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Abstract

Sea Fennel (*Crithmum maritimum* L.): A Promising Biosaline Crop. Extraction, Purification and Chemical Characterization of Polar Extracts †

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Crithmum maritimum known with several popular names as *finocchio marino, critmo, cretamo, spaccasassi, bacicci, basiggia, erba di San Pietro* and *salissia*, is a perennial halophyte, thrives on coastal cliffs and sometimes in sandy beaches along the Mediterranean, Pacific and Atlantic coasts.

This plant, native to southern Europe, survives also under salinity conditions, so it is considered a promising biosaline crop. However, its commercial cultivation potential is not yet fully exploited and there are few studies regarding the agricultural management and best practices to grow this crop in the Mediterranean environment.

Sea fennel is an emerging vegetable crop also thanks to its increasing food uses. This is due to its aromatic traits, for instance to make pickles and to flavour and season soups, sauces and salads. The connections between cultivation and nutritional value were investigated. Since the natural environment of the sea fennel has a high concentration of iodine, a biofortification experiment was performed to evaluate the effect on nutritional values.

For the reasons mentioned above, interest in this plant is growing and different studies have been performed to understand the total chemical profile of the vegetable.

This work aims to provide a complete quantitative and qualitative overview of the extract obtained from the aerial parts of *C. maritimum*, provided by a Mediterrean firm. For this purpose aerial parts were dried, ground and extracted by percolation with ethanol 70% at 60 °C. The purification was done using an Amberlite® XAD7HP sorbent resin. For the quantification was used an UHPLC-DAD-MS/MS system, equipped with electrospray ionization (ESI) and a Zorbax ODS (250 × 4.6 mm, 5 µm) column.

From the results emerges that the purified extract is richer than the unpurified one, furthermore the extract was mainly composed of phenolic compounds, among which hydroxycinnamic acids and flavonoids were the two main chemical classes. Among the former, chlorogenic acids, including 5-O-caffeoylquinic acid (10.5–22.36 mg g^{-1}), 3,5-di-O-caffeoylquinic acid (5.99–15.82 mg g^{-1}) and 4,5-di-O-caffeoylquinic acid (5.09–15.35 mg g^{-1}), were the most abundant ones. Among flavonoids, rutin (1.60–4.33 mg g^{-1}) and kaempferol-3-O-rhamnoside (0.07–0.33 mg g^{-1}) were the main constituents.

These results support the use of this plant as a functional food or in nutraceuticals, thanks to the abundance of antioxidant compounds. This also suggests the study of the relation between cultivation systems and nutraceutical values.

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