Epidemiology of Yam Viruses in Guadeloupe: Role of Cropping Practices and Seed-Tuber Supply

Mame Boucar Diouf, Sébastien Guyader, Olyvia Gaspard, Eric Francius, Pierre-Yves Teycheney, Marie Umber

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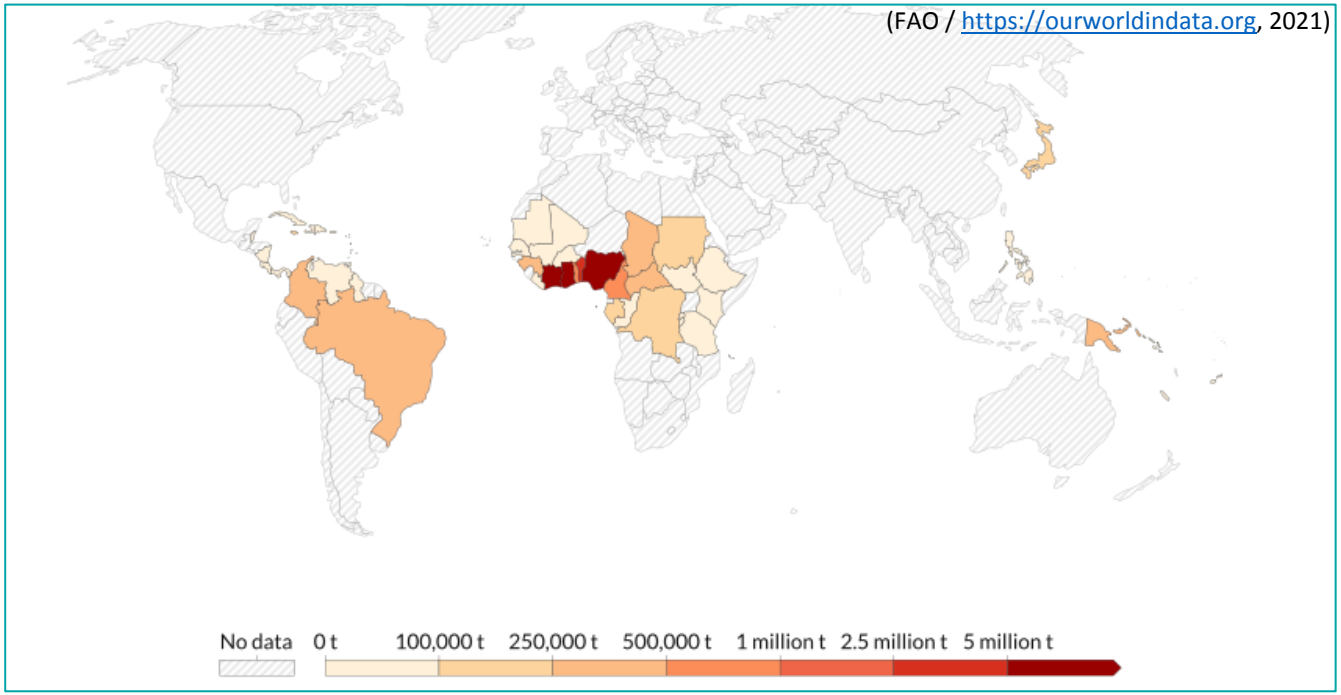
YAM – *A vital root crop for the intertropical world*

- **Ranks 4th** among the root crops (metric tons produced)
- **Dietary**, **medicinal** and **cultural** importance, especially in west Africa (> 95% of the worldwide production)



