

## **Landscape context and movement of coffee pests**

*Jacques Avelino<sup>1</sup>, Fabrice DeClerck<sup>2</sup>, Amada Olivas<sup>2</sup>, Cipriano Rivera<sup>2</sup>, Hector Cruz<sup>3</sup>, and Ali Romero<sup>3</sup>.*

<sup>1</sup>Cirad, Controlling Pests and Diseases in Tree Crops research unit, IICA/PROMECAFE, San José, Costa Rica.

<sup>2</sup>Division of Research and Development, CATIE, 71710, Turrialba Costa Rica. <sup>3</sup>University of Tolima, Tolima, Colombia.

**Email:** [jacques.avelino@cirad.fr](mailto:jacques.avelino@cirad.fr)

Existence and severity of pest and disease attack are determined at plot level by interaction between host, noxious organism, environment and agricultural management. However, the immigration of noxious populations from outside the plot may also affect pest and disease incidence at plot level. We present the results from three studies in the Volcanica Central Talamanca Biological Corridor that explore landscape effects on the densities and movements of three coffee pests: (1) coffee rust (*Hemileia vastarix*), (2) coffee berry borer (*Hypothenemus hampei*) and the (3) root-knot nematodes (*Meloidogyne spp.*).

The first study explored the impact of landscape context on these diseases and revealed that the coffee borer responds to the proportion of coffee in the landscape at small scales (150 m), whereas the coffee rust responds to the proportion of pasture in the landscape at a slightly large scale (300 m). Nematodes did not respond to landscape context at any scale. The second study focused on the dispersal ability of the coffee borer through sugar cane, pasture and forests through a series of 140 m transects that crossed the edge between coffee and the aforementioned land uses. We found the majority of coffee borer individuals (96.5%) in coffee; however the remaining 4% exhibited significantly greater abundances in sugar cane and pasture compared to forests. The third study used a grid approach with traps placed every 50 m in a 500 x 500 m grid and also supported the notion that the borer is largely limited to coffee fields with limited local dispersal abilities in adjacent land uses. These relationships indicate that fragmenting coffee farms at small scales (i.e. interspersing alternate land uses or linear barriers such as riparian corridors) may help to significantly reduce coffee berry movement between plots.

## **Biographical sketch**

I am a plant pathologist, with a PhD degree of the University of Orsay, Paris XI. I have been working for CIRAD since 1986 and have been based at CATIE since 2007. I have spent almost 25 years conducting research in four Mesoamerican countries: Mexico, Guatemala, Honduras and Costa Rica working primarily on coffee and cacao pests and diseases. I have also worked on coffee quality for 10 years.

The main focus of my research has been on the relationships between pest and disease epidemics, and their relationship with the environment and crop management. During the last 2 two years I have led different studies on the effect of plant biodiversity on coffee pests and diseases at the plot and landscape scales. This research has been conducted with the support of EU funded CAFNET project and the CIRAD funded Omega3 project. I have published more than 80 papers, books, book chapters, and congress communications.