Agricultural and Horticultural Use

In agriculture, chitosan is used primarily as a natural seed treatment and plant growth enhancer, and as an ecologically friendly bio-pesticide substance that boosts the innate ability of plants to defend themselves against fungal infections. The natural bio-control active ingredients, chitin/chitosan, are found in the shells of crustaceans, such as lobsters, crabs, and shrimp, and many other organisms, including insects and fungi. It is one of the most abundant biodegradable materials in the world.

Degraded molecules of chitin/chitosan exist in soil and water. Chitosan applications for plants and crops are regulated by the EPA, and the USDA National Organic Program regulates its use on organic certified farms and crops. EPA-approved, biodegradable chitosan products are allowed for use outdoors and indoors on plants and crops grown commercially and by consumers.

The natural bio-control ability of chitosan should not be confused with the effects of fertilizers or pesticides upon plants or the environment. Chitosan active bio-pesticides represent a new tier of cost-effective biological control of crops for agriculture and horticulture. The bio-control mode of action of chitosan elicits natural innate defense responses within plant to resist insects, pathogens, and soil-borne diseases when applied to foliage or the soil. Chitosan increases photosynthesis, promotes and enhances plant growth, stimulates nutrient uptake, increases germination and sprouting, and boosts plant vigor. When used as seed treatment or seed coating on cotton, corn, seed potatoes, soybeans, sugar beets, tomatoes, wheat and many other seeds, it elicits an innate immunity response in developing roots which destroys parasitic cyst nematodes without harming beneficial nematodes and organisms.

Agricultural applications of chitosan can reduce environmental stress due to drought and soil deficiencies, strengthen seed vitality, improve stand quality, increase yields, and reduce fruit decay of vegetables, fruits and citrus crops. Horticultural application of chitosan increases blooms and extends the life of cut flowers and Christmas trees. The US Forest Service has conducted research on chitosan to control pathogens in pine trees and increase resin pitch outflow which resists pine beetle infestation.

NASA life support GAP technology with untreated beans and ODC chitosan bio-control treated beans returned from the Mir space station aboard the space shuttle – September 1997

Chitosan has a rich history of being researched for applications in agriculture and horticulture dating back to the 1980s. By 1989, chitosan salt solutions were applied to crops for improved freeze protection or to crop seed for seed priming. Shortly thereafter, chitosan salt received the first ever bio-pesticide label from the EPA, then followed by other intellectual property applications.

Chitosan has been used to protect plants in space, as well, exemplified by NASA's experiment to protect adzuki beans grown aboard the space shuttle and Mir space station in 1997. NASA results revealed chitosan induces increased growth (biomass) and pathogen resistance due to elevated levels of beta 1-3 glucanase enzymes within plant cells. NASA confirmed chitosan elicits the same effect in plants on earth.

Nontoxic, low molecular weight chitosan polymer solutions appear to be safe enough for broad-spectrum agricultural and horticultural uses. In 2008, the EPA approved natural broad-spectrum elicitor status for an ultra-low molecular active ingredient of 0.25% chitosan.

A natural chitosan elicitor solution for agriculture and horticultural uses was granted an amended label for foliar and irrigation applications by the EPA in 2009. Given its low potential for toxicity and abundance in the natural environment, chitosan does not harm people, pets, wildlife, or the environment when used according to label directions. The US Forest Service tested chitosan as an eco-friendly bio-pesticide to prearm pine trees to defend themselves against mountain pine beetles.

http://en.wikipedia.org/wiki/Chitosan#Agricultural_.26_Horticultural_use Taken from on June9, 2013 by Alaskan Organics LLC.