

Top ways to manage banana fungicide resistance

Fungicides help manage yellow Sigatoka (leaf spot) in the tropics. Now we need to better manage their use, or risk losing them forever.

Regular testing of leaf spot infected banana material in far north Queensland shows fungicide resistance is present in the banana industry. Resistance to the strobilurins (e.g. Cabrio® and Flint®) is known to occur in most banana production areas. Now a second fungicide group is at risk with serious shifts in sensitivity being detected in the triazoles (e.g. Folicur®, Opus® & Tilt® are trade names).

With very few new banana fungicides on the horizon, we need to value what we have today so they are effective tomorrow and further into the future. Do your bit to protect the tropical banana industry. Outlined below are the top 6 ways to avoid or manage fungicide resistance.

1. Deleaf that spotted leaf, don't spray it

The most critical part of the Sigatoka disease management program in banana is deleafing. This is also the best way to avoid or manage a resistance issue on your farm and neighbouring farms. Fungicides are not effective on visible spots and the application of these products to infected leaf material encourages fungicide resistance. Therefore, leaf spot infected leaves should be removed before fungicides are applied.

Deleafing is important all year round however spring is a key period. Ensure all spotted leaves are removed to reduce the level of disease prior to summer. Warm and wet summer conditions favour the development of yellow Sigatoka, making it more difficult to manage.

2. Know the fungicide groups

Both protectant and systemic fungicides are available for the management of yellow Sigatoka. Each chemical group has a different mode of action and has an important role to play in a spray program; this in turn influences when these products should be used. Table 1 provides a complete list of fungicide groups registered for the management of yellow Sigatoka in the banana industry.

Protectant fungicides help to prevent the development of yellow Sigatoka and should form the bulk of your applications throughout the year. Mancozeb should **always** be applied with oil, while chlorothalonil should **never** be applied with oil. Therefore growers cannot interchange between mancozeb and chlorothalonil.

'Systemic' fungicides used in bananas are more accurately described as being 'translaminar' which is where the pesticide passes through the leaf tissue from one surface of a leaf to the other'. This means the fungicide moves below the surface of the leaf but is not truly systemic because its movement is limited. The common misconception is that systemic fungicides used in bananas can 'kill' existing disease. While they are often referred to as 'curatives' their activity is limited to the early stages of the disease (stage 1 to 2b).



Figure 1. Remove leaves with visible leaf spot to reduce the disease load and to ensure the longevity of the fungicides used in the banana industry for management of yellow Sigatoka

These products have no effect on lesions beyond stage 2b (see figure 2) and the application of these products to lesion stages 3, 4 and 5 simply encourages the development of fungicide resistance. Therefore, apply systemics when conditions are conducive to disease development (warm and wet weather conditions) and not when you can see symptoms.

Table 1. Fungicide groups and examples of trade names registered for the management of yellow Sigatoka in the Australian banana industry (accurate as of 10 September 2015)

	Activity Group	Active Constituent	Example trade name
Protectants	M1	Copper in various formulations	Liquicop
	M3	Mancozeb & zineb	Dithane, Penncozeb Zineb
	M5	Chlorothalonil	Bravo, Whack, Unite
Systemics	Group 3 (Dimethylation Inhibitors commonly called DMIs or Triazole)	Difenoconazole	Score, Digger, Ace
		Epoxiconazole	Opus, Soprano
		Fenbuconazole	Indar
		Propiconazole	Tilt, Bumper, Throttle
		Tebuconazole	Folicur, Hornet
	Group 9 (Anilinopyrimidine)	Pyrimethanil	Siganex, Predict
	Group 11 (Strobilurin)	Trifloxystrobin	Flint
		Pyraclostrobin	Cabrio
Group 7 (Pyridinylethylbenzamide)	Fluopyram	Luna Privilege	

Figure 2. Stage 2b lesions on a banana leaf.

For all of the lesion stages refer to the “Controlling banana-leaf diseases” poster produced by ABGC.



3. Rotate fungicide groups

There are nearly 200 trade names of fungicides registered for the management of yellow Sigatoka in banana. Know which groups the products belong to and ensure that the systemic chemical groups are rotated.

It is important to rotate between the groups, not simply between products in these groups to avoid resistance. For example, switching between propiconazole and difenoconazole is not considered ‘rotating’ as both actives belong to Group 3.

4. Follow the product use recommendations

There are restrictions that apply, especially to the systemic fungicides, in relation to:

- maximum number of applications per year
- maximum number of consecutive sprays of the same fungicide group
- restricted 'no spray' periods when some fungicide groups are not permitted for use

Table 2 below is based on CropLife Australia's Fungicide Resistance Management Strategy for the far north Queensland banana industry. This resistance strategy came into effect on 25 June 2015 and as product labels are renewed they will refer to this strategy.

Table 2. CropLife's fungicide resistance strategy for the far north Queensland banana industry
(valid as at 25 June 2015)

Chemical group	Max. no. of applications/year	Max. no. of consecutive sprays	Restrictions (no spray) periods
Group 3 (DMI)	6	2	June to September inclusive
Group 9 (Anilinopyrimidine)	6	2	No restrictions
Group 11 (QoI)**	2	Not allowed	May to September inclusive

****IMPORTANT** – Resistance to yellow Sigatoka in banana amongst products in Group 11 (strobilurin fungicides) has been recognised and documented by CropLife Australia. Group 11 products must only be applied in a mixture with another fungicide from a different activity group, registered for the control of yellow Sigatoka, at the full registered rate. Each fungicide included in the mixture counts towards the maximum number of spray applications allowed for Group 3 or Group 9 fungicides. Also note that Group 11 fungicides are no longer to be applied with oil alone.

5. Use the recommended label rate

The application rates listed on the product label have been proven through field efficacy trials. Therefore, halving the rate to save money puts the fungicides under adverse pressure and increases the risk of a build-up of a resistant population of spores.

Always check the label for the correct application rate, as different trade names may have varying amounts of an active ingredient. For example, the active ingredient propiconazole (Group 3) appears in over 50 products registered for yellow Sigatoka management in bananas, and amongst this list are 4 different concentrations of the active ingredient.

6. Thorough spray coverage

For the fungicide to have the best chance at protecting the leaf from further infections, thorough spray coverage is required. This is especially important for the protectants which only work on the leaf area they come into direct contact with, and as already mentioned, the systemics have limited ability to move within the leaf.

More information about the fungicide resistance strategy for the far north Queensland banana industry is available at CropLife Australia's website www.croplife.org.au

To download or print a copy of the strategy, go to: www.croplife.org.au > [crop protection](#) > [resistance management](#) > [2014 Banana- Yellow Sigatoka](#)

For more information contact:

Queensland Department of Agriculture and Fisheries
South Johnstone 07 4064 1130 or Mareeba 07 4048 4600.

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