



Indonesian Rubber Research Institute



Permanent rubber agroforest, based on gap replanting, as farmer strategy in Jambi, Indonesia*

Gede Wibawa, Sinung Hendratno, Anang Gunawan, Chairil Anwar, Supriadi, Arif Budiman & Meine van Noordwijk

Introduction

Rubber is an important tree crop in Indonesia (covering 3.5 million ha), most of it (83%) is “jungle rubber” managed by smallholders. This low input system combines profitability and environmental protection. Two basic options exist for rejuvenation: **SLASH-and-BURN** based cyclical systems (**CRAS**, Photo 1) or by **GAP**-planting in permanent agroforests (**PRAS**, Photo 2)



Photo 1: Slash and burn based cyclical rubber agroforestry systems (CRAS)



Photo 2: Gap replanting (without burn) in permanent rubber agroforestry systems (PRAS)

As part of the ASB program a survey was started to better understand farmers interest in and constraints to use PRAS. We set out to characterize PRAS choices at landscape, village/household, field, patch/gap and tree level.

Photo 3: Discussion with farmer collecting clonal seedling for *sisipan* (inter-planting)



Results

- * the local name for gap replanting is **Sisipan**
- * most gap planting uses natural gap (88% of responses), rather than (partly) man-made gaps (12%0
- * part of the PRAS farmers (24 %) also plant rubber after slash-and-burn on forest or bush fallow land
- * if gap space allows (100-200 m²), farmers may use selective light burning and plant horticulture crops such as: chilly, tomato, soja bean.
- * some farmers *sisipan* young rubber between very old rubber trees (5-10 trees/group) and then overexploit them by tapping all panels to kill the trees slowly. Two to three years after, they hope that the old rubber trees will die and can be replaced by the new generations of *sisipan*.
- * The most important tree plant by farmers (88%) for gap planting is rubber (*Hevea brasiliensis*) followed by coffee (*Coffea robusta*) and cinnamon (*Cinnamomum burmanii*) (9%).

There are three ways of obtaining rubber planting material:

- a) by preparing, one year before planting, in a small portion of land near the house, where the rubber seeds are collected from their rubber garden,
- b) by transplanting small/young rubber seedlings (1-2cm of stem diameter and 1m height) from the existing rubber garden to the gap,
- c) by buying big and high seedling stumps (3-5cm stem diameter and 2-2.5m height) at the village market. Before planting, normally during wet season, the planting materials are soaked in river or pond for about 10-14 days, to stimulate the bud growth.

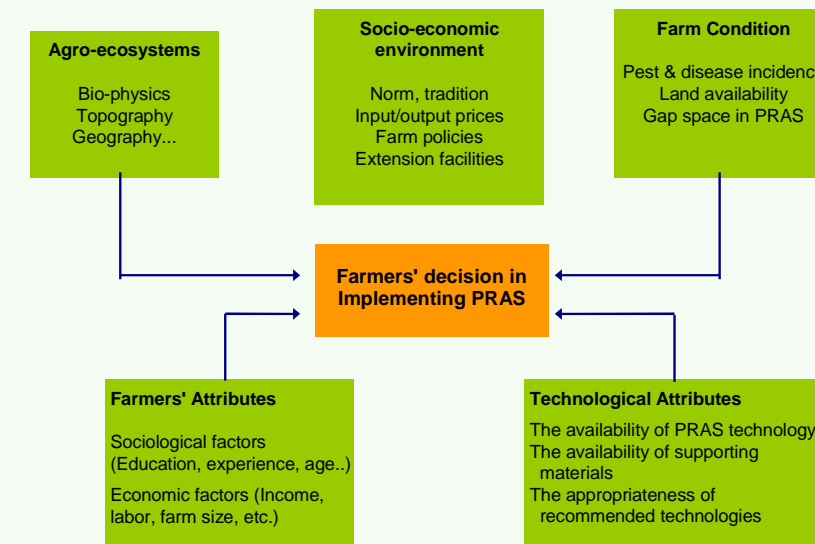
The choice of planting materials is closely related to the risk of pest damages (wild pigs, deer, monkeys) and to the competitiveness of rubber to its surrounding vegetation. The bigger and higher the planting materials, the higher the chance of success. Farmers hope that the high seedling stumps grow faster and can be tapped earlier than the smaller planting materials.

