

Extensionist information on banana bacterial wilt, caused by the bacterium *Ralstonia solanacearum* Smith (*Pseudomonas solanacearum*), race 2.

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1) It is one of the worst diseases which can affect the culture of banana. This disease is of a systemic vascular nature, caused by the soil pathogen of the above classified, being able to reach all the organs of the plant. In Brazil it is called MOKO, where it prevails in the ecosystems of floodplains.

2) *In Brazil, the only variety more resistant to this disease, is *Musa spp Pelipita = ABB.**

3) Transmission and dissemination of the disease

It can occur in different ways, among which we can highlight:

3.1) *The use of infected tools in the various operations that are part of the treatment of the banana plantations.*

3.2) *Contamination from root to root or from soil to root.*

3.3) *Another important vehicle of transmission of this bacterium is the insects vectors. These insects are systematic visitors of inflorescences. Main vector insects: bees (*Trigona spp.*), wasps (*Polybia spp.*), Fruit fly (*Drosophyla spp.*) and many other genera.*

4) Pesticides:

It is very important that know that up to the present moment, there are no chemicals (agrochemicals/agrotoxicals/pesticides) able to eradicate the disease, much less prevent it.

Therefore, when recommending agrochemicals of any nature and / or composition to combat or prevent disease, this should be strictly refused. We reinforce: There is no chemical treatment to heal and/or prevent this disease.

5) Symptoms:

It attacks young plants and fruit-yielding plants.

5.1) In young and rapidly growing plants, one of the three youngest leaves acquires pale green or yellow coloration and breaks near the junction of the blade with the petiole. Within a few days to a week, many leaves will break.

5.2) However, the most characteristic symptom manifests in the young shoots that have been cut and have grown again.

These darken, atrophy and may exhibit distortions.

The leaves, when affected, may become yellow or necrotic.

The vascular discoloration of the pseudostem is more intense at the center and is less apparent in the peripheral region, unlike what occurs in the plant attacked by the Panama disease.

In the fruits of the attacked plants, the symptoms are very characteristic, presenting dry, firm rot of brown coloration.

6) Damages and physiological disturbances:

Although the losses caused by the disease can reach up to 100% of the production, it is known that with permanent surveillance, it is possible to live with the disease and keep it at a low incidence rate by systematically eradicating the outbreaks that arise periodically.

This means that it is necessary to develop a "Phytosanitary Surveillance Program", so that the disease does not enter the growing area and not even nearby. Thus, the spread of the pathogen is impaired or delayed across the area.

I take this opportunity to reaffirm the importance of the creation of "Cooperatives of Small Farmers and/or Family Farmers".

In the small cooperative environment, collective proposals such as this one of a "Phytosanitary Surveillance Program", and other proposals of collective interest, are dynamized quickly, with maximum efficiency.

If a single banana farmer in the region does not participate in the Program, or if he participates partially and/or incorrectly, this disease will never be eradicated from the region, even if all other farmers meet 100% the following suggestions.

7) CONTROL

7.1) The main basis for the control of this disease is its early detection and rapid eradication of the infected plants as well as of those that are adjacent and apparently healthy ones that may have contracted the disease. One cannot run risks.

7.2) For that purpose, it is essential that an inspection scheme of each plant be performed by well trained persons and repeated at regular intervals of two weeks, depending on the degree of incidence of the disease. All infected plants and their neighbors must be completely eradicated.

7.3) It is important that the eradicated area remains clean during fallow, for up to 12 months, and may reach 36 months if the infestation is very severe. In these cases, it is recommended the rotation of different cultures.

7.4) In the virgin areas, where there are other species of musaceae such as Heliconia and Estelitsa, these should be eradicated manually, and the area should be kept in fallow for 12 months.

7.5) Other important measures for the control of moko:

7.5.1) Disinfection of the tools used in the thinning, pseudo-cutting and harvest operations. For this purpose, the immersion of that material in a 1:3 formaldehyde solution after its use in each plant is carried out.