YAM – *The first food crop in Guadeloupe*

Dioscorea alata

D. cayenensis

D. rotundata

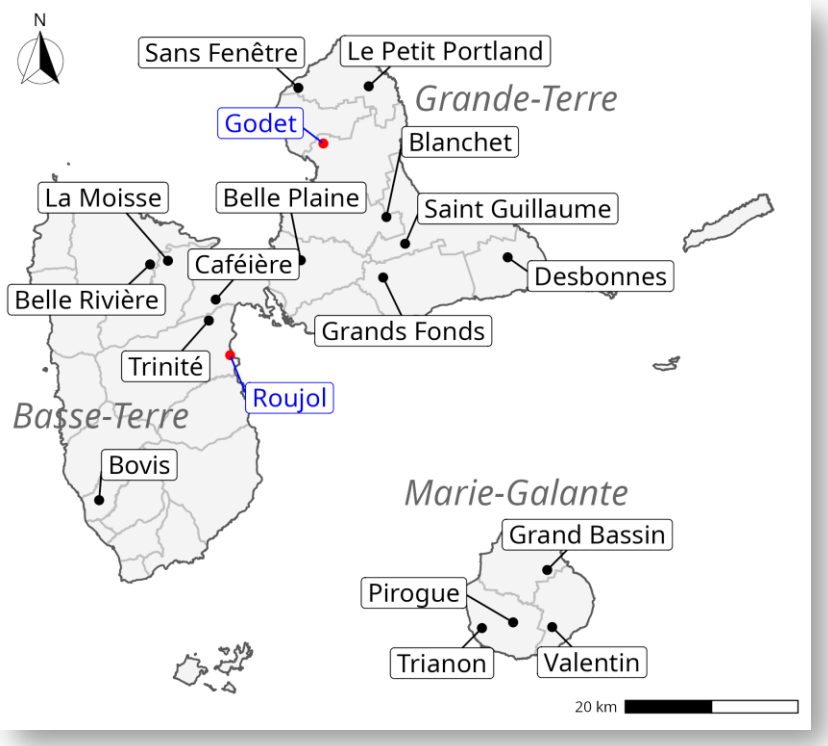
D. trifida

YAM – *Constraints to the production*

- Only **20-40% of the yield potential** is attained:
  - high requirements in soil nutrients
  - competition with itself and weeds
  - pests and pathogens… ⍰ viruses
- ICTV recognizes **25 virus species** worldwide
- In Guadeloupe, **9 viruses** reported in yam:
  - assigned genera:
    Ampelovirus, Badnavirus, *Banmivirus*, *Cucumovirus*, *Macluravirus, Potexvirus, Potyvirus, Sadwavirus, Velarivirus*
  - unassigned genus of *Betaflexiviridae*
- Since the advent of HTS technologies, “novel” viruses keep surfacing and being characterized at the genomic level
- **Much less is known about impact and epidemiology…**

