WEST-SUMATRA PROGRESS REPORT

NUMBER 2/Augustus 1996

R.A.S ON FARM EXPERIMENTATION
IMPLEMENTATION IN THE WEST-SUMATRA PROVINCE
In East Pasaman

MONITORING MISSION

Eric Penot, ICRAF
Pak Hisar, BPS
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1 OBJECTIVE OF THE MISSION

The main objective was to monitor the implementation of the 8 on-farm trials in the village of Bangkok, East Pasaman. A programme of activities has been set up with the staff involved in the activities, ie Pak Coan, PPL from DISBUN, who will work 2 days a week on SRAP activities, Pak Sofyan, Pro-RLK, as field coordinator, Pak Hisar, BPS for technical support and Hellen Kramer, Pro-Rlk, as supervisor.

2 TRIALS CHARACTERISTICS

All 8 trials are located in the village of Bangkok, representative of a very critical land pattern with the following characteristics:

- The altitude is at the limit of marginal land for rubber (between 500 and 600 meters).
- Soils are acid leached soils with a very low nutrients content,
- Steep slopes with high risk of erosion,
- Sheet Imperata environment.

RAS 2.2 systems with continuous foodcrops pattern and countour lines appear as one of the most probable tree crop based alternative to rehabilitate such critical land.

The 3 trials implemented in Bangkok are the following:

RAS 2.2a : comparison of 3 amounts of fertilization for rubber:

- PLOT A : "0 fertilization",
- PLOT B : "application of high amount of Rock Phosphate (RP) at planting time only (1 ton /ha or RP, 27.5 % in the planting hole and 72.5 % broadcast in the field at planting time)
  So - in the planting hole : 500 grams per trees (275 kg/ha)
  - broadcast in the field at planting time : 725 kg/ha
- PLOT C : complete TCSDP fertilization programme for the first 2 years with RP at planting time and NPK fertilisation every 3 months).
TCSDP fertilization programme is the following:

**IN GRAMMES/tree**

<table>
<thead>
<tr>
<th>PLANTING TIME</th>
<th>+ 3 months</th>
<th>+ 6 months</th>
<th>+ 9 months</th>
<th>+ 12 months</th>
</tr>
</thead>
<tbody>
<tr>
<td>October 96</td>
<td>January 97</td>
<td>April</td>
<td>July</td>
<td>October</td>
</tr>
<tr>
<td>RP</td>
<td>200</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>UREA</td>
<td>50</td>
<td>50</td>
<td>50</td>
<td>50</td>
</tr>
<tr>
<td>SP36</td>
<td>40</td>
<td>40</td>
<td>40</td>
<td>40</td>
</tr>
<tr>
<td>KCL</td>
<td>40</td>
<td>40</td>
<td>40</td>
<td>40</td>
</tr>
</tbody>
</table>

The amount of each fertilizer to be supplied to the plots is calculated in annex for each farmer and for each plot.

*Note that the protocol of this trial has been changed compared to the original version released in the March 1996 report, to take into account the interesting results of the PKT demo plots (use of 1 ton of RP/ha).*

**RAS 2.2b**: emphasis is put on rice experimentation: *varieties x fertilization*.

- **PLOT A**: local rice or improved rice (variety 1) + 0 fertilization
- **PLOT B**: local rice or improved rice (variety 1) + CRIFC fertilization dose (high dose recommended by CRIFC/Bogor)
- **PLOT C**: improved rice (variety 2 + 0 fertilization)
- **PLOT D**: improved rice (variety 2) + CRIFC fertilization dose (high dose recommended by CRIFC/Bogor)

Rice varieties 1 and 2 are Wayararem and Jatiluhur with a 4 months cycle. Local rice varieties have a 6 month cycle.

"**CRIFC fertilization dose**" is the dose recommended by CRIFC/Bogor for JAMBI.

