

## Arsenic content and speciation in Uruguayan Rice

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### ABSTRACT

Rice is the most important cereal for human feeding. Rice production is essential to provide food security for many developing countries all over the world. Arsenic is a carcinogen class I element, being inorganic forms more dangerous to human health than organic ones. It can be present in soils by natural geogenic and anthropogenic sources. Arsenic absorption by rice plants is favored by flooding conditions. Main arsenic exposure paths to humans are through contaminated water and rice consumption. Maximum levels of inorganic and total arsenic have been set by different organizations involved in rice world commerce. World Health Organization (WHO) proposed a maximum level of inorganic Arsenic (iAs) of 0,20 mg/kg for polished rice. Mercosur limit for total arsenic (tAs) in grain has been set in 0,30 mg/kg in polished grain. FDA has set inorganic arsenic level in rice for baby food purposes in 0,10 mg/kg.

As a part of an overall multi institutional project seeking to determine the levels of this element and study potential genetic and management alternatives a country sampling strategy was developed. In two cropping seasons (2017-2018 and 2018-2019) 75 commercial rice samples were taken each year, totalizing 150 samples. These samples were taken all over Uruguayan rice production regions, including all main varieties and regions planted in the country. tAs and iAs were analyzed on polished rice samples.

Previously to this effort, several experimental plot studies were carried out in different locations where rice polished samples were also analyzed for tAs and iAs levels. By integrating all samples, a data base of 254 rice samples was generated. Average tAs and iAs levels were 0,21 and 0,06 mg/kg respectively. 78% percent of the samples analyzed for tAs were below the 0,30 mg/kg maximum level established in the Mercosur countries and 100% of the samples presented levels of iAs levels below the 0,20 mg/kg established by WHO and 88% were even below 0,10 mg/kg of iAs required for baby foods.

**Key words:** Rice, Arsenic, Oryza Sativa, Food safety; Uruguay