Prospects of different sources of silicon in agricultural and horticultural crops

Silicon (Si) is found beneficial in many crops and promotes the growth and development of plants under abiotic and biotic stresses. In the past decade, studies have focused on a better understanding of the mechanism involved in the Si transport and confirmed Si uptake by plants at the molecular level. Weathering reactions, leaching and intensive cultivation of high yielding cultivars can reduce the concentration of plant available Si in soil. This emphasizes the need for a good Si source in agricultural and horticultural crops. The addition of silicate materials to crops started in Japan in the early 1950s and is commonly used in many parts of the world such as Korea, Taiwan, Thailand, Sri Lanka, Brazil, South Africa, USA and other countries. Wollastonite (CaSiO₃), iron and steel mill slags or their derivatives, K and Na silicates, foliar/liquid formulations, Si minerals, calcium silicate hydrate, silica gel, thermo-phosphate, diatomite, rice straw, rice hull, rice hull ash, sugarcane bagasse and other Si rich crop residues are the commonly used Si sources in different crops. But, for field application an ideal Si source should possess attributes like local availability, cost effectiveness, easy to handle, Si solubility and improve plant available Si and Si bioavailability, environment friendly and improve crop growth and yield. In India, the preliminary experiments using Si fertilization have given promising results in field crops like rice, maize, finger millet, sugarcane and potato and horticultural crops like grapes, tomato, pomegranate and banana. Calcium silicate and rice hull ash applied at the rate 2-4 t Si ha⁻¹ and foliar silicic acid at the rate 2-4 ml L⁻¹ were found to improve Si content and crop yield. Application of slag improved the Si and Zn nutrition of rice with a favorable benefit: cost (B:C) ratio over calcite application.

Biography

Prakash Nagabovanalli B is a Professor of Soil Science at University of Agricultural Sciences (UAS), Bangalore, India. He has contributed immensely in identifying silicon deficient areas and categorization in different soils of South India. He organized the Indo US workshop on Silicon in Agriculture during 25-27 February 2010 and the 8th PSILPH at UAS, Bangalore during 18-22 October 2012. He has guided 14 masters and four PhD students in Soil Science. He has contributed for release of silicon based technology (recycling of rice hull ash and foliar silicic acid) in the package of practices of UAS, Bangalore. He has more than 40 publications published in national and international journals. Being President of the International Society for Silicon in Agriculture and related disciplines since 2014, he will be involved in organizing 7th International Conference on Silicon in Agriculture in 2017 at UAS, Bangalore, India.

nagabovanalliprakash@gmail.com

Notes: