



JARDIM
BOTÂNICO
DO RECIFE



**BOTANIC
GARDENS**
CONSERVATION
INTERNATIONAL

Additional report of project

**Saving the rooftop of
Pernambuco Endemism
Center: collecting seeds of
endangered emergent trees
species from a biodiversity
hotspot**



Saving the rooftop of Pernambuco Endemism Center: collecting seeds of endangered emergent trees species from a biodiversity hotspot

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*Cover image: seed of *Cariniana legalis* (jequitibá)

Recife, January 2023

Introduction

Thanks to BGCI Global Botanic Garden Fund, we have produced new information that can help in future projects of conservation of two endangered tree species: *Cariniana legalis* (Mart.) Kuntze and *Manilkara dardanoi* Ducke. These species are locally known as jequitibá and maçaranduba, respectively. They offer habitat to several other plants and animals, but the long history of logging in the Atlantic Forest brings the jequitibá and the maçaranduba to the edge of extinction.

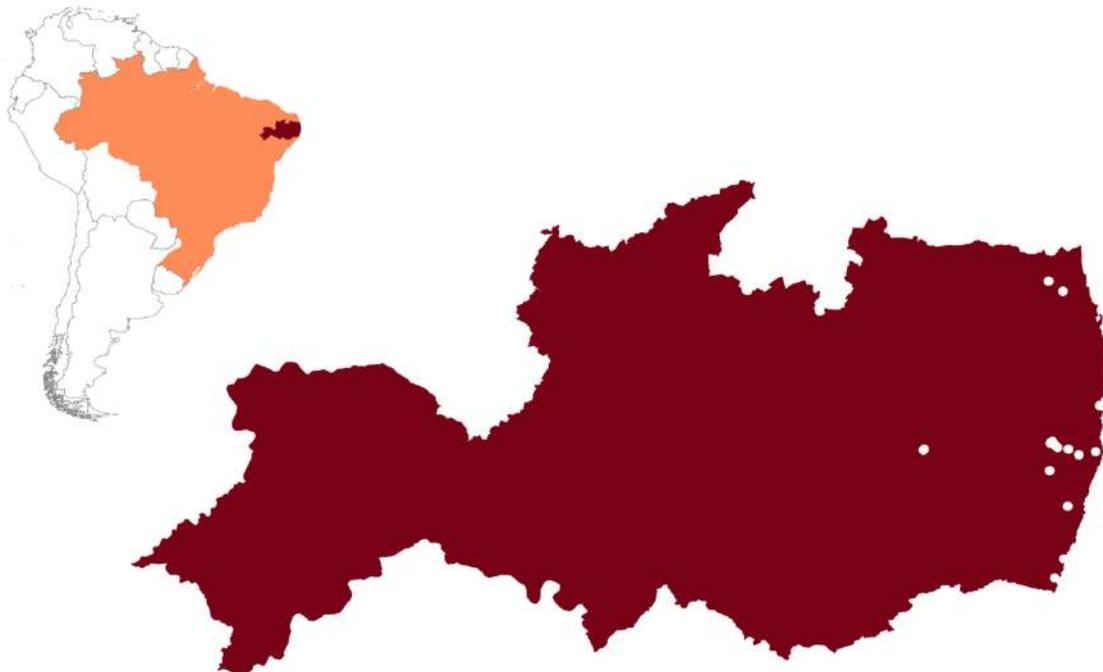
Before this project, fundamental biological aspects of these species were ignored, which could hamper future conservation actions. For example, available data on literature and herbaria recorded three localities to *C. legalis* and two other localities to *M. dardanoi* in the Northern extreme of the Atlantic Forest — especially at Paraíba and Pernambuco states from Brazil, our delimited study area. However, no information about population size or number of mature individuals in nature were available.

Our preliminary surveys indicated several potential localities to find new populations close to the places of original records. We visited these localities and collected data on phenology, seeds production, seed germination, morphology, taxonomy, ecology and conservation. We also found difficulties that should be reported for future endeavors in the conservation of these species. In order to offer more details than is possible to include in the online form of BGCI, we present this additional report with simplified data for our use in the Jardim Botânico do Recife and for public communication.

Increasing the search for jequitibá and maçaranduba at the northern extreme of Atlantic Forest

We expanded the search of jequitibá and the maçaranduba for fourteen localities in the study area in order to confirm the existence of the known populations of these species and to explore places with suitable habitats for them. As far as we know, this is the first time that this initiative is taken in our study area.

We confirmed that these two species are quite rare and have low density populations — especially the jequitibá. We also created a dataset of documented absences in the study area, which is very important for planning future actions of reintroduction of these species.



*Area of study in Brazilian Northeastern. The area of study also represents the northern limits of the Atlantic Forest. White dots are areas explored in searching for jequitibá and maçaranduba.

R

Jequitibá in the Reserva Biológica Guaribas, Paraíba State.

