

Fight Fire

The first step to beneficial plant protection is simply learning which fungi and bacteria are good

With Fire

By Matt Kowalski

Beneficial microbes typically form symbiotic relationships with plants, which means the microbes get something from the plant and the plant gets something equal in return from the microbe.

Fungi grow everywhere. They can grow on your feet; bacteria also can grow in the back of your throat. They can grow on the lawn and garden, too. Though people and plants do not share the same pathogens, both attract microbial critters that can be disfiguring, disabling and, in many cases, deadly.

Dealing with these types of plant diseases in the most natural way possible is by far the most attractive method of treatment. Today there are plenty of very good, safe and natural disease control products that greenhouse growers have to choose from.

Prevention Is the Best Medicine

Yes, Grandma was right. Eat well, exercise, take your vitamins and get plenty of rest. For plants, that means good soil, regular (but not too much) watering and proper nutrients. This is what I like to call the first line of defense. Just like people, plants can better defend themselves from sickness if they are healthy to begin with.

Still, even with the proper regimen, disease can be blown in by air, carried through watering or vectored (a fancy word we all learned in high school biology but never thought we'd ever use in real life) by insects or animals. Even the most properly cared for plant can be overwhelmed by an onslaught of disease causing microorganisms that slime the roots, canker the stems and liquify the leaves.

"All right, Kowalski," you say. "I've done everything I'm supposed to do to keep the plant healthy. I've maintained the first line of defense. What's next?"

Bring on the Good Guys

We've all heard of probiotics, the beneficial bacteria that live in our stomach and intestines that help with "moving things along." There are, in fact, millions of microorganisms that live all over our skin, hair, nails and inside our bodies that don't really hurt or help us in anyway. They're just kind of along for the ride. Plants have



Depend on us
to Support
your
Growth



Experience PARsource's sales and technical staff have decades of industry experience. We partner with Lighting Sciences International to deliver cutting edge technology. It's no surprise that PARsource is the fastest growing U.S. lighting company over the past 10 years.

Dependability Our magnetic ballasts are the most reliable in the industry and our GLX and GLS reflectors offer the highest efficiency in the industry. Our service is second to none, with a long history of customer satisfaction.

Flexibility We know that when you profit we've succeeded. Our proprietary LightSmith™ software will help us create the perfect lighting schematic for your greenhouse, for the season, and for your specific crop needs.



Lighting Solutions
for Your Growing World

800.634.9990

parsource2.com

2249 S. McDowell Ext.
Petaluma CA 94954

PARsource

Write in 119



Left: Salvia mums on the right show improved root systems in this Streptomyces lydicus trial. Left plant is untreated.

Below: Stronger roots flourish as a result of beneficial microbes like Streptomyces lydicus.

A very, very small percentage of actinomycetes live on plants roots and foliage. And a small percentage of those are actually beneficial and protective to the plant.



these microorganisms, too. They live on the roots, stems, foliage and other parts. As with human microorganisms, most of them don't really do anything to help the plant. There are some that are known to help with nutrient uptake. A few help with rooting. But there are some, a very small percentage, that actually live on the plant and aggressively attack invading diseases. These are known as beneficial microbes, and they typically form symbiotic relationships with plants, which means the microbes get something from the plant

(in the form of food from waste material produced in the roots or leaves) and the plant gets something equal in return from the microbe (in the form of protection from disease).

We see this relationship a lot in nature, from the teeth-cleaning fish that hang out in sharks' mouths to bees that pollinate flowering plants. The theory goes that these relationships evolved over millions. Each organism (whether plant or microbe) was able to give and receive maximum benefits from its partner. In



The onion plugs on the right show enormous promise in the Streptomyces lydicus trial. The trial on the left is untreated.

Making the Right Choice

for your Crops

Versatility We offer more options than other manufacturers. Choose from magnetic, digital, or convertible ballasts. Add 90% efficient GLS or GLX reflectors to provide superior uniformity. Then add the largest bulb selection in the industry. We can match your crop's needs with the right equipment from reflector to ballast to bulb.

Adaptability No two crops are alike. That's why PARsource has all the right equipment for your needs. Our industry experience enables us to quickly identify the system that delivers the exact lighting you need for your crops, season and location.

Expertise More choices means our professional staff can tailor its recommendations to your needs. We can match regional light to your crop needs, and we will be there every step of the way to make sure you make the right choice to help your business grow.



