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BRIEF COMMUNICATION

Phenolic Compounds Present in Rice Husk

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Abstract. In a study on the phenolic distribution of rice husk (lemma, palea, rachilla and sterile lemmas), seven phenolic acids were detected in the alkali and alcoholic extracts. The total quantity of phenolic compounds in the husk differed with cultivars; however, no qualitative difference was noticed.

Rice grains are prone to infection by various organisms before or after harvest causing brown to blackish discolouration in the form of small flecks or large blotches to cover the entire glumes. A large number of fungi and bacteria are associated with the discolouration of rice grains (PADMANABHAN 1949, MATHUR and NEERGAARD 1970, NEERGAARD 1970, OU 1972). The extent of grain discolouration is influenced by the environmental factors, the organism involved and degree of infection. The brown discolouration of plant tissues in the disease syndrome has been attributed to the oxidation of phenolic compounds (FARKAS and KIRÁLY 1962, CRUICKSHANK and PERRIN 1964, RUBIN and ARTSIKHOVSKAYA 1964). The qualitative and quantitative nature of phenolic compounds present in rice husk (lemma, palea, rachilla and sterile lemmas) is not well understood and this was investigated.

One hundred grams of rice seeds collected from cultivars 'IR 8', 'Ratna', 'CR 1014', 'Benibhog' and 'Zenith' were hulled separately in Satake Rice Machine at 1000 rpm and the husk and the kernels were separated. The husk portions were ground in a Mitamura Riker Crusher 18—10 using a 20 mesh sieve. 25 g of the powdered husk were moistened with ethanol and 75 ml of 0.5 N KOH solution was added. The mixture was warmed at 60 °C for 45 min on a hot water bath to liberate the phenolic compounds (GEISSMANN and NEUKOM 1973) and filtered through Whatman No. 1 filter paper. The pH of the filtrate was adjusted to 3 with HCl and extracted thrice with equal quantities of diethyl ether. The extracts were evaporated to dryness, residue was dissolved in 20 ml of 20% $NaHCO_3$ solution and extracted with diethyl ether. The ether extracts were discarded. The alkali phase was again adjusted to pH 3 using HCl and extracted with diethyl

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ether for three times. The pooled ether extract was evaporated to dryness and the residue was taken in minimal quantity of methanol.

In another extraction method the powdered husk was simply extracted in boiling ethanol, the final volume of the extract was made up to represent 10 g in 100 ml alcohol and was used separately for both quantitative and qualitative estimation of phenolic compounds.

Thin-layer chromatography was carried out on silica gel G (E. Merck, Germany) thin-layers with authentic phenolic compounds. The solvent mixtures used were: system 1, benzene-dioxane--ethyl acetate (90 : 25 : 4, v/v), system 2, benzene-ethyl acetate (3 : 1, v/v) (GEISSMANN and NEUKOM 1973), system 3, benzene-dioxane-acetic acid (95 : 25 : 4, v/v) and system 4, toluene-acetic-acid-water (4 : 1 : 5, v/v) (HARBORNE 1961, RANDERATH 1966). Visualization was effected with 1% ferric chloride reagent or diazotized sulfanilic acid reagent (RANDERATH 1966).

The total phenolic contents of this extract were measured using Folin-Ciocalteau reagent (BRAY and THORPE 1954). Chlorogenic acid was used as a standard.

The presence of seven phenolic compounds in both the extracts was established by thin-layer chromatography. Based on identical Rf values and colour reactions to the authentic compounds, they were identified as chlorogenic, caffeic, ferulic, vanillic, *p*-coumaric, *p*-hydroxybenzoic, and salicylic acids. No qualitative difference could be observed between the extracts of husk belonging to different cultivars. However, the total quantity of phenolic compounds varied with the rice cultivar. Cultivar 'Zenith' possessed the highest amount of alkali extractable total phenols in the husk (128 μg/g oven dry sample) followed by 'IR 8' (100 μg), 'CR 1014' (94 μg), 'Benibhog' (90 μg) and 'Ratna' (89 μg). Alcohol extraction yielded lesser amounts of total phenolic compounds.

The presence of phenolic acids in rice husk is of great importance from the point of grain diseases and seed microflora. Exudation of these phenolic acids during rice seed germination and its influence on seed transmission of diseases, rhizosphere microflorra and seedling growth cannot be ruled out.

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