



Guide for soil and foliar use in bananas.

SOIL BENEFITS:

EXCELLENT ROOT COLONISER

CAN IMPROVE NUTRIENT UPTAKE

EASY IRRIGATION APPLICATION

RELIABLE, STABLE FORMULATION

MAXIMISE POTENTIAL FOR ROOT GROWTH

FOLIAR BENEFITS:

REGISTERED BIOLOGICAL FUNGICIDE

EXCELLENT ENVIRONMENTAL SAFETY

NO WITHHOLDING PERIOD

LOW RISK OF RESISTANCE

ALTERNATIVE PROTECTANT FUNGICIDE OPTION



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Allowed
Input**

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Soil use

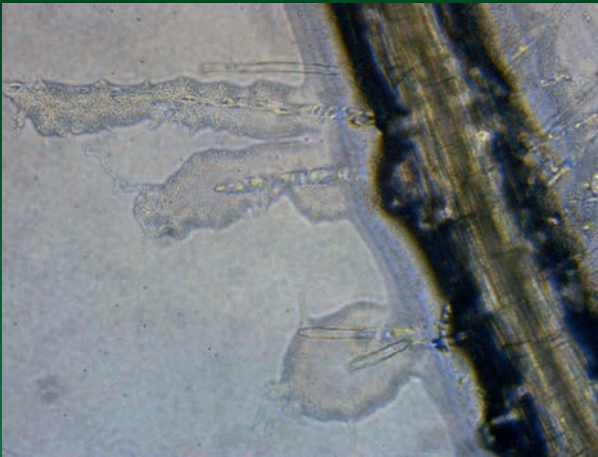


Figure 1. Serenade Prime builds a dense film around the surface of the root tips.

How it works

Serenade® Prime is a liquid suspension of the spores of *Bacillus amyloliquefaciens* strain QST 713. This strain has excellent root colonisation ability. It's spores can rapidly colonise banana roots forming a symbiotic relationship with the plant. The plant provides the bacteria with a food source in the form of root exudates, and in return the QST 713 bacteria change soil resources into plant useable forms and improve nutrient uptake (Figure 1).

Nutrient uptake

Colonising young banana roots with Serenade Prime, provides the opportunity to build a supply of plant-available nutrients ahead of critical periods of nutrient demand. It assists uptake of soil nutrients which may otherwise be unavailable for the plant, including phosphorus and iron. Colonisation results in the release of organic acids, which mobilises 'fixed' phosphorous to assist rapid early root development (Figure 2). It also releases enzymes which decompose organic material into plant-available forms, which are more easily taken up by banana roots.

In response to the more accessible plant resources made available by Serenade Prime, the plant can grow a large number of lateral roots, which are denser often with more root hairs. This allows a greater access to uptake of immobile micronutrients like manganese, zinc and iron, which are only obtained from soil in close proximity to the root surface.



Figure 2. Serenade Prime applied 4 weeks after application on plant bananas. Tully 2020.

Soil application

Application can be made via micro-sprinkler irrigation or as a soil drench to deliver the spores through trash into the root zone. Application on ratoon crops should focus on followers that have a developing root system prior to bunching. As a general guide apply on ratoon crops prior to the wet season (e.g. Nov-Dec) and after the wet season (e.g. Apr-May).

On plant crops, apply when young roots first start to actively grow. A second application may be beneficial mid-way towards bunching.

Apply Serenade Prime at 5 mL/plant or a maximum of 10 L/ha. It can be mixed with commonly used fertiliser or soil amendments.

Images used with permission: Suan, Gil. 2019; Central Mindanao University, "Effects of *Bacillus subtilis* root colonization on the incidence of fusarium wilt (*fusarium oxysporum* f. sp. cubense schlect.) on 'cavendish' banana grown on different soils."

Untreated control



Serenade Prime treatment – 5 mL/plant



Survival on roots

Serenade Prime continues to colonise the establishing root system, provided they are actively growing and producing root exudates. It has shown to survive on ratooning bananas for up to 11 weeks after application via micro sprinkler irrigation in Tully, during February 2020 (Figure 3). Quantification of colonisation was determined using qPCR root analysis. It has shown to further colonise young plant bananas applied at 5 mL/plant in a pot trial.



Figure 3. Serenade Prime applied at 10 L/ha was shown to colonise for up to 11 weeks after micro sprinkler irrigation in mid-February on ratoon bananas. Tully 2020.

Foliar use

How it works

Serenade Prime contains multiple biological compounds which have direct contact activity. These compounds prevent the development of ascospores of *Sigatoka*, resulting in deformation of the germ tube and physical rupture to the cell membrane (Figure 4). These multiple compounds work synergistically to not only create an effective fungicide, but also make it very difficult for diseases to develop resistance.

