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Many green plants contain biologically active substances that are or could be used in pharmaceutical or food processing industry. Rose geranium (*Pelargonium graveolens* L.), an evergreen shrub, is a source of an essential oil used in aromatherapy, skin care, and as a food flavour. In addition to that, several studies also indicated antioxidant and insecticidal activity of geranium extracts [1, 2].

Supercritical fluid extraction (SFE) using carbon dioxide is an innovative green technology for obtaining valuable botanical substances without traces of organic solvents. In contrary to traditional separation techniques, such as hydrodistillation or organic solvent extraction, SFE allows separation of the isolate into several fraction during the extraction.

Focus of this work was on using SFE combined with the different fractionation techniques (additional separator, sorption on silica gel in one step with extraction) in the range of pressures and temperatures (9–30 MPa, 40–50 °C) for enhancement of volatiles in extracts from geranium aerial parts. The efficiency of SFE in terms of composition and yield was compared with hydrodistillation. The composition of volatiles in the isolates was determined using GC-MS and GC-FID.

Major compounds analyzed in SFE isolates were citronellol (17.7% w/w), geraniol (16.9% w/w) and citronellyl formate (8.8% w/w). The extraction yields obtained by SFE at conditions 30 MPa, 40 °C (10 mg/g) and 12 MPa, 40 °C (9.9 mg/g) were comparable with the yield of essential oil (10.1 mg/g) obtained by hydrodistillation, although the concentrations of volatiles in the SFE extracts were lower. Use of additional separator under conditions of 9 MPa and 0 °C led to separation of cuticular waxes and other high molecular substances from the volatile fraction. The fractionation using silica gel as sorbent was effective in terms of separation of citronellol and geraniol within the second fraction, which was obtained by extract desorption with pure CO_2 at 30 MPa and 40 °C.

The validity of using SFE combined with different fractionation techniques as a method for enhancement of extract volatiles' concentration was demonstrated, as well as its advantages over simple extraction. Future work will be focused on optimization of adsorption and desorption conditions during SFE fractionation with several types of sorbents.

References

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