



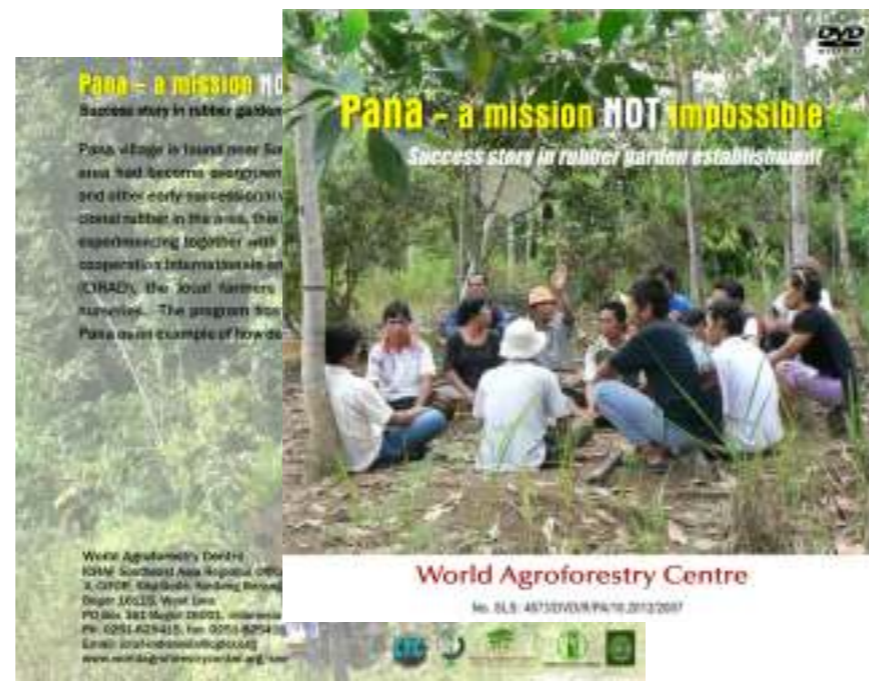
World Agroforestry Centre
TRANSFORMING LIVES AND LANDSCAPES

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RAS-3: The Conversion of Degraded *Imperata* Grassland to Productive Rubber Agroforest in West Kalimantan

Introduction

- *Imperata* grassland covers large areas of West Kalimantan with little production function.
- Rubber Agroforestry System type 3 (or RAS-3) can be established in *Imperata* land and provide rubber, perennial timber and fruit trees.
- Annual crops (rice, chilli, vegetables) are grown in the first year only
- Legume Cover Crops include *Mucuna*, *Flemingia*, *Crotalaria*, *Setaria* and *Chromolaena*
- Fast Growing Trees (FGTs) such as *Paraserianthes falcataria*, *Acacia mangium* and *Gmelina arborea* can effectively shade out *Imperata* and also produce for pulpwood.



