

Hybrids: The future of crop protection – the case of STK Regev as the first hybrid fungicide

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Replacing Mancozeb with tea tree oil-based Timorex Gold for the successful control of black Sigatoka and the reduction of chemical load in banana plantations Sipcam Iberia presents TIMOREX GOLD bio-fungicide to control powdery mildew and botrytis



As a leader in biopesticides innovation, STK (formerly Stockton) is pioneering a new generation of ‘hybrid’ products that combine the powers of biological agents and synthetic chemistries, and which may present a new era in pest control.

The call for chemical load reduction is an important aspect of sustainable agriculture. New effective alternatives to existing synthetic products are required to increase options for the control of plant diseases.

New hybrid solutions are now proving a ‘best-of-both-worlds’ opportunity by combining biological and chemical crop protection active ingredients to provide an effective solution. Regev™ EC, by STK, is the first potent hybrid fungicide in the market. Its uniqueness lies in its high efficacy combined with a very low probability for the development of resistance or cross-resistance in plant pathogens. The hybrid patented formulation contains difenoconazole (200 g/lit) and essential tea tree oil extracted from *Melaleuca alternifolia* plants (400 g/lit). This breakthrough formulation provides multiple modes of action against plant pathogens and plant defence mechanisms including SAR & ISR for improved efficacy in plant disease control and a reduced synthetic chemical load compared to other mixtures based on two traditional chemicals.

Activity of a breakthrough formulation

Regev significantly inhibits spore germination or lesion development on treated leaves and limits the expansion of lesions caused by various fungi:

- The tea tree oil (TTO) disrupts the fungal cell membrane and cell wall in plant tissue infected with phytopathogenic fungi - exhibiting a curative activity against fungal pathogens that enable growers to use it even when the disease is already visible on the tissue. TTO also activates defense mechanisms in plants and induces systemic resistance against plant pathogens.
- Difenoconazole, the second active ingredient of Regev, affects the fungal cell membrane by inhibiting ergosterol biosynthesis.

With these multiple modes of action, diseases effectively controlled by Regev include powdery mildews (caused by fungi in the order *Erysiphales*), apple scab (*Venturia inaequalis*), Black Sigatoka in banana (*Mycosphaerella fijiensis*), species of *Alternaria*, *Cercospora*, *Botrytis*, *Rhizoctonia*, *Pyricularia*, *Helminthosporium*, *Sclerothium* and more.

An effective tool for resistance management

In as much as Regev has a unique multiple functional activity and presents a very low probability for development of resistance or cross-resistance in plant pathogens, it is an important tool in preventing the development of resistance during the growing season. It can be applied either alone, or rotated with products that exhibit different modes of action and to which fungal pathogen populations have shown a loss of sensitivity, so that the population of pathogens which are less sensitive to chemical products can be reduced. Studies have shown that a combination of TTO together with difenoconazole improved the efficacy of difenoconazole, including against fungal populations which exhibited a lower sensitivity to difenoconazole.

An efficacy already proven across the globe

Regev is currently used for controlling a broad range of diseases on arable crops, cereals, fruits and vegetables. Hundreds of trials conducted in recent years have proven the high efficacy in various crops and pathogens and in different countries.

Figure 1 below presents an example of excellent Regev activity against a destructive black Sigatoka disease in banana. This trial was conducted in Colombia in 2018 under high disease pressure, and included four foliar sprays at 10 days intervals of Regev or tank mixes of triazole fungicides plus mancozeb, at the recommended rates and spray volume of 19 L/ha. Both difenoconazole and epoxiconazole each plus mancozeb inhibited black Sigatoka following the spray applications compared to an untreated control. However, Regev effectively inhibited Sigatoka and provided the best disease control (Figs. 1 and 2).

The Hybrid REGEV is already widely registered and used

Regev is already registered in the USA, Israel, Serbia, the Philippines and 10 Latin American countries for various crops and diseases. It is currently in the process of registration in Brazil and the EU.

Hybrids are the future of crop protection

Historically, biopesticides have been used largely on high-value crops, such as fruits and vegetables, but hybrids like Regev are being used on fruits and vegetables, and have also proven to be a cost-effective approach for row crops like soybeans, and broad acre crops like rice and corn.

The preventive and curative activities of Regev, together with the indirect activity via the host plant by systemic resistance, and the fact that it is reliable, leaves little residue and provides significant added value to growers,

make Regev an important component in plant disease control. Its activity has been shown on a wide range of plant pathogens and can be an easy-to-use and effective alternative for controlling various diseases. Regev substantially reduces chemical residues on crops to meet strict MRL regulations and respond to growing consumer demands. Regev is the first hybrid fungicide and foreshadows the future of sustainable crop protection.