Epidemiology of yam viruses in Guadeloupe

Methods



2019

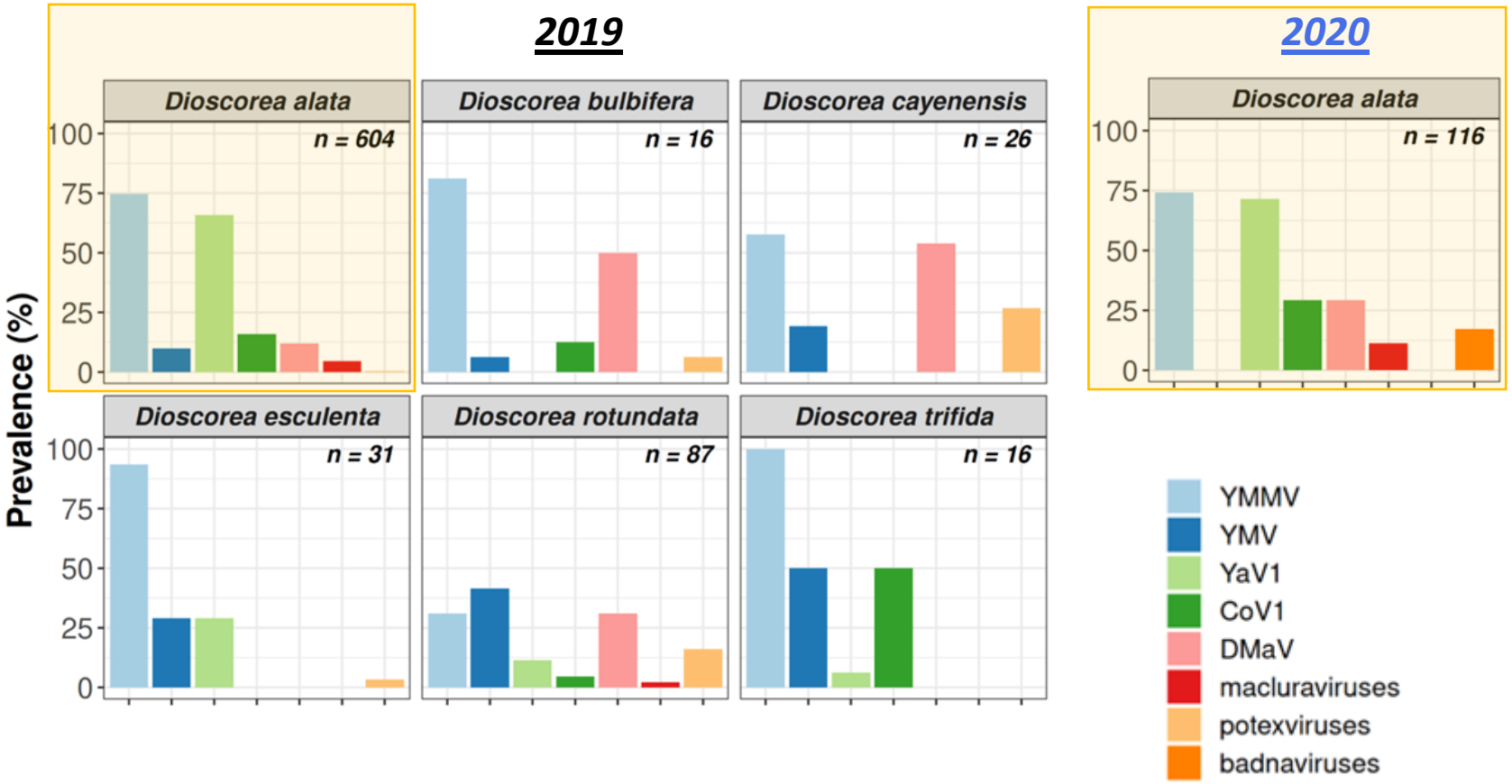
- **18** plots surveyed (records on what yams were grown, cropping practices, environment)
- **780** yam leaf samples collected (6 yam species, 15 cultivars)
- **46** weed leaf samples collected

2020

- **2** plots
- **117** samples of *D. alata* collected (1 yam species, 7 cultivars)
- **80** weed leaf samples collected

