

## Silicon uptake, transportation and accumulation in rice

GuntamukkalaBabu Rao<sup>1</sup> and Pusarla Susmitha<sup>2</sup>

Received October 28, 2017 and Accepted January 3, 2018

**ABSTRACT :** Silicon (Si) is the important nutrient for sustainable production of rice. Rice is a typical silicon accumulating plant and it benefits from silicon nutrition. In the soil, silicon is present as monosilicic acid and polysilicic acid as well as complexes with organic and inorganic compounds such as aluminium oxides and hydroxides. Silicon is absorbed by plant roots as monosilicic acid. Silicon transportation in rice is governed by three genes *i.e.* LSi1, LSi2 and LSi6. Among these, LSi1 and LSi2 are responsible for transport of silicon from root cells to the apoplast, whereas LSi6 is involved in transfer of Si from the large vascular bundles to the panicles. When the concentration of monosilicic acid exceeds, it gets polymerized to form silica gel ( $\text{SiO}_2 \cdot n\text{H}_2\text{O}$ ). Silicon is deposited beneath the cuticle as cuticle-silicon double layer in the form of silicic acid. Amorphous silica particles that precipitate in plant cells are called Phytoliths or Plant opal. Phytoliths can be assembled without any energy by polymerization of silicic acid, when its concentration exceeds 2 mM. Phytoliths are found in specific cells called silica cells located on vascular bundles and/or are present as silica bodies in bulliform cells, fusoid cells or prickle hairs in rice. The silica accumulation of plant is higher during the reproductive period.

**Key Words:** Silicon, low silica genes, phytoliths, rice, silicic acid.