

# TIMOREX GOLD<sup>®</sup>

THE NEW GENERATION  
OF BIOFUNGICIDES



## Timorex Gold® is a non-residue eco-friendly natural Biofungicide, with significant added values to humans and the environment.

Timorex Gold® is the new generation of biofungicides for the control of Black sigatoka. Timorex Gold® is a biofungicide based on a plant extract of the *Melaleuca alternifolia*, developed by Biomor, member of the Stockton Group. The natural components contained in Timorex Gold® offer multiple modes of action on fungal and bacterial cells, representing the unique fungicidal capabilities of *Melaleuca alternifolia*, bringing with it a new concept and dimension for a highly effective and sustainable control of black Sigatoka in banana and plantain.

Timorex Gold® exhibits superb prophylactic and extremely strong curative efficacy against Black sigatoka, with exceptional performance in the most intense disease pressure conditions. Timorex Gold® addresses the banana growers' requirements for efficacy, ease of use, and cost.

Timorex Gold® non residual features reduces the conventional chemical load in banana plantations caused by the intensive use of synthetic fungicides.

Timorex Gold®, with its powerful disease control capabilities promises higher yield and growth enhancement. Timorex Gold® guarantees crop production quality, such as higher number of leaves produced, higher number of leaves at harvest and increased yield.

Timorex Gold® is an eco-friendly non-residual fungicide, harmless to beneficial insects and bees, that offers human and environment safety. Timorex Gold® provides the banana industry a unique opportunity of a safe, better and more efficient control of Black sigatoka.

Timorex Gold® is a leading product for effective Resistance Management and is widely adopted for large-scale use in the leading banana-growing countries using conventional, and organic farming.

Timorex Gold®, developed by the Stockton group, exhibits the group's 35 years of knowledge and experience in the crop protection industry by introducing the new generation of scientifically proven advanced products.

**Timorex Gold® is a proprietary multi-component natural biofungicide of the Stockton Group and is covered by worldwide patents**



### Timorex Gold® benefits

- Strong prophylactic and curative activity
- Increases leaf production and yield parameters
- An effective Resistance Management Tool
- Non-residual
- No PHI (Pre-harvest Interval) limitations
- No re-entry limitations
- Harmless to beneficial insects and bees
- Environmentally safe
- Zero toxic load
- Certified for use in conventional and organic agriculture

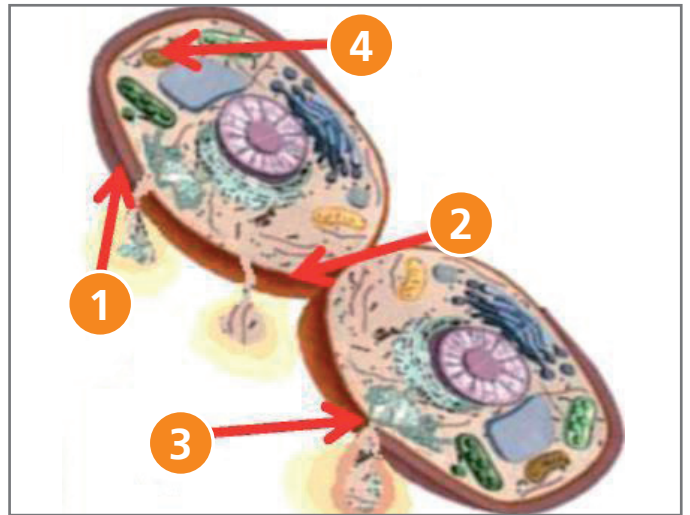
## Multiple modes of action of *Melaleuca alternifolia*

The scientists at Stockton Group discovered the unique and powerful properties of this natural plant extract for plant disease control in agricultural crops. It was found to be effective against a broad spectrum of diseases in vegetables, bananas, plantains, fruit trees, and grapevines.

The natural multi components contained in *Melaleuca alternifolia* offer multiple modes of action on fungal and bacterial cells.

The fungicide and antimicrobial activity of *Melaleuca alternifolia* extract against fungal pathogens is a consequence of their ability to alter the permeability barrier of the membrane structures of living organisms in multiple modes of action:

1. Destroy cellular integrity
2. Increase membrane permeability in cell structures
3. Lead to loss of cytoplasm
4. Inhibit respiration and ion transport processes

