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Control of the African Cassava Brown Streak Disease with Virus Resistant Cassava Germplasm from South America

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Abstract

Cassava brown streak disease (CBSD) is the most devastating disease of cassava (*Manihot esculenta* Crantz) in East Africa and is presenting a serious threat to cassava cultivation on the continent. The two virus species, Cassava brown streak virus (CBSV) and Uganda Cassava brown streak virus (UCBSV) cause a very similar disease but differ in their ability to replicate in cassava. On the plant side, there are cultivars that respond with severe symptoms particularly on roots while others respond to CBSD viruses with mild symptoms on leaves and stems only, have unblemished roots and maintain a low virus titer. Nevertheless, all African cassava cultivars become virus infected and there is uncertainty whether those resistant lines are resistant against UCBSV, CBSV or both viruses.

Virus screening to identify resistance in cassava under field conditions is very critical and often doubtful because it is bound to the presence of virus(es) and their infection pressure. Virus type, vector behaviour and inoculation time contribute to uncertainty in finding the right sources. The aim of this is study was to develop an efficient laboratory method for virus screening of cassava and to screen the diversity of South-American cassava germplasm (maintained in the CIAT germplasm repository) for resistance against CBSVs. For screening large numbers of cassava plants, we had to develop a robust and efficient virus inoculation and evaluation workflow.

Our search for natural resistance in 238 South-American cassava lines revealed that most South-American cassava varieties tested were susceptible to CBSV. However, we also identified 9 cassava lines that did not become infected while in further 9 lines, CBSV was not found in leaves but the virus was restricted to the root tubers. The resistance was characterised by further biological assays with cassava, also including other virus isolates and molecular experiments to quantify and localise virus in the infected susceptible and the resistant immune cassava plant. Preliminary results from field trials show the outstanding CBSD resistance of South-American cassava varieties. This work provides convincing evidence for the invaluable contribution of germplasm collections to supply the genetic resources for the improvement of our crops.

Keywords: Cassava, cassava brown streak disease, resistant immune plant, virus screening

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