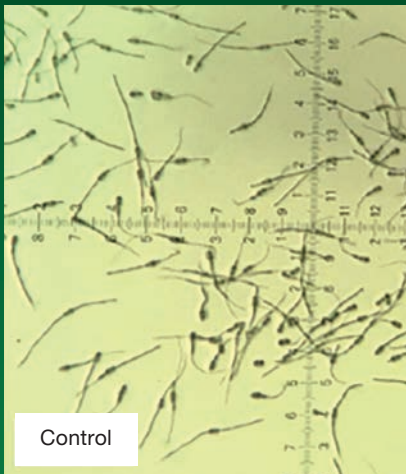
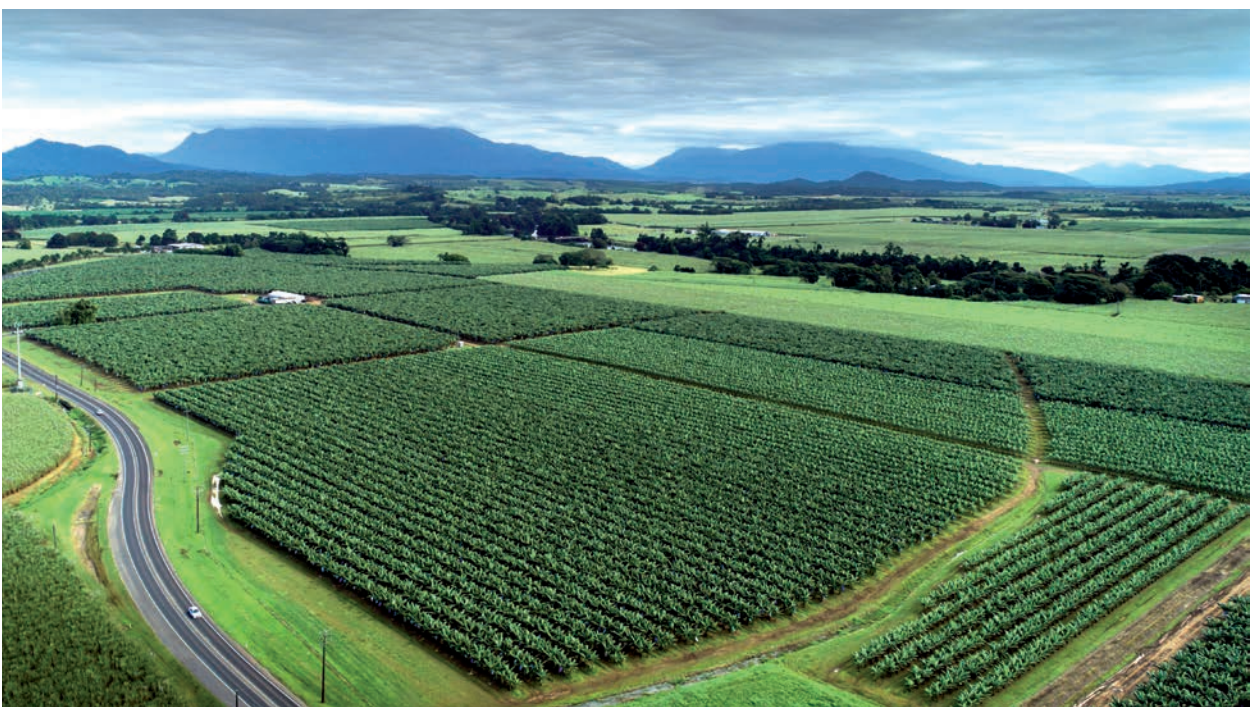


Figure 4. Impact on development of black Sigatoka, 24 hours after inoculation (100X Magnification).

Activates plant defences

In addition to fungicide activity, Serenade Prime triggers the plants own natural defence mechanism. It turns on the crops defence system to precondition the plant to defend against later disease infection.



Foliar application

Serenade Prime is a protectant fungicide and should be applied with a high quality mineral crop oil. It should be part of an integrated spray program with systemic fungicides. Application should be made via aerial spray or ground rig application every 14-21 days. Use the shorter interval under conditions more favourable to disease development. There is no withholding period or restriction on the number of applications per season.

Apply Serenade Prime at 1.0 L/ha with a high quality mineral crop oil at 3.5-5.0 L/ha. It has a rainfast period of 4 hours and it compatible in a tank-mixture between pH 4.5-8.5. Contact Bayer for further information on compatibilities.



Environmental Safety

Serenade Prime spores are subject to natural competition by microflora and physical and chemical degradation. It is of low toxicity to aquatic species tested and is not expected to impose any environmental risk.

For further details contact your local Bayer representative.

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