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Virus Indexing of Cassava – Developing Standardised Serological Methods for Field Diagnosis

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Abstract

Cassava is an important staple crop in Africa and it is particularly vulnerable to pest attacks and diseases. The most serious cassava diseases are caused by viruses and those causing the Cassava mosaic virus diseases (CMD) are found wherever cassava is grown on the continent. More recently, Cassava brown streak virus (CBSV) has emerged in East Africa and because of its current spread it poses a potential threat to Central and West Africa.

Early disease diagnosis is most significant for disease prevention and control; to produce and disseminate clean planting materials only and to prevent spreading viruses to new areas. For virus detection under field conditions, serological tests are most fit for the purpose and to this effect, serological reagents for cassava virus detection were developed at the DSMZ Plant Virus Department. Antisera and monoclonal antibodies were produced and triple antibody sandwich enzyme-linked immunosorbent assay (TAS-ELISA) protocols were optimised and protocols established. Using these tests it was possible to detect and differentiate between African cassava mosaic virus (ACMV) and East African cassava mosaic virus (EACMV) and the species causing brown streak diseases in cassava, Cassava brown streak virus (CBSV) and Uganda Cassava brown streak virus. To determine the best materials for virus testing, virus distribution and quantity of ACMV and CBSV was assessed in naturally infected cassava plants by testing leaves for presence and quantity of virus. To elucidate the correlation between symptoms and virus titre, leaf samples with and without symptoms were collected from greenhouse-grown cassava to detect and quantify ACMV using TAS- ELISA; CBSV and UCBSV using TAS- ELISA and quantitative PCR. ACMV was present in the youngest symptomatic leaf tissues while CBSV and UCBSV were better detected in middle and older symptomatic leaves. Virus accumulation differed and depended on the genotype of cassava. In summary, we have developed serological assays for detection of mosaic and brown streak viruses infecting cassava which is a first step in the standardisation of methods to support decision making in nurseries, plant clinics and quarantine stations.

Keywords: Cassava, cassava brown streak virus, cassava mosaic virus, quantitative RT-PCR, TAS-ELISA

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