Local farmers' comments from RAS trials are captured in video

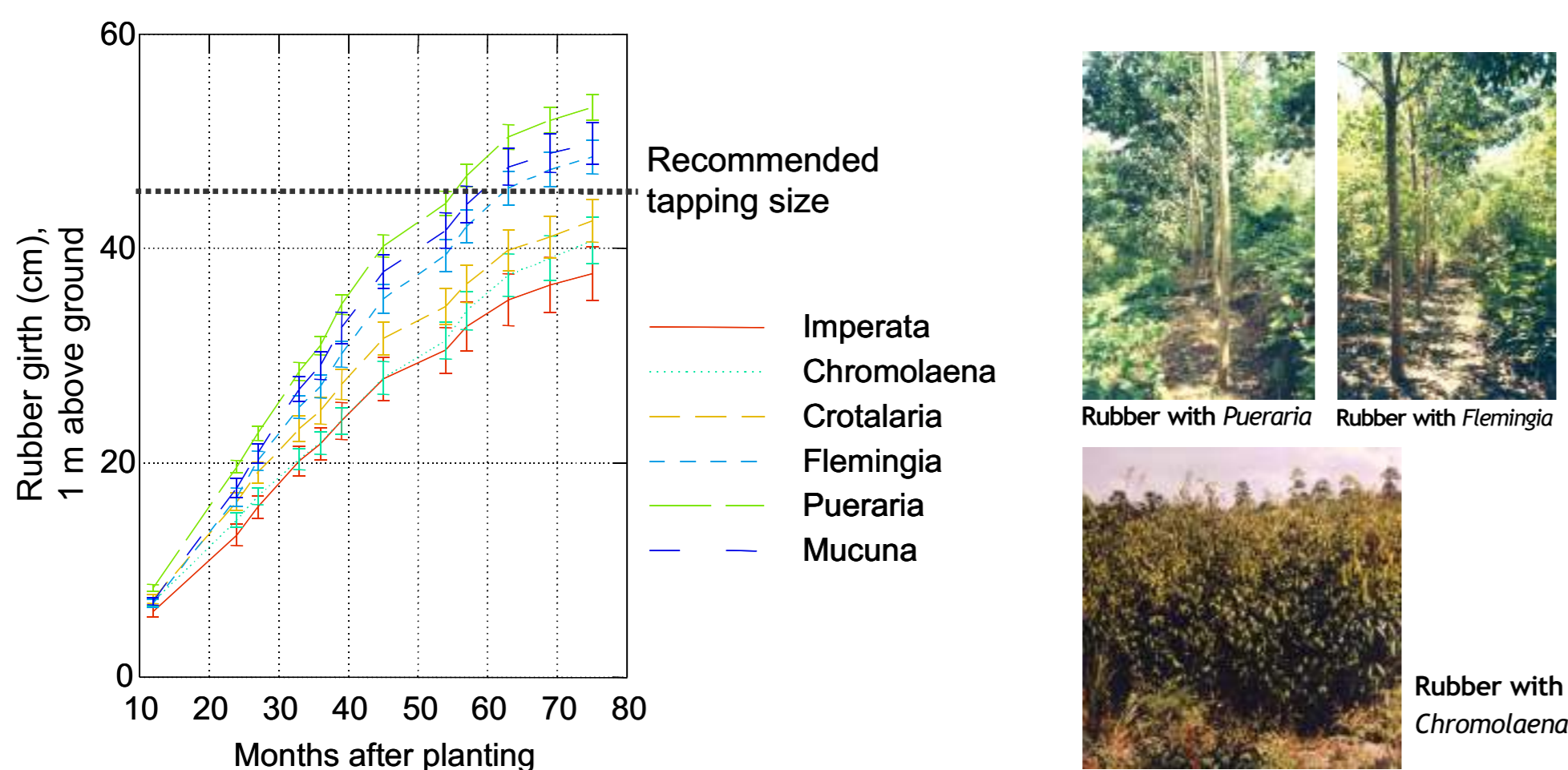
Methodology

- As part of a large network of rubber agroforestry demonstration-trials in Indonesia, the RAS-3 approach was tested in 3 sites in West Kalimantan, monitored for 6 years
- Compared trees and types of cover crops/MPT/FGT combination.
- Productive rubber clones (PB260, BPM1) raised in polybags in nurseries and planted in the field with normal density of 550 plants/ha.
- Included farmers traditional practice of growing annual crops in the initial years.
- Trial plots managed by farmers, with technical advice from ICRAF.
- Farmers did not always follow the agreed protocols.