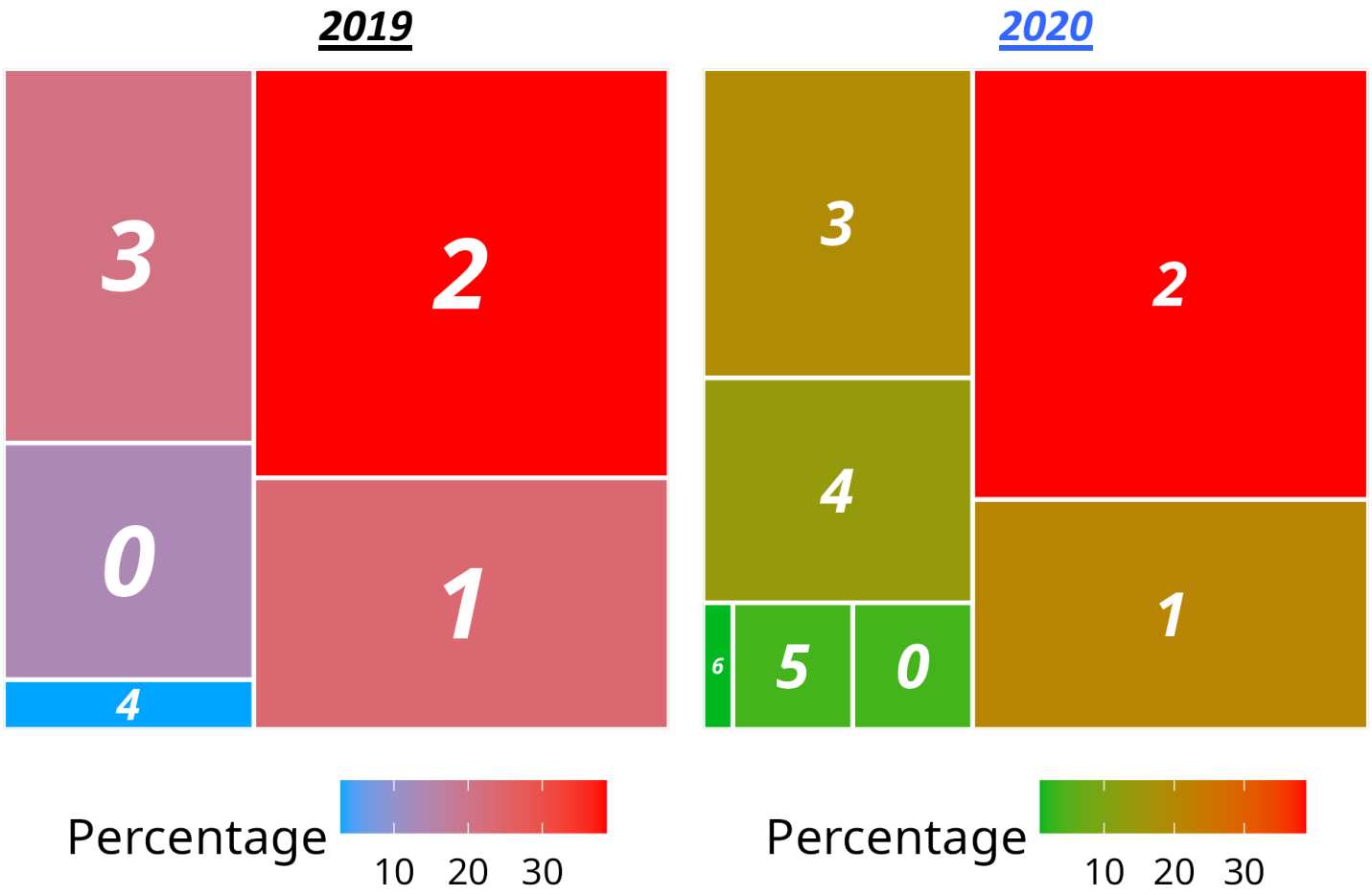
Epidemiological survey in Guadeloupe

Results: prevalence of viruses in yams



