

A close-up photograph of a person's hand, wearing a blue and white plaid shirt, reaching towards a row of young green plants in a field. The background is a soft-focus field of similar plants under warm, golden sunlight. The overall scene conveys a sense of care and growth in agriculture.

Global Insight Series 2022

# Plant Health

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W O R L D W I D E

# Changing the Perception of Fungicides



# Changing the Perception of Fungicides

By Jackie Pucci, Senior Editor, *CropLife* and *AgriBusiness Global*

The conventional wisdom that fungicides are “nice to have” applications that cannot match “must have” herbicides is being challenged.

From a bird’s-eye view, the segment’s growth speaks volumes: just about half a million acres of corn were treated with fungicides back in the late '90s and early 2000s, while today, over 20 million acres are treated. The development of sophisticated “racehorse” hybrids that are bred to push the limit on yields and exploit full-season maturity has resulted in much larger windows for disease to come in and become yield-limiting. In addition, troublesome new diseases like tar spot and *Curvularia* leaf spot have emerged.



Tyler Harp, Fungicide Technical Product Lead, Syngenta US. Photo courtesy of Syngenta

“Fungicides are probably more of a must-have than you’re aware of, even though there are years where it may not return very much, if you don’t have disease or abiotic stress,” says Tyler Harp, Fungicide Technical Product Lead with Syngenta US. But in a span of five years, with abiotic stress present in one or two of those years, the average yield bump over the five years is almost always 15 to 18 bushels across any given location, he says.

“One of the things that we’re learning more and more, is that in addition to disease control, certain classes of fungicides – we call them plant health

fungicides — have the ability to also increase the productivity and the efficiency of the crop,” Harp tells *CropLife*.

Syngenta calls these fungicides, including [Miravis Neo](#), “cleaner and greener.” Cleaner refers to the ability to manage yield-robbing fungal diseases. Greener refers to the prolonged greening of the plant, by which the fungicide ultimately enables the plant to produce more energy for the period that it’s in the field as opposed to a premature senescence or dry down.

**“We want to link the fact that it’s cleaner and has good disease control, but it’s greener because of these plant health benefits: preservation of yield in the presence of abiotic stress, as well as a more efficient and productive crop,”** Harp says.

These fungicides can reduce the leaf transpiration rate but maintain photosynthesis — the PS2 efficiency. “We’re conserving and preventing some of the loss of water vapor of the leaf while having no impact on the energy production,” he explains, noting that in a field where a product like Miravis Neo is used compared to an adjacent field where it is not applied, and drought conditions follow, “you’ll get more leaf curl in the untreated.” The leaf is curling because the plant is trying to conserve the water it has.

The advantage of harvest efficiency is more well known, because the results are tangible — the grower sees a better-quality harvest. When a plant has disease in the leaves or abiotic stress, the leaves will pull starches from the stalk, which compromises the integrity of the crop and makes it more prone to lodging or breaking in the field. The combine is forced to drive as much as 2 mph slower; on the flip side, university research indicates the fungicide application could save growers about \$23/acre, Harp says.

Botanical Solution Inc. (BSI)’s Quillibrium biofungicide — which was first commercialized in 2019 in Chile and in 2021 in Peru through a partnership with Syngenta and will also launch in Mexico — is another example of these products’ multifaceted properties.





BioConsortia unveiled a broadened nematicide seed treatment pipeline in 2022. Shown here is a slide of colorful microbes forming a consortia. Photo courtesy of Bioconsortia

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This broad-spectrum biofungicide, based on the extract of *Quillaja saponaria* Molina, a plant native to Chile, has been proven to be highly efficacious and consistent in the prevention and control of *Botrytis cinerea*, powdery mildew, sour rot, *Alternaria*, and others, especially for conventional growers of blueberries, vines, and vegetables. It also triggers a systemic acquired response in the plant when used as a preventative treatment, which results in yield gains across different geographies and markets.

