

## SOFTGUARD

**The natural Plant protection.**

**Fights against Plant diseases.**

*Chitosan Oligo Saccharin*

The natural way to protect your plants against fungus, viruses and nematodes. Improves resistant of roses against black spot (plant fungus on Roses). It is not a fungicide, but protect your plant against fungal diseases and has a high efficiency for organic growers.

Chitosan offers a natural alternative to the use of chemical products that are sometimes harmful to humans and their environment. **Chitosan triggers the defensive mechanisms in plants** (acting much like a vaccine in humans), stimulates growth and induces certain enzymes (synthesis of phytoalexins, chitinases, pectinases, glucanases, and lignin). This **new organic control** approach offers promise as a biocontrol tool. In addition to the growth-stimulation properties and fungus control, chitosans are used for:

- Seed-coating
- Frost protection
- Bloom and fruit-setting stimulation
- Timed release of product into the soil (fertilizers, organic control agents, nutrients)
- Protective coating for fruits and vegetables



Untreated Plant



Treated with SoftGuard

### *Characteristics:*

A group of oligosaccharides have been implicated in some processes, which defend themselves from being attacked by creatures, such as weed, virus and insect and so on. *SoftGuard* is the name given to a small group of these oligosaccharides that cause hormonal effects on plants. Some of these responses include stem elongation, stimulation of ethylene production, and antagonizing virus, but the one they are well known is their elicitation of various defensive actions (e.g. plant fungus control). It has been affirmed that *SoftGuard* begin the production of the phytoalexins, lead to lignin synthesis, and promote ethylene formation. Lignin strengthens the cell walls, while ethylene has many different functions.

Experiments have shown that *SoftGuard* can be made into a plant immunization activating agent and regulating additive. It can start and regulate the immunization of plants at gene level and induce anti-virus substance production. It can directly affect the opening and closing of certain genes and regulate the process of plant growth. Furthermore, *SoftGuard* can reduce and eliminate the infections of pathogenic agents especially against fungal, which are difficult to control.

*SoftGuard* has no toxicity, no residue and is fitful for non-pollution agricultural ecological system and sustainable development of agriculture. However many unsolved technical difficulties were met to produce *SoftGuard* at industrial scale.

Basing on the technical assistance from Ministry of Agriculture of People's Republic of China and rich materials of marine creatures of China, Beijing Leili Agrochemistry Co., Ltd. has successfully developed a biological molecule degradation technique that firstly make mass production of *SoftGuard* and commercial application of *SoftGuard* on agriculture realized in the world.

**Production Process:**

[Chitin] decartelization [Chitosan] degradation [SoftGuard]

**Composition:**

| Analysis of SoftGuard  | Wt/Vol              |
|--|---------------------|
| Chitosan Oligo Saccharin<br>(Molecule weight $\leq 3000$ Dalton) | $\geq 2.6\%$        |
| N, P <sub>2</sub> O <sub>5</sub> , K <sub>2</sub> O              | 12%                 |
| Appearance   | Light yellow liquid |
| pH   | 4-5                 |
| Gravity  | 1:1.1               |

*Poison: LD<sub>50</sub> ≥ 5000mg/kg by mouth.*

**Functions:**

1. It is rich in pathogenic microbial metabolic analogue. By immunization principles, it can induce the plant to produce anti-virus substances and efficiently control fungal & bacteria diseases, such as blight (*Fusarium Avenaceum*), yellow blight (*Verticillium Wilt*), Zonation Canker (*Ascochyta glycines*), Downy Mildew (*plasmopara viticola*), Anthracnose (*Colletotrichum*), Angular Spot (*Pseudomonas*) and Soft Rot (*Erwinia Carotovora*). Meanwhile, it can strongly inactivate and inhibit plant virus, so it can control proliferation and infection of various mosaic viruses.

2. As a high efficient chitosan-activating gene, it can replace other plant hormones to regulate the process of growth. For plant growth, it can improve the rate of emergence and sprout, make young plants stronger, promote root growth, enhance plant ability to absorb and utilize the soil nourishment, thicken and enlarge leaves to enhance photosynthesis and resistance activity. It can also improve transform and accumulation rate of nutrition, promote early ripening of fruit and increase quality & plant yield.

3. It contains metal-chalet organic macromolecular substances and especially rich in K<sup>+</sup>. And it can be decomposed and absorbed by microorganism; provide plant nourishment; improve soil fertility; so it can efficiently promote plant growth and inhibit physiological diseases of plant.

