



Dual strategy protects against pathogenic fungi

Anti-aging effect for wheat and other cereals

Pathogenic fungi can cause dramatic crop losses in farming. Using an innovative combination of two effective active substances, researchers at Bayer CropScience are now tackling these harmful microorganisms in cereals. The new product, Aviator™ Xpro™ launches a powerful dual attack on the metabolism of fungal cells. The fungicide efficiently protects cereal plants against pathogens that cause disease, thus ensuring higher yields.

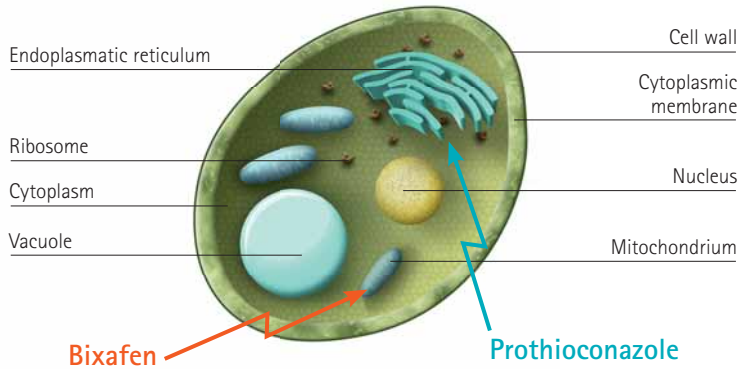
Fungi are among the oldest living organisms on earth, and evolution has turned them into real survival artists. Pathogenic fungi can cause major harvest losses in agriculture in almost all climates. The spores and mycelia of fungi infect plant parts such as the roots, stems, leaves and developing fruits. Neither cereals, vegetables, fruit, oilseed rape nor soy are safe from them. In some cases, a single fungal spore is enough to cause infection of an entire plant. The

resulting disease significantly impairs the yield and quality of a harvest. For this reason, researchers at Bayer CropScience are taking steps against pathogenic fungi using a dual strategy. They have paired prothioconazole, an active ingredient that was launched very successfully a few years ago, with the new ingredient bixafen in a new-generation cereal fungicide: Aviator™ Xpro™. "Xpro technology is the term we use for this combination of two fungicidal active ingredients

that have been optimized for cereals in an innovative formulation," explains Damien Viollet, Global Asset Manager Bixafen at Bayer CropScience. New crop protection products from the Xpro™ family help not only to control disease, but also to optimize cereal growth through a number of positive effects.

"The two modes of action in Aviator Xpro disrupt fungal respiration and cell membrane stability," explains Dr. Andreas Görtz, Bayer

Attack on fungal cells



Two-pronged attack by Aviator™ Xpro™: bixafen blocks an enzyme that plays an important role in the respiratory chain. This reduces the energy production in the mitochondria, the cellular power plants, and fungal growth is inhibited. The active ingredient prothioconazole blocks an enzyme in the endoplasmatic reticulum and thus prevents a new cell membrane from forming.



Wheat strategy: cereals are some of the most important crops for global food production. Scientists at Bayer CropScience are therefore working closely together with cooperation partners such as Bahar Miraghazadeh and Dr. Peter Chandler from the Australian research organization CSIRO (photo, left) to boost the quality and yields of wheat.

CropScience Research Disease Control. The different active substances mount a simultaneous attack on the pathogens. Bixafen blocks a key enzyme in the mitochondrial respiratory chain of the fungal cell. Energy production drops, or even collapses entirely, and growth is inhibited. Bixafen belongs to the class of pyrazoles-carboxamides, and represents a whole raft of new fungus-specific agents that selectively intervene in the metabolic processes of the pathogens. In developing bixafen for use on cereals, Bayer CropScience's researchers optimized it to defend against Septoria leaf blotch, brown rust and other pathogenic fungi.

The established active substance prothioconazole likewise attacks fungal metabolism. It inhibits an enzyme in sterol biosynthesis, which is essential for the formation of the cell membrane. As a result, the cell membrane becomes unstable and further cell growth is inhibited. No matter which developmental stage a fungus has reached – germination of fungal spores, germ-tube extension, mycelial growth or formation of the spores – Aviator™ Xpro™ exerts its effect in all phases.

"Aviator Xpro protects plants from the inside out," Viollet explains. To ensure that enough active substance molecules reach the inside of a plant, the Bayer researchers have also improved the product's rainfastness: just 15 minutes after a farmer applies the product, about 70 percent of the active ingredient is already securely deposited on the leaf. Even subsequent rainfall can no longer wash it off.

Stress protection genes keep plants green and healthy

Once the fungicide has penetrated the upper leaf layers, it spreads to the deeper cell layers and the xylem, the plant's transport system. From there the product spreads with the flow of water through the plant's entire tissue, also protecting leaf parts not reached by the liquid spray. The two active substances, bixafen and prothioconazole, remain evenly distributed in the tissue over a long period of time, without accumulating at the leaf tips. This way, they simultaneously control both new and existing pathogens, displaying a long-lasting effect. Andreas Görtz and his co-workers

have also observed yet another advantage: "The duo also has a positive effect on the physiology of the plants," the researcher explains.

With Aviator™ Xpro™, farmers can not only control fungal diseases more efficiently and durably, but also improve the vitality and thus the stress tolerance of cereal plants. If barley or wheat crops suffer from a lack of water, known as "drought stress", the Bayer active substances prothioconazole and bixafen alter the physiological processes of the plants, resulting in more uniform ripening and a longer grain fill period. This "anti-aging effect" not only keeps the plants greener and healthier for longer, but also ensures higher yields. Depending on crop, location and variety, yield increases of over ten percent can be achieved compared to current standard fungicides. On a wheat field, for instance, a farmer can harvest up to 0.6 tons more per hectare. This represents another important contribution to securing our global food supply.



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More information on the topics of wheat and crop protection