**Composition and functionality of pectic polysaccharides from pea hull**

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Although pea hulls represent about 10% of the mass of peas (*Pisum sativum*)1 there is no commercial application of this by-product of protein and starch production. Regarding the chemical composition, pea hulls contain up to 15% of galacturonic acid2. Therefore, pea hulls must be considered as a promising raw material for the recovery of pectic polysaccharides. However, there is a lack of knowledge in scientific literature on suitable extraction procedures as well as on the chemical and functional properties of pea hull-derived pectic polysaccharides, which is addressed in this investigation.

Extraction of pectic polysaccharides was performed based on a central composition design with extraction time, temperature and pH as variables. Nitric acid was used as acidifier as it is commonly used in commercial pectin extraction. The extracts contained 45 – 76 % galacturonic acid with a low degree of methoxylation (< 50 %). Neutral sugar composition was significantly affected by the extraction conditions. Compared to commercially available citrus pectin and sugar beet pectin, the ratio of neutral sugars distinctly differed. Arabinose and galactose content was reduced while glucose and xylose content was increased, which indicates a structural difference of pea hull pectin. The protein content of pea hull pectin varied between 6 to 12%, which is higher than in citrus and even sugar beet pectin. Although pea hull pectin is characterised by a low degree of methoxylation, a similar degree of acetylation and a similar molecular weight compared to citrus pectin, calcium-induced gelation could not be achieved. Despite pectin being widely used as a gelling agent, pectin from specific botanical origin like e.g. sugar beet pectin, lack this property. However, this type of pectin is suitable for stabilisation of emulsions3. In the present study pea hull-derived pectin was compared to commercial pectin regarding its surface activity. A decrease of the interfacial tension was observed at the air-water interface and at the oil-water interface. Interfacial tension was even lower than for sugar beet pectin. This is a first indication, that pea hull pectin might be applicable as a foaming agent and also as an emulsifier and may be linked to its high protein content.

Ongoing research focuses on the applicability of pea hull pectin as a surface active compound in complex food systems. Furthermore, recent data from the present study indicate that, the type of acid used for extraction significantly affects the composition and thus functionality of the pectic polysaccharides.

*References:*

1 Ali-Khan, S. (1993). Seed hull content in field pea. *Canadian Journal of Plant Science*, *73*, 611-613.

2 Weightman, R., Renard, C. & Thibault, J. (1994). Structure and properties of the polysaccharides from pea hulls. Part 1: Chemical extraction and fractionation of the polysaccharides. *Carbohydrate Polymers,* 24, 139–148.

3 Ngouémazong E. D., Christiaens, S., Shpigelman, A., Van Loey, A. & Hendrickx, M. (2015) The Emulsifying and Emulsion-Stabilizing Properties of Pectin: A Review. Comprehensive Reviews in Food Science and Food Safety*,* 14, 705–718.

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