How Agroforestry Systems May Impact Pests and Diseases in Robusta Coffee in Ecuadorian Amazonia

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Abstract

Coffee agroforestry systems could potentially reconcile agricultural, social and environmental objectives, especially in tropical regions, where farmers are generally poor. We assessed how agroforestry and different types and levels of intensification affected pest and disease development on *Coffea canephora* (robusta coffee) trees in Joya de los Sachas, in the Ecuadorian Amazon. The five coffee shading methods assessed were: 1) full sun (no shade); or *Musa* spp. AAB (plantain) at 333 plants ha^{-1} combined with trees of 2) *Myroxylon balsamum*; 3) *Inga edulis*; 4) *Erythrina* spp; or, 5) *Erythrina* spp. and *Myroxylon balsamum*. The four coffee farming practices assessed were: conventional farming at either 1) moderate or 2) intensified input or organic farming at 3) low or 4) intensified input. The experiment was an RCBD thus with 20 treatment combinations, replicated three times. A pyranometer was used to assess shade cover above the coffee in each plot. Infestation of pests and disease incidence of the following were evaluated monthly: the brown twig beetle (*Xylosandrus morigerus*), the coffee leaf miner (*Leucoptera coffeella*), the coffee berry borer (*Hypothenemus hampei*), the anthracnose disease (*Colletotrichum* spp.), the thread blight (*Pellicularia koleroga*) and cercospora leaf spot (*Cercospora coffeicola*). Furthermore, the anthracnose disease severity was assessed with the help of ImageJ.

Agroforestry with *Inga edulis* reduced brown twig beetle infestation by 9 %, compared with in the full sun treatment. Both brown twig beetle and coffee leaf borer infestation were both reduced by 12 % in the intensified organic treatment compared with the intensified conventional treatment. The anthracnose disease severity was found to be only 3 % greater within the intensified organic farming in comparison to the intensified conventional treatment. We conclude that both shade tree treatments and management strongly influence pest infestation levels and diseases incidence and therefore should be considered when selecting optimum management strategies for coffee cultivation.

Keywords: Disease, Ecuadorian Amazon region, pests, pyranometer, robusta coffee, shade

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