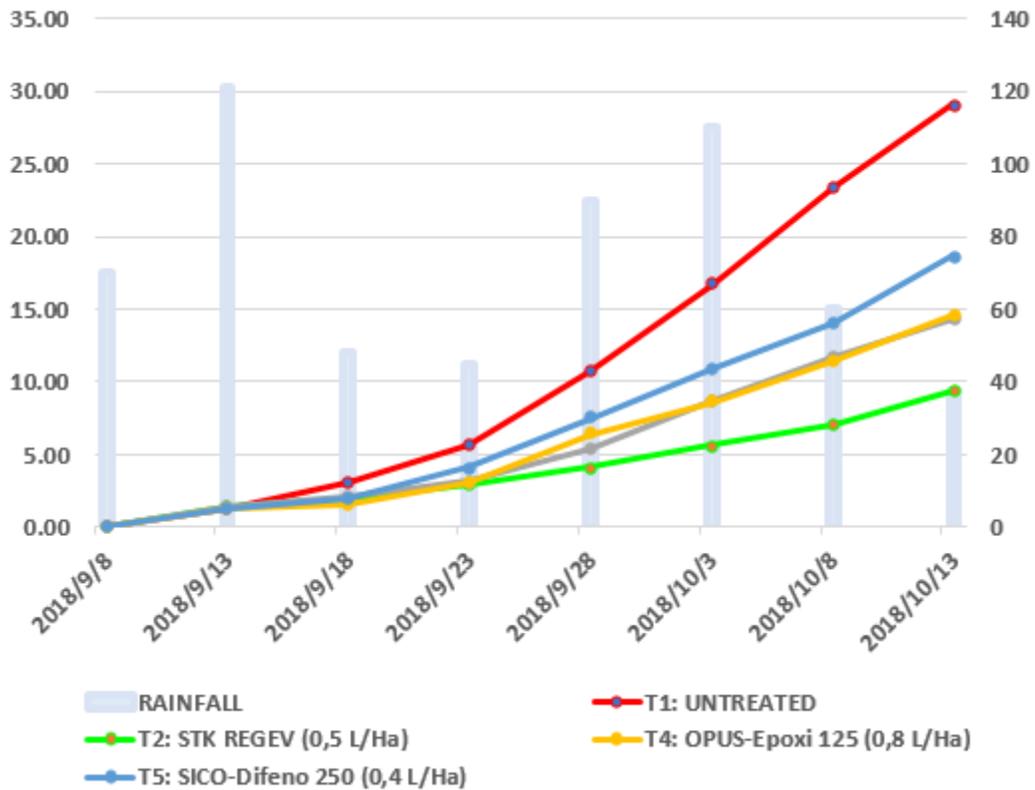


Fig. 1. Efficacy of Regev alone and tank mixes of the triazole fungicides difenoconazole and epoxyconazole plus captan against black Sigatoka disease in banana.

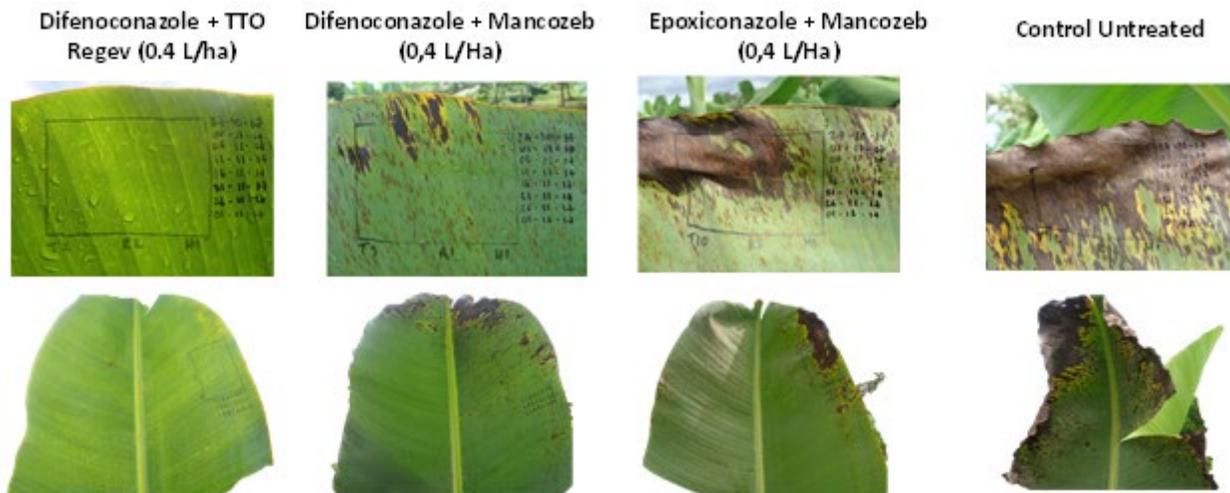


Fig. 2. Control of black Sigatoka in banana leaves by Regev and tank mixes of triazolefungicides plus mancozeb