- * The goal of 'sisipan' to hide the plant from pest damages, especially wild pigs and monkeys. Average number of trees planted in a natural gap range between 50 - 100 trees ha⁻¹ year⁻¹ while for an artificial gap may reach 1000 trees ha⁻¹ year⁻¹
- * Individual fencing, using bamboo or woods, is the way to protect the plants from pests, especially for the those planted following the weeded rows.

Plant/vegetation category	Plant/vegetation types
A. Main plants having high economic value	Rubber, Coffee, Cinnamon (3)*
B. Plants/vegetation having medium economic value	
* Fruit trees	Lancium, Jengkol, Petai, Kabau, Jack fruit, Cempedak, Rambutan, Salaca, Manggis, Kemiri, Klengkeng/Bedaro, coconut, Durian (13)
* Food crops	Rice, Chilly, Tomato, long bean, ground nut, green bean, banana, egg plant, Zingiberaceae, sweet potato, cucumber (11)
* Timber trees	Sungkai, Medang, Pulai, Balam, Rotan, Bambu, Meranti, Mersawa, Kompas, Jelutung, Petaling, Tembesu, Kulim, Plangas (14)
C. Plants/vegetation that potentially have high economic value	Kelat, Siacing, Pening-pening, Kemenyan, Terentang, Irok-Irok, Leban, Jerangkang, Ekonomi, Sesam, Sapat, Pinang Baik, Klukup, Kawang (14)
D. Other plants/vegetation	Berangan babi, Kayu Buluh, Nibung, Kayu Ubi, Mang, Terap, Jirak, Mupul, Pinis, Sekubung, Semantung, Balik Angin (13)

(*) number of species

* Research funds were obtained from the Australian Centre for Institute Agriculture Research (ACIAR) via the Alternative to Slash-And-Burn program
* Participation at this meeting was funded by the United Kingdom Department for International Development under the Forestry Research Programme project R7264. DFID accepts no responsibility for information provided or views expressed.



Key reasons to choose PRAS

Order of determinant factors influenced farmers to practice *sisipan*.

No.	Description	Percentage
1	PRAS is farmers' effort to increase the land productivity and to keep the continuity of income from the existing rubber and other trees.	99
2	PRAS is practice to minimise risks such as: risk due to pest (wild pigs, monkeys, deer) damages.	74
3	PRAS is done to rationalise the family labor shortage (due to limited capital to hired labor and limited family labor, unavailability of cheap inputs of production at village level and extensive upkeep of plants in <i>sisipan</i>)	58
4	PRAS is old tradition technology that is transferred from father to son, and easy to be adopted by farmers in relatively small scale farming. No special time should be allocated to practice <i>sisipan</i>	56
5	PRAS just needs very little cash money and may be adapted to the limited availability of farmers' capital.	51
6	Size of land owner of farmers is still large, where the production factors available may be used to manage other activities in CRAS.	16
7	Other reason/factor	8



Photo 4: Bamboo shafts are used to protect *sisipan*-rubber from pig damage

Conclusion

PRAS systems are much more common than we had realized.

At the landscape level, PRAS is closely related to the availability of land for paddy rice production. Upland rice can not be grown in a PRAS system, as it needs an open area benefits from slash and burn practices (increase of pH, soil minerals such as P, Mg and K).

PRAS, at village level, is influenced by land shortage, accentuated by: protected forest, private plantation and transmigration projects. Socio economic environments such as distance to road, extension facilities and technological attributes such as the appropriateness of recommended rubber technologies and availability of planting material could not be analyzed at this stage, due to limitation of the design of study.

The relation between age of farmer and length of experience in implementing PRAS indicates that older farmers tend to practice PRAS just recently, while younger farmers tend to have longer experience in PRAS. This might be affected by limited land availability at village level faced by younger farmers, while the older farmers did not experience such condition in the past.

The most determinant factors of PRAS at farmers level are combination of more than two factors. The main factors are continuity of income from rubber or other trees and the risk of pest damages (wild pigs, monkeys, deer).

At gap and tree-level further research is in progress to test how more productive rubber germplasm can be introduced in the context of PRAS systems.