



A new fungicide to combat gray mold, powdery mildew and co.

Protecting sweet fruit

Problematic fungal pathogens are especially fond of fruit and vegetables at the very end of the growing season. Researchers at Bayer CropScience have now developed a new active substance that effectively combats these dangerous microorganisms. It can be applied at lower use rates than conventional fungicides, ensures high-quality fruit and reduces post-harvest losses. The substance also protects field crops such as oilseed rape and soy against diseases.

Fruit and vegetables are good for us, as any child can tell you. However, these low-calorie sources of vitamins and minerals often have a long and challenging life before reaching our plates. Along the food chain, a wide variety of plant diseases can jeopardize the quality of peaches, berries, etc. What's more: "Fungal pathogens can spread out over an apple tree or raspberry bush even before the harvest," explains Dr. Heiko Rieck, Global Project Manager at Bayer CropScience in Monheim. "They disseminate particularly rapidly in warm, humid weather." That spells trouble for fruit growers, since the microorganisms

infect the young shoots, leaves and other parts of the plant, forming an unappetizing white, gray or brown coating. The fungal pathogens attack the fruit as well, impairing its quality when even the smallest amount of fungus is present and leading to severe crop damage.

Rieck and his colleagues at Bayer CropScience have now discovered a totally new active ingredient from a class of its own to combat this problem. "Fluopyram enables us to offer fruit growers and vegetable farmers a solution with a broad application scope, and in particular one that is lastingly effec-

tive in combating many types of disease pathogens. As a result, crops maintain their quality," says Gilbert Labourdette, Global Development Manager. The active ingredient from Bayer is especially good at protecting against gray mold – known as Botrytis among experts – and powdery mildew. It is also effective against a wide range of other diseases such as scab, white mold and fruit rot.

After treatment, the molecules of the active substance fluopyram diffuse evenly over the plant and systematically infiltrate the mitochondria, the "power factories" of the fungal cells. The mitochondria



Sweet fruit, safely stored: raspberries spoil particularly easily. The active ingredient fluopyram developed by Bayer scientist Dr. Heiko Rieck (right) and his team protects fruit not only against fungal infestation; the fungicide also lengthens the time that fruits can be stored.

Help against fungus attacks

A fungus cell offers many points of attack for fungicides, ranging from the cell membrane structure to the cell "power factories." One of the factors determining a substance's effectiveness is whether and how it diffuses through the plant. Non-systemic agents remain exclusively on the surface of the leaf, meaning they have a merely preventive effect. Systemic fungicides penetrate the waxy layer on the leaves and then spread to all parts of the plant, where they control spores and can even cure a fungal infection that has already become visible. Fluopyram likewise forms a depot on the surface and then penetrates steadily through this layer from where it diffuses to all parts of the plant.

normally convert sugar into energy, thus keeping the cell alive. Fluopyram blocks an enzyme crucial to energy production and cellular metabolism. "As an active ingredient, fluopyram's success is based on an optimum combination of numerous factors," explains H el ene Lachaise, Research Fungicides – Biology. "The active ingredient is specifically delivered to the site of action in sufficient concentration, fits well into the crucial enzyme structures and efficiently prevents them from functioning." A reserve is built up for later as well: "The active substance is continuously released via a depot formed on the leaves and in the plant during application," says Lachaise. That is a good thing, because fungal infection can occur at any moment after application since cells multiply exponentially, doubling in number every 12 hours.

Antifungal agent for longer storage

"Our new agent to combat Botrytis and powdery mildew has proven successful in tests with more than 70 crops worldwide. These include grapes, peaches, apples and other fruit that are considered minor crops such as raspberries," says Dominique Steiger, Global Asset Manager. Fluopyram has also proven highly effective in tests with tomatoes, oilseed rape and even cut flowers. "In comparison to other active substances, treatment with just small quantities of fluopyram is sufficient to ensure

results and keep gray mold infestation in check," says Steiger. "What's more, fluopyram remains effective for much longer than many of the fungicides currently in use." The advantage: fruit and vegetables remain fully protected until harvest and can then be stored with no concerns over fungal infection. In tests, even especially sensitive crops such as peaches and berries retained a perfect appearance after approximately a week in storage and losses were significantly reduced. In comparison, the sensitive skin of untreated fruit stored under the same conditions was covered with a thick, gray layer of mold after 7 days.

The properties of this active substance from Bayer open up entirely new prospects for all parties involved in the production chain of the food and nutrition industry. Fruit growers and international trading companies suffer billions of dollars' worth of annual losses due to poor quality and damage during storage and transport.

For approximately 6 years now, Bayer researchers have been working intensively together with independent partner institutes on approval of the potent fungicide. Bayer CropScience expects initial market approvals in 2011. "Our goal is to get regulatory approval as rapidly as possible in many countries. After all, there is strong demand for high-quality fruit and vegetables worldwide," explains Steiger. The outstanding technology will be available in different dedicated products under the brand name Luna®.

Despite its impressive advantages, fluopyram is not intended to completely replace the products currently on the market. "Studies have shown that careful combination with other active substances yields additional advantages," says Lachaise. "Fluopyram offers us a new agent to combat leaf blight and powdery mildew that, when used alternately with other fungicides, effectively prevents the build-up of resistance."

Fluopyram is still effective against fungus the next year

It is already clear that the success story of this new fungicide is far from over. Fluopyram protects not only the harvested produce in the orchard but also entire trees. "For example, it reduces overwintering primary infection by powdery mildew, as it is then no longer able to grow the following year," explains Labourdette. This infection is caused by fungal spores in the buds from which the new shoots grow. Fluopyram effectively controls these pathogens as well: tests show that no infection is present in the year after treatment. "The buds of apple trees were totally free of germs," says Labourdette of the test results. Fluopyram can thus be counted on to provide all-round protection against fungal pathogens.

 www.research.bayer.com/fluopyram
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