

NATURAL BIOACTIVE PRODUCTS FOR VEGETABLE DISEASE CONTROL

Simona Lukšiūtė¹, Alma Valiuškaitė¹, Neringa Rasiukevičiūtė¹

¹Lithuanian Research Centre for Agriculture and Forestry, Kauno st. 30, LT-54333 Babtai, Kauno district
simona.lukosiute@lammc.lt

Rising food contamination with pathogens demands precise diseases and pests control. *Alternaria* leaf blight and black spot are diseases caused by *Alternaria* spp. has become one of the most common carrot diseases. The use of chemical pesticides for control of various plant diseases is still a common practice, especially in developing countries. Although with the application of chemical fungicides, these diseases can be controlled, the hazardous impacts of pesticides in human health and environment are well known [1, 2, 3]. Moreover, with their excess applications, pest resistance already exists. Naturally occurring biologically active compounds, such as essential oils, are generally assumed to be more acceptable and less hazardous than synthetic compounds and represent a rich source of potential disease control agents. Crucial oils of medicinal and aromatic plants are believed to have antifungal properties [4, 5, 6]. Therefore, this study aimed to determine the in vitro effect of *Lavandula angustifolia*, *Citrus sinensis*, and *Thymus vulgaris* essential oils on *Alternaria* spp. Experiments carried out at the LAMMC Institute of Horticulture, Lithuania, 2018 - 2019. Lavender and thyme essential oils (EO) were obtained from dried material by hydrodistillation using the Clevenger-type apparatus, and orange blossom oil was commercial. EO separately mixed with potato dextrose agar in concentrations from 200 to 1000 µl/l, poured into Petri dishes. Small purified isolate fragment of 5 mm diameter placed in the centre of the Petri plate and incubated at 25 ± 2 °C in the dark for 7 days. The antifungal activity of EO was compared with chemical fungicide Switch® 62,5 WG (a.i. cyprodinil 375 g/kg + fludioxonil 270 g/kg). The diameter of the pathogen colony was measured 2, 5, and 7 days after inoculation (DAI). Concentrations of the essential oils, which demonstrated reduced growth of the pathogen, were considered to have an antifungal effect. The results showed that lavender EO had a weak antifungal activity at 200 and 400 µl/l concentrations. However, the most effective concentration was 800 µl/l. The orange blossom EO at 800 and 1000 µl/l concentrations had 100 % suppression of *Alternaria* spp. development 2 DAI. Chemical fungicide Switch® 62,5 WG was more effective compared with lavender and orange blossom EO at tested concentrations. However, thyme EO completely inhibited the growth of *Alternaria* spp. at concentrations above 200 µl/l. Besides, the fungicidal activity of concentrations from 200 to 1000 µl/l was even better than chemical fungicide 2 and 5 DAI and in all concentrations from 400 µl/l 7 DAI. To conclude, natural bioactive products produced from plants, especially thyme, have the potential to be control agents for diseases caused by *Alternaria* spp.

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- [1] N. Rasiukevičiūtė, E. Survilienė, A. Valiuškaitė. *Alternaria dauci* infekcijos prognozavimas skirtinguose agroekologiniuose regionuose su iMETOS® sm ligų prognozavimo sistema. *Sodininkystė ir daržininkystė*, 31 (3-4): 77-85 (2012).
- [2] V. Singh, A. Shrivastava, S. Jadon, N. Wahi, A. Singh, N. Sharma. *Alternaria* diseases of vegetable crops and its management control to reduce the low production. *International Journal of Agriculture Sciences*, 7(13): 834–840 (2015).
- [3] F. Fung, H. S. Wang, S. Menon. Food safety in the 21st century. *Biomed. J.* 41, 88–95. (2018)
- [4] M. A. Gatto, A. Ippolito, L. Sergio, D. Di Venere. Extracts from wild edible herbs for controlling postharvest rots of fruit and vegetables. In: A. Ippolito, S. M. Sanzani, M. Wisniewski, S. Droby (eds.), *Using Science to Increase Food Availability. III International Symposium on Postharvest Pathology*, Bari, Italy, 1144: 349–354. (2016).
- [5] A. Morkeliūnė, N. Rasiukevičiūtė, D. Burokienė, A. Valiuškaitė. Application of *Salvia officinalis* and *Pinus sylvestris* essential oils for controlling *Colletotrichum* spp. *Rural Development 2019: Research and Innovation for Bioeconomy* (2019).
- [6] L. Šernaitė, A. Valiuškaitė, N. Rasiukevičiūtė, E. Dambrauskienė, P. Viškelis. The effect of spice extracts on strawberry pathogen *Botrytis cinerea*. *Rural Development 2019: Research and Innovation for Bioeconomy*. (2019).