The generic tree-soil-crop interaction model WaNulCas for the evaluation of multi-species agro-ecosystems in the tropics : a case study with banane (Musa spp.)

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ABSTRACT

Multi-species tropical cropping systems including agroforestry, intercrops and cover crops are presently considered of pivotal importance for the development of sustainable agro-ecological low input systems that respect human health and the environment. The biological efficiencies that mixed species or genotypes are expected to develop with their environment depend on appropriate management practices that must be adapted to farmers' possibilities. Existing agronomic experience may not be sufficient to assist such farmers in predicting the consequences of their trial-and-error approach. A flexible tool is desirable for evaluating the effects of a wide range of initial soil conditions, fertilizer levels, and intercropping practices on the yields and environmental status to be expected. The paper describes the application of the generic tree-soil-crop interaction model WaNuLCAS (Water, Nutrients and Light Capture in Agroforestry Systems) to the case of banana (*Musa acuminata*) intercropped with a leguminous crop *Canavalia ensiformis*. Once properly parameterized, the combined model can be used for evaluating scenarios of cultivating banana in combination with other crops in different environmental conditions; the model provides a predictive understanding of how the banana tree is likely to interact with other plants, directly or indirectly via modified availability of soil, water, and nutrient resources. In the context of the Caribbean banana crisis, such an approach may be very helpful to assist decision making for the optimization of alternative low input banana cropping systems.

Key words: Banana, Competition, Crop model, Intercropping

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