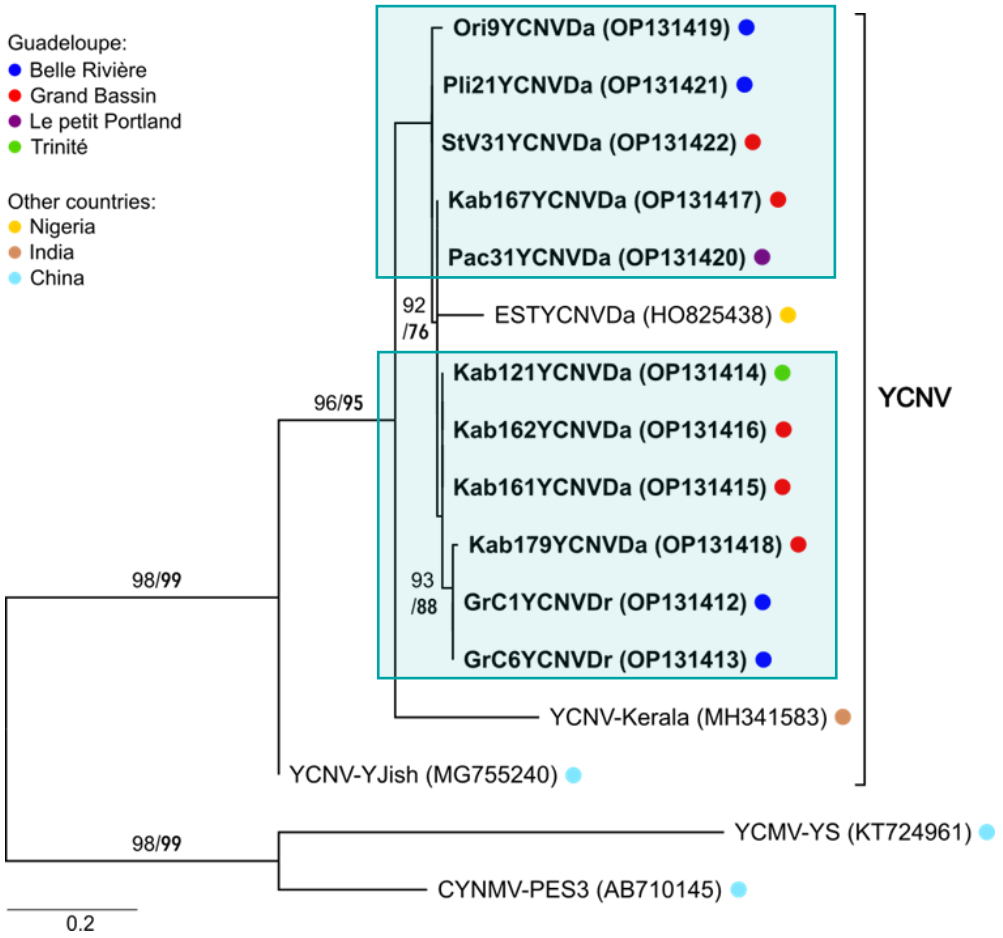
Epidemiological survey in Guadeloupe

Results: mixed infections



