

Dietary Isoflavones: Aglycones and Glycosides

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Publications and Presentations

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Tan, J., Day, A. J. and Morgan, M. R. A. *Identification and Characterisation of β -D-Glucosidases from Diverse Plant Sources Using Flavonoid Glycosides: Apple Seeds Are a Rich Source of Stable Enzyme*. (Manuscript in preparation)

Abstract

Flavonoids are non-nutrient secondary metabolites ubiquitous in plants, associated with protection against various diseases, such as cancer and cardiovascular diseases. Dietary flavonoids are normally found as conjugated glycosides except, notably, in fermented foods where although there may be losses in total flavonoid content, levels of liberated aglycones can be relatively high. There has been considerable interest in the relationship between the form and structure of the ingested flavonoids and the consequences for efficiency of absorption.

The research focused firstly on β -D-glucosidases (β -D-glycoside glucohydrolase, EC 3.2.1.21) extracted from different plant sources and characterised. The enzyme was found at the highest levels in almond and apple seeds. The optimum reaction conditions of the enzyme from apple seeds were determined to be pH 5.5 at 65°C, and the enzyme extract was stable at 4°C for at least 12 weeks. Kinetic characterisation of the enzyme from selected materials was carried out by using para-nitrophenyl- β -D-glucopyranoside (p-NP-Glc) as substrate. The K_m and V_{max} of the enzyme from apple seed extract were determined, for the first time, to be 5.48 ± 0.34 mM and 15.60 ± 0.95 U/mg protein ($n = 8$), respectively, with the protein content of the extract being 0.728 ± 0.019 mg/ml.

Secondly, isoflavone contents from different sources were investigated. Soy bean and its products are were found to be good sources of daidzin and genistin; kudzu was the best source of puerarin; red clover and chickpea were good sources of formononetin and biochanin A. Passion fruit was found to be an interesting source of isoflavones outside the legume family.

By using selected enzyme sources and isoflavone sources, a novel natural style soy-based food was developed in which isoflavones existed predominately as aglycones. The food, derived using soya and enzymes from waste sources, may have further potential.

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