

Are all Brazil nuts selenium-rich ?

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1 INTRODUCTION

Brazil nuts (*Bertholletia excelsa*, *Lecythidaceae* family) from the Amazon region of Brazil are consumed worldwide, and are known as the richest food in selenium (Se). Depending on the soil Se content, concentrations of Se range from 5 to 512 mg/kg (Dumont et al., 2006; Chang et al., 1995).

Brazil nuts are a convenient dietary source of Se. The dietary consumption of one nut per day could avoid the need for other Se-fortified foods or expensive Se food supplements (Thomsom et al., 2008). It is known that the variation of Se concentration in Brazil nuts results from different growing conditions (such as soil Se contents), as well as among individual nuts (Secor & Lisk, 1989; Chang et al., 1995). However, there are few studies that characterize these local and regional variations of Se concentrations. Thus, this study aimed to evaluate the concentration of Se in Brazil nuts growing in different areas of the Amazon Region. This will show how the Se variability in soil, as well as genotypic variability impacts Se concentration in Brazil nuts.

2 MATERIALS AND METHODS

Samples of Brazil nuts were obtained from native areas and crops in the states of Mato Grosso, Acre, Amazonas and Amapá. These nuts were collected from five plants in each state. Additionally, two different plants of 4 clones were collected from the Aruanã farm in Itacoatiara-Amazonas to compare the concentration of Se to almonds obtained locally. All samples were collected in January, 2015.

Acid digestion was performed in the laboratory of Fertility and Plant Nutrition in the Department of Soil Science at Federal University of Lavras. The

samples were oven-dried at 60°C till constant weight, ground and 0.5 g of each material were placed in tubes for digestion in digesters blocks in triplicate, as well as standards reference material White Clover (BCR-402) and Plankton (BCR-414). Six mL of a mixture composed of nitric and perchloric acid in the ratio 2:1 (v/v), respectively, were added and allowed to stand at room temperature overnight and then digested at 200°C for 2 hours. After completing digestion, 10 mL of distilled water were added to the extracts. Selenium determinations were performed using graphite furnace-atomic absorption spectrophotometer. The recovery rate of the standard reference material was at an average (n=3) 69.18% for White Clover (BCR-402) and 83.59% for Plankton (BCR-414).

3 RESULTS AND DISCUSSION

The results show that concentrations of Se in Brazil nuts varied significantly among different sampling places (Fig. 1). The average Se concentrations in nuts collected from Amazonas (AM) and Amapá (AP) were about 30-fold more Se than those from Mato Grosso (MT) and Acre (AC). This regional variation of Se concentration in Brazil nut is in agreement with the previous research finding reported by Chang et al. (1995). The concentrations of Se in the almonds collected from the Acre-Rondônia region were 0.03-31.7 mg/kg (fresh weight) but 1.25-512.0 mg/kg (fresh weight) from the Manaus-Belém region. The almond Se concentrations from the four sampling regions showed a descending order of: Amazonas (97.785 mg/kg)>Amapá (82.920 mg/kg)>Acre (3.495 mg/kg)>Mato Grosso (2.084 mg/kg) (Fig. 1).

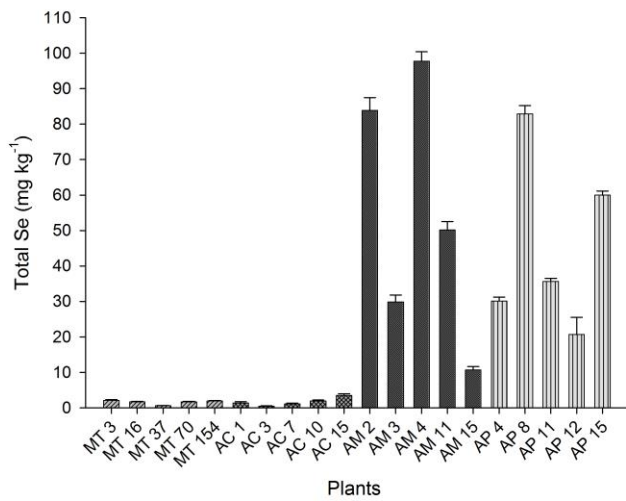


Figure 1. Selenium concentration in Brazil nuts almonds from different parts of the Amazon region.

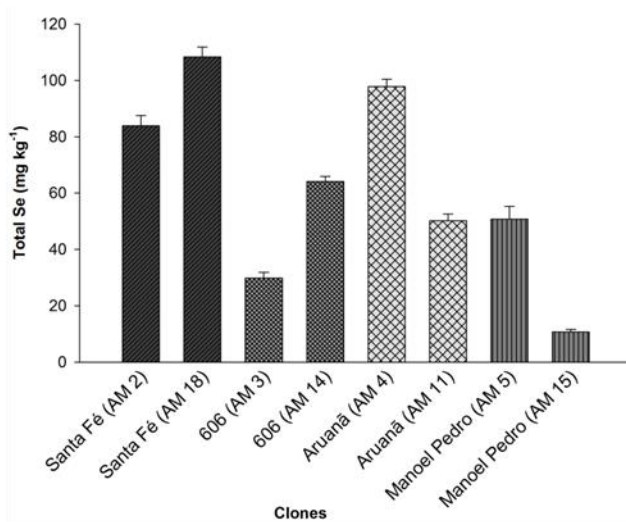


Figure 2. Selenium concentration in Brazil nuts almonds from different clones grown in Itacoatiara, Amazonas.

The concentrations of Se accumulated in Brazil nuts of different farm clones in Aruanã were shown in Figure 2. Despite being grown in relatively similar soils, different farm clones had significant variation of Se concentration, which suggests that there are other genetic factors that associated with the plant's ability of accumulating Se in the almonds.

With regard to intrinsic factors associated with the plant, is necessary to carry out more research. The correlation between levels of Se in soil and almonds needs further development. Additionally, factors contributing to a greater or lesser uptake of Se in Brazil nuts as well as the different clones of trees in the Amazon area need to be studied in order to better understand the plant's ability in absorb available Se in the soil and to translocate to the seeds.

4 CONCLUSIONS

Brazil nuts have regional and local variations in their Se concentration, which are influenced by both the soil Se concentration as well as the genotypic ability of each plant to accumulate Se.

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