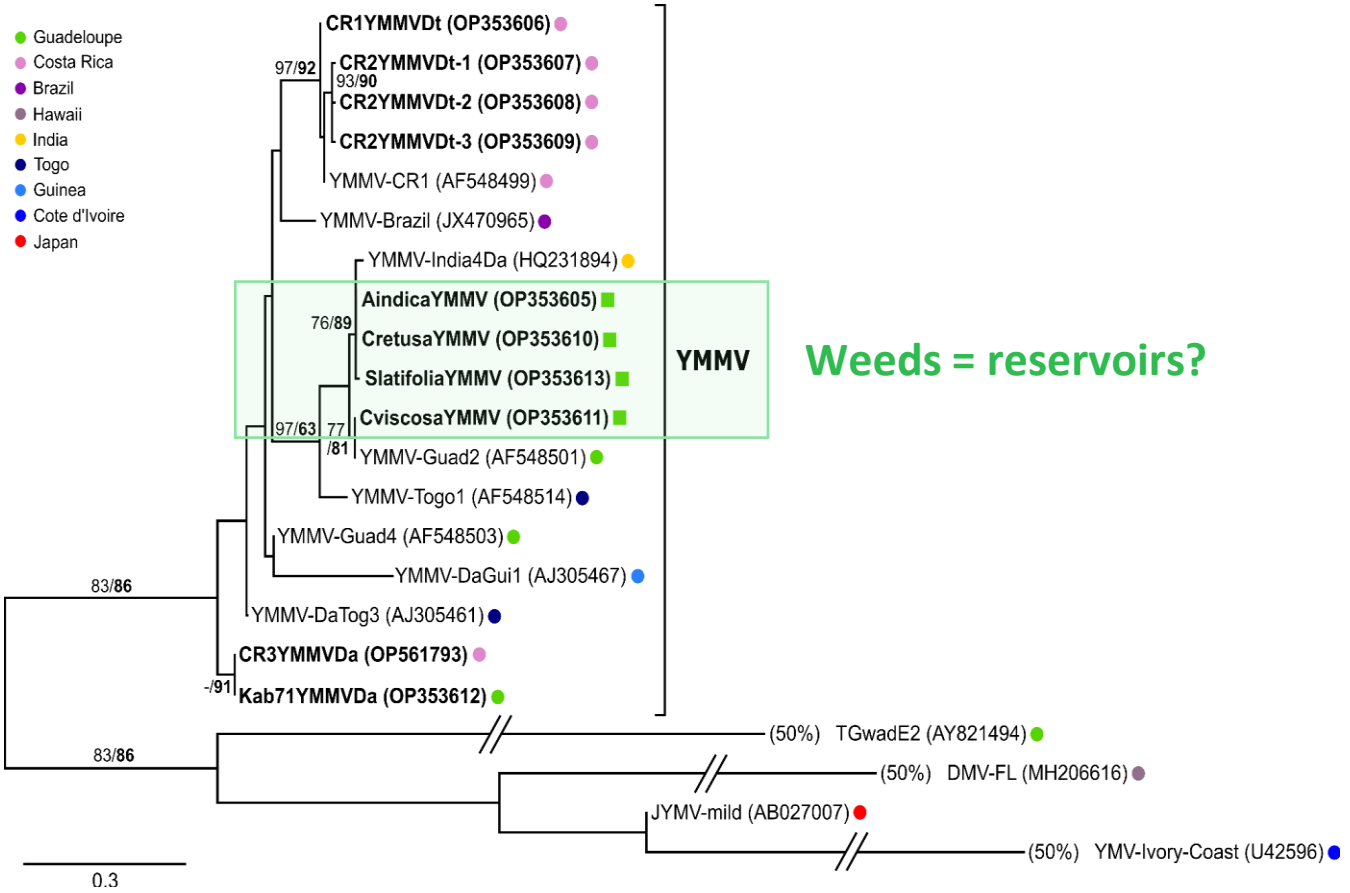
Epidemiological survey in Guadeloupe

Results: yam macluraviruses in Guadeloupe