Result and Conclusion

Rubber and cover crops

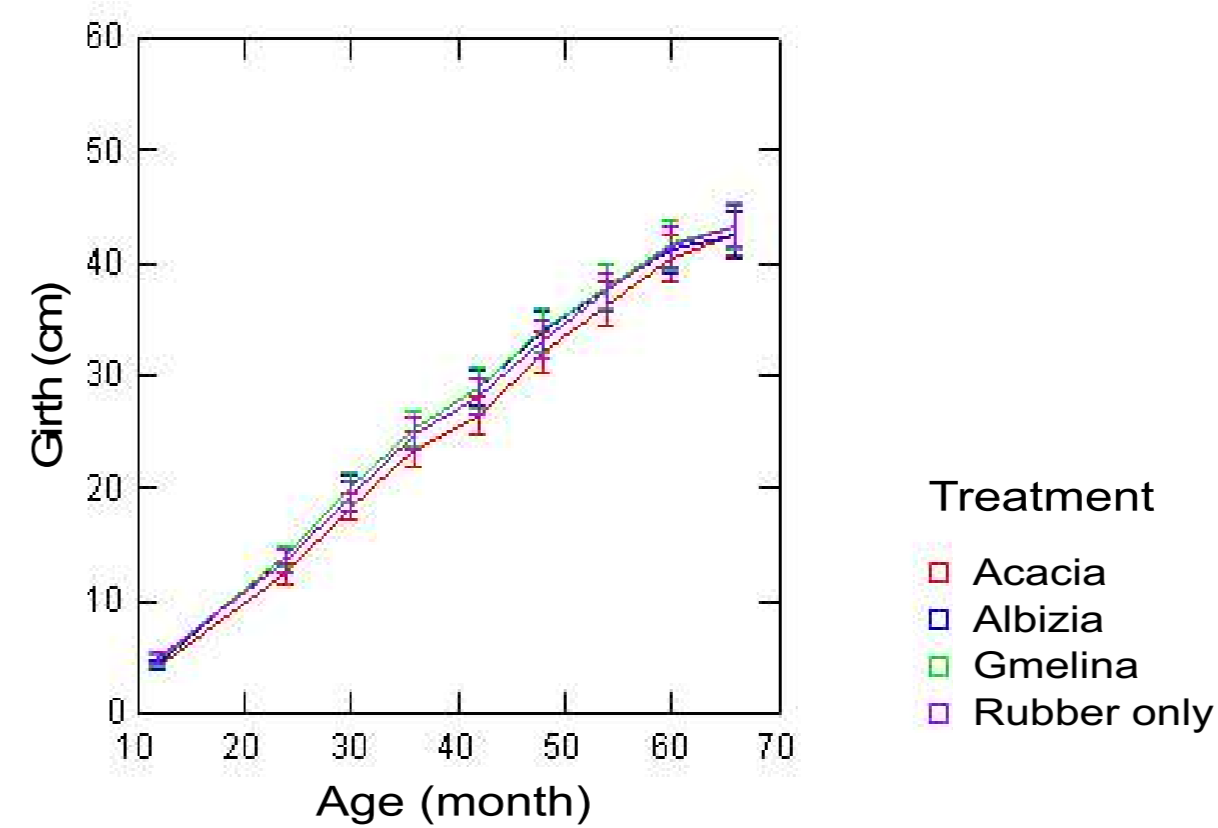
- Cover crops varied in their ability to suppress *Imperata*.
- *Pueraria*, a creeping legume was most effective followed by *Mucuna*
- Both required regular 'weeding' to avoid their vines climbing strangling young rubber trees.
- Among erect legumes *Flemingia* proved better
- *Crotalaria* was ineffective
- Rubber trees in control plots (without cover crops) showed the slowest growth



Graph 1. Rubber tree growth in RAS-3 trial plot with cover crops

Rubber and fast growing trees (FGTs)

