

Companion® Biological Fungicide Goes Above and Beyond Chemical Fungicides

- **Companion® was the first-ever EPA registered liquid biofungicide on the U.S. market.**
- **Over 15 years of university testing**
- **Researched at over 30 accredited institutions across the country and around the globe.**
- **Registered and approved for use in over 25 countries.**

What is Companion®?

A broad-spectrum biological fungicide for soil-borne and foliar diseases

Companion's GB03 strain of *Bacillus subtilis* has multiple modes of action to prevent and control plant diseases. It produces a broad-spectrum Iturin antibiotic that disrupts the cell-wall formation of pathogens, and it triggers an advantageous Induced Systemic Resistance (ISR) in plants, whereby a plant's natural immune system is activated to fight plant diseases. Companion's fast-colonizing beneficial



rhizobacteria stimulate root growth and promote turf vigor while also crowding out plant pathogens. Easy to use and handle, Companion is an environmentally-friendly fungicide with an unsurpassed safety profile and a low 0-4 hours REI. Because its modes of action circumvent the development of pathogen resistance and since it can be used alone or in combination with traditional chemical fungicides, Companion is the ideal foundation for an effective integrated pest management and disease management program.



Tomato plant grown with a conventional N-P-K fertilizer program.



"Sister plant" grown under same field & fertilizer conditions but with the addition of Companion shows improved branching and vigor.



Nine days after application, Sweet Peppers treated with Companion (the two on the right) show increased top growth and better rooting than the untreated peppers on the left.



A close-up of two tomato plants. The plant on the right had one application of Companion applied and shows denser, longer root growth promoted after only 9 days.

VERSATILE

For use on all outdoor field grown food crops including vegetables, herbs, small fruits, berries and fruit and nut trees. Can also use in greenhouse plug production and hydroponics operations.



Agricultural Diseases:

- Alternaria spp.**
- Black Root Rot, Early Blight
Aspergillus spp.
Botrytis cinerea
- Crown Rot, Damping-off Fungus, Gray Mold, Leaf blight
Colletotrichum orbiculare
- Anthracnose
Colletotrichum spp.
- Anthracnose
Didymella bryoniae
- Gummy Stem Blight
Erwinia
- Soft Rot
Erwinia carotovora
- Cucurbit Wilting, Angular Leaf Spot, Bacterial Soft Rot
Erwinia tracheiphila
- Cucurbit Wilting, Angular Leaf Spot, Bacterial Soft Rot
Golovinomyces cichoracearum, formerly called Erysiphe cichoracearum
- Powdery Mildew
Fusarium oxysporum
- Wilt
Fusarium solani
Phytophthora aerial blight
- Blight, Leafspot and Rot

- Phytophthora spp.**
- Late Blight, Blackeye/Buckeye Rot in Tomatoes
Plasmodiophora brassicae
- Corky Root, Clubroot
Podosphaera xanthii, (formerly called Sphaerotheca fuliginea)
- Powdery Mildew
Pseudomonas syringae
- Angular Leaf Spot
Pythium aphanidermatum
- Root Rot
Pythium irregulare
- Root Rot
Pythium spp.
- Root Rot
Rhizoctonia solani
- Root Rot, Bottom / Stem Rot
Sclerospora graminicola
- Downy Mildew
Sclerotinia minor
- Blight
Sclerotinia minor
- Lettuce Drop
Xanthomonas campestris
- Bacterial Leafspot
Uncinula necator
- Powdery Mildew
Xanthomonas campestris
- Bacterial Leafspot
Xanthomonas axon
- Citrus Canker

Break-Through Technology



Growth Products’ pioneering research in environmentally safe solutions for Sustainable Agriculture led to Companion®’s technology.

Years of research went into developing Companion and gaining its EPA registration in every green industry market including Agriculture, Turf, Landscape, Greenhouse, Nursery, Ornamentals, Hydroponics, and Home & Garden Use. Companion has been tested at leading universities, by government agencies, and by the most prestigious agricultural facilities around the world.

