

Abstract

In East and Central Java, Indonesia smallholder farmers have developed tree production systems as the best use of marginal agricultural uplands. The systems are frequently intercropped, but dominated by trees with teak as the major species component. Farmers usually grow teak from seedlings of natural regeneration origin, without any attempt at selection for growth rate, wood quality or forms. Farmer surveys and an inventory of tree gardens were conducted in Gunungkidul District, Yogyakarta, on Java Island to establish the importance of teak to farm families and to identify the silviculture practices currently used by farmers. Results indicate that few farmers practice any form of silvicultural management and smallholder teak production systems in Gunungkidul yield timber of limited quantity and quality. Smallholder management practices, together with limited market knowledge and restrictive timber regulation policy, impede the profitability of smallholder teak systems. Adopting improved silvicultural practices is a step towards improving returns from smallholder teak systems. Those practices should be integrated into the existing smallholder teak systems. A related challenge is to build smallholders' market linkages and improve their financing options. Work on those two topics is ongoing.

Objectives

Identify and evaluate current and potential silvicultural management practices through participatory approaches that include smallholder producers and forestry professionals

Methodologies

- Inventory of 227 tree gardens, 47.1 hectare
- Farmer Interviews with 275 farmers
- Visits to teak research stations and teak plantations
- Focus Group Discussions

Results - Smallholder Teak Systems

Most farms consist of multiple parcels and various teak production systems. Teak is the most important tree crop, accounting for 12% of household income. It is managed to meet households periodic and emergency monetary needs.

The most common smallholder teak systems are:

- *Tegalan* – upland systems found 1.0 to 1.5 km from the homestead, where tree and annual crops maybe either integrated or segregated
- *Pekarangan* – homestead systems found near the homestead, where tree and annual crops are mainly integrated
- *Kitren* – upland tree farming systems found 1.0 to 1.5 km from the homestead, without annual intercropping
- Border planting – trees planted on the border of agricultural land



Figure 1. Tegalan system



Figure 2. Pekarangan system



Figure 3. Kitren system



Figure 4. Border planting system

Table 1. Characteristics of smallholder teak systems.

Teak System	Percent of Teak Systems	Farm Size (ha)	Tree density (ha)	Tree species (farm)
<i>Tegalan</i>	50.6%	0.47	1072	8
<i>Pekarangan</i>	21.9%	0.24	1177	13
<i>Kitren</i>	21.9%	0.31	1532	5
Border planting	4.8%	0.31	138	7

Hierarchical Cluster Analysis

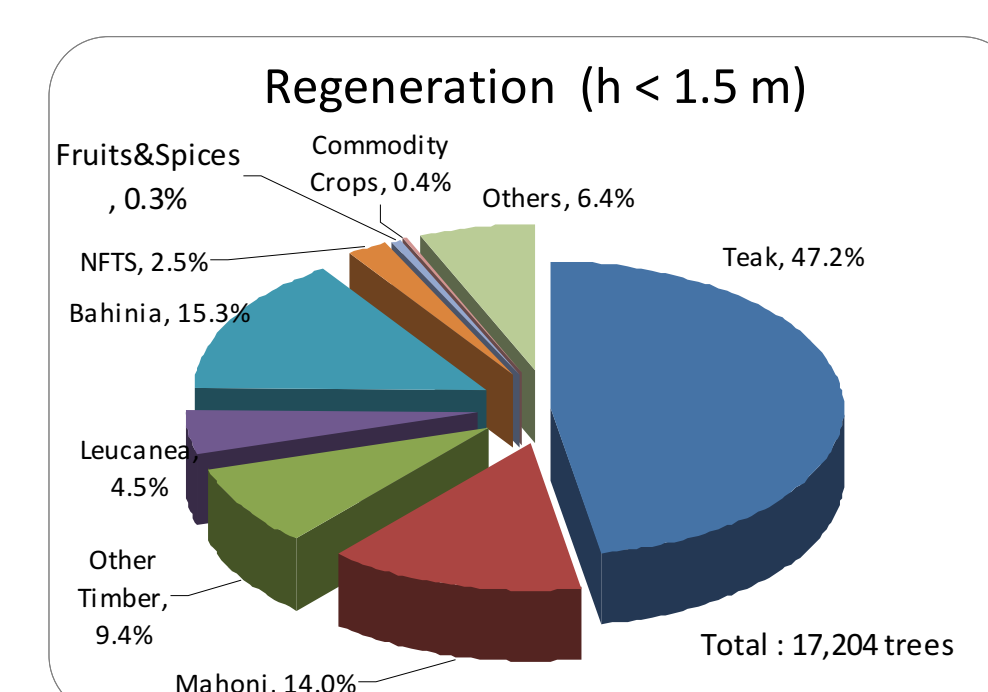
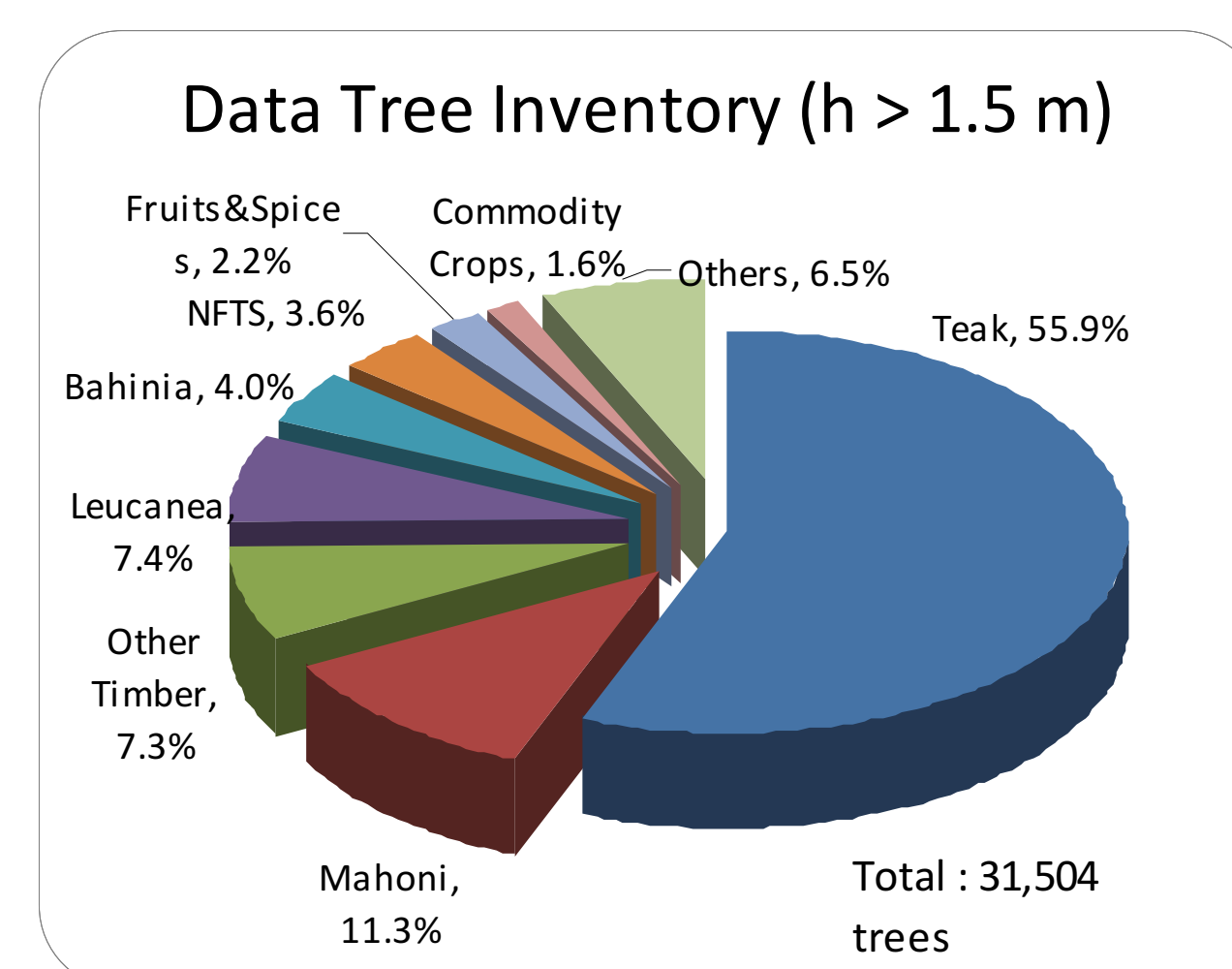
Cluster Analysis indicates that structure and management of *Tegalan* and *Pekarangan* systems are almost identical. Both systems are intercropped and together account for 72.5% of teak systems. *Pekarangan* systems contain a greater number of species. Tree spacing is 3x3 m in *Tegalan* and *Pekarangan* systems and 2.5x2.5 m in *Kitren* systems.