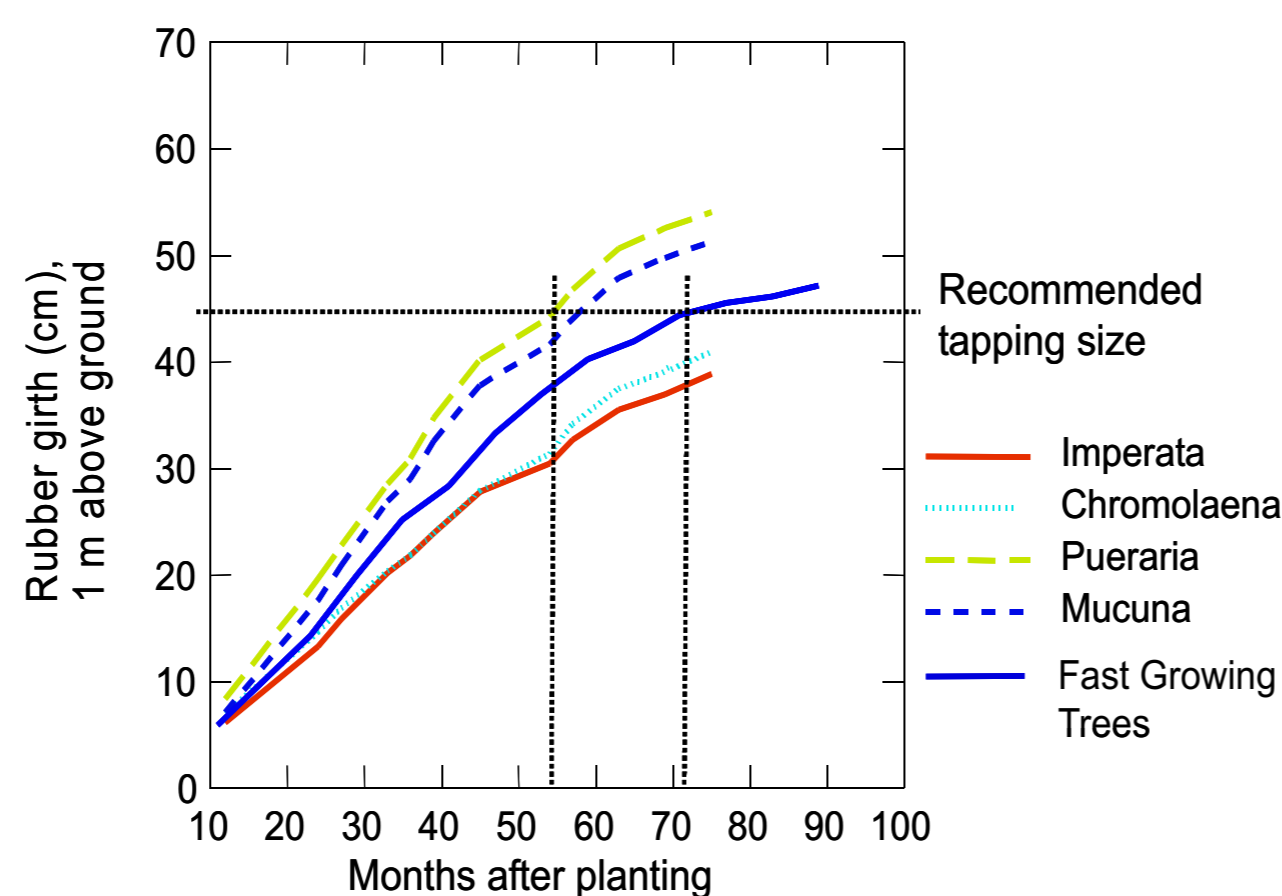
- All FGT species seriously affected growth of rubber trees; hence farmers cut down all remaining FGTs in the third year.
- All FGTs were only partly successful in controlling *Imperata*
- *Imperata* managed to regrow in more than half of the plots.
- There was no statistically significant difference in control of *Imperata* or growth of rubber trees between the tested FGT species - *Acacia*, *Paraserianthes* and *Gmelina*
- But rubber growth in FGT mixed plots was better than in *Imperata* or *Chromolaena* infested plots; but this was far less than growth of rubber growth in plots with legume crops.



Graphic 2. Growth of rubber trees with cover crops and fast growing trees.

Additional Observation

- There was no higher incidence of rubber tree mortality due to White Rubber Disease in jungle rubber converted plots (2-6%) compared to previously *Imperata* grassland (1-7%).
- Survival of rubber trees was above 90 percent.
- In the first two years of tapping, latex yield from PB260, RRIC100 and BPM1 reached 1100 - 1300 kg/ha/year.



Graph 3. Rubber tree growth in RAS-3 plots

Conclusion

- LCC (*Pueraria* and *Mucuna*) effectively controlled *Imperata*, but required periodic 'weeding' to prevent strangling of rubber plants.
- Seeds of *Pueraria* and *Flemingia* were unavailable locally and *Mucuna* required repeated planting.
- FGTs (selected for their use as pulpwood source in future) only partly suppress *Imperata* growth.
- All FGTs, *Acacia* in particular, seriously affected growth of rubber trees from the start.
- Planting FGTs 2-3 years after planting rubber may be better, while *Pueraria* and *Mucuna* should be incorporated in these first few years.
- Most associated fruit trees did not survive the harsh condition of *Imperata* infested land.

