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BIODIVERSITY PRESERVATION of THE AGROFORESTRY ECOSYSTEMS in GUADELOUPE: ASSESMENT of CROP HEALTH STATUS and SANITATION

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CONTEXT:

- Lack of scientific studies on viral infection and its damages over agroforestry crops in tropical context.

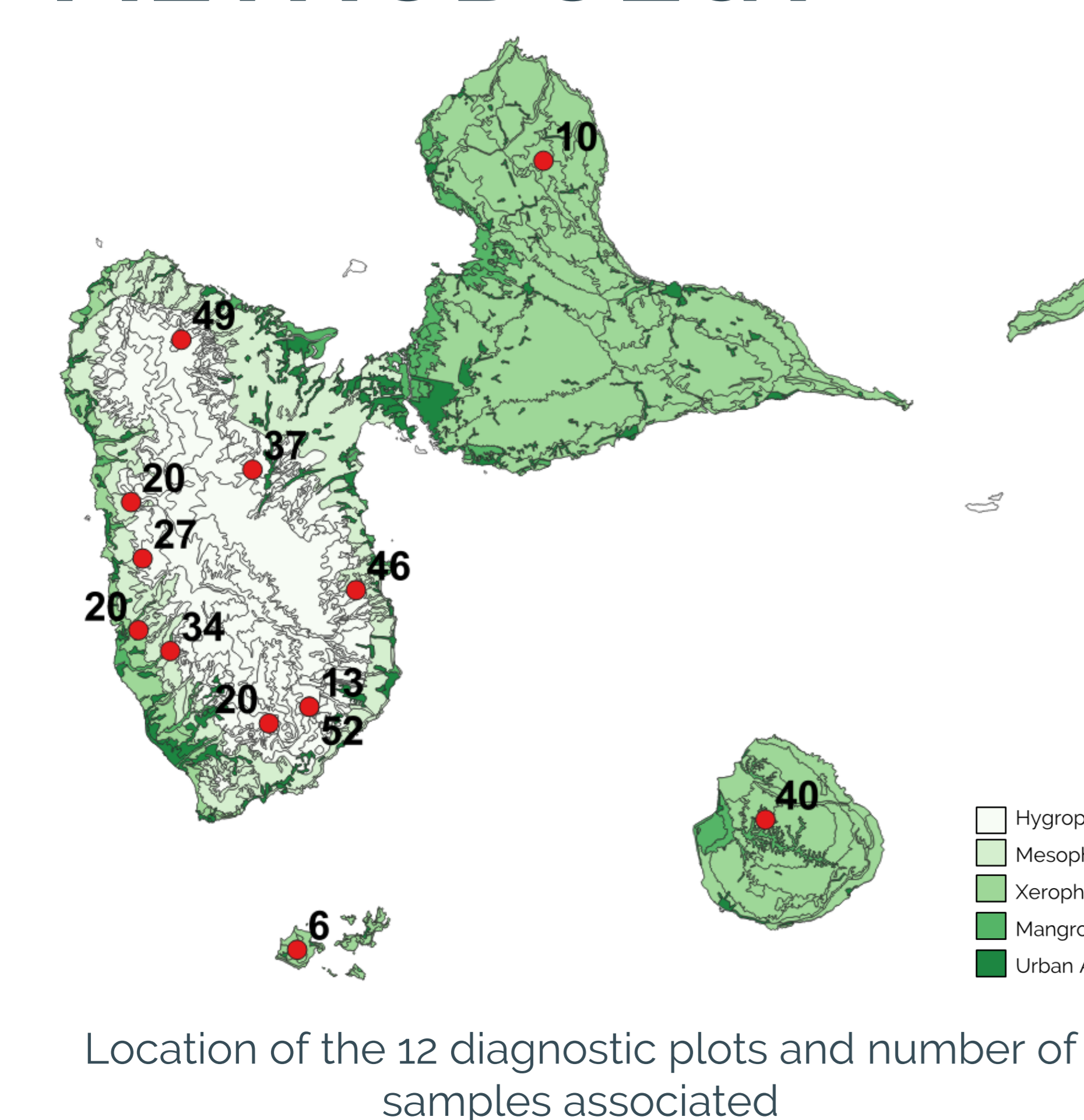
OBJECTIVES :

- Contribute to improving global knowledge on Guadeloupe's agroforestry by :
 - Identifying the different varieties of **yam** (*Dioscorea* spp.), **banana** (*Musa* spp.), **pineapple** (*Comosus comosus*) and **vanilla** (*Vanilla & pompona*) grown in the undergrowth
 - Visually characterizing the **global crop health**
 - Analyzing the **viral sanitary status of major crops** by molecular tests

Thanks to this study, the presence of several viruses infecting vanilla has been confirmed. Such studies are a first in Guadeloupe.