Intercropping

82% of farmers intercrop *Tegalan* and *Pekarangan* systems. Intercrops: soybeans (81% of farms), corn (66%), cassava (63%), peanuts (52%), and rice (35%). *Kitren* systems might be intercropped after seedling establishment for 1-3 years.

Species Composition

Teak dominates the systems (55.9% of trees and 47.2% of regeneration), followed by other timber species (18.7% and 23.4%, respectively).



Current Silvicultural Practices

- Regeneration: 72% of farmers use wildings, 30% local seedlings, 20% coppice, only 12% have used improved quality seedlings (mainly through government reforestation programs).
- Weeding and Use of Fertilizer: Only in association with annual crops.
- Pruning: 65% of farmers prune to harvest fuelwood, leaving 10-15 cm branch stub. 55% of trees pruned (mainly at age 1 to 10 years).
- Thinning: 57% of teak systems are not thinned. No thinning for quality or to improve growth (reduce density). No thinning of coppice. Traditional thinning equals harvesting the biggest trees when families need money.
- Harvesting: Traditional harvesting system is '*tebang butuh*' (harvest to meet needs).



Farmer teak systems can be described as overstocked, slow growing, and of sub-optimal quality and production.

Farmers are aware they need to improve their silvicultural management. They request information on pruning, thinning, quality germplasm, market access and information, and intercropping.

Other Work

Farmer Teak Silvicultural Trials to:

- demonstrate the advantages of teak silvicultural management;
- inspire innovation by participating farmers; and
- create field venues for cross-visits and farmer workshops.

Six months after establishment of trials results indicate improved height and diameter breast height (dbh) from thinning, pruning, and singling coppice treatments.

Developing *Farmers Silvicultural Manual* jointly with farmers based on standard silvicultural practices, farmers' realities, and project findings.

Trial results and the manual will be useful avenues to facilitate enhanced silvicultural management by farmers.

Summary Thoughts

Smallholder systems are not industrial plantations and farmers are not solely teak producers. *Tebung butuh* system might be best for farmers. However, current management practices are sub-optimal. Farmers need to improve their silvicultural practices. Silvicultural management needs to be integrated with better awareness of ongoing associated work to identify marketing opportunities and financing options.

Acknowledgement

This study was implemented with support from the Australian Centre for International Agricultural Research (ACIAR), in collaboration with CIFOR, Inter-CAFÉ IPB, Forest Research and Development Agency (FORDA, Department of Forestry, Indonesia) and Pokja Hutan Lestari Gunungkidul.