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Abstract

Extraction and Determination of Total Phenolic Contents, Flavonoid Contents, and Volatile Compounds in *Epilobium angustifolium* and *Cannabis sativa* Varieties †

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Plants are a natural source of phytochemicals, many of which have favorable bioactive properties for human health and are therefore used in ethnomedicine for preventing and treating a variety of diseases [1]. *Epilobium angustifolium* (fireweed) is a popular medical plant that is known and used worldwide. Due to its abundance of secondary metabolites such as polyphenols, tannins, and terpenes, fireweed has antioxidant, anti-inflammatory, and anti-aging properties [2]. Cannabis sativa (industrial hemp) is mainly cultivated as a source of industrial fiber or seed oil. In addition to cannabinoids, the chemical composition of industrial hemp includes many other active compound groups, mostly tannins and polyphenols [3]. The biological activity of the herb is dependent on its geographical origin and the sample preparation procedure [4].

The aim of the present study was to quantitatively determine the total phenolic and flavonoid contents and characterize the volatile compositions of three different plants growing in Estonia: fireweed and the industrial hemp varieties Finola and Estica. The volatile compounds were extracted from dried samples using headspace SPME (solid-phase microextraction) and analyzed through use of GC-MS. Polyphenols and flavonoids were investigated in plant ethanol extracts through use of colorimetric tests. As a result of SPME-GC-MS, over 15 volatiles were quantified (≥1%) in each sample. The volatile compound compositions were similar in all of the samples, and the volatiles with the highest contents detected were β-caryophyllene and humulene. Colorimetric tests showed high concentrations of polyphenols (up to 157.6 ± 8.1 mg GAE/g) and flavonoids (up to 11.7 ± 0.9 mg QE/g), whereas the fireweed extracts indicated higher levels. The obtained results show that the investigated plants, fireweed, Finola, and Estica, are valuable sources of phenolic and volatile phytochemicals.

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