

The genetic improvement of promising Amazonian tree species is at the same time very much needed and very problematic (Farmer participation and on-farm trials as a solution)

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INTRODUCTION

Several native Amazonian fruit species have commercial potential. Unfortunately, their economic characteristics vary from tree to tree, even on an individual farm. Strong variation in taste, size and pulp percentage can turn buyers away and make industrial processing inviable. This happened to peach palm (*Bactris gasipaes*), whose fruit varies strongly in quality, oil/starch quotient, size, form and color.

Genetically improved planting material can help to promote these species. However, it is impossible to guarantee long-term support for a breeding program with large on-station experiments of species with limited economic importance.

An alternative approach compares progenies of superior trees in on-farm trials, using one-tree plots, installed with assistance from researchers and managed by farmers. Single-tree plots are not ideal, but allow comparison of a high number of progenies on a small area, while culling can transform them into seed orchards of genetically improved material (van Leeuwen, 2009). The first results of trying this approach are discussed here.

MATERIALS AND METHODS

Work occurs in Amazonas state, Brazil, with peach palm and assai (*Euterpe precatoria*) in the municipalities of Coari and Codajás, respectively. Peach palm is an important, expanding cash crop in Coari, as is assai in Codajás. These municipalities are a one- or two-days boat-travel from Manaus, Amazonas' capital, where the National Research Institute of the Amazon (INPA) is based. The trials were made possible by short-term projects, ending shortly after installation. For Codajás, some contact was maintained through an intermediary. In Coari, some collaboration with INPA occurred in 2014-2016. In 2019, a new two-year project started to accompany the previously installed trials.

In Coari, 28 peach palm progenies are compared in ten trials (nine with smallholders, one at the local facility of the Federal University of Amazonas - UFAM), installed in January 2010. Each trial occupies 2800 m², has four repetitions, one-tree plots and 5x5 m spacing. In Codajás, five trials with smallholders were installed early 2011 to compare nine assai progenies. Each trial occupies 6000 m², having two repetitions, one-row plots of ten trees (time lacked to use one-tree plots), 5x5 m spacing and a surrounding border.



The difficult rural transport makes farm visits a challenging, time-consuming job. Try to work with groups of farmers relatively close to each other.
(The third author on her way to participating farms.)

RESULTS

During a 2014-visit to nine of the peach-palm trials, five were judged “very good”, one “good”, while four were in bad shape. A visit early in 2019 to Codajás encountered three well-tended trials (the other two were lost by the extreme high floods of 2012 and 2014). The lesson is clear: if a crop is important (and expanding), on-farm trials can be an option.

SUGGESTIONS AND RECOMMENDATIONS

Diagnosis of the species' local way of production and its place in the farming system can be helpful at the beginning.

Work with groups of farmers relatively close to each other. This reduces time and energy spent in travelling.

Trial size can vary with the farmer. Some can have one or few repetitions, others more.

Special border rows are necessary to avoid “border effects”. Next to forests, two or more rows are necessary. If possible, use plants from the progenies of the trial. Randomize border plants and map their origin.



Spontaneous fruit trees, not part of the trial, can affect the differences under study (assai progeny trial, *Euterpe precatoria*, 8 years after planting, farm in Codajás).



Border-effect affects growth of progenies (peach-palm trial, 5 years after planting, UFAM). Too ‘clean’ soil results from maintenance by company specialized in cleaning buildings.

Voluntary trees need to be removed from the trial (farmers maintain useful trees), to avoid heterogeneity. Acting in time, the seedling can be placed elsewhere.

Controlled intercropping with a second tree species is an option. At the start, the trial is often combined with an annual crop (manioc). After that, farmers will introduce trees in a haphazard way. To avoid this, intercrop the trials with an adequate, farmer-chosen crop and assist with obtaining planting material. For both palms, cupuaçu (*Theobroma grandiflorum*), guava (*Psidium guajava*) and guarana (*Paullinia cupana*) may be good choices.

At least one trial at a location where thinning will be acceptable: an institution or farmer interested in selling quality plants. (Eliminating productive trees goes against peasant logic.)

Try to find ways to motivate participating farmers. Make clear what is expected from the farmer (in writing?), organize field days, judge trials at intervals, award diplomas at an official meeting, . . .

Try to get local cooperation: education institutions, extension service.

Try communication by smartphone (photos, videos, spoken reports) between Research Centre and interior.

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