**In Harmony
with Nature
100% Organic
100% Natural**

Research List:

- Rutgers, The State University of New Jersey**
Rutgers Cooperative Extension
Department of Plant Pathology
New Brunswick, NJ
- The Pennsylvania State University**
Department of Plant Pathology
University Park, Pennsylvania
- University of Massachusetts**
Turfgrass Pathology
Amherst, MA
- University of Maryland**
Department of Natural Resource Sciences & LA
College Park, Maryland
- Cornell University Department of Plant Pathology**
Long Island Horticultural Research & Extension Center
Riverhead, NY
- University of Florida, IFAS**
Southwest FL Research and Education Center
Immokalee, FL
- University of Florida, IFAS**
Gulf Coast Research & Education Center
Wimauma, FL 33598
- University of Florida, IFAS**
Tropical Research and Education Center
Homestead, FL 33031
- University of Connecticut**
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- Humofert Demirtzoglu & Co. S.A.**
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Athens, Greece

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- University of Arizona**
Department of Plant Pathology
Yuma Agricultural Center
Yuma, AZ
- The University of Sydney**
Department of Plant Pathology
Sydney, Australia
- University of Mysore**
Dept of Studies in Applied Botany and Biotech Manasagangotri
Mysore, India

- University of Georgia**
Plant Pathology - CES Horticulture
Tifton, Georgia
- University of Georgia**
Alternatives for Methyl Bromide
Athens, Georgia
- National Research Center**
Horticultural Crops Technology Department
Dokky, Giza, Egypt
- Central MS Research & Extension Center**
Extension Plant Pathologist
Raymond, Mississippi

- Chase Horticultural Research, Inc.**
Plant Pathology
Mt. Aukum, CA
- Auburn University**
Department of Entomology & Plant Pathology
Auburn, Alabama
- University of Maine**
Dept. of Plant, Soil and Environmental Science
Orono, Maine
- Pacific Ag Research**
Research & Development
San Luis Obispo, California

- Texas A & M Department of Plant Pathology**
Southern Crops Research Laboratory,
USDA College Station, Texas
- Ohio State University**
Department of Horticulture & Crop Science
and Department of Plant Pathology
Columbus, Ohio



Fusarium wilt on cucumbers usually attacks when plants are 60 to 80 days old and in the production stage. Its negative results on crop yield can be devastating.



By applying Companion every 21 days from seedling to transplant, and through the life of the plant, this grower was able to avoid Fusarium on his plants and get another 1 to 2 months of cucumbers for market.

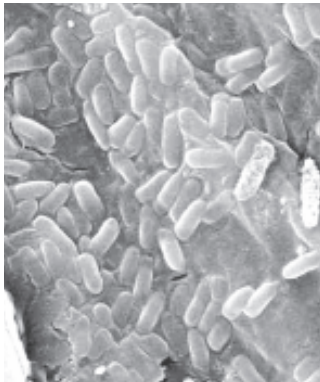


The grower was so pleased with Companion that he washed the roots of one of his treated plants to show its dense, white, healthy root system.

Multiple Modes of Action

To prevent & control diseases and to improve crop vigor

- **Directly competes against soil-borne pathogens** by quickly colonizing a plant’s root hairs with beneficial bacteria, thereby crowding out disease-producing microbes and creating a “shield” to protect plants.
- **Produces strong Iturin antibiotics** that kill pathogens by disrupting cell wall formation.
- Creates a highly beneficial **Induced Systemic Resistance (ISR)** by stimulating the plant’s phytohormones and natural immune system to better resist diseases.
- Acts as a **Plant Growth Promoting Rhizobacterium (PGPR)** that stimulates better rooting and better overall growth.
- Is an important tool in a turf manager’s **Disease Resistance Management Program**, helping to prevent pathogens from building a resistance to chemical fungicides.
- Is **non-selective to plant materials**, and thus is beneficial to all types of agricultural crops including vegetables, herbs, fruits, citrus and nuts. Works at all growth stages, from seeds to plug to harvest.
- Contains **gram-positive bacteria** which survive in even extreme environmental conditions including heat and drought, making it a durable and reliable fungicide that growers can trust.



Bacillus subtilis spores populating the root hairs



Notice hyphae formation around root hair providing a protective glove

Resistance Management

A 100% natural and organic biological fungicide, Companion can play an important role in a grower’s Integrated Pest Management (IPM) program. Chemical fungicides enable pathogens to build up resistance over time, but Companion’s multiple modes of action prevent the development of disease resistance.

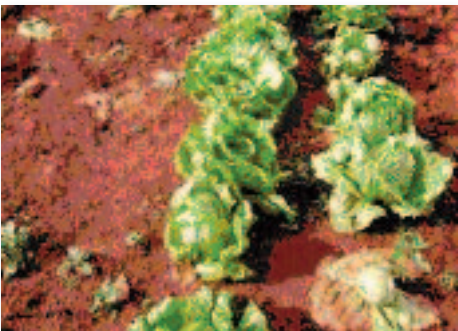
Other benefits include:

- Low 0 – 4 hour REI for workers.
- No special storage requirements; remains shelf stable for more than two years.
- 100% miscible in water and may be applied through all types of irrigation systems.