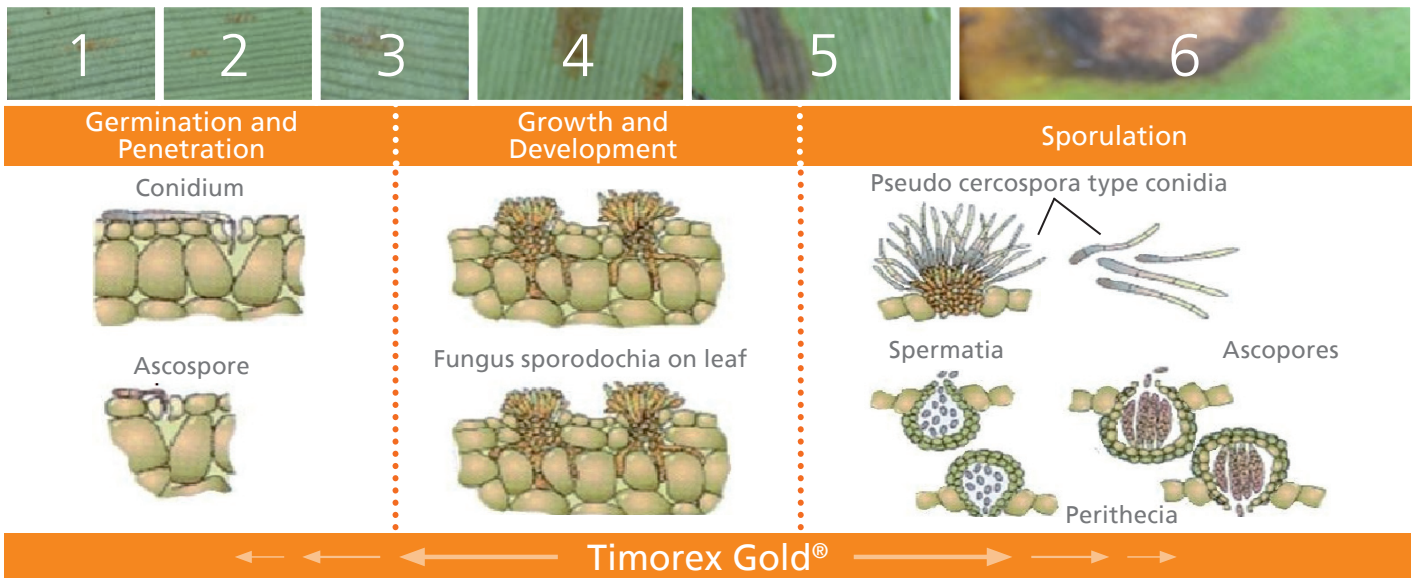


\*Performed in yeast cells

More Control  
More Sustainability  
More Profit

## Development stages of Black sigatoka on banana leaves

A series of trials involving various large-scale and semi-commercial demonstration trials proved that **Timorex Gold®** has outstanding curative activity against Black sigatoka, as indicated in developmental stages (DS) 1 to 4.

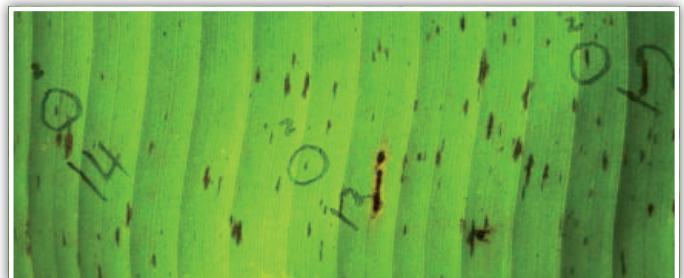


*Development stages of the the Black sigatoka in banana leaves*

Unlike chemical fungicides, which can either prevent or inhibit Black sigatoka only at stages 1 and 2, **Timorex Gold® controls Black sigatoka in stages 1, 2, 3, and 4.** Treatments with Timorex Gold® demonstrated that lesions treated with Timorex Gold® at stages 2–4 became dark brown and had no further expansion even 57 days after application.

Timorex Gold® penetrates the plant tissue through the waxy layers to the mesophyll of the banana leaves. This enables the prevention and/or cure of the Black sigatoka development through contact with fungi that may be developing within the leaf's structure. The exceptional curative activity of Timorex Gold® makes it a unique fungicide and opens a new dimension in disease control that will enable growers to use it even when the disease is already visible on the banana leaves.

