

Summary

Functional properties of coniferous shoots and new possibilities for their use in functional food design

There is an increasing demand for functional food products all over the world. Currently, conifer shoots are rarely used as a food ingredient, despite their wide availability in many parts of the world. Research conducted in recent years confirms that compounds present in shoots of coniferous trees can be a rich source of many bioactive compounds, e.g. terpenoid hydrocarbons, tannins and phenolic compounds.

The aim of the study was to evaluate the shoots of selected coniferous trees in terms of the content of bioactive compounds with potential functional properties and the possibility of using them as a raw material in food production. The test material consisted of shoots of 6 selected coniferous trees (Spruce *Picea abies* L., European Larch *Larix decidua* Mill, Scots Pine *Pinus sylvestris* L., Douglas Fir *Pseudotsuga menziesii*, Silver Fir *Abies alba* and Juniperus *communis* L.). It was shown that the shoots of the studied coniferous trees and their water and water-ethanol extracts are a good source of minerals and phenolic compounds. Extracts from the tested shoots are rich in phenols, including: caffeic acid, ferulic acid, chlorogenic acid and 4-hydroxybenzoic acid, and are characterized by antimicrobial, antifungal, antioxidant properties and inhibit hyaluronidase activity in an in vitro model. In the further stages of the research, it was found that Scots pine shoots allow the production of traditional and low-alcohol beers rich in bioactive compounds with the desired sensory profiles. The addition of shoots at the stage of wort boiling did not adversely affect the course of the fermentation process and allowed to obtain beers that were characterized by antioxidant properties in in vitro tests, as well as an acceptable sensory profile. The results obtained as part of the doctoral dissertation indicate the bioactive properties of conifer shoots and the possibility of their use in functional food.

Keywords: conifer shoots, *Pinus sylvestris*, polyphenols, antioxidants, functional food, beer, fermentation

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