- **Clearly visible abundant new root growth.**
- **Improves yield, blossom set, and fruit size.**
- **Increases hyphae formation.**
- **Enhances nutrient uptake.**
- **Is antagonistic to blue-green algae [*Cyanobacteria*].**
- **Helps reduce salinity in soils.**
- **Speeds germination.**
- **Helps prevent transplant shock.**



Six weeks after transplanting, Iceberg lettuce that was treated with Companion showed excellent control of Sclerotinia, as shown in the photo above, taken at Serve-Ag Research in Australia.



In identical field conditions, this untreated Iceberg lettuce shows crop loss and lack of turgidity due to Sclerotinia. The untreated lettuce had a loss of nearly 60 percent.



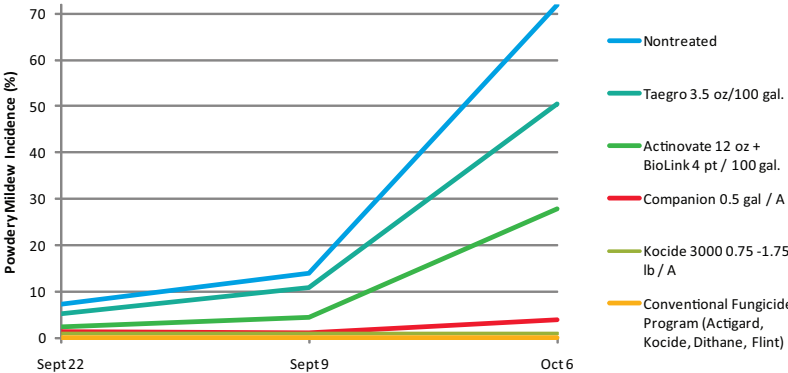
During transplanting, tree roots are typically damaged when removed from their liners. Here, a Valencia orange on Swingle root stock was treated with Companion in order to prevent pythium root rot, which often damages stressed trees.



Fifteen months later the citrus tree has grown nicely. Follow-up applications of Companion biological fungicide have helped protect the tree from diseases such as Canker, Greening, and Alternaria.

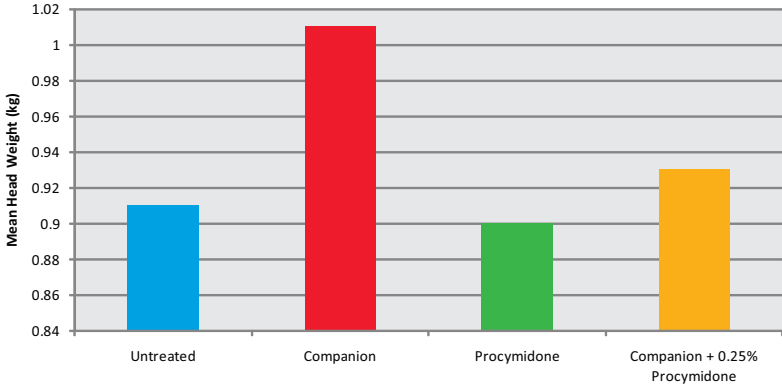
TESTING

Powdery Mildew on Organically-Produced Tomato
Dept. of Plant Pathology & Plant-Microbe Biology LIHREC, Cornell University



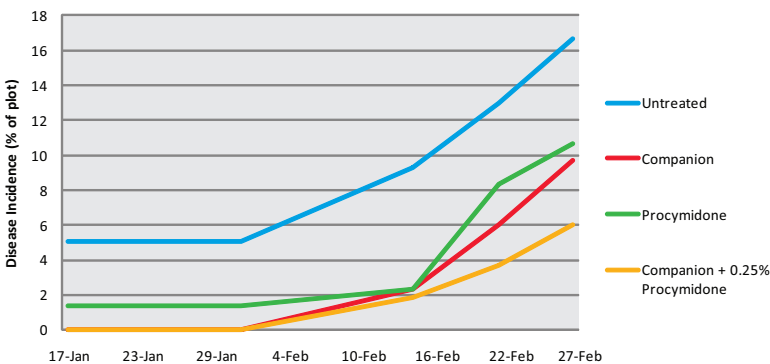
Companion worked better than the chemical Procymidone in the control of Sclerotinia minor on lettuce crops. The best disease control was achieved with Companion and 25% of the regular amount of Procymidone. By using Companion with reduced amounts of chemical fungicides, a grower can save money and reduce chemical use and exposure by up to 75%.

