Extraction of Terpene Content in Humulus lupulus L. (Common Hops) Varieties

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There is growing interest in the Cannabacaea family for therapeutic and clinical use. Best known for hemp and marijuana (Cannabis sativa), this family also includes the Humulus lupulus (common hops). While most research to date has focused on delta-9-tetraydrocannabionl (THC) and cannabidiol (CBD) from marijuana, there are many other secondary metabolites believed to have therapeutic benefits, including terpenes, in hops. Humulus lupulus are widely used to contribute flavor via terpenes and alpha/beta acids in the brewing process, however they are likely being under-utilized as a source of therapeutic compounds. The purpose of this research is to determine the variety of Humulus lupulus that will yield the most humulene and myrcene, terpenes that are abundant in hops. Fresh, vacuum-sealed Humulus lupulus samples were acquired shortly after harvest. Following sample collection and pulverizing, terpenes were extracted from four hop varieties (Nugget, Chinook, Rakau, Triple Pearl) by ultrasonic extraction. Humulene and myrcene were quantified using Gas Chromatography Mass Spectrometry (GC-MS). Myrcene and humulene concentrations from each Humulus lupulus variety were compared using Single Factor Analysis of Variance (ANOVA) and Student's t-Test. Triple Pearl hops produced statistically more myrcene than other varieties tested ($p<0.0089$), but yielded the least humulene. There was no significant difference in the concentration of humulene produced by Rakau, Chinook, and Nugget hops ($p>0.3997$). Results suggest that terpene yield may vary significantly by Humulus lupulus variety. Hop selection should be an important consideration when cultivating hops for 'plant to product' extraction.