Lighting Solutions for Your Growing World

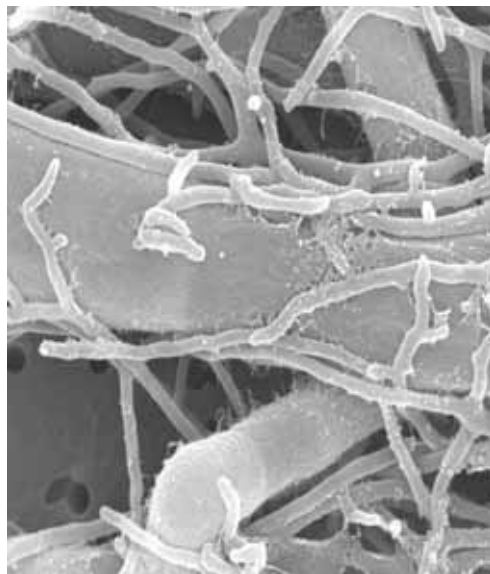
800.634.9990

parsource2.com

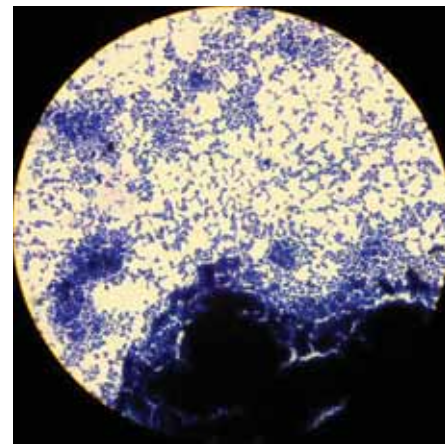
2249 S. McDowell Ext.
Petaluma CA 94954

PARsource

Write in 121



Streptomyces griseoviridis attacking Alternaria. (Photo: Dianne Cupples, Agrifood Canada)



Bacillus subtilis under an electron microscope. (Photo: University of Cincinnati - Clermont.)

Common plant diseases where beneficial microbes can help fight back:

Root diseases

Pythium
Phytophthora
Fusarium
Rhizoctonia

Gerbera daisies treated with Actinovate SP



Foliar diseases

Powdery Mildew
Downy Mildew
Botrytis
Monilinia

Gerbera daisies untreated and infected with powdery mildew



the case of beneficial microorganisms they have been able to develop several ways in dealing with the plant's enemies including producing pathogen-killing enzymes, antibiotics and other antifungal metabolites. In fact, certain beneficial microorganisms even attach and feed on harmful diseases. Yep, not only do they "eat their lunch," they eat them for lunch too.

Good fungus. Good bacterium. And, um...good actinomycete?

There are good fungi, good bacteria and good actinomyces. First off, yes. There is such thing as a good fungus. The one most beneficial to plants is called *Trichoderma harzianum*. This particular fungus grows on roots and helps defend the root zone from bad fungi. *Trichoderma* survive best in the root zone and populations tend to

decline in soil alone.

Bacillus are a family of good bacteria that have several beneficial genii, which act to control plant diseases. Most notably, *Bacillus subtilis* and *Bacillus pumilus* have been very heavily researched. These beneficial bacteria can grow on roots and in the soil.

The final beneficial soil microbe you need to pay attention to is the actinomycete, probably the most populous soil microbe in the world. However, most do not interact with plants much. They're just in the soil, doing their own thing. A very, very small percentage of actinomycetes live on plants roots and foliage. And a small percentage of those are actually beneficial and protective to the plant. Of these there are only two you need to worry

Proven Winners® Invites You to Attend our FREE Roadshow® Seminars



You'll learn about:

- New Proven Winners varieties and programs and how they will increase your business
- Pricing strategies for optimum sales
- Cultural tips for successfully growing Proven Winners annuals, perennials, and ColorChoice® Flowering shrubs
- Creative destinations, merchandising, and store layout from Judy Sharpton

Roadshows are coming to a city near you this October:

