



Tropentag, September 20-22, 2023, hybrid conference
“Competing pathways for equitable food systems transformation:
Trade-offs and synergies”

Screening cassava for resistance against cassava mosaic and cassava brown streak viruses using a precise and rapid high throughput workflow

SAMAR SHEAT, STEPHAN WINTER

Leibniz Institute DSMZ, German Collection of Microorganisms and Cell Cultures GmbH, Germany

Abstract

Growing cassava in Africa requires resistance against the viruses causing cassava mosaic disease (CMD) and the viruses causing cassava brown streak disease (CBSD). Breeding cassava for resistance against viruses requires the sources of resistance, readily flowering genotypes to produce viable crosses, seeds, and most importantly, a straightforward screening process. Screening for resistance against mosaic viruses can be achieved by planting seedlings into virus hotspots because infections and disease spread with viruliferous whiteflies are guaranteed. Symptoms become readily visible, and scoring for disease incidence and severity allows the selection of resistant candidates already during the first planting season. In contrast, screening for resistance against cassava brown streak viruses is cumbersome because of the unpredictable transmission by whiteflies and the slow plant infection processes that are often not associated with distinct leaf symptoms. Thus, only the assessment of root necrosis which is done at the end of the growing cycle can serve as an indicator for plant resistance/tolerance. The selection of promising candidates thus is associated with high uncertainties from the erratic virus infections. We have developed a high throughput virus screening workflow for cassava resistance screening by which cassava seedlings pass through an intensive and precise virus infection routine after which resistance against mosaic and brown streak viruses can be assessed with high accuracy and, in less than nine months - from seedling infection to a final verdict. Components of the tactics are; effective virus infections, reduced biological repeats, and increased accuracy; susceptible sensitive lines are eliminated early to conduct detailed virus studies with pre-selected lines only. The developed protocol shifts resistance evaluation from the field to the nursery, replacing the erroneous and lengthy infection and screening process with a method of precision and speed.

Keywords: CBSD, CMD, disease tolerance, dual virus resistance, plant immunity, precise virus screening, resistant cassava