Epidemiological survey in Guadeloupe

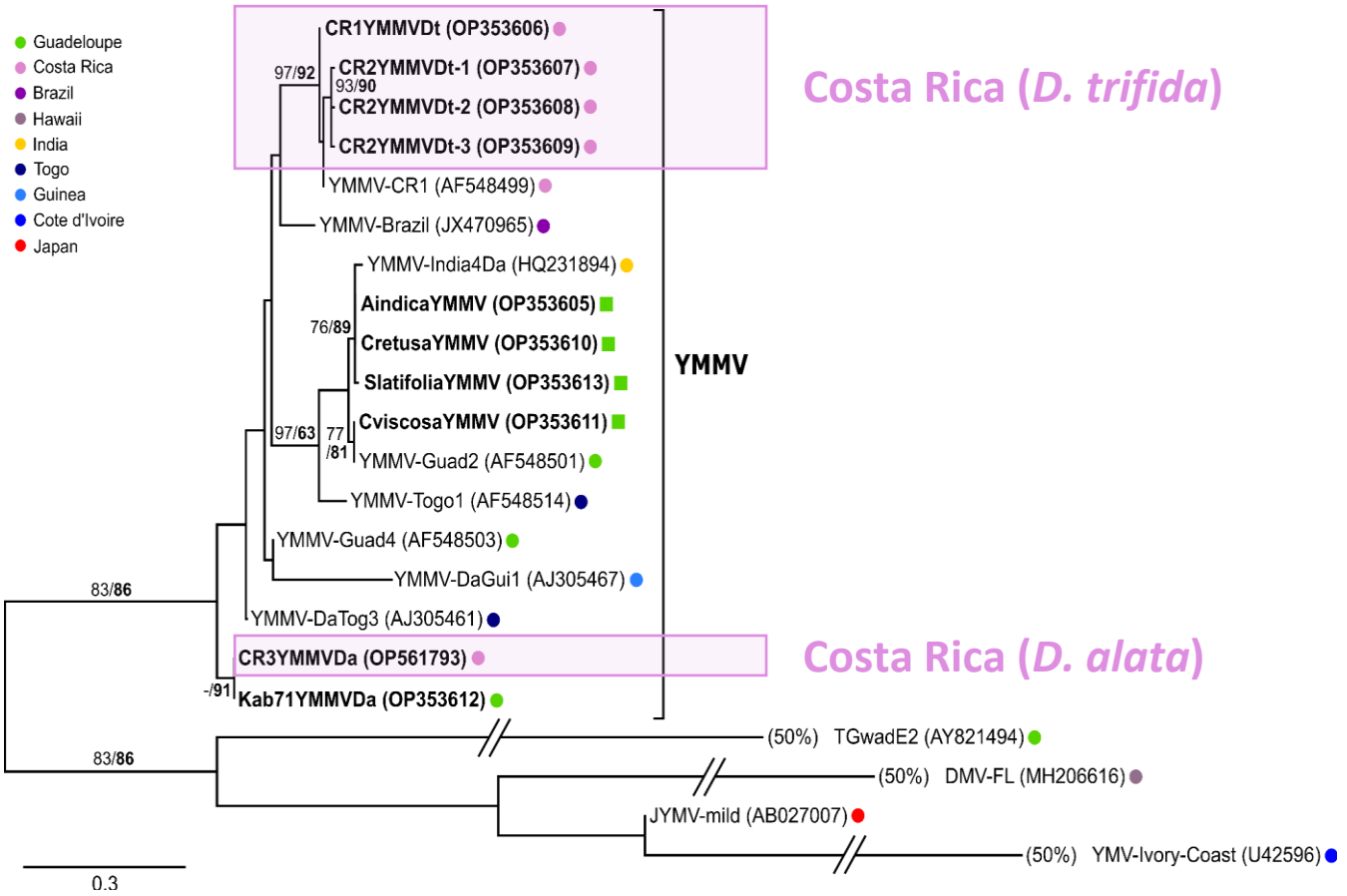
Results: yam viruses in weeds



Weeds = reservoirs?

