappearance of nitrogenous fertilizers by turning into nitrates, and / or to prevent them from increasing, and thus increasing the nitrogen uptake of plants, to reduce the amount of nitrogen fertilizer thrown into the unit area and its effectiveness against existing chemical nitrate inhibitor fertilizer is discussed. In the literature review, it was observed that when some medicinal plants and plants obtained from essential oil were mixed with soil by fertilization, nitrification slowed down and N use efficiency of plants increased.

Key words: Essential oil, nitrate, nitrogen

1. Introduction

Essential oils have terpenoid / non-terpenoid components which are readily crystallizable in liquid form at room temperature (Isçan, 2002; Cheng et al., 2007). It is very important to research the essential oil contents of medicinal plants both scientifically and economically. In order to increase microorganism resistance to all

known antibiotics, it becomes necessary to investigate plant resources and their effects on cells. Essential oils are highly active against bacteria and fungi. Essential oils with many functions, such as intercellular communication and hormones, are found in parts of plants such as flowers, fruits and wood (Hanamanthagouda et al., 2007). The effects of essential oils such as antiseptic (inhibiting the reproduction of microbes), stimulants, and antioxidants increase their importance even more (Lee, 2011). Families rich in essential oil components are mainly Labiatae (Lamiaceae) and Asteraceae (Compositae), Rosaceae, Apiaceae, Lauraceae, Zingiberaceae and Pinaceae families (Pişkin, 2007). Antibiotic effects of essential oils are the most widely known properties. They are highly active against bacteria, viruses and protozoa. Essential oils are complex mixtures containing different components. Therefore, the degree of action of microorganisms can also vary from plant to plant. The antimicrobial effect of essential oils may vary depending on the ecological conditions and species of the plant (Toroğlu and Çenet, 2006).

2. Nitrogen in Soil

Nitrogen is the most important for plant nutrition and development (Aktaş, 1995). The difficulty of keeping the nitrogen at a certain level in the soil and the high cost of providing the nitrogen required for the plants make it very important to know the degree of utilization of the nitrogen fertilizers applied. Therefore, it is extremely important to know the nitrogen lost in various ways. One of the most important problems encountered in plant breeding is unconscious fertilization. The biggest problem in this fertilization is due to nitrogenous fertilizers. Excess nitrogen application, although it does not contribute to the product increases the cost of production, surface and ground water can be seen as contaminants by mixing (Karaman et al., 2004; Karaman et al., 2005). In particular, the use of excess nitrogenous fertilizers is a common problem. Excessively used nitrogen has negative effects on plant development, yield and product quality (Karaman and Turan, 2012).

3. Effects of Essential Oils on Nitrification

Cytotoxic effect varies depending on the concentration of essential oil in bacterial cells. Especially the period in which the bacteria appear on the reproductive curve is of great importance. Cytotoxic effects of volatile oils may vary depending on phenols, alcohols and aldehyde content (Sacchetti et al., 2005; Bakkali et al., 2005; 2008). Plants are capable of producing an unlimited number of aromatic compounds. These compounds are mostly phenolic and their oxygen-bound derivatives. The antimicrobial properties of the components of carvacrol, eugenol and thymol, known as phenolic compounds, are reported to be quite high. Members of this class are reported to be bacteriostatic agents. The hydroxyl groups form different antimicrobial activity in the different compound. Phenol compounds

increase the antimicrobial activity of acetate side groups. Alcohols also have bactericidal effect rather than bacteriostatic effect and cause protein denaturation on vegetative bacteria (Dorman and Deans, 2000; Erdoğan, 2014).

Since the bacteriostatic effect of essential oils is known, many studies have been conducted on the effects of essential oils on foods. However, the bacteriostatic effects of essential oils in the soil, *Nitrosomonas* spp. and *Nitrobacter* spp. species and their effects on developmental periods. Few studies have shown that plant species such as *Pongamia glabra*, *Azadirachta indica*, and *Camellia sinensis* prevent nitrification (Sahrawat and Parmar, 1975; Prasad and Power, 1995). When some medicinal plants and plants obtained from essential oil are mixed into the soil with fertilization, it has been observed that nitrification slows down and N use efficiency of plants increases (Kiran and Patra, 2003). In these sources, the essential oils obtained from medicinal plants, where the researchers generally use whole plants or wastes as inhibitors, together with the fertilizer materials. *Nitrosomonas* spp. and *Nitrobacter* spp. species were not used to reduce the effectiveness and increase the use of N. Patra et al. (2002) in their study, they are used extensively as a nitrification inhibitor and they have negative effects on other creatures and the environment stated that. They stated that biological nitrification inhibitors should be used instead, which are biologically removable, more effective and inexpensive, and increase the use of N.

