

## Digestive System Model under the Influence of Proanthocyanidins

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**Introduction.** In order to ascertain the effect of proanthocyanidins on the digestive system a model was made. The model of the digestive system included the key enzymatic components in metabolism of carbohydrates, proteins and lipids. Previous experimentations show that these tree-extracted proanthocyanidins have influence on different enzymatic systems of the digestive system.

**Aim.** The aim of the study is to establish a base line effect of widely growing tree extracts: goat willow (*Salix caprea*), Scott pine (*Pinus sylvestris*) and black alder (*Alnus glutinosa*), on the activity of the digestive system *in vitro*.

**Material and methods.** The hydrophilic extracts were obtained at the Institute of Wood Chemistry from the trees' bark using sequential extraction and characterized in terms of component composition and antioxidant capacity (ABTS<sup>+</sup>, DPPH and ORAC assays).

The European standard digestive system model included an array of experimental work testing the effect of the above-mentioned extracts on the activity of enzymes that play the key role in metabolism of proteins, carbohydrates and lipids.

The focus of the model included the activity of enzymes present in the oral cavity, stomach and intestines, with the highest focus on salivary amylase, pepsin and lipase. The methods used in order to establish the effects of each given extract on the function of the enzymes incorporate the testing of quantitative and qualitative results of enzymatic functions (products).

**Results.** The high total polyphenols content (40–50% DM) was found for extracts under study. The polyphenol fraction of black alder extract consisted mainly of proanthocyanidins (condensed tannins). The extracts showed high antioxidants capacity (close or higher than referent antioxidant Trolox) in all three assays.

The modulated effect of the given extract has shown both activation ( $15 \pm 1\%$ ) and inhibition of salivary amylase (dependant on the given extract), strong activation of pepsin by two of the given extracts (Goat willow and Scott pine), as well, as on lipase with strong activation ( $20 \pm 2\%$ ) absent bile.

**Conclusions.** The diversity of effects on the digestive system model produced by these extracts may prove its worth in treatment of high verity of metabolic disorders including: liver disorders, patients that underwent cholecystectomy, carbohydrate intake control, stomach acidity problems and enzymatic secretion issues.