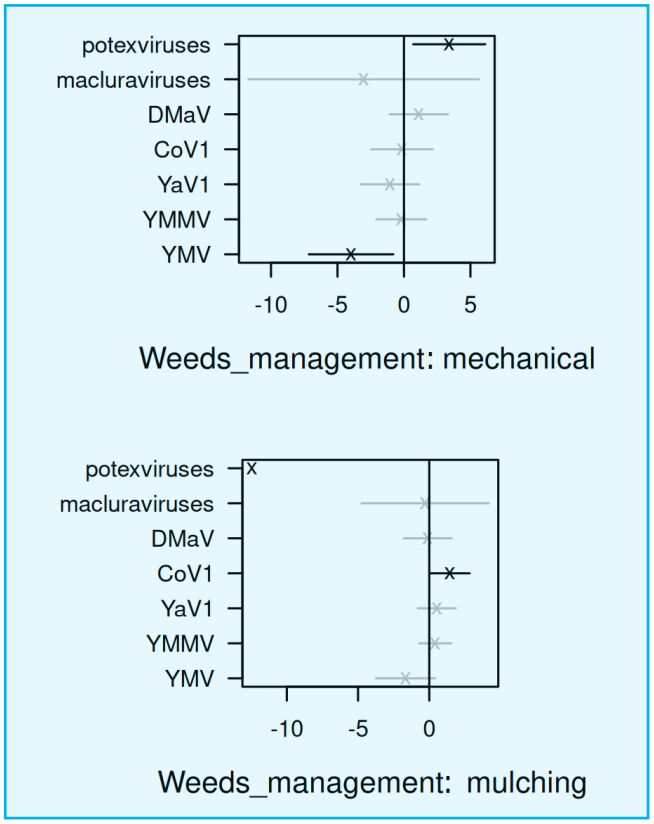
Epidemiological survey in Guadeloupe

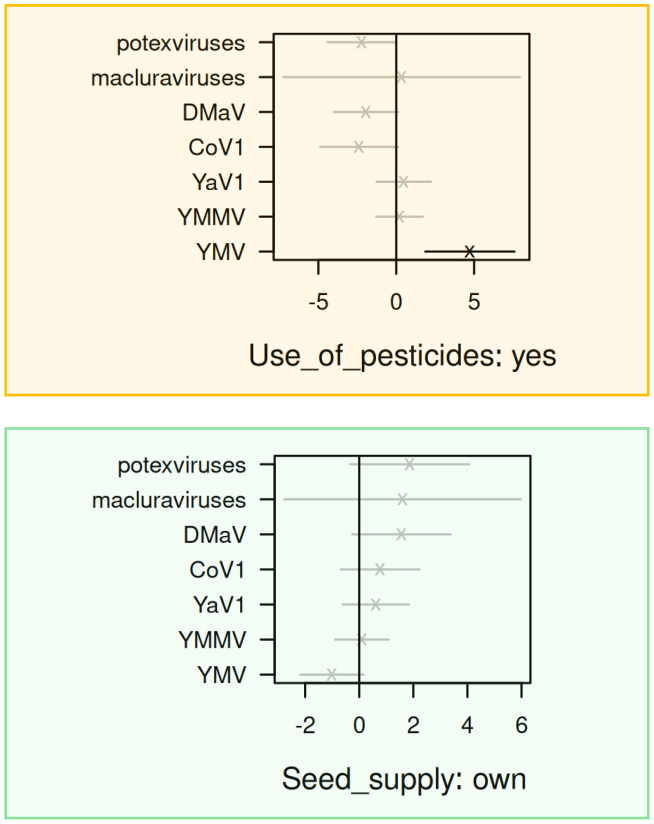
Results: yam viruses in weeds



Epidemiological survey in Guadeloupe

Results: effect of crop-related variables on virus occurrence





Epidemiological survey in Guadeloupe

Results: efficiency of vertical transmission

D. trifida mother plants:
YMMV
YaV1

Daughter tubers

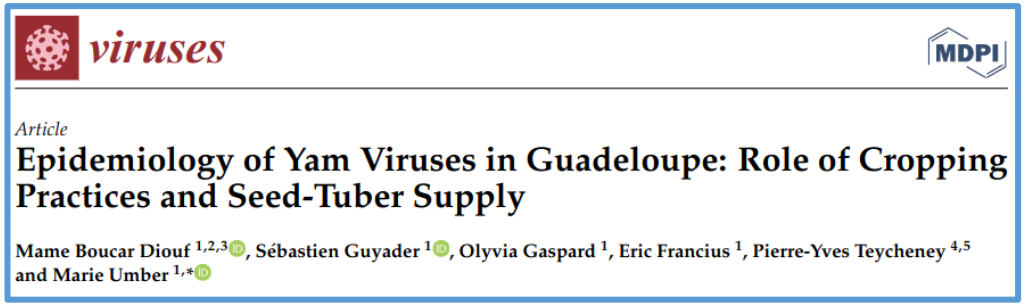
Daughter plants

96% YMMV
0% YaV1

Epidemiological survey in Guadeloupe

Summary

- **YMMV** and **YaV1** are the most prevalent in Guadeloupe
- **Mixed infections** are predominant
- First detection of **YCNV** in Guadeloupe
- Weeds likely act as reservoir of **YMMV**
- Evidence that imported tubers from abroad can **introduce viruses**
- **Vertical transmission**: high for YMMV / non-existent for YaV1
- Some **cropping practices** seem to correlate with the **occurrence** of some viruses… but these correlations are sometimes counterintuitive



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