4. The field experiments also proved that the *SoftGuard* have good effects on preventing nematodesis. And lots of field experiments in *Shandong, Hebei, Tianjing* and *Beijing* have demonstrated that *SoftGuard* has the following comprehensive effects on vegetable, fruit-tree, oil-bearing and field plants.

- ✧ Control of disease and insect pests: 50%-95%;
- ✧ Rate of reducing the usage of pesticides & fertilizers: 50%
- ✧ Yield increase: 8.5%-30%.

**Precautions:**

The product is non-toxin without any plant hormone. After diluted, it can be mixed with any non-alkalescent pesticides and chemical fertilizers as supplementary synergist. If it rains within 6 hours after spraying, it must be re-sprayed. Do not apply the product in the silkworms breeding area. The validity period of the product is 2 years.

*SoftGuard* should be stored in frost-free condition with optimum storage range between 5-40degC. And it is a non-hazardous and non-flammable foliar fertilizer. Gloves and face shield should be worn when handling the concentrate.

**Note:**

- 1, Seed Soaking: 400 times dilution with water, application before seedtime
- 2, Foliar Spraying: dosage about 2-4 L/ha, spraying 2-3 times during seedling & fruit growing period
- 3, Root Irrigation: 4.5-7.5 L/ha; 2-3 times during seedling stage and growth stage.

**Packing:** 0.25 ltr. Bottle; 1ltr. Bottle x 12 bottle/case; 200ltr. Drums

**Field trials with SoftGuard on different plants**

| Time            | Plant              | Application Methods   | Effects   |
|-----------------|--------------------|---|---|
| July, 2001      | Tobacco            | 800 times dilution of SoftGuard, spray 2 times at the beginning of with 7-10 days of interval,                      | Effect on protection and cure of tobacco brown leaf spot was increased by 73%   |
| September, 2001 | Tobacco            | Spray dilution of SoftGuard at 1000 times, 800 times and 600 times for 2 times with 10 days interval                | Average effects on protection and cure of tobacco brown leaf spot was increased by 68.2% by 1000 times dilution, 84.3% by 600 times dilution and 76.6% by 800 times dilution. |
| Mar-May, 2002   | Cucumber           | Spray dilution of SoftGuard at 600 times, 700 times, 800 times for 3 times with interval of 7 days                  | Effect on protection and cure of nematode was increased by 82.1% by 600 times, 79.0% by 700 times and 73.2% by 800 times.   |
| Jan – Feb, 2002 | Seedling of Banana | 600 times dilution of SoftGuard, 1 time for foliar application and 1 time for root irrigation with 20 days interval | Banana resumed normal growing and no nematode was found after application of SoftGuard  |

| <i>Crops</i>   | <i>Disease to be controlled</i>  | <i>Application period</i>          | <i>Dosage (L/ha)</i> |
|--|--|------------------------------------|----------------------|
| Pepper<br>Tomato                                     | Early, late blight, Green blight Blight, black rot, Root turgescence                   | Before seedtime                    | Dilution: 1:400      |
|  |  | Seedling, fruit growing period     | 1-1.2L/ha            |
|  |  | Initial disease (root) nematodosis | 2-2.5L/ha            |
| Water-melon,<br>Mask melon,<br>Cucumber, Balsam pear | Blight, Anthracnose, Cataplexy, Stand blight, Black spot, Downy mildew, Powdery mildew | Before seeding nematosis           | Dilution: 1:400      |
|  |  | Seedling, Fruit growing            | 1-1.5L/ha            |
|  |  | Initial disease                    | 1.5-2L/ha            |
|  |  | Initial root disease Nematodosis   | 2-3L/ha              |
| Banana,<br>or<br>Fruit tree                          | Leaf spot, Anthracnose, Canker, Brown spot, Blackspot, Downy mildew, Powdery mildew    | Tip sprouting, fruitage            | 1 -2L/ha             |
|  |  | Initial root disease nematodosis   | 1.5-2 L/ha           |
| Grape  | Leaf spot, Anthracnose, White-rot, Black pox, etc.                                     | Initial disease                    | 1-2L/ha              |
| Vegetables, fruit, melon, cereal crops, Cash crops   | Leaf mosaic, stubby curtailment, viruses, leaf spot                                    | Seedling, Fruitage                 | 1-2L/ha              |
|  |  | Before seedtime nematodosis        | Dilution: 1:400      |
| Tobacco  | Leaf mosaic, fungi isease  | Seedling, Initial disease          | 1-2L/ha              |

