English

LIQUID SILICON

INSTRUCTIONS FOR USE

Silicon is a beneficial plant nutrient, found in virtually all soils but not – until now – in hydroponic nutrient solutions. Silicon will strengthen the plant walls producing stronger healthier plants with massive root systems and increased resistance to pests and disease. Silicon is very basic, it has a high pH, and can therefore be used effectively to raise the pH of hydroponic nutrient solutions.

Liquid Silicon

- Improves uptake of nutrients and transport through the plant.
- Strengthens cell walls, helping plants to resist attacks from fungi and mites.
- Increases chlorophyll production leading to darker green leaves and improved light collection.
- Increases uptake of available CO_2 and utilises the enhanced metabolic processes to deliver higher yields.
- Adds crucial extra potassium for enhanced flowering.

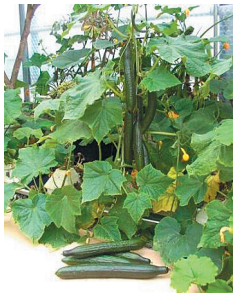
Liquid Silicon is highly beneficial to plants in the range of 20–50 ppm in the nutrient solution. It is not included, at these levels, in nutrient concentrates. It needs to be added as a separate component by the grower. Liquid Silicon can be added to nutrient tanks every time a fresh batch is made up.

Liquid Silicon has an important role in the uptake and vascular transport of mineral nutrients, and can greatly improve the mechanical strength of the plant and its resistance to fungal diseases.

The addition of Liquid Silicon to nutrient solutions can greatly reduce the incidence and severity of fungal diseases including Botrytis (bud rot) and powdery mildew.

Recent research has demonstrated that raising the silicon concentration in hydroponic solutions produced thicker, whiter, healthier root systems and increased yields.

Silicon has also been shown to result in higher concentrations of chlorophyll per unit area of leaf tissue. This means that a plant is able to tolerate both lower and higher light levels by using more of the available light.



Liquid Silicon... the missing element.

Liquid Silicon is available in the following sizes:
250 ml 1 litre 5 litre

Improves disease resistance
Strengthens plants
Increases weight and bulk

Benefits to the grower:

- Increased yields and flower weight – as a result of the presence of silicon in the plant cells producing healthier and hardier plants.
- Increased stem strength and rigidity – silicon aids in maintaining better leaf orientation for light receival which in turn enhances photosynthesis and growth rates.
- Increased tolerance to high salinity – silicon has been shown to reduce problems arising from nutrient toxicity and/or imbalance. Depending upon the type of nuisance chemical, high silicon levels have been shown to either reduce nuisance chemical uptake or aid in redistributing it more evenly within the plant. This reduces the damaging impact of such chemicals on individual cells.
- Increased cell strength helps resist penetration of fungal diseases – particularly mildews. When applied via the nutrient or as a foliar spray, silicon accumulates around the points of fungal attack to physically resist fungal ingress.
- Increased leaf strength improves wilting resistance.

Liquid Silicon helps to regulate the metabolism of carbon dioxide and enables the plant to make much more efficient use of available levels of CO_2.

Designed by professionals ... fine-tuned by experience

Instructions for use

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Hydroponics – as a supplement

1. First make up a fresh tank of nutrient solution in the usual way. Do NOT adjust pH at this stage.
2. Calculate how much silicon needs to be added to the tank. A good starting point is **1 ml per 2 litres of final tank volume** (≈ 1 teaspoon per 2 gallons).
3. FIRST add the required amount of Liquid Silicon to clean water, in a bucket and mix thoroughly. Allow to stand for ten minutes before adding to the nutrient tank. Add to tank very slowly while pump is running for maximum mixing and dispersal.
4. Check pH, it will be high of course, and correct back to desired level using pH DOWN. (Either phosphoric or nitric acid.).

Add Liquid Silicon in this way with each new tank change. Use throughout the life of the crop.

N.B. When using Liquid Silicon it is especially important to change the tank regularly. Once every TWO WEEKS or less would be ideal.