Salt Lake City, UT

October 5, 2010

Boston, MA

October 12, 2010

Baltimore, MD

October 14, 2010

Portland, OR

October 20, 2010

Saskatoon, SK

October 22, 2010

Columbus, OH

October 27, 2010

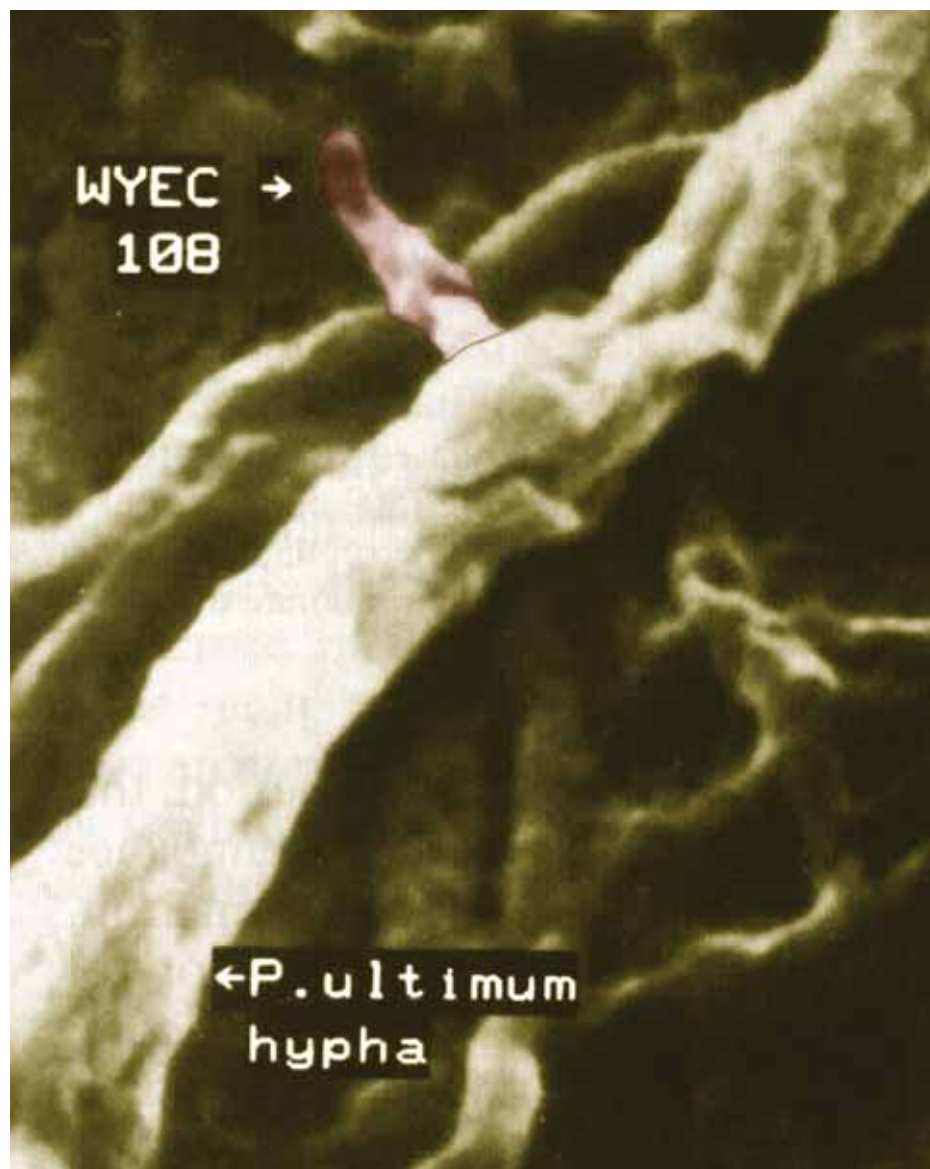
Kansas City, MO

October 29, 2010

For more information or to register, visit www.provenwinners.com.

PW
PROVEN
WINNERS®
The #1 Plant Brand.®

Write in 124



This magnified photo from an electron microscope shows *Streptomyces lydicus* attacking *Pythium* strand. (Photo: Natural Industries)

POLAIR™ High Pressure Fog Systems

Custom designed for your particular application, using proprietary software, which includes weather data for over 2000 cities.

Each system offers the following:

- Stainless steel atomization nozzles with anti-drip check valves — with the best nozzle warranty in the industry.
- 100% efficient. Flash evaporation provides instant cooling even in areas of high humidity. More efficient than pad cooling and without large temperature differentials. Cooling is even with PolAIR.
- Precise humidity control for cold storage, propagation and tissue culture.



Create the perfect environment with PolAIR Fog Systems.

