

Antioxidant Activity of Rice Hull Extracts Obtained after Alkaline or Acid Digestion with Regard to Phenolic Content and Composition

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Rice hull is an agro-industrial waste produced in large amounts worldwide, which is mainly utilized to provide energy in the rice-milling industry whereas alternative uses are rather limited.

The present study focuses on the phenol content and composition, as well as the antioxidant activity of rice hull extracts prepared after digestion with 1 and 4 M NaOH or HCl acid solutions (solid to liquid ratio of 1:25 w/v, 120 °C, 1.2 bar, 2h in a pressure cooker). Digestion at high temperatures was selected as the phenolic compounds found in the hulls are bounded [1]. The extracts were tested toward the scavenging of DPPH, ABTS and peroxy radicals (using the crocin bleaching assay), the ability to reduce copper ions employing CUPRAC assay, as well as their efficiency to retard oxidation of liposomes. Phenolic content was determined with Folin-Ciocalteu and composition with HPLC and GC-MS after derivatization.

Antioxidant activity testing showed that the extracts obtained after NaOH digestion presented comparable (DPPH, CBA) or superior activity (ABTS, CUPRAC and liposomes) to those obtained after hull treatment with HCl acid solutions. Total phenol content and analysis of individual phenols with the aid of HPLC and GC-MS showed that extracts after NaOH treatment were richer in phenolics and contained mainly hydroxycinnamic acid derivatives (monomeric and dimeric). Whereas acid treated ones contained only some hydroxybenzoic acids and aldehydes.

The present findings add to knowledge on the valorization of rice hulls as sources for antioxidants.

References

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