4. Conclusion

As a result of this study, it has been determined that essential oils obtained from medicinal and aromatic plants have a significant effect on the activities of bacteria involved in nitrification processes. However, the amount of active substances in the content of the essential oil and the concentration of the essential oil to be used are effective at the level of nitrogen availability.

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References

- Aktaş, M., 1995. Plant Nutrition and Soil Fertility. Ankara Univ. Faculty of Agriculture Publication No: 1429, Ankara 344 p.
- Bakkali, F., Averbeck, S., Averbeck, D., and Idaomar, M., 2008. Biological effects of essential oils – a review. Food Chem. Toxicol. 46:446–475.

- Bakkali, F., Averbeck, S., Averbeck, D., Zhiri, A., and Idaomar, M., 2005. Cytotoxicity and gene induction by some essential oils in the yeast *Saccharomyces cerevisiae*. *Mutat. Res.* 585:1-13.
- Cheng, A., Lou, Y., Mao, Y., Lu, S., Wang, L., and Chen, X. 2007. Plant Terpenoids: Biosynthesis and Ecological Functions. *Journal of Integrative Plant Biology*, 49: 179-186.
- Dorman, H.J.D., and Deans, S.G. 200. Antimicrobial agents from plants: antibacterial activity of plant volatile oils. *Journal of Applied Microbiology*, 88: 308-316.
- Erdoğan, E.A. 2014. The Determination of Essential Oil of Some of Plants Which Belong to Lamiaceae, Investigation of Antimicrobial and Antimutagenic Activities, Ph.D. Thesis, University of Mersin. pp. 121.
- Hanamanthagouda, M.S., Kakkalameeli, S.B., Naik, P.M., Nagella, P. Seetharamareddy, H.R., and Murthy, H.N. 2010. Essential oils of *Lavandula bipinnata* and their antimicrobial activities. *Food Chemistry*, 118:836-839.
- İşcan, G., 2002. Antimicrobial Activity of Essential Oils From Some Umbelliferae Species. *Anadolu University Graduate School of Natural and Applied Sciences Biology Program, Master of Science Thesis*, pp. 65.
- Karaman, M.R. and Turan, M. 2012. Sustainable management strategy in plant nutrition and fertilizer efficiency parameters. *Soil-Water Journal*, 1(1): 15-21.
- Karaman, M.R., Brohi, A. R., İnal, A., and Aydeniz, A. 2004. 15N Investigation of nitrogen released from tobacco-waste to be utilized by maize crop. *Isotopes Environ. Health Stud.* 40: 285-290.
- Karaman, M.R., Saltalı, K., Erşahin, S., Güleç, H., and Dericci, M.R. 2005. Modeling nitrogen uptake and potential nitrate leaching under different irrigation programs in nitrogen fertilized tomato using the computer program. *Environmental Monitoring and Assess.* 101:249-259.
- Kiran, U., and Patra, D.D., 2003. Medicinal and aromatic plant materials as nitrification inhibitors for augmenting yield and nitrogen uptake by Japanese mint (*Mentha arvensis*). *Bioresource Technology*, 86: 267-276.
- Patra, D.D., Anwar, M., Chand, S., Kiran, U., Rajput, D.K., and Kumar, S., 2002. Nimin and *Mentha spicata* oil as nitrification inhibitors for optimum yield of Japanese mint. *Communication Soil Science and Plant Analysis*, 33:451-460.
- Pişkin Ç. 2007. Determination of antimicrobial effects of some spice plants belonging to Lamiaceae family. *Selcuk University, Graduate School of Natural and Applied Sciences, Master Thesis*,
- Prasad, R., and Power, J.F. 1995. Nitrification inhibitors for the agriculture, health and environment *Advances in Agronomy*, 54: 233-281.
- Sacchetti, G., Maietti, S., Muzzoli, M., Scaglianti, M., Manfredini, S., Radice, M., and Bruni, R., 2005. Comparative evaluation of 11 essential oils of different

- origin as functional antioxidants, antiradicals and antimicrobials in food. *Food Chem.* 91: 621–632.
- Sahrawat, K.L., and Parmar, B.S., 1975. Alcohol extract of Neem (*Azadirachta indica*) as nitrification inhibitor, *Journal of Indian Society of Soil Science*, 13:131-134.
- Toroğlu, S., and Çenet, M., 2006. Applications of some plants used for therapeutic purposes and methods used for determination of antimicrobial activities. *KSU Journal of Science and Engineering*, 9(2): 12-20.