

Effect of cultural association on banana or cocoa disease severity and epidemiological understanding

Abstract

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Banana and cocoa are cultivated in various types of production systems in monoculture or associated together. Their production is impacted by biotic factors such as diseases affecting leaves or fruits controlled by frequent applications of fungicides. Biodiversified crop system could reduce impacts of biotic factors. Little knowledge exists on the effect of the production system on the severity of major airborne diseases of these crops (black Sigatoka for bananas and Moniliophthora pod rot for cocoa). Cultural association may modify the inoculum pressure and/or the conditions for fungal infection and/or dispersal. The effect of the cultural association between banana and cocoa on the severity of the 2 major diseases of these crops was studied through an epidemiological survey on 20 banana or cocoa plots cultivated in monoculture or associated between them in two localities with environmental contrasting (Turrialba and Limón, in Costa Rica). The severity of banana black Sigatoka and the incidence of cocoa disease were measured from September 2022 to January 2023. For the banana, we demonstrated a significant effect of the association which could be explained by a change in several epidemiological parameters (later incubation duration, slower symptom development speed, and lower sporulation capacities). This effect was related to a decrease in temperature within the associated plots. For cocoa, the disease incidence was low, and no significant effect of the association was observed. Thus, this study demonstrated for the first time the positive effect of the association between cocoa and banana on diseases severity. This new knowledge would be useful to design an innovative cropping system for bananas.

Keywords:
epidemiology,
crop association,
agroecological
control



VIII Scientific Wallace Conference

Proceedings



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ISBN: 978-9977-57-795-1

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C397

VIII Scientific Wallace Conference Proceedings/ CATIE- Centro Agronómico
Tropical de Investigación y Enseñanza
– 1^a ed. – Turrialba, Costa Rica : CATIE, 2024.
120 p. : il. – (Serie divulgativa / CATIE ; no. 24)

ISBN 978-9977-57-795-1

1. agricultural research 2. conferences 3. agrarian structure
4. climate change 5. farms 6. sustainability 7. governance
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Citación sugerida:

CATIE (Centro Agronómico Tropical de Investigación y Enseñanza, Costa Rica). 2024. VIII Scientific Wallace Conference Proceedings (en línea). Scientific Wallace Conference (8, 2023, Turrialba, Costa Rica). Turrialba, Costa Rica, CATIE. 100 p. (Serie divulgativa / CATIE, no. 24). Disponible en: <https://repositorio.catie.ac.cr/handle/11554/5175>

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