## **Chitin/Chitosan: An Avant-Guarde Product for Better Plant Growth**

### **History**

From Dr. Tahir Mahmood

Chitin is one of the most abundant polysaccharide found in nature. It is often considered a cellulose derivative, although it does not occur in organisms producing cellulose. Chitin was first found in Mushrooms in 1811 by Professor Henri while he was Professor of Natural History and Director of Botanical Gardens at the Academy Science Nancy, France, that was later to be called Chitin. During 1830's it was isolated from insects and named Chitin. The name chitin is derived from Greek meaning tunic or envelope. During 1850's Professor C. Roughet discovered while experimenting with Chitin that it could be transferred into water soluble form through some chemical reaction and in late 1870's name Chitin modified to Chitosan and later on much of the research was focused on these compounds. Chitosan is a polysaccharide of Glucosamine which is derived from Chitin. It is formed through a process of deacylation of Chitin molecule. Chitin/Chitosan is also a constituent part of cell walls of parasitic fungi. These days it is being produced from the processing waste of crabs, shrimps, oysters and fungi.

## Importance of Chitosan in Agriculture

Everybody had an idea that these days use of biologically active and environmentally friendly substances for plant protection as well as growth enhancing is becoming an indispensable part of modern agriculture system. This is especially more common in developed world where the governments and people becoming more conscious about using toxic chemicals on plants. Under these circumstances people need to use certain plant protecting substances that do not accumulate in soil, plants, animals and human body and that can easily degrade in natural environment. Secondly they want those substances that have the ability not only to increase plant stability against unfavorable conditions like disease and insects but also have the ability to increase the crop yield and improve its quality.

One of the most promising way of improving plant protection and quality is the method of inducing non specific resistance against such stresses based on natural plant potential activation according to model worked out by nature itself and activation of plant growth enhancing mechanism. Plant resistance to pathogens and growth enhancing factors are based on various mechanisms such as: formation of induced antibiotics, proteinase inhibitors, and active oxygen form, maintenance of hormonal balance, activation of enzymes etc as well as modification of the plant cell wall by lignin, suberin and silicium. These protective and growth enhancing mechanisms are induced by various substances separately but Chitosan, a non toxic, organic and biodegradable natural biopolymer meets all these requirements. Chitosan (SoftGuard) possess a high growth stimulating efficacy combined with antifungal and antibacterial activity of systemic character. All these properties have a prolonged effect and cause no damage to agro ecology. Chitosan (SoftGuard) has wide scope of application on various plants. It can be used through irrigation as well as though foliar sprays. Once being applied through foliar or irrigation to plants it provides plant protection against fungal infection by rapid expression of a number of defense responses, including accumulation of phenolic compounds and formation of structural barriers at sites of attempted fungal penetration. Chitosan inhibits the reproduction of pathogens and also induces activation of genes, which produces protease inhibitors that help protect against insect attack. It also stimulates the plants hormones responsible for root formation, stem growth, fruit formation and development.

Plants do not contain Chitosan but they do secrete Chitinase enzyme. Structurally there is a small amount of Chitinases in plants but once the Chitosan is being absorbed by plants it improves the activity and content of Chitinase enzymes and eventually plants with high Chitinase activity has better resistance to diseases.

There are two types of Chitosan oligosaccharide products available in the market, one having low molecular weight Chitosan compounds and other with higher molecular weight. A product with low molecular weight Chitosan is better than the high molecular weight because it has more growth stimulating effect with its ability to permeate into Nucleus and to impact the proper gene expression. It is also able to increase and accelerate callusogenesis and morphogenesis as well as tissue regeneration. This low molecular weight Chitosan is also able to induce rapidly lignifications of plant tissues in conjugated with affected tissues. Always try to use products with low molecular weight Chitosan. There are some products like SoftGuard with low molecular weight Chitosan are available in the market.

Apart from its disease resistance and growth promoting effect Chitosan use can also improve the beneficial microbial activity when used in soil or soil less medium. This increase in microbial activity helps in conversion of organic nutrition (not available) to inorganic (available) form. It also helps in making a better root system that helps plants to absorb more nutrients from medium. In general Chitosan can help improve the fertilizer use efficiency, increase number and size of flowers/fruits, increase the shelf life of produce and this all ultimately lead to more production with

less or no use of toxic substances for insect and disease control. With the growing awareness about Chitosan I believe strongly that this will be the product of this century for better plant growth.

At the end I would like to say that in life it is not the strongest nor the most intelligent survive but the ones most adaptable to change. Always try to use safe (safe for Animals, Human beings and Environment) products for plant growth in order to make this world a better place for living.

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