

Effects of Drought Stress on the Chemical Composition and Bioactive Properties of *Cichorium spinosum* L.

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Abstract

Cichorium spinosum L. (spiny chicory), is one of the most well known wild edible plant (WEP) due to its valuable phytonutrient and macronutrient content. Spiny chicory leaves are harvested in nature for food and phytomedicinal purposes. In the search for sustainable agricultural systems, several studies have focused on deficit irrigation as an option for commercial cultivation of WEPs in marginal conditions. The present study aimed to chemically characterize, by chromatographic methods, the tocopherols, organic acids, and fatty acids content in the leaves of *C. spinosum* cultivated under three different irrigation levels, namely: drought stress (C1: 50% of field capacity (FC)), full irrigation (C2: 100% FC) and control (C3: rain-fed conditions). Moreover, the individual phenolic compounds profile and bioactive properties (antimicrobial, anti-inflammatory, cytotoxicity, and hepatotoxicity activities) were assessed in the hydroethanolic extracts.

The studied spiny chicory leaves presented only two tocopherol isoforms (α - and γ -), while quinic, oxalic, and succinic acids were the organic acids found in the highest concentrations. Regarding the phenolic profile, flavonoids and phenolic acids were found, mostly *O*-glycosylated derivatives of quercetin, luteolin, kaempferol, and caffeoylquinic acids, especially in C1 samples (water stress caused the accumulation of secondary metabolites). Gram-positive bacteria showed greater sensitivity to the C3 hydroethanolic extract; overall, the extracts did not show anti-inflammatory, hepatotoxic, and cytotoxic activities except for the AGS tumour cell line. These results emphasize the influence of water stress on the quality of plants, further underscoring the potential and significant added value of *C. spinosum* cultivated under marginal conditions.

Keywords: spiny chicory; wild edible plant; drought stress; chemical composition; antimicrobial.

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