**Timorex Gold® has strong curative activity**



## Control of Black sigatoka in banana treated by Timorex Gold®



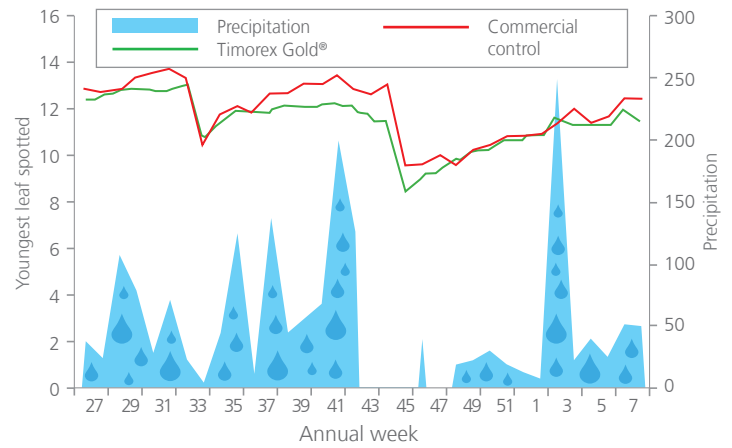
**CONTROL**



**TIMOREX GOLD®**

## Belize Trial

Starting from week 27 of 2008 to week 8 of 2009, 32 consecutive foliar sprays of Timorex Gold® were applied to a commercial area of 134 hectares. A control commercial treatment included protectant and systemic fungicides applied in parallel dates to the treatment with Timorex Gold®. Timorex Gold® treated areas demonstrated efficacy equivalent to the control commercial treatments, as indicated by analyzing the youngest leaf spotted.



## Effects of Timorex Gold® on leaf production, yield, and growth enhancement

Timorex Gold® treated 32 consecutive times in a commercial area of 134 hectares in Belize, surpassed the commercial practice by one additional functional leaf at harvest (Fig 11).

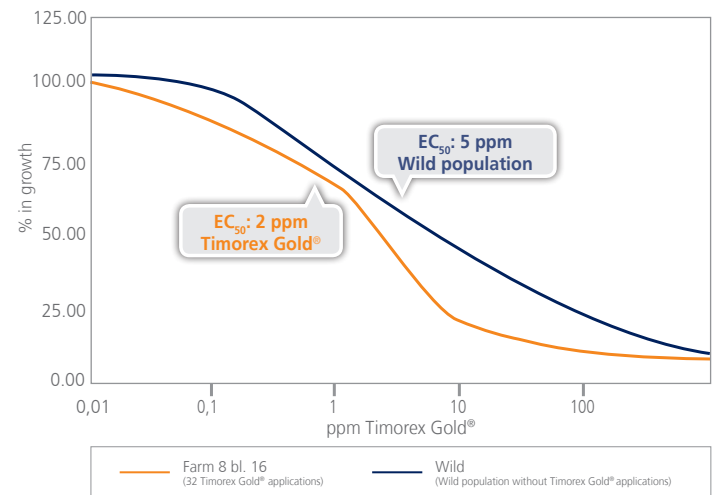
Vargas et al. (2009) found that one additional functional leaf at harvest increased the yield of the banana plantation by 1 kg/bunch. Hence increased the yield of the banana plantation by 1,700 kg/ha, meaning additional 81 banana boxes/ha.

	Program	
	Timorex Gold®	Standard chemical treatment (control)
Average weight (kg)	22.6	21.0
Number of hands	6.7	6.3
Basal Grade	11.2	9.6
Apical Grade	8.5	7.7

## Resistance Management Tool

Timorex Gold® is one of the most effective alternatives for the appropriate management of resistance and/or loss of sensitivity of the Black sigatoka fungus.

Timorex Gold® can be rotated in applications with products to which *Mycosphaerella fijiensis* populations have shown a loss of sensitivity. In this way, the population of individuals less sensitive to benzimidazoles, strobilurins, and/or triazoles can be reduced.



## Application recommendation in accordance to country-specific label

### Timorex Gold® product safety

- Timorex Gold® is completely harmless to banana plantation workers.
- Timorex Gold® leaves no residue in the soil, water, or air. Its safety to the environment has been demonstrated in numerous studies conducted by leading international laboratories.
- Timorex Gold® allows for the re-establishment of populations of beneficial organisms in the plantation.

*Melaleuca alternifolia* extract is classified as a low-risk substance in Europe, for which Maximum Residue Limits (MRL) are not required and is in the list of USDA food additives.

The active substance in Timorex Gold® was approved by the European Union and included in the positive list of the EU, in Annex I of Directive 91/414/EEC for the registration of pesticides.

<sup>1</sup> Vargas A., Araya M., Guzman M., Murillo G. 2009. Effect of leaf pruning at flower emergence of banana plants (*Musa AAA*) on fruit yield and Black sigatoka (*Mycosphaerella fijiensis*) disease. *International Journal of Pest Management*. 55(1):19-25.



## ABOUT US

The Stockton Group provides its customers with knowledge, expertise and experience acquired over 45 years of best practice performance in the crop protection industry. Stockton currently operates in more than 35 countries worldwide, holding over 320 product registrations of branded herbicides, fungicides and insecticides. Through **stkBIOMOR**, the Stockton Group's research and

development innovation center in Israel, we manifest our commitment to meet the challenges of modern sustainable agriculture. Our global team includes leading agronomists, phytopathologists, entomologists, chemical engineers – all developing our proprietary new generation biopesticides which are incorporated into our global registration and commercial operation.

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