

The Plant Growth Enhancing and Biocontrol Mechanisms of *Streptomyces lydicus* WYEC 108 and Its Use in Nursery and Greenhouse Production

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Antifungal and Growth Enhancing Properties

Streptomyces lydicus WYEC108 is a gram-negative soilborne bacterium that was isolated from linseed plants grown in England. The isolation took place more than a decade ago by a team from the University of Idaho (Crawford and others 2005). The bacterium is a saprophyte and root colonizer. It also has growth enhancing and antifungal properties.

Streptomyces lydicus WYEC 108 has five properties that either suppress fungal pathogens or enhance plant growth: (1) rhizosphere competent; (2) antibiosis; (3) mycoparasitism; (4) cellulose and chitinase production; and (5) siderophore production. *Streptomyces lydicus* WYEC 108 is rhizosphere competent, or able to colonize and grow on roots as they develop. Colonization of roots reduces the area where pathogens can attack the root (Tokala and others 2002). The bacterium is capable of antibiosis or the ability to produce chemical compounds—antibiotics—that are detrimental to several fungal pathogens (Trejo-Estrada and others 1998). Mycoparasitism is the ability of this organism to live off of fungal pathogens. It gains entry into the fungal hypha by emitting enzymes that break down cell walls. Cellulase breaks down cellulose, which is a beneficial substrate for some pathogens. Chitinase will break down chitin, which is found in insect exoskeletons and eggs. Siderophores are low molecular weight compounds that sequester iron. In the case of legumes, nodules colonized by the bacterium were able to assimilate more iron.

Streptomyces Lydicus WYEC108 and Environmental Parameters

The bacterium is tolerant of a wide range of environmental factors typically found in agricultural and horticultural production systems. The pH range is from 4 to above 8. Active temperature range is from 45 to 140 °F (7 to 60 °C). In soil, the bacterium will live off chitin, cellulose, and lignin, as well as root exudates. If the environment falls outside these parameters, the bacterium will sporulate. However, the organism will die at temperatures that exceed 160 °F (60 °C).

Diseases Suppressed

The biocontrol agent suppresses both soil and foliar pathogens. Soil diseases that can be suppressed include *Pythium* spp., *Fusarium* spp., *Phytophthora* spp. and *Rhizoctonia* spp. Foliar diseases that can be suppressed include *Botrytis* spp., downy mildew, and powdery mildew.

Commercial Products

Natural Industries, Inc. licensed the worldwide patent on this strain from the University of Idaho. They have developed several products with this single organism as the active ingredient. Two water soluble products, Actinovate® SP and Micro 108®, are available for spray and drench purposes. The seed treatment formulation is Micro 108® Seed Inoculant. There

is a soil incorporation product called Actino-Iron® (Action Iron® in California). The substrate used in this product is a byproduct from the water treatment facilities in the Tampa region of Florida. The substrate contains iron, sulfur, and humic and fulvic acids.

References

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