In this place, we have found the greater population of this species

Jequitibá is still disappearing from the nature

Previously to our work, taxonomists collected *Cariniana legalis* in three localities in the study area. We have visited these localities and searched in several other Atlantic Forest remnants looking for this species. Here, the occurrences of the Jequitibá in two localities are confirmed, and one local extinction in Pernambuco is reported. Overall, we identified seven mature individuals of this species in our study area. All of them occur in protected areas.



*Above: map of known populations of *C. legalis* before the beginning of this project. Below: actual occurrence with the record of a local extinction and the size of each population represented by the size of dots.



Fruits of jequitibá

The tall trees of this species difficult the harvesting of fruits

Maçaranduba is found in only one place

Almeida Jr. and Zickel¹ reported a population of *M. dardanoi* for the southern littoral of Pernambuco state. They also informed that another known population went extinct once it has not been found since 1952. We confirmed this information after performing field work in eight different localities along the littoral of Pernambuco that potentially could host *M. dardanoi*.

We localized the only known population of *M. dardanoi* and accounted for 45 mature individuals flowering and fruiting in an area of 1 ha. However, visual inspections allow us to recognize at least one hundred of young and mature individuals in adjacent remnants.



*The only known population of *Manilkara dardanoi* at the southern end of the study area.

¹Phytotaxa 161(3): 235-240. 2014.

Flowers of maçaranduba

Despite the intense searching for this species, we have confirmed that its population is restricted to only one place. We have collected population data for a new conservation status assessment, which should consider higher risk of extinction to this species



Low seed production and germination rate impose difficulties to conservation strategies of jequitibá and maçaranduba

Despite the project started after the flowering and fruiting time of both species, we are able to identify the main periods to collect seeds of maçaranduba and jequitibá in our area of study. We obtained more success in collecting seeds of jequitibá. In two opportunities, we accessed the seed production of jequitibá in April to June of 2022 and in January of 2023. For maçaranduba, we collected seeds only in March of 2022.

However, we are able to obtain a few seeds of jequitibá with high quality even after harvesting dozens of fruits. Thus, in 2022 we planted 28 seeds and produced only one seedling of jequitibá. In January, we obtained only 25 seeds of good quality. For maçaranduba we obtained more seeds, however none germinated.

Species	Date	Seeds	Germinated	Technique
<i>C. legalis</i>	Apr. 2022	28	1	greenhouse
<i>C. legalis</i>	Jan. 2023	25	in obs.	greenhouse
<i>M. dardanoi</i>	Mar. 2022	30	0	greenhouse
<i>M. dardanoi</i>	Mar. 2022	180	0	in vitro

*Information about seed collected and germinated along the project. Collection of *C. legalis* of January 2023 is still under observation.

Collecting population data of jequitibá
We have collected data on the populations of jequitibá and
maçaranduba for supporting future studies of conservation
status assessment of IUCN Criteria.

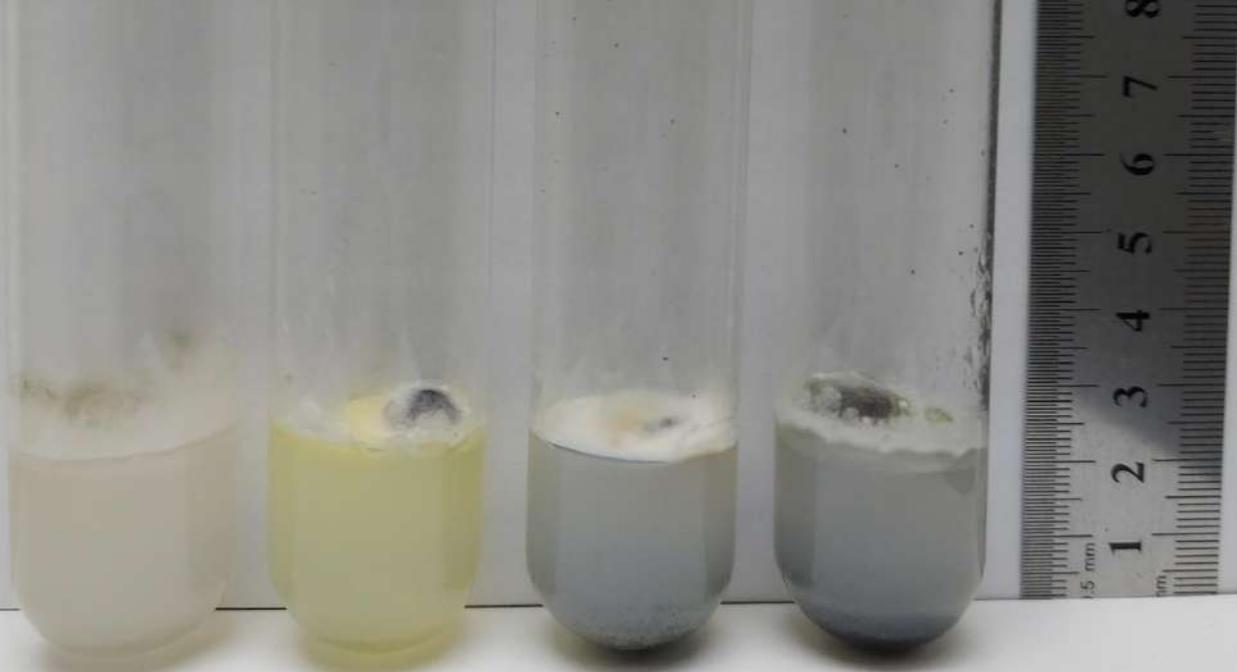


Alternative strategies and partnerships for conservation of jequitibá and maçaranduba

