# **Cracking the Brazil Nut puzzle : Can Nut Gathering** and Timber Harvesting Coexist?

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# Introduction

Non-timber forest products (NTFPs) can provide a livelihood for forest communities in the tropics. Yet, forests are becoming more accessible to logging companies. Thus, it is vital to develop forest management practices that do not jeopardise NTFPs. Brazil nut (BN), *Bertholletia* excelsa, is important due to its high market value, and the need for near intact forest for production.



#### Results

- Main yield-influencing factors: size, crown position, liana load, yearly variation, genetics, climate, soil and pollination
- 98% of trees >40 cm diameter at breast height are productive
- Emergent rather than suppressed crown essential for productivity
- At DBH >100 cm, crown size most important factor
- Higher productivity on soils with higher CEC and available P
- Liana cutting greatly increases yield over time

Fig 1: Two Brazil nut trees in Acre, Brazil credit: Jürgen Blaser

### **Objectives**

1: Identify most important factors for BN productivity

2: Assess which forest management techniques can enhance BN production in natural stands and minimize trade-offs incurred during timber harvest

3: Assess effects of differing social and policy contexts on practices and stakeholder perceptions

#### **Methods**

Systematic review in "web of science" using the search string "Brazil nut" as topic on 25.08.2019  $\rightarrow$  1249 papers

• Improved regeneration in shifting cultivation fields compared to logging gaps

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External factors	Population	factors	Individual factors	
Abiotic :	Short term :		Size: DBH for young	
-soil depth, type, cation exchange	-Density of reproductive	e trees,	specimen, crown size for trees DBH>100 cm	or
capacity, available P	high produc	ing trees	Crown shape, position	
-climate: September rainfall, el Nino,	(DBH 100-15 Medium ter	,	(emergent, in canopy, suppressed)	
extreme events			Liana load→influences	
	-Prereprodu	ctive	crown shape/size	
Biotic:	sapling dens	sity,		
-Pollination	growth, survival (light and soil nutrients)		Yearly fruiting variation pattern→biannual,	
-Dispersal	Long term:		regularly high/low, almost biannual	
	-Seedling an densities	d sapling	Other genetic factors	
Recommended practices for enhanced production potential:		Reduced impact logging synergistic and mitigating practices for BN		

Refining results to relevant categories: forestry, environmental studies, plant sciences, biodiversity conservation, ecology, biology, agriculture multidisciplinary, agronomy, horticulture, entomology, environmental sciences"  $\rightarrow$  471 papers

Limited to documents containing search terms in title  $\rightarrow$  166 papers Process above repeated with search string "*Berthollettia excelsa*"  $\rightarrow$  72 papers

Combination of both searches  $\rightarrow$  189 papers  $\rightarrow$  overlapping results

Further selection according to the potential relevance estimated by analyzing the titles and abstracts  $\rightarrow$  61 papers



External: P amendments for soil, ecosystem preservation for biotic factors

Population: protection and conservation of mature, reproductive specimen, sufficient gap sizes to allow seedling development and sapling growth, most efficient enrichment plantings in fallows

Individual: Assess production potential/fruiting pattern of trees, map locations, liana cutting for crown shape/size

Synergistic: Liana removal for crew safety, damage avoidance, smaller logging gaps, low intensity preserves ecosystem, previous mapping of BN used in planning or BN mapping during logging planning

Mitigating: marking BN trees before logging, directional felling to avoid BN trees

Weaknesses: high cost/low timber volume, insufficient gaps for medium/long term regeneration

Fig 3: Scheme aggregating the main findings

## Conclusions

- Coexistence, even synergies between nut gathering and timber harvest are possible
- These depend on applied forestry practices, location and timing
- Logging activities should be planned with nut gatherers if they are not executed by them.

#### Fig 2: Location and number of studies on Brazil Nut (n=61)

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Institutional barriers such as unclear and conflicting legal frameworks

hinder the integration of both livelihoods

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