**This biofungicide's unique modes of action provide growers with an effective tool for resistance management and promotes worldwide exports of top-quality fresh produce, meeting the strictest MRL guidelines.**

Dr. Eric Tedford, R&D manager for Summit Agro USA, exclusive U.S. distributor for STK Bio-Technologies, explains that STK's tea tree oil-based biofungicide, Timorex ACT, and hybrid fungicide Regev (tea tree oil + difenoconazole), are primarily known for their high efficacy against a broad spectrum of plant-pathogenic fungi with strong prophylactic and curative activities in crops including vegetables, herbs, grapevines, bananas, rice, coffee, and fruit trees.



Yet, tea tree oil has also been found to turn on genes in some crops, such as bananas and tomatoes, to become resistant to disease.

**“You can almost equate it to giving a plant a vaccination,”** Tedford describes.

In addition, tea tree oil is an excellent product for disease control because it contains eight different terpene alkaloids.

“The reason this is important is because all eight of these are having activity against pathogens, and then you’ve got the difenoconazole [in Regev]. You can almost think of it as a combination of nine active ingredients, all working in tandem to kill the pathogen,” he adds. In

addition, one of the modes of action from the active ingredients in tea tree oil is disruption of cell membranes. Therefore, both Timorex ACT and Regev provide control of both fungal and plant pathogens. Most fungicides have no activity against bacterial plant pathogens.

Sarah Reiter, who leads business development at [BioConsortia](#), points out that between 10% and 40% of all crop yield is lost to disease, and often it’s lost before disease is even recognized to be present.

BioConsortia’s work focuses heavily on bionematicides for fruits and vegetables and increasingly in row crops, delivered as seed treatments. One of the lead products for corn in its pipeline, which it anticipates to begin marketing in 2025, is shown to outperform [Poncho Votivo 2.0](#) and delivers a 10-bushel yield boost.

Its nematode solutions often outperform chemical counterparts – for example, its bionematicide in strawberries delivers 36% better yield than synthetics.

Plant growth-promoting effects, aside from nematicidal modes of action, include production of indoleacetic acid (IAA) in the root zone and turning on of either induced system resistance or systemic acquired resistance.

**“That is the plant defending itself, basically. It may trigger growth cascades inside the plant and the plant sort of outgrows the plant damage. Both of those are really impressive secondary benefits of bionematicides,”** Reiter says.

Since Reiter came to work with biologicals for the first time in 2006 at AgraQuest, after 12 years in the conventional chemistry world at Syngenta, she has also noticed that the way growers think about biologicals has changed dramatically.

“They’ve come to recognize they’re not silver bullets,” she says. “My own perception is that the market got very used to the broad- spectrum solutions from the chemistry side of the business with glyphosate ... But the farmer has changed their way of thinking with respect to fungicides and insecticides to where they are really looking for the specialist tool. They don’t want to spray a super-broad-spectrum insecticide, because they only want to control one or two pests. I think that farmers are thinking about it really differently, and that has opened the door to a lot of biologics.”

### ‘Less Is More’

Communicating the fringe benefits of fungicides to retailers and end users presents a separate set of challenges.

Tea tree oil, for example, makes plants better able to protect themselves, but “it’s hard to tell that to a distributor, because they’re not used to that,” Tedford points out. “It’s harder, but I think more people are coming around to it, and more growers are coming around to it, because they’ve actually used products and have seen [the results.]”





Botanical Solution Inc. CEO Gaston Salinas speaking about the company's new Quillibrium botanical-based biofungicide. Photo courtesy of Botanical Solution Inc.

