

Composition and Biological Activities of *Thymus kotschyanus* Essential Oil

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Abstract

Essential oils (EA) are some excellent compounds found in the thymus, which can exert antifungal, phytotoxic and insecticidal activities. promotes their exploration and potential agricultural and food uses. The essential oil (EO) obtained from *Thymus kotschyanus* collected from East Azerbaijan Province (Iran) was characterized by gas chromatography and mass spectrometry (GCMS) analysis. Thymol is the most important compound (60.48%), although 35 other active compounds were found in EO. A large amount of carvacrol (3.08%), p-cymene (5.56%) and gamma-terpinene (6.67%) were found in EA. The EO of *T. kotschyanus* has been tested against important plant pathogenic fungi (*Botrytis cinerea*, *Aspergillus niger* and *Penicillium extension*). The antifungal test showed that the use of ≥ 500 ppm EO produced fungicidal effects on all fungi tested. Similarly, the use of EO ≥ 500 ppm inhibits the germination and subsequent growth of all cultivated weed seeds (*Amaranthus retroflexus* L. and *Panicum miliaceum* L.), which proves its herbicidal effect. Finally, the insecticidal ability of *T. kotschyanus* EO against selected insects (*Oryzaephilus surinamensis* and *Sitophilus oryzae*) was also observed. *O. surinamensis* is more susceptible to EO (LC50 = 4.78 $\mu\text{L/L}$ air) than *S. oryzae* (LC50 = 13.20 $\mu\text{L/L}$ air). The results of this study can provide new safety resources for the development of new products in the food, agriculture and pharmaceutical industries.

The collection of wild-type thyme as a medicinal plant is very common in Iran, because its various biological characteristics have led to its destruction. The purpose of this study was to compare the chemical composition, anti-oxidant and antibacterial properties of *T. kotschyanus* collected in the eastern part of Azarbayan, Iran. essential oil (EO) from wild and cultivated aerial parts of *T. kotschyanus* was studied by gas chromatography/mass spectrometry (GC/MS). The antibacterial activity of (EO) and methanol extracts was tested in bacteria by the disk diffusion method, and their minimum inhibitory concentration (MIC) value was determined by the agar dilution method, and the value was determined of minimum inhibitory concentration (MIC) by the DPPH and FRAP assay methods. Antioxidant activity. 35 components have been identified, representing more than 90% of the total components of the oil. The oil is , the wild type is dominated by monoterpene hydrocarbons (50.2%) and the cultured type is dominated by oxygenated monoterpenes (63.38%). The main components of wild type oil are; thymol (29.96%), cumene (21.35%) and alpha pinene (12.72%) and are of the cultured type; thymol (47.48%) and alpha pinene (5.49%). The MIC value of the strain is sensitive to the EO of *T. Kotschyanus*, the wild type is 2128 $\mu\text{g} / \text{mL}$ and the cultured type is 216 $\mu\text{g} / \text{mL}$. Our data show that culture significantly affects the EO chemical composition and antioxidant potential of *T. kotschyanus*. They are a reasonable source of natural antibacterial substances and have the potential for pathogenic drugs.

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