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Research Application Summary

Detection and screening of yellow and sweet calabash passion fruit for resistance to woodiness disease in Uganda

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Abstract

In Uganda passion fruit woodiness disease (PWD) damages passion fruit, causing yield losses of 60-100%. This study aimed at detecting and screening yellow and sweet calabash passion fruit for resistance to PWD. Four viruses, namely, *Cowpea aphid borne mosaic virus, Cucumber mosaic virus, Passiflora latent virus,* and *Tomato ringspot virus* were detected using ELISA. Only *Cowpea Aphid borne mosaic virus* showed a weak reactivity with antiserum, indicating its presence in the tested samples in low concentrations. The detected virus was used to mechanically inoculate yellow and sweet calabash to observe symptom development. This is still on-going.

Key words: *Cowpea aphid borne mosaic virus*, *Cucumber mosaic virus, Passiflora latent virus,* passion fruit, *Tomato ringspot virus*, Uganda

Résumé

En Ouganda, la maladie de passiflore (PWD) endommage ce fruit, causant des pertes de rendement de 60-100%. Cette étude a visé à détecter et examiner la passiflore jaune et sucrée du calebassier pour la résistance à la maladie PWD. Quatre virus, à savoir, *Cowpea aphid borne mosaic virus, Cucumber mosaic virus, Passiflora latent virus* et *Tomato ringspot virus* ont été détectés, employant ELISA. Seulement *Cowpea Aphid borne mosaic virus* a montré une réactivité faible avec l'antisérum, indiquant sa présence dans les échantillons examinés dans de faibles concentrations. Le virus détecté a été employé pour inoculer mécaniquement le calebassier jaune et sucré afin d'observer le développement de symptôme. Ceci est encore en cours.

Mots clés: *Cowpea aphid borne mosaic virus*, *Cucumber mosaic virus, Passiflora latent virus*, passiflore , *Tomato ringspot virus*, Ouganda

Background

Passion fruit is among the major fruit crops with a potential of improving incomes and nutrition of rural poor. It is mainly grown by small holder farmers who constitute 35% of fruit farmers in Uganda (NARO, 2000). Passion fruit is estimated to cover over 1200 ha with a total annual yield of 10,000 t (MAAIF, 2001).

Several diseases caused by viruses have been reported to affect passion fruit crop in Uganda. Among them, passion fruit woodiness disease (PWD) caused by *Cowpea aphid borne mosaic virus (CABMV)* is the most important. It occurs in most passion fruit growing areas in Uganda (Ssekyewa, 1999), causing yield losses as high as 60-100% and up to 40% reduction in fruit quality (Ochwo-Ssemakula, 2008).

Previous studies have indicated the existence of a limited passion fruit germplasm base in Uganda, with yellow (*Passiflora edulis var. flavicarp*) and sweet calabash (*Passiflora maliformis*) cultivars thought to be tolerant to PWD (Anon, 2002). However, no studies have been conducted to confirm these findings yet such studies could generate genetic materials for developing PWD resistant varieties. Therefore this study aimed at screening yellow and sweet calabash passion fruit types for resistance to passion fruit woodiness disease under screen house conditions.

Literature Summary

Passion fruit woodiness disease is widely spread in passion fruit growing areas of the world causing significant damage to the crop. Several control mechanisms have been developed to manage the disease which include; development of transgenic passion fruit but over time, their resistance breake down (Novaes and Rezende, 2003); cross protection using mild strains of *passion fruit woodiness disease virus* which has been tried but has not materialised into complete crop protection against the virus (Novaes and Rezende, 2005). Most control strategies so far developed have not succeeded due to the non-persistent manner in which aphid vector transmit the virus. Aphids do not colonise the passion fruit plant, thus making aphid control through spraying insecticides practically impossible (Fauquet *et al.*, 2005). Thus, there was need to identify natural resistance within the available germplasm as to ensure sustainable and durable control of the disease.

Study Description

The experiment was conducted in a screen house and laboratory at National Agricultural Laboratories at Kawanda in Uganda. Passion fruit leaves showing PWD symptoms were collected from farmer's fields in Mukono, Uganda. Four viruses (cowpea

aphid borne mosaic virus, Cucumber mosaic virus, passiflora latent virus and *tomato ringspot virus*) that are known to cause similar symptoms as PWD were detected using Enzyme Linked Immunosorbent Assay (ELISA). The detected virus from the leaf samples was used to mechanically inoculate yellow and sweet calabash seedlings. Virus free scions were subsequently grafted to the mechanically inoculated rootstocks and observed for PWD symptom development.

Research Application

Samples tested showed weak reactivity with polyclonal antiserum for CABMV. This possibly indicated low concentrations of the virus. On the other hand, polyclonal antiserum for *Cucumber mosaic virus, Passiflora latent virus, Tomato ringspot virus* did not react with the tested samples indicating the absence of these viruses in the samples that were examined. The screening work is still on-going.

A more efficient detection method that detects CABMV at low concentrations is needed rather than ELISA which is used in routine detection of this virus in passion fruit.

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