**FERTILIZATION DOSE**

<table>
<thead>
<tr>
<th>DOSE IN KG/HA</th>
<th>UREA</th>
<th>SP 36</th>
<th>KCL</th>
</tr>
</thead>
<tbody>
<tr>
<td>CRIFC</td>
<td>150</td>
<td>220</td>
<td>150</td>
</tr>
</tbody>
</table>

*Note that the protocol of this trial has been changed compared to the original version released in the March 1996 report.*
In 1996, due to the fact that some farmers have already planted their fields with local rice, the programme is the following:

<table>
<thead>
<tr>
<th>farmers</th>
<th>PLOT A</th>
<th>PLOT B</th>
<th>PLOT C</th>
<th>PLOT D</th>
</tr>
</thead>
<tbody>
<tr>
<td>SIAM</td>
<td></td>
<td>LOCAL RICE</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BURHAM</td>
<td></td>
<td>LOCAL RICE</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BADUL</td>
<td>Jatiluhur</td>
<td>Jatiluhur</td>
<td>Wayararem</td>
<td>Wayararem</td>
</tr>
<tr>
<td>MUKTAR</td>
<td>local</td>
<td>local</td>
<td>Wayararem</td>
<td>Wayararem</td>
</tr>
<tr>
<td>No fertilization</td>
<td>No fertilization</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BURHAM extra plot</td>
<td>Jatiluhur</td>
<td>Jatiluhur</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Siam and Burham: no rice experiment in 1996. Local rice with no fertilization.
Badul: complete design with 4 plots: Jatiluhur/Wayararem x dose 0/dose CRIFC
Muktar: design of the fields according to the map as some plot have been partially planted with local rice (no fertilization) and 2 plots will be planted with Wayararem (1 plot with 0 fertilization and 1 plot with CRIFC fertilization).

To complete the rice experiment, a small plot without rubber (pak Burham) will be planted with 2 plots: be planted with Jatiluhur (1 plot with 0 fertilization and 1 plot with CRIFC fertilization).

RAS 2.2c: emphasis is put on the comparison between clones (both RRIC 100 and PB 260), BLIG (BLIG from North-Sumatra, and Seedlings from South-Sumatra (originally sold as BLIG but supplied to DRAP by a South Sumatra project).

The 3 plots are:
- PLOT A: clone
- PLOT B: BLIG
- PLOT C: Seedlings from South Sumatra.

The relative hologeneity and absence of characteristic yellow leaves plants of BLIG in the planting material supplied by a project in South-Sumatra indicates the possibility that this planting material is not BLIG but another clonal seedling planting material.
Normally, these plots are planted with improved rice varieties with BPS fertilization (BPS is a moderate dose of fertilization). ‘BPS fertilization dose’ is the dose recommended by BPS/Sembawa (used in RAS 2.2c).

**FERTILIZATION DOSE for RAS 2/2c**

<table>
<thead>
<tr>
<th>DOSE IN KG/HA</th>
<th>UREA</th>
<th>SP 36</th>
<th>KCL</th>
</tr>
</thead>
<tbody>
<tr>
<td>BPS</td>
<td>100</td>
<td>160</td>
<td>75</td>
</tr>
</tbody>
</table>

In 1996; farmers have planted their fields with local rice so this protocol for rice is cancelled and postponed for 1997.

In 1996: local rice and NO fertilization

All new RAS trials protocols are presented in anex 1. Plot situation is presented in anex 2.

**3 VISIT TO THE SRAP SITE IN EAST PASAMAN: in the village of BANGKOK.**

The mortality of rubber has been very high (up to 80% in the RAS 2.2a fields) due to late planting, direct planting of stumps and relative drought of the dry season. The late and direct planting has not allowed the rubber trees to have a sufficient development of roots to compete with drought. Therefore, the conclusion for rubber are the following according to this very critical environment:

- Early planting in October of stumps in polybags with the minimum stage of 1 whorl is required. Stumps have therefore to be prepared in polybags in July for a planting in the fields in October. The sooner the best in order to allow a sufficient development of the young trees to survive a possible drought in dry season, according to erratic rainfall pattern.

