agripower® Silica

Fertiliser Grade

Roles of Silica (Si) in soils and plants

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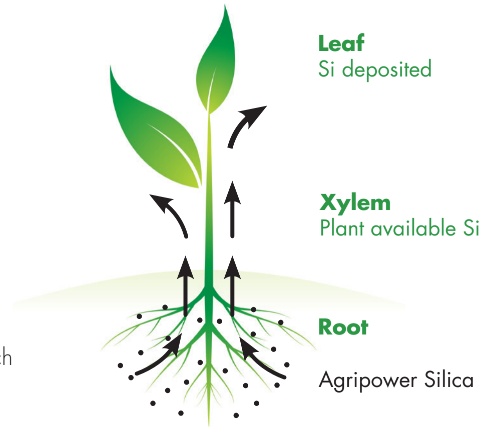
Silica (Si) plays a significant role in improving yields in a wide range of crops by increasing resistance to stress and enhancing growth through a number of well-documented mechanisms.



The role of Si in plant growth and development was overlooked until the beginning of the 20th century[1].

Si deficiency in soil is now recognised as being a critical limiting factor for crop production, particularly in soils that are deemed to be low or limiting in Plant Available Silica (PAS) and also for known Si-accumulating plants[2].

Si is accumulated primarily in the *epidermal* tissues of both roots and leaves in the form of a silica gel. This thickened epidermis increases the mechanical stability of plants[3], increasing the light-receiving posture of the plant and hence growth[1]. The deposition of Si in the plant tissues also reduces transpiration, thereby diminishing the impact of drought and salinity stress[4]. Si deposition in tissues has been proven to provide a mechanical barrier against various pests and diseases.

> “The application of Si in crops provides a viable component of integrated management of insect pests and diseases because it leaves no pesticide (chemical) residues in food or the environment”[5]

In the soil, it is hypothesized that Si ions released from Si fertilisers compete with phosphate ions for sorption sites on the soil, releasing the “fixed” or “unavailable” phosphate for plant uptake[6].

Crop Safety: Si is the only element known that does not damage plants with excess accumulation.

Plant Available Si – PAS

Currently, as has been established for micronutrients, the Si content in fertilisers is often expressed according to its total elemental content. However, this approach is completely flawed in expressing the plant available Si content of a Si fertiliser. For example, many Si-containing industrial by-products (slags) have been used as Si fertilisers, but there exists a high variation in the composition and availability of Si from these materials to the plant.

Plants can only absorb Si in the form of soluble monosilicic acid, or Plant Available Si (PAS). Many materials have a high elemental Si content (ie percentage Si) and may be seen to be a potential Si fertiliser, however, their effectiveness as a Si fertiliser is not dependent on the total Si content, but rather on Si *availability*. For example, quartz (sand) has a very high %Si of greater than 80% but is almost completely insoluble and therefore unavailable to plants as a source of Si.

There is some debate in academic literature as to the best direct chemical extraction method to use that correlates with plant Si uptake. In the absence of the scientific community universally agreeing on a method, Agripower has conducted extensive research into all the methods.

Agripower recommends the calcium chloride extraction method due to its reliability in measuring the available Si (PAS) in the soil. It is also a neutral method, not biased by the chemistry of the Si fertiliser*.

*Data reported here is based on the 0.01M$CaCl_2$ extraction method at an extraction ratio of 100

Why use Agripower Silica

Agripower Silica provides the soil with Plant Available Si (monosilicic acid) without any of the contaminants that may be found in other Si fertilisers. Monosilicic acid is taken up by the plant, improving it's growth and stress defense mechanisms.

Agripower Silica has additional properties, unique to its physical structure. It has a high cationic exchange capacity (CEC), enabling better retention and uptake of other nutrients as well as an ability to absorb and release large amounts of moisture. Improved resistance to stress and increased nutrient and water uptake all contribute to increased yields.

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3 Savant, N.K., Korndorfer, G.H., Datnoff, L.E., Snyder, G.H., 1999, “Silicon nutrition and sugarcane production: A review”, Journal of Plant Nutrition, 22: 12, 1853 — 1903

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5 Laing M.D, Gatarayiha M.C and Adandonon A, 2006, “Silicon use for pest control in agriculture – a Review” Proc. S. Afr. Sug Technol Ass, Vol 80, page 278

6 Nguyen, C.Q., Guppy, C., Moody, P., 2010, “Effect of P and Si amendment on the charge characteristics and management of a geric soil”, 19th World Congress of Soil Science, Soil Solutions for a Changing World

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