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## Antioxidant Activity of Barley Grain Extracts

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During the last years the use of natural antioxidants instead of synthetic ones becomes more and more popular. Barley (*Hordeum vulgare* L.) grain also can serve as a source of natural antioxidants as grain contains flavanols, tocopherols, phenolic acids, carotenoids etc. [1]. Extracts of barley grain have already been used for stabilization of corn [2] and sunflower [3] oils. Hullless barley is more valuable than hulled barley, as removal of hulls results in a loss of valuable cellular tissues and vitamins, located in germ and outside layer of grain.

We tested a new (registered in 2011) hullless barley variety „Irbe” bred at Priekuli Plant Breeding Institute (Latvia). The aim of our investigations was to extract antioxidants of barley grain with different extraction methods and to elucidate applicability of these extracts for stabilization of foodstuffs and cosmetics.

Barley grain was dried or preheated at different temperatures in conventional drying camera or in microwave oven and then ground ( $d < 0.069$  mm). Extracts were prepared using polar solvents (ethanol, acetone) and their mixtures with water, as well as nonpolar solvents (hexane, petroleum ether); besides that we used vegetable (rapeseed, linseed, hempseed) oils as solvents, too. Several methods were applied for extraction: Soxhlet extraction, shaking and ultrasonification at room temperature or boiling temperature of solvents.

The total phenolic content (TPC) of extracts was determined by spectrophotometer according to the Folin-Denis colorimetric method. TPC was expressed as gallic acid equivalents (mg GAE/100 g grain). TPC of extracts obtained

with polar solvents ranged from 31.9 to 511.5 mg GAE/100 g, but TPC of nonpolar extracts – from 1.8 to 10.4 mg GAE/100 g.

The greatest TPC (511.5 mg GAE/100 g) had the extract obtained with 70% acetone at boiling temperature of mixture, the second best extract (TPC=345.8 mg GAE/100 g) was prepared by ultrasonification of barley flour with 70% ethanol.

Free radical scavenging activity of extracts was evaluated by DPPH method. Results of DPPH test was expressed as  $IC_{50}$ .  $IC_{50}$  value shows the concentration of antioxidant necessary for 50% decrease of the initial DPPH concentration. The most efficient were extracts obtained with 70% ethanol and 70% acetone by ultrasonification (2.0 mg/ml and 0.9 mg/ml, correspondingly).

The results of our investigations reveal that grains of hullless barley (variety „Irbe”) contain plenty of natural antioxidants, which can be successfully used for improvement of oxidative stability of vegetable oils, as well as cosmetics and food.

1. Liu, Q., Yao, H. Antioxidant Activities of Barley Seeds Extracts. *Food Chem.*, 2007, vol. 102, N 3, p. 732-737.
2. Madhujith, T., Shahidi, F. Antioxidative and Antiproliferative Properties of Selected Barley (*Hordeum vulgare* L.) Cultivars and Their Potential for Inhibition of Low-density Lipoprotein (LDL) Cholesterol Oxidation. *Journal of Agricultural and Food Chemistry*, 2007, vol. 55, p. 5018–5024.
3. Anwar, F., Qayyum, H. M. A., Hussain, A. I., Iqbal, S. Antioxidant Activity of 100% and 80% Methanol Extracts from Barley Seeds (*Hordeum vulgare* L.): Stabilization of Sunflower Oil. *Grasas y Aceites*, 2010, vol. 61, N 3, p. 237-243.