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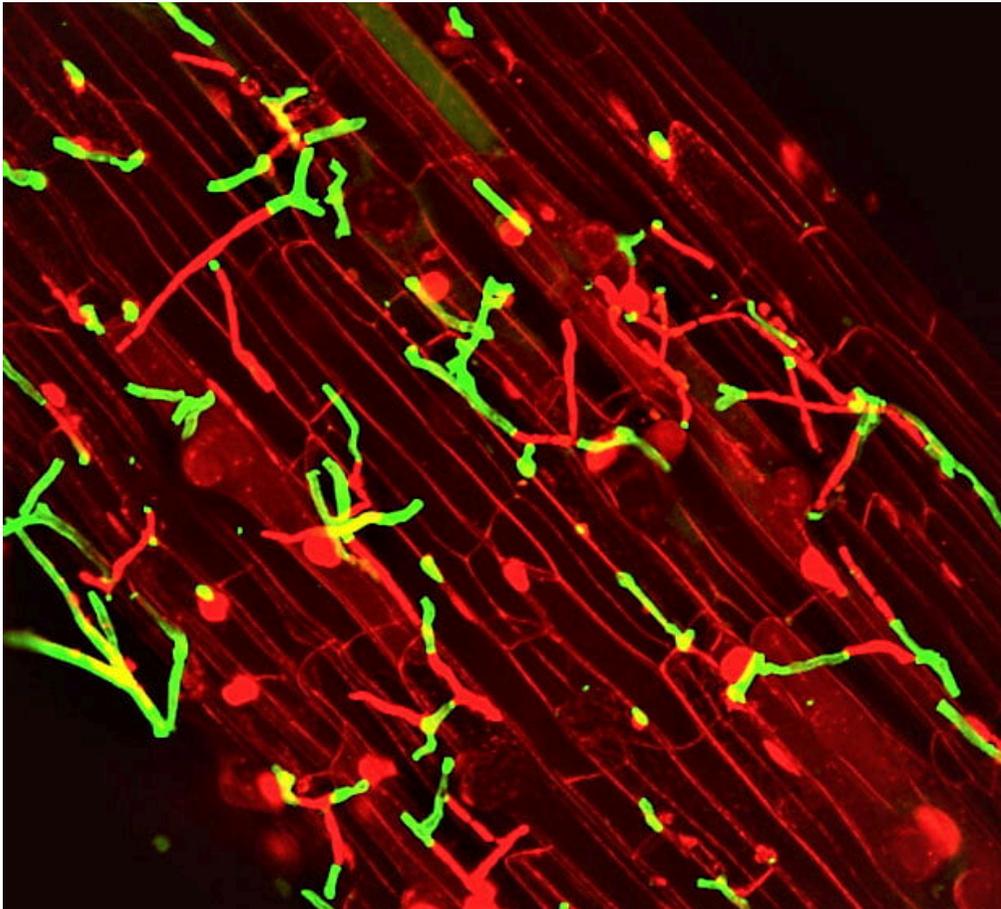
Gaston Salinas, CEO of BSI, notes that in developing a biofungicidal product, there is a huge temptation to extract the full value of your product in your marketing approach.

“When you are approaching a grower, you’re trying to give a simple, technical recommendation,” he tells *CropLife*. “For years, natural products

would be considered a sort of snake oil. If you are tempted to give a recommendation that the product is going to solve all your problems overnight – that it’s going to not only help you with disease pressure but it’s also going to help you with biostimulant benefits – then you are going to start losing credibility.”

Salinas explains that while trying to introduce a product, it is best to be as specific as possible and find your specific value proposition. “In our experience, less is more. It is better to hear directly from the grower all the great additional benefits when you get back to him the next season, instead of us pushing harder to use the product.”

For BSI, the trade-offs are clear. Focusing on the fungicidal aspects of the product and gaining a position in integrated management strategies comes first. “On the other benefits, we still don’t have the answer on how to capture that value. But we know it’s there, and I think it’s probably a challenge for most companies.



Five product leads ready for partnering from BioConsortia's nematicide pipeline are each based on single-strain, spore-forming beneficial bacteria; shown here is a photomicroscopy of fungal root colonization. Photo courtesy of Bioconsortia

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“We have learned the hard way how to deal with having a limited number of chemical molecules that can help get your fresh produce to destination markets. Fresh produce travels for 20, 30, 40 days until it gets to the end users. With tightening restrictions on conventional chemistry, we have to rely increasingly on natural products that are truly effective,” he adds.

**“This is how we encounter our main value proposition: to try to understand how we can leverage all these natural compounds in order to make traditional pest management strategies more effective.”**

Syngenta’s “cleaner and greener” messaging also speaks to the desire to make the science behind fungicidal activity less cryptic.

“It’s not like we haven’t known about these benefits; I just don’t think we’ve done a good job describing them and putting equity on it. That’s been my mission in life over the past year and a half, to help do that,” Harp tells *CropLife*, “because I really do believe there’s more value out there than what we think.”