

labour, off-farm nutrients and sunlight to increase production and reduce losses to stresses, while preserving the environment. Effective deployment of AEI needs to be addressed for different production systems and conditions of market and input access. Homologue sites selected on the basis of agro-ecology, production systems and farming objectives were evaluated for the incidence of common pests and diseases. Interviews with 48 households in two production systems and agro-ecological zones documented knowledge for applying AEI, including identification of diseases. The interviews also inventoried available capital, labour, and land, including irrigation, manure and mulch. Elements of AEI were in use across sites. Subsistence farmers were constrained by lack of knowledge and resources, including labour, to effectively apply AEI practices, particularly households that sell their labour off farm. In contrast, semi-commercial farmers were motivated to seek and access knowledge and used their agricultural incomes to marshal resources such as labour to apply AEI. With regard to disease/pest symptoms, some farmers readily recognized certain diseases (e.g. *Xanthomonas* wilt), while others confused symptoms (*Xanthomonas* and *Fusarium* wilt). The study concludes that improved farmer knowledge and capacity for ecological reasoning will lead to more effective use of current on-farm resources for disease/pest and nutrient-cycle management. Households that sell their labour may have difficulty using labour-intensive AEI. Understanding ecology should allow more targeted use of labour for IPM and nutrient management.

Detecting *Fusarium oxysporum* f. sp. *ubense* Tropical Race 4 in Soil and Symptomless Banana Tissues

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Tropical race 4 (TR4) of *Fusarium oxysporum* f. sp. *ubense* (Foc) is a quarantinable pathogen in many banana producing regions in the world. Preventing further spread where it is present (e.g. Australia, Taiwan and the Philippines) and precluding incursions into areas where it has not been observed (such as Africa, South and Central America and the Caribbean) is

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critical for maintaining local and commercial banana production. Spread of Foc is facilitated by trading of symptomless, but infected banana planting material, by movement of machinery with adhering infested soil and even by traditional banana-based packing material. In this work, field banana samples from symptomatic and symptomless banana plants collected in Taiwan and Australia, as well as infested soils from The Philippines were analyzed by using a PCR-based detection tool. Independently of the developmental stage of the sampled banana plants Foc TR4 was detected in symptomatic or symptomless samples as well as in soils from the Philippines by conventional or nested PCR analyses. These results will be used to develop and implement quarantine strategies and support TR4 management.