## Accepted Manuscript

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PII: S0896-8446(15)30119-4

DOI: http://dx.doi.org/doi:10.1016/j.supflu.2015.09.005

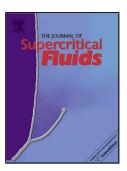
Reference: SUPFLU 3442

To appear in: J. of Supercritical Fluids

Received date: 19-6-2015 Revised date: 7-9-2015 Accepted date: 7-9-2015

Please cite this article as: G. Sodeifian, S.A. Sajadian, N.S. Ardestani, Extraction of *Dracocephalum Kotschyi Boiss* using supercritical carbon dioxide: experimental and optimization, *The Journal of Supercritical Fluids* (2015), http://dx.doi.org/10.1016/j.supflu.2015.09.005

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ACCEPTED MANUSCRIPT

Extraction of Dracocephalum Kotschyi Boiss using supercritical carbon dioxide:

experimental and optimization

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ABSTRACT

Dracocephalum Kotschyi Boiss was extracted using supercritical carbon dioxide (SC-CO2) technique. In this work, the influence

of pressure, temperature, flow rate and dynamic extraction time on the extraction yield of Dracocephalum Kotschyi's essential oil

was investigated by response surface methodology (RSM). The obtained results showed that the data were adequately fitted into

a second-order polynomial model. An RSM based on Central Composite Design (CCD) was employed to obtain the optimum

conditions in terms of the significant parameters. Differential evolution (DE) methodology was also used to optimize the process

parameters. The optimum extraction process parameters within the experimental range were found to be the pressure of 21 MPa,

the temperature of 35 °C, the flow rate of 3.77 g/min, and the dynamic extraction time of 160 min. The maximum yield

(0.9421%) obtained at the optimal conditions was more than that achieved by hydro-distillation method (0.7330%). Chemical

compositions obtained from both methods were identified by GC-MS and determined by GC-FID. To the best of our knowledge,

this is the first report on the extraction of essential oil from Dracocephalum Kotschyi by the SC-CO2 method.

Keywords: Dracocephalum Kotschyi Boiss, Supercritical CO2 extraction, Response surface methodology, Differential evolution,

Optimization.

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