- Fertilization seems to be a key component for the first year, either with a high amount of RP at planting time or with a 3 months continuous supply such as TCSDP fertilization programme. The trial RAS 2.2a should provide an answer.

- Imperata is not anymore a problem as long as continuous cropping is done by the farmer: the consequence is that weeding of rubber trees is perfect. However, continuous cropping without supply of fertilizers may lead probably to a limited nutrient supply for rubber. Fertilization of intercrops should be seriously considered.

- Rotation of rice and leguminous (peanut in that case) is favorable to both rubber growth and rice production.
4 MAIN COMPONENT OF A PROGRAMME OF ACTIVITIES

4.1 PROGRAMME OF ACTIVITIES FOR THE PPL/DISBUN

Time table: 2 days per week.

Programme of activities per month

AUGUSTUS

Maps of each fields will be provided to the PPL by ICRAF. Fields maps have the complete design of the fields with all rubber and associated trees. These fields maps are the following:

- fields maps with locations for associated trees (Durian, Petai, Jengkol, Kemiri and Cinnamon)
- fields maps with the definition of the plots according to the type of trials:
  - RAS 2.2a/rubber fertilization: 3 plots with fertilization dose: 0, RP at planting time and TCSDP (RP at planting time and SP36/UREA/KCL every 3 months)
  - RAS 2.2b/Rice fertilization: 4 plots: 2 varieties x 2 dose of fertilization (0 and CRIFC).
  - RAS 2.2c/Comparison clone/BLIG: 3 plots with clone, BLIG and seedlings from SumSel.
- fields maps with the selection of rubber trees to be measured for growth monitoring in each plots.

PPL and other staff should use these fields maps in order to implement the fields and monitor the farmers activities on rice and rubber planting, planting of associated trees and rice and rubber fertilization.

ACTIVITIES

- field stacking (pancan ajir) for clonal rubber for the 2 following farmers: Pak Badul and Pak Moktar (plots where rubber has to be planted in October 96).

- field stacking for non clonal rubber for the 2 following farmers for the "Bidji Sumsel" plots: Pak Budiman and Pak Udin (plots to be planted in October 96).

- field stacking for rice experiment: pak Burham (extra field close to the ICRAF field), pak Badul, pak Muktar.

The field stacking is according to fields maps provided to PPL.

- monitoring of the dead plants in each field: an empty map is copied and each dead tree should be marked as "dead". For all 6 planted fields. A table may report the total number of trees, the dead trees and the trees alive such as following:
Name of the farmer:
Type of trial:
Plot name:

<table>
<thead>
<tr>
<th>PLOTS</th>
<th>total number of trees</th>
<th>DEAD TREES</th>
<th>TREES ALIVE</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>B</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>etc....</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- ordering of fertilizers and other inputs necessary for the campaign (sprayer, round-up....), according to the field mission progress report of August 1996.

SEPTEMBER

- field staking for associated trees, according to the map provided by ICRAF. All 8 fields. All tree locations will be labeled with the name of the tree to be planted, so each farmers knows where to plant the trees. The associated trees are randomized on the field.

- control of the holing for rubber (6 x 3 m according to contour) and associated trees (9 x 12 m according to contour). All holes for rubber have to be completed by farmers at the end of September. All holes for associated trees should be completed for October.

- checking of stumps in polybags in farmers locations : with a good irrigation and control of growth (control that the shout is coming from the grafted bud and not from the rootstock ) and ensure that there is enough stumps for planting, or replacements of dead trees; in case there is not enough stumps in polybag (related to the number of dead trees per fields): immediately report to Pak Hisar for ordering more stumps from Sembawa.

