Silicophytoliths and silicon studies by field assays in mollic epipedons of the southeastern Pampean plains, Argentina

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Silicon is the second most abundant element in the earth's crust. It is essential for the normal development and growth of plants, and plays a key role in the physical, chemical and biological soil properties. Silicon is important in the formation of inorganic matrix and supporting structures, which in turn condition the availability and mobilization of basic elements,such as C, O, P, Al, and trace elements. Amorphous silica biomineralizations (silicophytoliths) constitute a significant source of silicon to the soil-plant-atmosphere system, as they dissolve faster than silicate minerals. However, their role in agronomic aspects related to the loss of physical, chemical and biological fertility is still poorly documented. Research on the importance of silicon nutrition in order to promote plant growth has been reported in many countries, but not in Argentina. Given the negative effects that the intense agricultural activity has been causing on soils of the Pampean Plain, this work aimed at evaluating the silicophytoliths and silicon contribution in natural and experimental soils sowed with two varieties of wheat (Aviso and Baguette), and with the application of solid (Silfix) or liquid (Quicksoil) silicon fertilizers. The content of silicophytoliths (% dry weight) in wheat was determined by calcination, and the content of SiO2 in soil solutions was determined through UV-Vis spectrophotometry by the silicomolybdate method. Wheat plants (*Triticum aestivum*) produced 27 Kg silicophytoliths.ha-1 in the vegetative stage, and 738 Kg silicophytoliths.ha-1 in the maturity stage. Media values of silicon in soil solutions varied from 1100 μmol/L in natural soils, to 722 μmol/L in plots with solid silicon fertilizer and 635 μmol/L in plots with liquid silicon fertilizer. These results, showing a substantial Si content decrease in cultivated soils, are important in order to advance into the knowledge of inputs and losses of silicon in agro-ecosystems. Specially, given the increase of the production of some crops that are not commonly producers of silicophytoliths/silicon (like soybean) in the Pampean Plain of Argentina. The Argentinian perspectives on agriculture application of silicon fertilizers and silicon enhancement of crops quality were also discussed. This work was supported by the Agencia Nacional de Promoción Científica y Tecnológica, Ministerio de Ciencia y Técnica (PICT 1583-2013) and Universidad Nacional de Mar del Plata (EXA 741/15).

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