



## Product Data

### Discover the Benefits of Silicon Nutrition in Your Plants!

DYNA-GRO'S unique Pro-TeKt® formula is an easy to use liquid concentrate that provides supplemental potassium (3.7%) and silicon (7.8%). The latest research proves that plants benefit in many important ways from supplemental soluble silicon. These benefits include greater tolerance of environmental stresses such as cold, heat, drought, salinity, mineral toxicity or deficiency, improved growth rates, accelerated root development on cuttings and improved resistance to insects and fungi. Soluble silicon promotes natural fungal defense mechanisms in plants, significantly reducing, and in many cases eliminating entirely, the need to use fungicides. Silicon deposited in epidermal cell walls enhances plants' resistance to small sucking insects. The resulting increased mechanical strength in epidermal cell walls enhances leaf presentation to light and improved stem strength. Soluble silicon enhances metabolic functions and plant growth rates by balancing nutrient uptake, distribution and transport and increasing chlorophyll concentration in leaves resulting in improved pollen fertility, fruit and flower count.

### Silicon Increases Resistance to Pathogens

Silicon deposition in the plant's epidermal cell layer acts as a barrier against penetration of fungal hyphae from powdery mildew, black spot, *Pythium* and *Phytophthora*, etc. Silicon is selectively transported to the site of fungal infection and is utilized by the plant metabolically to combat the growth of fungi. Silicon is also incorporated into cell walls improving heat, drought and cold tolerance by reducing transpiration. The added mechanical strength makes the plant less dependent upon osmotic pressure for leaf and stem turgidity. Silicon, selectively transported to the site of fungal infection, plays an active metabolic role in combating fungal growth by the production of polyphenolic compounds, part of a plant's natural defenses against fungi and insects. Silicon is rapidly bound in leaf tissue and deposited in a non-translocatable form within 24 hours of uptake. Therefore a continuous source of soluble silicon is very important to combat pathogens. This can be from constant feeding in hydroponics or from retention in the growing medium.

In some plants, foliar applications appear to lead to even lower rates of disease. Silicon, taken up by the plant via the roots, is moved to old leaves first, whereas fungal infections tend to attack the new growth first. Foliar application to the new growth Pro-TeKts the tender new leaves. Foliar sprays of soluble silicon have also been shown to be effective for the control of aphids and other sucking insects on many plants. Epidermal cell walls containing silicon deposits act as a mechanical barrier to insects. In addition to the silicate deposits in the leaves, the intracellular content of silicic acid also acts as an effective sap sucking inhibitor for many insects.

**AWARD WINNING FORMULAS**

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## Silicon Increases Metabolic Rates and Stress Resistance

Research has shown that silicon benefits plants in the following ways: improved resistance to wilt, resistance to water stress (heat and drought), enhanced leaf presentation resulting in improved light interception, enhanced reproductive growth, and increased tolerance of zinc deficiencies, cold temperatures, excessive phosphorus, manganese, sodium and aluminum concentrations. Silicon, deposited in the cell walls, forms a protective layer reducing transpiration through the outer cells. Silicon deposits in the cell walls of xylem vessels prevent compression of the vessels under conditions of high transpiration caused by drought or heat stress. Temperatures much above 90° F cause plants to virtually cease their metabolic functions because water is lost through transpiration faster than it can be replaced via the plant's root system. This results in harmful increases in intracellular mineral concentrations that inhibit plant functions. Increased levels of silicon in cell walls reduce transpiration loss caused by higher temperatures and the low humidity of typical interior growing conditions thus allowing continued metabolic functions at higher temperatures. Plants wilt less, resist sunburn and are generally more tolerant of heat stresses. Cuttings and plugs are more tolerant of the stresses encountered during root formation and potting up as a result of decreased transpiration. Studies at the Universities of Florida and Minnesota have shown significantly increased success rates in propagation of cuttings when silicon is applied foliarly through a misting system, or as a drench or soak prior to sticking. The surfactant characteristics of Pro-TeKt® result in better uptake of water and the minerals dissolved in it for better nutrition and growth.



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. Moreover, supplemental levels of soluble silicon have been shown to produce higher concentrations of the enzyme RUBP carboxylase in leaf tissue. This enzyme regulates the metabolism of carbon dioxide and enables the plant to make more efficient use of available levels of CO<sub>2</sub>.

Silicon deficiencies often are indicated by malformation of young leaves and a failure of pollination and fruit formation in many cases. Plants with silicon added to the nutrient formula also show delayed leaf and flower senescence. The shelf life of cut flowers, specialty pot crops and plugs is also extended. Leaves are thicker and darker green compared to those grown without soluble silicon.

In growth tests at the University of Florida dry weight in *Dendrobium nobile*, *Aeschmea fasciata*, *Spathiphyllum* and *Anthurium scherzerianum* provided 49 ppm soluble silicon increased from 18% to 80% over the dry weight of control plants grown without supplemental silicon. 32 of the 39 species evaluated in this test took up additional silicon when it was provided. Those plants are considered Si-responsive and had greater leaf thickness as well as greater dry weight.

### Application Rates

**Soil and Soilless Mixes:** Apply Pro-TeKt® at a rate of 1:1500 to 1:3000 (1/2 tsp to 1/4 tsp/gal) depending upon the plants' requirements.

**Hydroponics:** Continuously feed Pro-TeKt® at a rate of 1:750 (1 tsp/gal).

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