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INAA for discriminationg geographic origin of Brazilian rice

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The concentration of chemical elements in plants and in their edible parts varies according to the plant genotype, soil fertility, environmental factors and agricultural practices. Based on such relation, chemical elements have been used to discriminate the origin of food, identifying species or variety, cultivation system and geographic region, amongst other characteristics. Trace elements are especially interesting for discriminating the geographic origin, since their availability for plants is normally connected to the geology and genesis of soils. As a staple food worldwide, rice has already been studied by different analytical techniques for tracing origin. Here, instrumental neutron activation analysis was applied for evaluating Brazilian rice samples, in order to identify chemical elements with potential for discriminating geographic origin. Sampling was performed directly in the consumer market of Piracicaba city, São Paulo State, tracking the origin back to the processing unit. Emphasis was given to commercial brands from Rio Grande do Sul, the state with the main production of rice in Brazil. At total, twelve municipalities of Rio Grande do Sul were represented by the sampling procedure, comprising the regions west, south and east of the State. After processing in a rotor mill, samples were irradiated at a thermal neutron flux of 8×10^{12} cm-2 s-1 for 8 hours and radioactivity was counted in HPGe detectors at decay times of 4, 7, 15 and 30 days. Concentrations of chemical elements were assessed by the k0 method, allowing the determination of As, Br, Co, Cs, K, Mo, Na, Rb and Zn. The clearest separation was observed for Na, which presented systematically higher concentrations in rice samples originated from the east part of Rio Grande do Sul, i.e. close to the Atlantic Ocean. However other chemical elements also demonstrated to be useful for discriminating the geographic origin.

Primary author: Dr BACCHI, Marcio A. (CENA/USP, Brasil)

Co-authors: Dr ELIAS, Camila (U); Prof. DE NADAI FERNANDES, Elisabete (University of Sao Paulo); Mrs KATO, Lilian S. (CENA/USP); Dr SANTOS, Luis Gustavo C. (CENA/USP); Mrs SARRIÉS, Silvana R.V. (CENA/USP)

Presenters: Dr ELIAS, Camila (U); Prof. DE NADAI FERNANDES, Elisabete (University of Sao Paulo)

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