

Infestation dynamics of mealybug vectors of the Cocoa swollen shoot virus in young cocoa plots surrounded by barrier crops in Soubré (South-West of Côte d'Ivoire)

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ABSTRACT

The Cocoa swollen shoot disease probably represents today the greatest threat to cocoa production in Côte d'Ivoire. The disease is caused by the Cacao swollen shoot virus (CSSV), a badnavirus transmitted to cocoa by about 15 mealybug species. At local scale, the propagation of CSSV outbreaks is closely related to mealybug dispersal behaviors. The ability of barrier crops to stop the disease spread has been demonstrated in Togo and Ghana, yet mechanisms involved are still not elucidated. The present study aims at better understanding these mechanisms by studying mealybug population dynamics in young plantations surrounded by barrier crops. A set of twelve 0.25 ha cocoa plots surrounded by 10 m large hedges of coffee (*Coffea robusta*) or acacia (*Acacia auriculiformis*), or without hedges (control plots), was implemented within large CSSV outbreaks in mature cacao plantations, in July and August 2019, near Soubré (South-West Côte d'Ivoire). First counts of mealybug colonies on cocoa and barrier crops were done in September 2019 and February, March and May 2020. From November 2020 to December 2021, populations were assessed monthly using a scoring scale, a score from 0 to 3 being given to each cocoa or barrier tree according to the size of the hosted population. *Pseudococcus longispinus* and *Ferrisia virgata* were the first species present on cocoa, but populations remained small until May 2020 with a maximum of 0.5% of trees infested by small populations of mealybugs. These two species have long waxy hairs that allow them to be transported by wind. Although very common in neighboring mature plantations, *Formicococcus njalensis* was first recorded in young plots in November 2020. Since then and until December 2021, *F. njalensis* was the dominant species on cocoa and coffee with 63.8% of the total community. *F. virgata*, *Planococcus citri* and *P. longispinus* represented 10.8%, 4.7%, 2.9% of the community, respectively. Total infestation rate remained small during the

study period with minimum and maximum values of 0.94% in May 2021 and 3.73% in December 2021, respectively. Compared to other species, *F. njalensis* showed a more patchy distribution in plots, with populations initially aggregated on the borders of plots. Our results suggest that barriers of acacia or coffee do not prevent cocoa infestation by mealybugs and that infestation dynamics differ between species, according to their dispersion behavior.

Keywords: Pseudococcidae, Dispersion, Distribution