

A Comparative Study on Terpene Profile and Antioxidant Properties of *Humulus lupulus L.* and *Cannabis sativa L.* Extracts

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The Cannabiaceae is a family of dicotyledonous plants that contains only two genera *Humulus* and *Cannabis*. *Humulus lupulus L.* (hop) is a perennial climbing herb usually cultivated for its inflorescences and used as flavor for beer production. *Cannabis sativa L.* is cultivated in temperate and tropical regions and also called “hemp” when referred to industrial use (fiber-type), or “therapeutic” also called “marijuana” (drug-type) for the variety with high content of Δ^9 -THC ($>0.6\%$; w/w). To date, the main use of hemp is largely related to food; in fact, hemp seeds are generally used for producing oil and flour. Plants in the family Cannabaceae are well known for their content of biologically-active terpenophenolic metabolites. On the other hand, other bioactive compounds such as phenols, flavonoids and terpenes are reported in both hop and cannabis and not in deep investigated. In the present study, the terpene profile of ethanolic extracts obtained from two hop varieties (cascade vs chinook) was compared with those of hemp inflorescence (carmagnola variety). In addition, the total phenol compounds (TPC) and radical scavenging activity of ethanolic extracts (DPPH) were determined. The content of terpenes was significantly ($p < 0.05$) higher in cannabis extracts (7.621 mg/g) than hop (<3.915 mg/g) mainly due to 3-carene, β -caryophyllene, β -eudesmol, α -bisabolol and phytol. However, no significant differences ($p > 0.05$) were found on hop terpenes as related to their variety. The TPC, ranged 19.74 – 23.40 mg gallic acid equivalent/g, did not significantly change ($p > 0.05$) as related to hop and cannabis. Moreover, the cannabis extracts showed the lowest antiradical activity (33.03 μ mol Trolox equivalent/g). The antioxidant behavior of ethanolic extracts was also studied in bulk oil model system. Linseed oil was stripped for removing the more polar compounds (such as hydroperoxides) and then added by hop and cannabis ethanolic extracts at rate of 0.1 mg/g oil. The oil was stored at 55 °C for 15 days and its oxidative behavior (peroxide value and hexanal) was determined.