

Seed Collection and Propagation to Promote Reforestation and Increased Biodiversity in Finca Las Piedras and Local Brazil Nut Concessions

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Abstract

Deforestation and Brazil nut exploitation are immense threats facing the Madre de Dios region of Peru. As these obstacles become increasingly dire, resurgence of local native species is critical. To contribute to reforestation efforts and increased biodiversity, both within Finca las Piedras and local Brazil nut concession areas, we aim to create a methodology that can help with long term forest diversity. In doing so, we hiked in the forests of Finca Las Piedras and collected all available seeds, fruits, and nuts. After finding the seeds, we photographed them, added them to our database, described them, and described their source. Our protocol for seed collection and eventual propagation maintains the replicability and description required to perform this project in the future. After seed collection and data entry we then labeled and planted the seeds. We organized the seeds based on where they should be planted to maximise our results (ex: species that attract animals would be more valuable to be planted within Finca Las Piedras compared to Brazil nut concessions.) Eventually once the seedlings are successful and viable enough to be transplanted, we plan to allocate specific species to Brazil nut farmers on concessions to increase biodiversity in these areas. While also contributing to the forest restoration efforts here at Finca Las Piedras.

Introduction

In the Madre De Dios region of Peru, brasil nut concessions make up most of the land owned in rural areas (Gallice 2022, *unpublished*). These concessions are conceded to Peruvians with the intention of allowing these citizens to manage the land and profit exclusively from the Brazil nuts on the property. However, this is not the reality. In most cases, owners of the concessions use timber extraction and agriculture to increase their economic opportunities. Frequently in areas of

Brazil nut concessions, seeds are unable to grow and germinate due to various reasons (e.g., most brasil nut seeds are harvested, and none get replanted). This lack of species regeneration combined with land exploitation, contributes to long term unsustainable agriculture and a vulnerable forest. With increased deforestation, there is an extreme loss of biodiversity on these concessions because of monocrop environments. Continuing

with this current pattern of limited species renewal and monocrop agricultural systems will degrade the land and make these areas significantly less biodiverse. Our goal is to support a resurgence of native species both within Brazil nut concession areas and the forests of Finca Las Piedras. This will contribute to more diverse forests while continuing to maintain the economic viability of the concession areas. We did this by collecting, germinating, and propagating local fruits, nuts, and seeds. Once the trees are large enough to plant in the ground, we will plant them in Finca Las Piedras and/or give them to local farmers in Brazil nut concession regions to plant into their otherwise monocrop agricultural and forest land. This project will help ensure the local prosperity of endangered native tree species both in the Brazil nut concessions areas and the forests of Finca Las Piedras. However, long term we aim to address the larger goal of increasing biodiversity and reforestation efforts within Brazil nut farmer's properties and the forests of Finca Las Piedras. We hope that the replicability of our project will allow for long term forest restoration to tackle the biodiversity crisis in Brazil nut concession areas.

Methodology & Protocol

We collected any viable seeds encountered while hiking in the forest at Finca Las Piedras. Each seed collected was given a voucher code so that it would be easily traceable. As we found fruits or seeds, we collected the name of the collector, the collection date, the number of seeds found, descriptions of the seeds found, waypoints of seed location in latitude and longitude, seed placement when found, and number

of seeds in a fruit (if applicable). If we could find the tree from where the fruit or seed fell, we collected descriptions of the tree, the diameter breast height of the tree, and additional orienting information. We also took pictures of the original seed placement, the seed itself from many angles, the inside of the fruits or seeds, and the originating tree, the bark, the leaves, dead leaves, any exposed roots or buttresses, and any additional interesting data. If we couldn't identify the seed, we initially cross referenced our seeds with the Fruits and Seeds of Finca Las Piedras field guide (Smith, & Gallice, 2017) we collaborated with naturalists from the region for identification. As such, we noted who identified the seed, how they identified it, when they identified it, the common and Latin names of the identified species, and whether the species was viable for our intended projects. While collecting, we ensured proper storage for our seeds (placed them in plastic containers with the lids off) so that they had adequate aeration so they would not get moldy.

Results

We discovered many decomposed or partially decomposed seeds during our walks through Finca Las Piedras. However, we also discovered many fruitful seeds that will contribute greatly to our reforestation goal of our project. The viable seeds we discovered were majority Palm seeds/fruits. These palm seeds occurred in large quantities (approx. 20-1000 viable seeds) surrounding the base of the tree they fell from. We also discovered seeds from vines, smaller shrubs, and small tree species, which will not be productive nor viable long term and were not worth planting. We discovered 17 different species and 558

seeds/nuts/fruits in total. Our results despite the non-viable, partially, or completely decomposed fruits and seeds were 74% Hausai palm seeds and 11.8% Hauponas palm seeds, of which we planted about 60-70 and 40-50 respectively. We also planted 31 Huayruro species, 2 Cashaponas, 10 unidentified (suspected palm) species, and 12 more Huasai palm seeds.

Discussion

This project plays an integral part of addressing deforestation and landscape change, as it provides the framework for restoring the forest through planting otherwise underutilised seeds. The scale of deforestation of the Amazon is rampant and devastating. Due to this accelerated harsh reality, ecosystem restoration efforts are essential. By planting otherwise underutilised and overlooked seeds, our project contributes to long term reforestation efforts at Finca Las Piedras and within nearby Brazil nut concession areas. During our time of collection (Mid-late June) many of the seeds we found on the ground were decomposed, yet, upon trial and error, we discovered how to determine which seeds were usable and which were dead or decomposing. After learning what to seek out in terms of seed quality we were then better able to collect useful seeds for our project. Learning which seeds species are viable at certain times of year (Mid to late June) is an integral tool in making this project more easily replicable in the future. We ended up planting three palm species and ### other species. The protocol and database we developed will help ensure the long-term prosperity of this project. We hope that the methodology we created for seed collection will allow this project to

continue time and time again, making this method of reforestation a necessary piece of the framework here at Finca Las Piedras.

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Citations

Geoff Gallice, May 31, 2022. (Conversation).

Smith, T. R., Gallice, G. (2017). Fruits and seeds of Finca Las Piedras. *Alliance for A Sustainable Amazon*.