



## **Silicon Supplements**

by Sue Bottom, sbottom15@gmail.com

Silicon supplements, what? Huh? You do not see silicon listed on fertilizer labels. It is not generally considered an essential plant nutrient because plants can grow in its absence. Silicon is known to have a beneficial effect on plants by strengthening cell walls and making them thicker, stronger and more resistant to abiotic stresses like drought and cool temperatures, as well as biotic stressors like pests and disease. Silicon is the second most common element in the earth's crust. It is minimally soluble in water so it is found in small quantities in surface water, ground water and soil. Even small quantities are adequate for garden plants, where it is taken up through roots as uncharged silicic acid,  $\text{Si}(\text{OH})_4$ , and ultimately irreversibly precipitated within the plant as amorphous silica.



1. Silica deposited in the cell tissues provides mechanical strength, so flower stems require less staking .

There are many studies demonstrating the role of silicon in enhancing the growth of flowering ornamentals, including orchids. Anecdotal reports from Mark Rose of the former Breckinridge Orchids, who used potassium silicates in his fertilization program, attribute thicker leaves and stronger flower stems to silicate additions. Courtney often talks about Mark's well-grown plants with harder-than-cardboard leaves, and strong stems that did not require staking; a definite plus. The benefit of harder cell walls to prevent pathogen invasion is "icing on the cake".

There are several potassium silicate products on the market. Dyna-Gro "Pro-TeKt" has been available for many years and many orchid growers have experimented with using the 7.8% silica (as  $\text{SiO}_2$ ) product. There are many potassium silicate products available at hydroponic outlets, like the Hydrodynamics International "Europonic Silicate" that has the highest silica content at 11%. There are also some products that were formulated for use on turf and golf courses, and contain humic acids to improve uptake through the roots and leaves, such as Growth Products "Green Speed Si" and Chemical Dynamics "Dyna-Flo K-Si" that both contain 7% Silica.

Deciding how much silicon would be beneficial for orchid growth required some research. Studies for many flowering ornamentals have been conducted at application rates from 25 to 100 ppm Si, with best results reported in the 25 to 50 ppm Si range. For comparative purposes, there is typically 14 to 20 ppm Si in the soil water matrix (per Marschner). Water in our surficial aquifer averages 15 ppm Si (range of 3 to 32 ppm), and the Florida aquifer averages 10 ppm Si (range of 7 to 15 ppm). You have to wonder how much silicon epiphytic orchids receive from rainwater in their natural habitat growing on trees. The only source of silicon would be the dust settling on tree leaves



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and trunks, decaying bark, and the silicon exuded from tree leaves that originated in the soils below. Orchids are efficient nutrient scavengers and accumulators of nutrients. Too much silicon and orchid leaves can actually become brittle. Dyna-Gro suggests a range of Pro-TeKt application rates from 13 to 64 ppm silicon. A reasonable estimate of 8 to 10 ppm silicon was selected as appropriate for orchids.

Dyna-Gro Pro-TeKt Recommended Application Rates		
Maintenance	Mix ¼ to ½ tsp. per gallon of water with every watering.	16 to 32 ppm Silicon
Hydroponics	Mix ½ to 1 tsp. per gallon of water for recirculating systems.	32 to 64 ppm Silicon
Siphon Mixer	(1:15 ratio) Mix ½ - 2 fl.oz. per gallon of water for a concentrate feed solution.	13 to 51 ppm Silicon (at the hose end)
Irrigation Injector	(1:100 ratio) Mix 8-10 fl. oz. per gallon of water to make an injectable concentrate. Apply Pro-TeKt separately when using a single head injector.	31 to 38 ppm Silicon (at the hose end)
Foliar Spray	Mix ½ tsp. per gallon of water - spray directly on leaves. Note: Spot test plants first for sensitivity to sprays.	32 ppm Silicon

If you have well water or a municipal water supply derived from the Florida aquifer, you likely have sufficient silicon present in your water. If you are using a pure water, like rainwater or reverse osmosis water, or a very low soluble salt well water, you might want to consider routine silicon supplements, at low levels to provide a steady source of silicon for developing tissue.



2. Potassium silicates will form a goopy gel when mixed with concentrated fertilizer solutions.

Silicon supplements are a little tricky to use due to their chemical nature. They are made by dissolving silica ( $\text{SiO}_2$ , or sand) in lye to form potassium silicate. This solution is very alkaline with a pH in the 11 to 12 range; it is so alkaline that some people use it as a “pH Up”. Concentrated solutions of potassium silicates and fertilizers should not be mixed together because the silicates will polymerize to form a gel, or a colloidal silicate solution.

As a general rule, do not mix the silicate solution with any other chemical. If you use a Dosatron or siphonex for applying fertilizer, alternate fertilizer and potassium silicate applications. Do not mix more than you are going to use that day. The potassium silicate product is denser than water and it will tend to settle to the bottom, so keep the solution agitated, such as with an aquarium aerator in



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the concentrate bucket. If you apply fertilizers with a watering can or sprayer, you can add the potassium silicate directly to your final nutrient solution.

Poor water quality is the enemy of the orchid grower. Up to a point, you can compensate for poor water quality by adjusting your watering habits and selection of potting mixes, containers and fertilizers. Water with a low soluble salts content is essential for the best orchid culture. With rainwater or other sources of pure water, you will have to supply everything your orchids need to grow. This will likely include a fertilizer that contains calcium and magnesium along with the other macro and micronutrients. You may find your plants are more resistant to disease and pests as well as environmental stresses if you add silicon supplements to your nutrition program when using a pure water for irrigation.

### Citations and Additional Reading

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