METHODOLOGY



Viral sanitary status

To test sanitary status for each species*

- ✓ Banana → 5 viruses
- ✓ Vanilla → 6 viruses
- ✓ Pineapple → 10 viruses
- ✓ Yam → 14 viruses

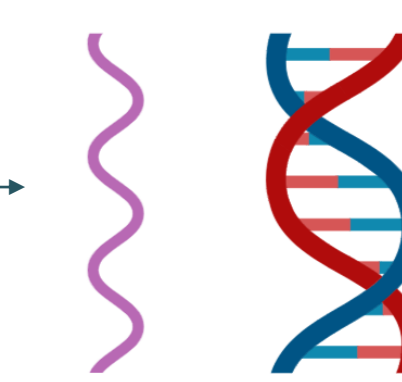
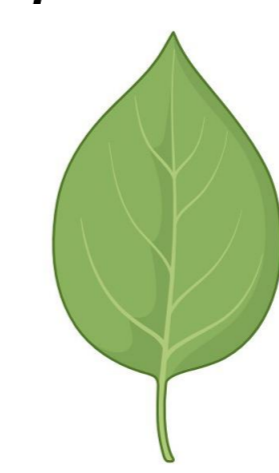
Global crop health
Visual observations
To identify pests and viral vectors and evaluate the global crop health



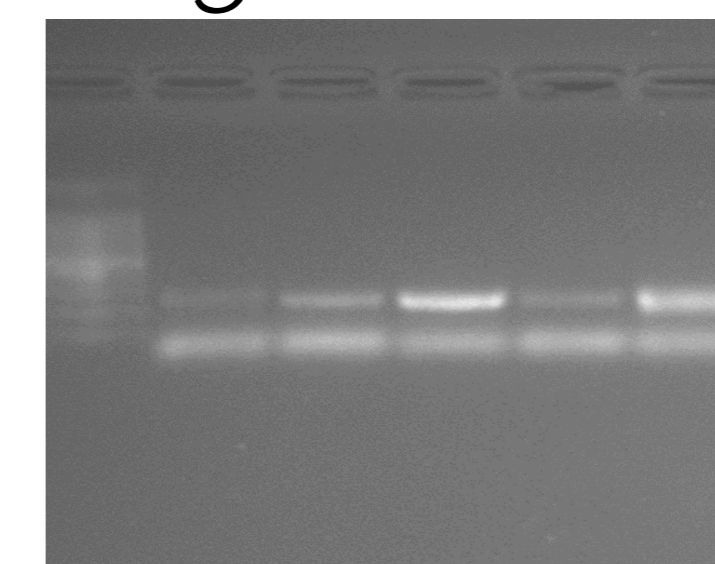
* For protocol details see <https://www.anses.fr>

Leaf collection
374 samples collected

TNA (DNA + RNA) extraction



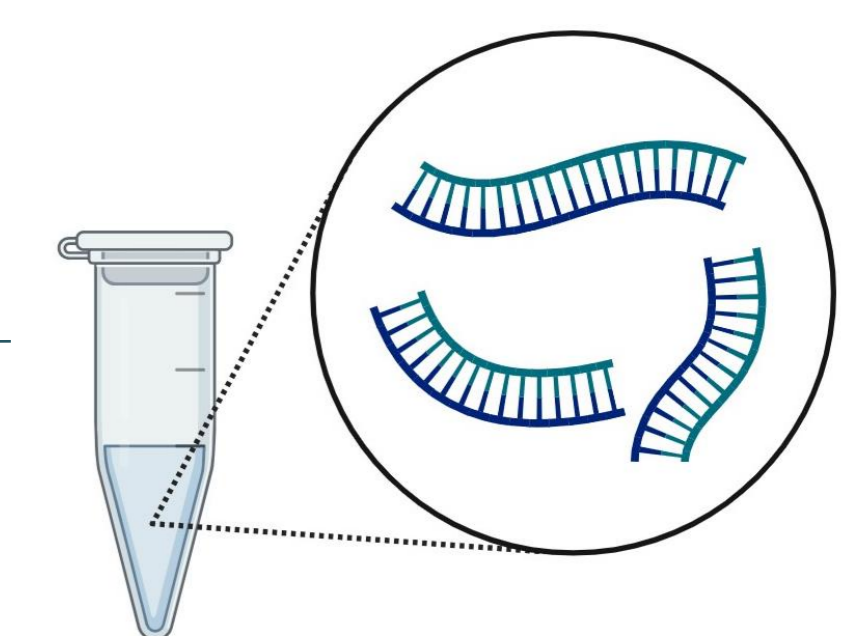
Electrophoresis
agarose 1%



PCR analysis
specific primers

Reverse transcription

cDNA synthesis



Illustrations created with Biorender.com

PRELIMINARY RESULTS

Global crop health

The field investigations led to the discovery of symptomatic plants and several insects which could potentially transmit viruses:

- Mealybug (*Dismicoccus*)
- Green aphids (*Acyrtosiphon pisum*)
- Blue leafhopper (*Cicadella viridis*)



