

Sophisticated science as background for simple solutions: a model to Witches' Broom, a devastating cacao disease caused by the fungus *Moniliophthora perniciosa*.

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The introduction of Witches' Broom in Bahia in 1989 disrupted the social and environmental cacao-based structure in Brazil. Genomics orientated experiments led to a model for the disease. The spore penetrates meristematic tissues establishing a biotrophic phase inside the apoplast. The plant performs a strong oxidative reaction, which is bypassed by fungal mechanisms involving the mitochondrial uncoupling. The fungus promotes the disarrangement of pectin and the irregular growth of infected plant tissue, converting it in a nutritional sink. This is stopped by apoptosis that leads to an increase of nutrients in apoplast, which is a signal to mycelial conversion to the non-infective saprophytic phase. This is characterized by strong mycelia growth and secretion of necrosis inducing proteins. The mycelia invade the necrotic tissue and remain with a few competent cells to form basidiocarps, which close the cycle by the sporulation. Amazingly, a farmer, the agronomist Edvaldo Sampaio, was successful in facing the disease. His strategy consisted in anticipating the trimming of the plants along with nitrogen addition at the rain session. These simple actions work at essential phases of the disease, avoiding infection and the biotrophy establishment.

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