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# Regional phytosanitary risk management package for bananas: field diagnostics, locally produced bioinputs, tolerant varieties, and digital extension

COLOMBIA, ECUADOR, SPAIN, HONDURAS, PERU, VENEZUELA, DOMINICAN REPUBLIC



Webstory

## Technological solution

Foc R4T persists in the soil for decades through resting structures, travels on planting material, irrigation water, and soil clinging to machinery and footwear, and no treatment returns an infested field to production. Prevention and early detection are the only viable strategy, and that is where the gaps pile up: diagnosis depends on central laboratories, so an outbreak spreads while it is being confirmed; for banana blood disease no country in the region has a validated method; the bioinputs already handed to producers are neither characterized nor standardized; and tolerant clones have not been tested across several cycles or under commercial conditions. Rapid methods move the decision to the field; characterization and local production units turn an artisanal input into a product with measurable parameters; semi-commercial plots measure how the clones actually behave; and the chatbot carries training to growers whose connectivity is limited.

## Technological description

The diagnostic methods tell apart the races of Fusarium oxysporum f. sp. cubense (R1, tropical race 4 or Foc R4T, and subtropical race 4), the Ralstonia behind Moko and banana blood disease, and the bunchy top and streak viruses; to the endpoint and digital PCR they add rapid field-deployable methods based on loop-mediated isothermal amplification (LAMP) and portable PCR, plus a regional bank of positive DNA controls. The biological control agents are strains of Trichoderma spp. and Bacillus spp. characterized molecularly and biologically, produced in local mass-production units. The planting material consists of banana and plantain clones with validated tolerance to Foc R4T and Moko, with low-cost clean seed multiplication; dissemination rests on a knowledge management platform and an educational WhatsApp chatbot. The reference sector is banana and plantain production, both for export and in smallholder economies.

## Impacts and results

Diagnostic protocols validated across countries for five groups of pathogens, together with a regional bank of positive DNA controls verified through an interlaboratory trial and accessible to all participating countries, head the list of expected results. On management, eight integrated management recommendations for Foc R4T and Moko are anticipated, supported by semi-commercial trials of 6 to 20 hectares assessed over at least three production cycles, and two local bioinput production units whose concentration, viability, purity, and shelf life are verified at least twice a year. On planting material, at least five promising clones are to be evaluated in the field and two induced-mutation lines selected, alongside two clean seed nuclei. The ex ante estimate places the benefit at a 40% to 60% reduction in plant mortality, a 15% to 20% reduction in the loss of productive area, and savings of close to 25% on agrochemicals.

**- 40 %**
Estimated reduction in plant mortality in affected areas

**5**
Expected pathogen groups with a diagnostic protocol validated

**- 25 %**
Estimated reduction in agrochemical spending

**6000**
People trained virtualyl and in-person

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