4-Characterization and diagnostic of Yam virus X (YVX) and Yam necrosis virus (YNV), two novel viruses infecting yams in Guadeloupe

Acina-Mambole I.1, Bonheur L.1, Anzala F.2, Gomez R.2, Lange D.2, Faure C.3,4, Marais A.3,4, Pavis C.2, Roumagnac P.5, Filloux D.5, Candresse T.3,4, Teycheney P.Y.1

1 CIRAD, UMR AGAP, F-97130 Capesterre Belle-Eau, Guadeloupe, France
2 INRA, UR1321 ASTRO AgroSystèmes TRopicaux, Domaine Duclos, F-97170 Petit-Bourg (Guadeloupe), France
3 INRA, UMR 1332 BFP, BP81, 71 Avenue Edouard Bourlaux, 33883 Villenave d’Ornon Cedex, France
4 Université de Bordeaux, UMR 1332 BFP, BP81, 71 Avenue Edouard Bourlaux, 33883 Villenave d’Ornon Cedex, France
5 CIRAD, UMR BGPI, F-34398 Montpellier Cedex 5, France

teycheney@cirad.fr

Several viral species infecting cultivated yams (Dioscorea spp.) are known. They include viruses belonging to the families Alphaflexiviridae (genus Potexvirus), Betaflexiviridae (genus Carlavirus), Caulimoviridae (genus Badnavirus), Cucumoviridae (genus Cucumovirus) and Potyviridae (genera Macluravirus and Potyvirus). However, it is widely acknowledged that yet uncharacterized viral species are present in yam germplasm collections worldwide and could be propagated through the distribution of infected germplasm. Therefore, viruses are currently the major constraint for much needed exchanges and distribution of yam germplasm.

In order to promote the safe exchange of yam germplasm conserved in the Guadeloupe Biological Resources Center of Tropical Plants (CRB-PT), searches for new virus species in yams were undertaken. In silico analyses of ESTs of Dioscorea alata were performed and unveiled the existence of sequences corresponding to several known genera of yam viruses, such as Badnavirus and Macluravirus, and also to families of unknown yam-associated viruses, including Geminiviridae and Secoviridae. RT-PCR were performed on crude extracts of symptomatic yams (D. alata, D. trifida) following direct binding of viral particles and using degenerate primers. Amplification products were cloned and sequenced. Some of them displayed significant levels of homology with potexviruses and with viruses of the family Secoviridae. The 3’ ends of the corresponding viral genomes were successfully amplified by 3’ RACE, cloned and sequenced. Phylogenetic analyses confirmed the existence in yams of one new viral species within the genus Potexvirus (tentatively named Yam virus X, YVX) and one within the family Secoviridae (tentatively named Yam necrosis virus, YNV). The experimental host range of both viruses was explored through mechanical inoculation on various herbaceous plants.

Molecular diagnostic was developed for both YVX and YNV using direct binding reverse transcription PCR (DB-RT-PCR) and used to perform a prevalence study of both viruses in the Guadeloupe CRB-PT yam germplasm collection.

Keywords: yams; Potexvirus; Sadwavirus; diagnostic