ACCUMULATION OF MERCURY IN DIFFERENT RICE GENOTYPES CULTIVATED IN SOILS FROM THE REGION OF LA MOJANA, COLOMBIA

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Introduction

La Mojana is a region in the department of Sucre, Colombia, which is known for its great agricultural potential within that productive sector, and rice cultivation is presented as one of the most important, considering that and rice cultivation is presented as one of the most important, considering that for the first half of 2013, 68.7% of rice crops reported in the subregion of Bajo Cauca (which belongs La Mojana) he was sown in La Mojana. Thus rice cultivation is a factor of socio-economic impact in all municipalities of La Mojana, a situation that can consider it as the main source for basic needs of this population (FEDEARROZ, 2014). A report on native rice production in the region, indicated that about 47 different varieties which certain proportion are intended for personal consumption (Corpoica, 2013). Appreciable amounts of mercury (Hg) in different environmental compartments have been found on this region (Marrugo-Negrete *et al*., 2010; Marrugo-Negrete *et al*., 2015), and also in grains of rice traded in the towns (Argumedo-García *et al*., 2013). In this study, the accumulation in the rice grain of different varieties (native and commercial) that are grown in the region La Mojana was evaluated in order to establish which represents less risk to the health of the population.

Methods

In the experimental design it was used univariate design with 6 levels (landraces: Ligerito belepano (Lb), Ina blanco (Ib), Fortuna morado (Fm); commercial varieties: Fedearroz 2000 (Fe2), Fedearroz 473 (Fe4) y Fedearroz Mocarí (FeM)) and and three replications. Also, a completely randomized design (DCA) was used factorial arrangement 3 (commercial varieties: Fe2, Fe4FeM) x 4 (levels of mercury in the soil: 0,13, 0,3, 0,8 y 1,5 mg Kg-1) with three replications. The experiment was conducted in pots containing 10 kg of soil from the region of the La Mojana (topsoil 0-30 cm), in a greenhouse located at the University of Cordoba, Colombia. The average temperature was 27.8 ° C with a relative humidity between 76-82%. All analyzes were performed in a direct mercury analyzer (DMA-80) after spraying and drying of samples.

Results

ANOVA (alpha level of 0.05) for concentrations of Hg in the root and peel showed statistically significant differences between commercial and landraces assessed at the same level of Hg in the soil, however, no

differences occurred for husked grain concentrations (table 1). The mean values in the grain for all varieties, were between 7,37 ±6,93 µg Kg^{-1} (FeM) and 21,84 ±8,47 µg Kg^{-1} (Fe2)

Table 1. ANOVA test at an alpha level of 0.05, for concentrations of Hg in the root shell and shelled grain. Test at a fixed level of Hg (0.13 mg Kg^{-1}) between landraces and commercial

Órgan	Degrees of freedom	Sum of squares	Mean square	F-Valor	Pr > F
Raíz	5	2,6276	0,5255	5,48	0,0074
Grano	5	5,4397	1,0879	1,42	0,2842
Cáscara	5	3,0315	0,6063	3,29	0,0421

The average concentration of Hg in the shelled grain and the shell, for the experiment of commercial varieties grown in soil at different levels of Hg, are shown in Figure 1. The levels in the grain were below 30 ng g^{-1} for all treatments. To the shell, Hg levels were relatively higher than grain, reaching the highest in Fe4 Fe2 and varieties.

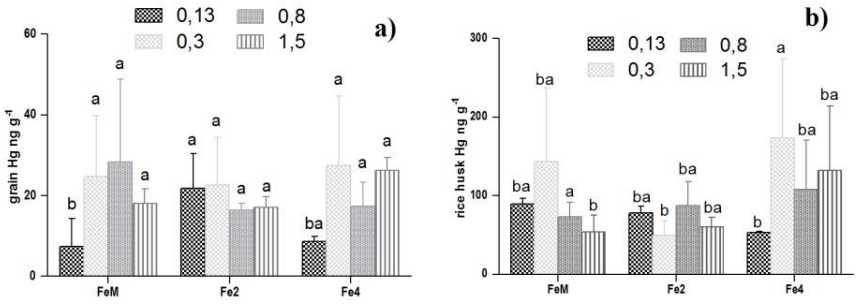

Figure 1. Hg in the grain (a) and shell (b) of commercial varieties, in soils at different concentrations of Hg. Different letters above the columns indicate statistically significant differences (alpha 0.05)

Conclusion

The accumulation of Hg in the grain of rice in different varieties objects of study showed few differences, even when rice was planted in soil at different levels of Hg, however, lower levels were found to landraces compared to commercial varieties.

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