

Moko disease of bananas

RALSTONIA (PSEUDOMONAS) SOLANACEARUM (RACE 2)

PROTEOBACTERIA—BURKHOLDERIALES—BURKHOLDERIACEAE

INTRODUCTION

Moko disease of banana is caused by the bacterial pathogen *Ralstonia solanacearum* formally *Pseudomonas solanacearum*. This soil-borne bacterium causes bacterial wilt in bananas and is also the causal agent of brown rot of potato, bacterial wilt or southern wilt of tomato, tobacco, eggplant and some ornamentals. *Ralstonia solanacearum* is widely distributed in tropical and some temperate regions.

DESCRIPTION

Wilt caused by Moko disease can be separated from fungal wilts by a bacterial streaming test. A stem section is cut from a plant with vascular discoloration using a sharp knife or razor blade. The stem section is placed against the inside wall of a water-filled clear beaker or glass so that the end of the section just touches the water surface. Milky white strands containing bacteria and extracellular polysaccharide will stream from the cut ends of the xylem.

On younger plants, wilt progresses quickly (Fig. 1) while in older plants, it progresses in stages based on the route of infection. Infections starting from the root or rhizome, begin with yellowing and wilting of the oldest leaves first. Infections that are spread from insects, first begin in the male flowers, with the flower buds and peduncle turning black and shriveling. In both cases the bacteria continues to spread through the xylem causing, complete collapse



Figure 1: Young banana plant wilting from Moko disease. Photo by Luadir Gasparotto, Embrapa

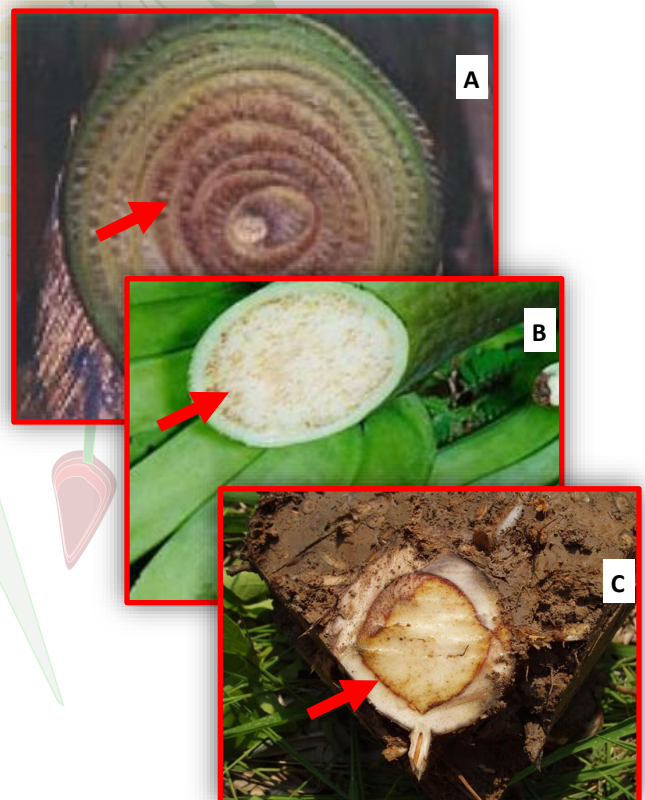


Figure 2: Vascular discoloration on A. pseudostem, B. peduncle and C. rhizome. Photo by Luadir Gasparotto, Embrapa

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DESCRIPTION cont'd

of the infected plant and in some cases blackened regrowth of suckers.

As the plant wilts, light to dark brown vascular discolouration occur in the pseudostem, the rhizome and in sheaths of the leaves (Fig. 2). Bacterial ooze may exude as droplets from the cut surface of vascular tissues, mainly in the peduncle or pseudostem. Symptoms on bananas include stalk discolouration and a brown or gray rot of the pulp (Fig. 3).

BIOLOGY

R. solanacearum primarily enters the plant through wounds in the roots made by farming tools and equipment, nematodes or insects; and through cracks where secondary roots emerge. Infection can also occur from the mouthparts of infected insects feeding on the flowers. Once the bacteria reaches the large xylem element, it spreads throughout the plant. *R. solanacearum* is able to dissolve the cell walls and create slimy pockets of bacteria and cell debris. These along with the production of highly polymerized polysaccharides increases the viscosity of the xylem and block the tissue.

Ralstonia solanacearum (Race 2) prefers high temperatures and high soil moisture. The bacterium is found in many different soil types and over a wide range of soil pH.

ENTRY PATHWAYS

The bacterium survives in infected plant material, vegetative propagative organs, and soil. The disease can be spread across long distances by the movement of planting material, such as, infected 'daughter' suckers, soil on planting material, contaminated planting tools and equipment.



Figure 3: Internal rot of fruit of banana caused by Moko disease . Photo by Luadir Gasparotto, Embrapa

DAMAGE

Moko disease causes wilting of the plants, internal rot and can kill the infected plant.

REGULATORY STATUS

Moko disease is CARICOM A2 regulated Within the Region, Moko disease is present in Trinidad & Tobago, Jamaica, Grenada and St. Vincent & the Grenadines

REFERENCE(S)

Liberato JR & Gasparotto L (2006) Moko disease of banana (*Ralstonia solanacearum*) Updated on 7/27/2016 4:55:29 AM Available online: PaDIL - <http://www.padil.gov.au>.

Olson, H;2005. *Ralstonia solanacearum*. Pathogen profile – Requirement for PP 728 Soilborne Plant Pathogens, Spring 2005. Department of Plant Pathology. NC State University. Accessed October 26, 2018 at https://projects.ncsu.edu/cals/course/pp728/Ralstonia/Ralstonia_solanacearum.html