7.5.2) Elimination of the "heart of the bunch of the banana tiers", as soon as the tiers have emerged in varieties with deciduous bracts (that happens after the emission of the last yielding bunch). This practice aims to prevent transmission by insects. This removal should be done by breaking the part of the rachis with the hand.

Alternative: Instead of simply eliminating the heart from the bunch, after the emission of the last tier of bananas from this same bunch, as an alternative, one can cover the whole bunch of bananas with a bag of polyethylene preferably blue in color, shortly after the opening of the bract of the first tier of the bunch under inspection.

The blue color is admittedly insect repellent, just as the yellow color is attractive.

7.5.3) As far as possible, do not clear or weed the weeds residing on the banana plantation. Eradicate only plants of the musaceae family.

7.5.4) Planting of proven healthy seedlings. In these cases, rotation of different cultures is recommended to.

<< Biofertilizants Complements >>

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Toxicity: Biofertilizer, in principle, has indeed a very low toxicity to persons and animals and environment. Even, it is advised not to let it come into contact with the mouth, nose, ear and eyes. Then, as a precaution, all contact of the product with the skin should be washed with clean water. Cares mainly with children is recommended as a priority, when Biofertilizers are being obtained, handled and applied. Grown-ups who are handling Biofertilizers, even not having evident contact, should wash their hands, arms all the face with clean water after handlings. There being contact with any part of the body, one should wash this part of the body with clean water. Attention: These recommendations are only zealous. Biofertilizer, in principle, has very low toxicity indeed. Biofertilizer can be used in all and any crop. But the utilization of Biofertilizers should be controlled to avoid excesses. Even having a number of advantages in its use, the excess Biofertilizer may cause chemical, physical and biological imbalance, making the soil unfit for the cropping of certain species in the same way as chemical fertilizers. The spraying of Biofertilizer should be done always after waterings or rains or in the freshest times of the day. Both the frequency and time of fertilization obey the calendar of each species.

Recommendations:

Sprays: Biofertilizers can be utilized by pulverizations for the direct leaf applications on proportion of 1 L to 20 L of water or 1/20 on to fruit-bearing trees, vegetables, bean, corn, cassava and also all the other crops, as well as pastures. These applications can be repeated weekly till the second month of growth of the crops. From the third month on, five

applications every 15 days are recommended. Leaf applications during the blooms of the plants are not recommended. Applications before the blooms and after the fecundation are recommended, the application being permitted on the growing fruits. When sprayed directly on the leaves of the vegetables or on the fruits to be collected soon (almost ripe), one should wait at least 45 days for human consumption of these raw products. Even so, before consuming, it is recommended to wash the vegetables and fruits with solution 2% of vinegar in drinking water. The products fresh - cut with boils, roasted, cooked or others are safer. If Biofertilizer is obtained only with plant products, in other words, without the use of animal manure, the raw plant products will be able to be consumed after the seven-day waiting period, after being washed with running clean water. But the ideal is for them to be washed with 2% solution of vinegar before being consumed. If it is not possible to use vinegar, then plant products should be very well washed in drinking water.

Fertirrigation: Then in the case of doubts or distrust of the farmer, for vegetables of immediate consumption, only is recommended, that is, to apply the Biofertilizer directly on to soil, diluted on proportion of 1 L to 10 L of water or 1/10, and wash the products before they are consumed. Directly on soil in the form of Fertirrigation, the Biofertilizer also confers excellent growth on plants.

The solid part of the Biofertilizer, that is, the material which remains retained in the sieve after filtering for the liquid use in the field, also is an excellent source of organic matter and nutrients which can be applied in soil.

Attention: in the pastures, a seven day waiting period is recommended for the resident animals to return to graze in the place of the application. The seeds will also be to be treated with the pure Biofertilizer before planting, soaking for 20 minutes into pure syrup. Soon, next, one should wait in the shadow for them to dry and, then, they are planted. At last, it is known that the single applications are not be done, since losses of nutrients can occur through leaching, erosion. The application even before collection is recommended, for the plant gets used to the food and when this is lacking it can become sick. But, remember that what distinct the medicine from the poison is the dose of the dilution.

Biopesticides:

During the production of biofertilizers, adding plants known as natural pesticides so gets biopesticides.