Systems are designed for:

- Cooling
 - Humidification
 - Chemical Distribution
 - Propagation
 - Supplemental Cooling to Pad Cooling
- ... and many other applications

Contact us today
for more information!

2710 Division Hwy, PO Box 8
New Holland, PA 17557
Phone: 800.433.1819, x.436
Fax: 717.355.2505

Email: hortna@valcompanies.com
Website: www.valcogreenhouse.com



Write in 123


about: *Streptomyces lydicus* and *Streptomyces griseoviridis*. They both colonize the soil, roots and leaves of plants very well. They produce byproducts destructive to diseases, byproducts like the enzyme chitinase as well as many unique antibiotics. Did you know most antibiotics in human medicine are derived from antibiotics produced by streptomyces? And the antibiotic streptomycin is used by apple and pear growers around the world to fight fire blight, a deadly foliar disease. *Streptomyces* are also great plant-disease fighters because they are known to parasitize pathogenic fungal pathogens.

Picking the Best

Remember the cardinal rule: Find products that are EPA registered. EPA-registered microbial fungicides have not only gone through the EPA's exhaustive safety testing process and have stacks of research compiled on efficacy and plant interaction, but they are also usually one particular strain of microorganisms whose disease-fighting capabilities are well documented.

A Part of the Solution

By no means can all harmful fungi and bacteria be completely controlled by beneficial microbes. But it is a very strong beginning to protecting your greenhouse, nursery,

lawn and garden. Once you have this natural system in place then you can move on to the third line of defense: plant extracts and biorationals. But that is another article for another day. 

Matt Kowalski is the president of Natural Industries in Houston, Texas. More information about Natural Industries and plant protection products can be found at www.naturalindustries.com.

GREEN HOUSE HEATING



S100 Firebox Series Solid Biomass Combustion

NEXT

 hurstboiler.com
Hurst Boiler 2010
tel: 229 346-3545

Write in 129

HORTIBLOCK®



FLOW TRAYS

ROOTRAINERS®

Propagation trays with results

Southeast US info: Northeast info:
Dick Barrett, Ph.D. John Sutherland
813-642-9986 330-858-5980

 **Beaver Plastics**



Toll-Free 1-888-453-5961
www.beaverplastics.com

Write in 128

Want to **CONTROL** Your Profits?



When you control the quantity of light penetrating into your greenhouse, you also control your profitability through increased quality of crops! Yes, Polygal can help you get the most out of your hard work with more great news.

-  Our **NEW** state-of-the-art **SPRING polycarbonate sheets block damaging infra-red solar** radiation and heat by maintaining consistently lower temperatures compared to other PC "Clear" brand sheets. Customers and plants love that!
-  **SPRING** allows maximum light to come in, but provides a much needed protective shield against hot, burning summer months. In winter months, **SPRING** also saves energy costs through optimum thermal comfort and insulation. Customers, plants and greenhouse growers love that, too!

Polygal's new **SPRING PC** sheets come in clear with an attractive green tint or translucent matte finish in standard 8mm thickness. Either style will keep your profits covered year round!

Unfortunately, we can't control things like gas prices, so the least we can do is help you control your greenhouse profits! **SPRING INTO POLYGAL TODAY!**

For more information, contact: sales@polygalusa.com

Seeking: Installation Contractors/Dealers/Distributors in Select Geographic Regions!
Contact us for details.



Polygal...The World Leader Growing Garden Center Profits Through the Roof!

PO Box 410592 | Charlotte, NC 28241 | 800-537-0095 | Fax 704-588-7400 | sales@polygalusa.com

Write in 127

Reliable
Ventilation Equipment
Since 1937!



Quietaire's Angle Flow - Aluminum or Galvanized Angle design incorporates all of the excellent qualities of the standard box design plus it increases fan performance which lowers cooling costs.



Quietaire's Stainless Steel Trough Cooling System - No sump required! This cooling system is self-contained, highly efficient and has a long life expectancy.



Quietaire's HAF 18 Fan - Efficiently improve conditions in your greenhouse with horizontal air flow fans. The fans push air in greenhouse continuously causing mass air movement.

Rely on Quietaire to manufacture long lasting, low maintenance, durable and dependable ventilation products. The type of products that you can count on for years to come!

Quietaire

Web Site: www.quietaire.com
Email: info@quietaire.com
Call (713) 228-9421 Fax (713) 228-9425
or write Quietaire for details.
505 North Hutcheson Houston, TX 77003



Write in 126