CARIBBEAN FOOD CROPS SOCIETY

52

Fifty-second Annual Meeting 2016

Le Gosier, Guadeloupe
Volume LII

MEETING HOST:

INRA VOTRE AVENIR EST NOTRE CULTURE 70 ans

ISSN 95-07-0410

Copies of this publication may be obtained from:

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Jardín Botánico Sur
1193 Calle Guayacán
San Juan, Puerto Rico 00936-1118

CFCS Website: http://cfcs.eea.uprm.edu/

PROCEEDINGS

OF THE

52nd ANNUAL MEETING

Caribbean Food Crops Society
52nd Annual Meeting
July 10 – July 16, 2016

Hosted by the
Institut National de la Recheche Agronomique
Centre Antilles-Guyane

Karibea Beach Resort - Pointe de la Verdure
Guadeloupe FWI

"Engineering Ecological Modernization of Agriculture / Exploring the Potential of Tropical Biological Resources for Innovation / Towards a Bio-Economic Development of Caribbean Countries"

Edited by
Michel Naves, Valérie Angeon, Bérengère Merlot, Louis Fahrasmane,
Jean Louis Diman, Patrick Labbé, Patricia Traffond,
Wilfredo Colon and Harry Ozier Lafontaine

Published by the Caribbean Food Crops Society

Paper presented at the 52nd CFCS Annual Meeting, Guadeloupe, July 10-16, 2016

VALUATION OF LOCAL GENETIC RESOURCES FOR SUSTAINABLE PRODUCTION SYSTEMS

THE TROPICAL PLANT BIOLOGICAL RESOURCE CENTER OF THE FRENCH WEST INDIES: SERVING AGRICULTURE AND RESEARCH THROUGHOUT THE CARIBBEAN.

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Keywords: Plant germplasm - Genetic resources - Viral diagnostic - Sanitation - Banana - Mango tree - Pineapple - Sugarcane - Yam - Information system.

Abstract

Plant genetic resources are instrumental in the adaptation of agriculture to social and environmental change. They are the backbone of research and breeding programs aimed at the development and transfer of new crop varieties best suited to consumers' needs and tastes and to new farming systems. To this aim, plant germplasm collections have been constituted worldwide. Securing such collections requires substantial human and financial investments that can prove difficult to maintain on the long run for small countries and territories such as most Caribbean countries.

In Guadeloupe and Martinique, INRA and CIRAD have constituted large plant germplasm collections of tropical crops over several decades. They joined forces in 2010 to create the Tropical Plant Biological Resource Center of the French West Indies (CRB-PT), which is affiliated to both institutions. In this paper, we describe CRB-PT's collections, services provided to end users and research programs as well as scientific and technical networking strategy.

Materials and methods

CRB-PT maintains collections of bananas (365 accessions), yams (481 accessions) [1], sugarcane (426 accessions), pineapple (526 accessions) and mango trees (90 accessions) [2] that cover a large part of the worldwide genetic diversity [1, 2]. These collections are conserved *ex situ* under field conditions in one location in Martinique (pineapple) and four locations in Guadeloupe, and also *in vitro*.

Within the past 6 years, CRB-PT has focused its efforts on:

1. The development of an information system allowing end users to gather information on conserved germplasm
2. The implementation of quality assurance measures regarding the traceability, introduction, conservation and distribution of conserved plant germplasm
3. The characterization of viruses infecting its germplasm collections, in order to develop appropriate diagnostic tools and implement them in sanitation programs allowing the distribution of certified virus-free plant material

These efforts were shared with other tropical BRCs and with French research groups working on plant viruses.

Main results

Funding from the French group of scientific interest IBiSA (*Infrastructures in biology, health and agronomy*) allowed the establishment and coordination of the Inter-TROP network [3]. This network started in 2010 and involves several French tropical BRCs from Guadeloupe, Martinique, French Guyana, Réunion, Corsica and Montpellier.

It led to the development of common quality assurance and computer tools operating under open source software. These tools are now used by the curators of the 14 germplasm collections scattered among the 6 participating BRCs, for managing data related to each conserved accession (passport, taxonomy, biological characteristics). In addition, a common portal was developed, providing public access to detailed information for accessions conserved in all 6 BRCs and allowing the ordering of plant material [4].

The tropical plant BRC of the French West Indies also plays a key role in research programs. It has provided tuber, leaf, pollen, root tip samples and whole plants to local, national and international research groups, to extension officers and end users in Guadeloupe, to a conservation center in Fiji and to tissue culture companies. In order to better serve end users, the tropical plant BRC increases its collections on a regular basis through the importation of additional accessions, in accordance with current regulations.
A specific standard developed for agronomic BRCs, NF S 96-900, was used to develop quality assurance. The implementation of a quality management involving a tracking system of flaws led the certification of the tropical plant BRC –the second BRC to be certified in France-. This certification has been renewed every year since 2014.
the tropical plant BRC coordinated the SafePGR project [5], funded by French national research agency (ANR) and several European outermost regions under the Era-Net program NetBiome. This project involved research groups from the University of the Azores, the University of Madeira, CIRAD in Guadeloupe, Réunion and Montpellier and INRA in Bordeaux and in Guadeloupe. The aim of this project was to run extensive searches of viruses infecting banana, garlic, sugarcane, sweet potato, vanilla and yam accessions conserved in Guadeloupe, Réunion, Azores and Madeira BRCs, using molecular approaches including next generation sequencing (NGS). Based on the extensive molecular characterization of these viruses, including the discovery of 21 new virus species, specific diagnostic tools were developed and implemented for sanitation programs, leading to certified virus-free planting material: to date, 25 yam accessions free of the 9 virus species known to infect this crop are available from the tropical plant BRC. Additional virus-free material will be produced in the coming years.

Conclusion

The Tropical Plant Biological Resource Center of the French West Indies is eager up to provide plant material to end users throughout the Caribbean region, in order to help promote crop diversification and selection programs and more generally to share knowledge with all Caribbean countries and territories. Feedback from end users is appreciated so that the benefits of crop diversification can be shared.

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Acknowledgements

Authors thank INRA, CIRAD, the Guadeloupe Region, the Martinique Region, the European Union (through its ERDF and EAFRD programs) and GIS IBiSA for financial support.