Lettuce Yield Assessment at Harvest
Serve-Ag Research, Australia



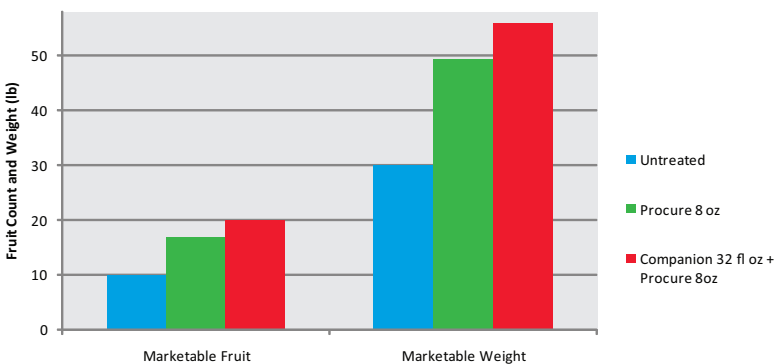
Chemical fungicides are known to decrease plant growth and stunt qualities such as crop yield. In this study Companion produced the highest lettuce yield. The use of Companion mixed with reduced amounts of the chemical fungicide Procymidone increased the lettuce yield above the stand-alone use of the chemical used at regular strength.

Evaluation for Control of *Sclerotinia minor*
Commercial Lettuce Crop, Serve-Ag Research, Australia



The best disease control does not always produce the best yields. The phytotoxicity from chemical fungicides can stunt crop growth and decrease yield. In this study, Companion combined with the chemical fungicide Procure (triflumizole) increased the Procure’s disease control but and most importantly yielded the most fruit per plot as measured by weight, and also increased the total number of marketable fruit.

The Integrated Use of Biopesticides With Conventional Fungicides
Control of Powdery Mildew of Cantaloupe, University of Florida



Companion was highly effective at providing Powdery Mildew control on tomato plants. Companion preformed significantly better than the organic fungicides Taegro and Actinovate, and virtually as well as Kocide 3000 (Copper Hydroxide) and conventional chemical fungicides including Actiguard, Dithane, Bravo and Flint.

Confidence

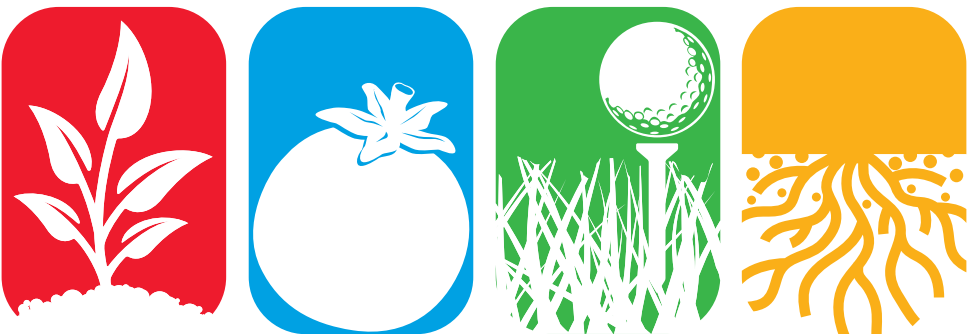
Growers in over 25 countries world-wide, with operations both large and small, have relied for years on Growth Products' Companion to keep their crops green, growing, and healthy. **Why do these growers make Growth Product's biological fungicide their "valued companion"?**

- **Companion has proven efficacy in preventing and controlling a wide spectrum of plant diseases.**
- **Companion is cost effective when used alone or in combination with lower concentrations of chemical fungicides.**
- **Companion's beneficial *Bacillus subtilis* not only prevents and controls fungal diseases, but stimulates root growth.**
- **Companion is 100% organic and natural, is safe for workers, and is good for the environment.**
- **Companion is compatible and can be tank-mixed with fertilizers, micronutrients, and most chemical fungicides, saving you time and money on spray applications.**

• **Proven** • **Tested** •
• **Reliable** • **Consistent** •
Each Gallon Contains Fifty Five Billion Spores of *Bacillus subtilis* GB03

Make Fungicides More Powerful With Companion®

Companion® excels as a stand-alone biological fungicide and as a beneficial "companion" fungicide. Companion increases efficacy when tank-mixed with chemical fungicides, or used in rotation with other fungicides, thereby reducing your total chemical costs, and helps prevent the development of disease resistance.



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