Silicon input can be increased as long as pH control does not pose any special problems, as it may do in very hard water areas. For best results with Liquid Silicon it can be increased to **1 ml per litre of final tank volume** (≈ 1 teaspoon per gallon).

Hydroponics – for pH control

Add to nutrient tank to raise pH when necessary. Dilute into fresh clean water first, and add in very small amounts until pH reaches required level.

Soil

Mix into tepid water at the rate of **1 ml per 2 litres** (≈ ½ teaspoon per gallon) and water into soil round the roots.

Repeat weekly for maximum benefit.

Foliar

Add to tepid water at the rate of **1 ml per 4 litres** (≈ ¼ teaspoon per gallon). Mist gently over plants at the end of light cycle. Always test spray one plant first, and wait for 48 hours to see results. Plants differ greatly in their response to foliar treatments.

Repeat weekly for maximum protection against mould and mites.

Growth Technology
www.growthtechnology.com

Liquid Silicon FAQ

If silicon is so important, how come we have managed without it for so long in hydroponic solutions?

Silicon is not an *essential* element, like calcium for instance. Plants will grow quite well without it. However it is categorised as a *beneficial* element, which means it brings significant benefits to any type of plant in any stage of growth. Until as recently as the late nineties this was not really recognised but new research has underlined the value of silicon to plants and has changed our ideas about how much plants actually need.

So what are the benefits?

Most importantly, silicon is incorporated directly into the cell walls, interacting with cellulose, to greatly add strength to the architecture of the plant. This process begins as soon as silicon is added and continues throughout the life of the plant. Stems become thicker and leaves take on a darker green colour, improving their light collecting potential and thus boosting photosynthesis. Every process in the plant is enhanced by this – which means stronger more vigorous growth, better resistance to pests and disease and – at the end of the cycle – heavier harvests.

How can silicon enhance resistance to pests and disease?

Interestingly the recent research into silicon was actually initiated in an attempt to discover why plants in hydroponic systems seemed more prone to various diseases, and even to attack by sap sucking pests, like mites and aphids, than plants in soil. The answer seems to include the fact that silicon is, usually, missing from hydroponic nutrients but present in almost all soils. The current theory is that it is the sheer mechanical strength of the cell wall that resists intrusion from pests and pathogenic organisms. It has become very common for commercial growers to use silicon against mildew mould and mites.

If silicon is so useful, why not just add it to the nutrient products – like IONIC – when you manufacture them?

Unfortunately silicon is extremely basic (alkaline) and cannot be mixed with nutrient concentrates without causing reactions and precipitation. It can be added to diluted nutrient solutions without reacting but it will, of course, raise the pH. There is an advantage to the grower in keeping it separate because it allows better control of the amount added – which can be varied, according to crop and season.

I have seen other silicon products that claim to have little effect on pH – how can that be?

This is deceptive marketing. Silicon, in the form that can be dissolved in water, is extremely basic and will, inevitably, raise the pH. There are products that make claims not to do so but this is because they are extremely weak. On a like for like basis – at the same concentration – all the silicon products would have approximately the same effect on pH.

So what about those pH issues?

Well silicon is basic and it will have an effect on the pH. The more you add the higher it will go and there is no avoiding this. However there is a well-established procedure for dealing with this – see instructions. It does add a bit of time to the daily or weekly procedure but there is no doubt that the extra effort will pay off. It is a good idea to change the tank a little more frequently when using silicon.

"I nearly gave up growing cucurbits altogether because of the ravages of powdery mildew. I choose not to use fungicides on our food crops and so the mildew was nearly uncontrollable once it got started. As a preventive measure Growth Technology Liquid Silicon had a near miraculous effect on the problem, and used from the start of the growing season on cucurbits almost completely cleared the problem. Result – a greenhouse full of healthy courgettes and cucumbers."

Nick Clooney
The Hydroponicum, Achiltibuie, Ullapool, Scotland