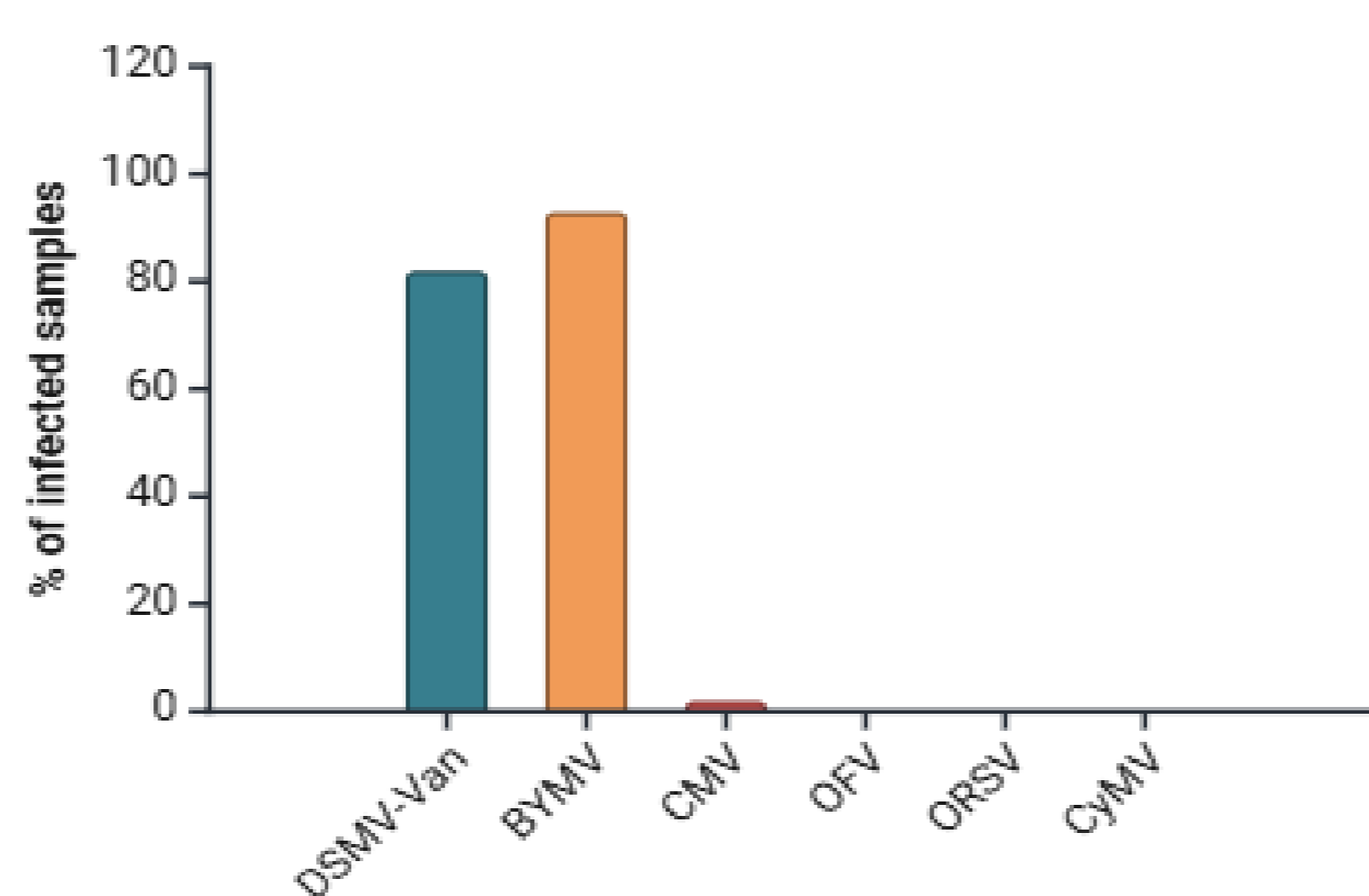
Vanilla leaf infested by mealybugs (*Dismicoccus neobrevipes*) showing a severe chlorotic spot

Viral sanitary status

3 out of 6 viruses tested were detected in 60 vanilla samples :

- 2 were highly prevalent: DSMV-Van and BYMV
- CyMV, OFV and ORSV were not detected
- Coinfection were found to be very common between BYMV and DSMV-Van.

Viral prevalence in vanilla



PERSPECTIVES

- Assess further samples of vanilla, yam, banana and pineapple for presence of viruses in crops
- Evaluate the correlation between the viral status of crops and the symptom observations
- Introduction of elite varieties in *in vitro* collection of the biological resources center for tropical plants (BRC-TP) to preserve the crop diversity found in agroforestry ecosystems (sanitized for viruses if necessary)



Vanilla axillary bud *in vitro*

Centre Antilles Guyane – Petit Bourg Guadeloupe

Umbert M., Filloux D., Gélabale S., Gomez R.-M., Marais A., Gallet S., Gamiotte F., Pavis C., Teycheney P.-Y. (2020) Molecular viral diagnosis and sanitation of yam genetic resources: implication for safe yam germplasm exchange. *Viruses* 12(10): 1101. <https://www.mdpi.com/1999-4915/12/10/1101#>

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