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The fungus *Ceratobasidium theobromae* causes a severe disease of cassava in Southeast Asia, the cassava witches’ broom disease

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Abstract

Cassava witches’ broom disease (CWBD) is a severe disease affecting cassava (*Manihot esculenta*) cultivation in Southeast Asia (SEA). Infected cassava plants display symptoms such as reduced internodal length, increased leaf proliferation, and stem weakening, which collectively lead to poor germination of infected stem cuttings and marked reductions in both fresh root yields and starch content. Consequently, CWBD inflicts substantial economic losses on both farmers and processors. Recent research conducted by the International Center for Tropical Agriculture (CIAT) teams in Laos and Colombia has elucidated a strong association between a fungus, *Ceratobasidium theobromae* and the symptomatic manifestations of CWBD. Notably, this fungus has been consistently identified in diseased samples since the initial outbreaks of CWBD in SEA and was transmissible by grafting. Since no other pathogens including phytoplasmas were detected in the affected plants, a fungal aetiology of the disease can be assumed. Utilizing RNAscope® *in situ* hybridisation, the pathogen was traced in the xylem tissues of stems, leaves, and petioles, as well as in the epidermis of stems. Additionally, the distribution of *C. theobromae* was found to be heterogeneous along the cassava stem, with a concentration in symptomatic areas. This uneven distribution indicates that the pathogen does not systemically infect the plant, thereby allowing the possibility of obtaining healthy planting material from asymptomatic sections of an infected plant. These insights are critical for advancing our understanding of CWBD epidemiology and developing effective disease management strategies. Such strategies are imperative to prevent the further spread of CWBD and mitigate the risk of introducing the disease to cassava-growing regions in Africa and the Americas through the international movement of planting materials. Current management efforts focus on refining quarantine protocols and ensuring the production and dissemination of pathogen-free planting material to control the spread of the disease.

Keywords: Cassava, pathogens, Southeast Asia