We believe that the biology of the jequitibá is the main difficulty in obtaining good quality seeds of the species. We collected closed fruits and observed high infestation by insects and fungi and mechanical damage. On the other hand, the main difficulty in the case of maçaranduba is probably associated with the advanced maturation state of the harvested fruits.

These difficulties impose the necessity for searching partnerships in the project. We started a strong partnership with the Centro de Tecnologias Estratégicas do Nordeste - CETENE to introduce both species in strategies of propagation in vitro. For now, we have collected buds of several individuals of maçaranduba to propagate in vitro and we are waiting for the next fruiting season to start a try of germination in vitro for seeds of jequitibá.

In vitro germination tests of maçaranduba were unsuccessful because of the high contamination of seeds. We believe that the advanced maturation state of the harvested fruits caused it.



Due to difficulties in finding seeds, we started to collect young shoots of maçaranduba for in vitro propagation.



The BGCI Global Botanic Garden Fund created opportunities for taxonomic and conservation studies

The obtained grant allows us to collect data for future taxonomic and conservation research. *Manilkara dardanoi* has unclear taxonomic delimitation that we will explore in future with the data collected in this project. Also, we obtained information about anthropogenic pressure, population size and occurrence that we will use in future studies of conservation to apply the IUCN criterias for both species.

In addition, the BGCI Global Botanic Garden Fund directly benefited other people allowing them to collect data for their own research. For example, in many excursions master science students of Universidade Federal Rural de Pernambuco attended the field work to collect data for themselves and to help us in collecting data for maçaranduba and jequitibá. Also, the established partnership with the CETENE allowed pós-doctoral students to collect data for future research with endangered species.



The grant provided by BGCI allows us to collect data for future taxonomic and conservation studies.

The BGCI Global Botanic Garden Fund improved the collections of Jardim Botânico do Recife

Because of the grant resources provided by the BGCI Global Botanic Garden Fund, the collections of JBR received six more endangered species and increased the percentage of protected species of endangered flora of Pernambuco from 42% to 54%.

These species were collected during the expeditions searching for maçaranduba and jequitibá, which was made possible due to the grants awarded by the BGCI. One of them – *Ilex sapiiformis* – is labeled as Critically Endangered Possibly Extinct in the Brazilian Red List.

Now, the JBR team is starting four new conservation programs for these recently collected endangered species. In addition, several endemic species are now cultivated in JBR after being collected in the expeditions granted by the BGCI Global Botanic Garden Fund.

With the resources of BGCI Global Botanic Garden Fund the JBR team were able to collect other endangered species to its collections, such as *Ilex sapiiformis* an Critically Endangered species, which were possibly extinct in nature before our project.



Social context forced us to adjust the budget

We expended all financial resources requested in the project. However, we reallocated part of the resources and made some adjustments in the final budget due to the increase in the prices of gasoline in Brazil that occurred along 2022. Thus, we spent more on gasoline than we expected in our original budget. This reallocation did not impact our work because the prices of car rent stayed relatively stable along the same period and because we were able to access some areas in simple vehicles, which reduced the costs.



Despite the adjustments of the budget, we are able to perform a broader searching for jequitibás and maçarandubas in the study area

The project reached 90% of success

Here, we compared the planned objectives of the project against the actual accomplishments. We assume a rate of 90% of success in the final assessment of the project because we totally achieved four and partially one of our objectives.

Objectives	Status	Remarks
Expeditions will be performed for searching populations of both species in ten localities previously selected from herbaria record.	Totally achieved	We performed expeditions for fourteen localities
Data on number of individuals, flowering and fruiting will be collected from each found population	Totally achieved	We identified: 2 mature individuals of jequitibá in one population from Pernambuco 5 mature individuals of jequitibá in one population from Paraíba 45 mature individuals of maçaranduba in one population from Pernambuco We collected data on phenology and population structure to all populations
Seed production will be monitored based on herbaria record and field work	Totally achieved	We identified that the time of seed production of each species is: January to April for jequitibás March to April for maçarandubas
Seeds will be collected from each found population	Totally achieved	We collected: 28 high quality seeds of jequitibá in Pernambuco 25 high quality seeds of jequitibá in Paraíba 279 seeds of maçaranduba in Pernambuco
Seeds will be distributed for other botanical gardens	Partially achieved	We are not able to distribute the seeds for other botanical gardens because of low production at the time of the project. We are still planning to distribute seeds. However, we sent most of the collected seeds to our partner. Thus, we achieved this objective partially.