- checking of the associated trees nurseries in farmers locations. Each farmers should prepare :
  - 20 durians
  - 20 petai
  - 20 jengkol
  - 20 kemiri
  - 50 cinnamon.
- implementation of a stock security nursery for associated trees in Rao in PPL’s place. With the following :
  - 200 durians
  - 200 petai
  - 200 jengkol
  - 200 kemiri
  - 200 cinnamon.
- rubber growth monitoring for 2 farmers fields: Pak Siam and pak Bumam, according to the protocol (measurements of 30 trees per plot with diameter, number of payung and height). So the number of trees to be measured, according to the fields maps is the following:

- RAS 2.2a/rubber fertilization: 3 plots with fertilization dose x 30 trees = 90 trees per field
- RAS 2.2b/Rice fertilization: 4 plots x 30 trees = 120 trees per field
- RAS 2.2c/Comparison clone/BLIG: 3 plots x 30 trees = 90 trees per field

Data are collected on the "rubber growth monitoring file" available in the RAS plot files with 1 page per plot.

- distribution of fertilizers and rice seeds to the farmers: fertilizers for rubber (planting time) and for rice (planting time and later for urea), according to tables available in the Augustus Field Report.

- making of the signs and implementation in the fields: Big sign of trials presentation at the entrance of the fields, signs per farmers close to each fields and signs per plots.

**OCTOBER**

- planting of rubber and fertilization at planting time:
  - specific fertilization for RAS 2.2a (Ema and Warni)
  - same fertilization for all the others: 200 grams of RP per tree at planting time

- planting of improved rice and fertilization at planting time (1/3 dose urea + SP 36 and KCL): see the protocol for the dose/ha and the tables in the report for each dose calculated per plot for each farmer.

- planting of associated trees: between October and December according to the tree status in polybags.

**NOVEMBER**

- distribution of UREA for rice experiment and monitoring of urea broadcast in the field (1 month after planting: 1/3 dose urea).

- monitor the planting of associated trees

- checking of the rice: chemical treatment if necessary in case of attacks of insects and pests.
DECEMBER

- distribution of UREA for rice experiment and monitoring of urea broadcast in the field (2 month after planting: 1/3 dose urea)

- monitor the planting of associated trees

- monitoring of rice harvesting (local rice) and control of rice production per plot (measuring the weight: production of the plot) and sending a sample of 100 grams of rice to ICRAF/Bogor.
  - RAS 2.2a/rubber fertilization: 3 plots with fertilization dose: so measurement of rice production for each.
  - RAS 2.2b/Rice fertilization: 4 plots: so measurement of rice production for each.
  - RAS 2.2c/Comparison clone/BLIG: 3 plots: so measurement of rice production for each.

- monitoring of dead plants in the fields (same as in September for all 8 fields.

- checking of the rice: chemical treatment if necessary.

**Monitoring of labour**

Each farmers should have a copy of the "buku buruh" and report in this book everytime he's going to SRAP plot the following:
- activity
- number of persons
- number of hours
- type of buruh: keluarga (familial) or Lain (external)
- the plot concernec (bagian).

The PPL should once a month that information is well collected by farmers. It is important for the farmers to be concerned with data collecting.

A monthly report of activities and problems will be sent every month to Pro-RLK and to BPS.

A technical mission with BPS (Pak Hisar), PRO-RLK/GTZ (Hellen Kramer) and ICRAF (E Penot) is scheduled in December. A further programme of activities will be then drafted.
## INPUTS AND ACTIVITIES DISTRIBUTION BETWEEN FARMERS AND SRAP

<table>
<thead>
<tr>
<th>SRAP project : INPUTS AND ACTIVITIES</th>
<th>FARMER : INPUTS AND ACTIVITIES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rubber stumps for:</td>
<td>Planting and replacement</td>
</tr>
<tr>
<td>Planting: Pak muktar and pak Badul</td>
<td></td>
</tr>
<tr>
<td>replacements: all other farmers</td>
<td></td>
</tr>
<tr>
<td>fertilizers for rubber</td>
<td>application according to TRIAL protocols</td>
</tr>
<tr>
<td>wayararem AND Jatiluhur seeds (improved upland rice)</td>
<td>local rice seeds</td>
</tr>
<tr>
<td>fertilizers for rice</td>
<td>seeds of palawijas for dry season cropping</td>
</tr>
<tr>
<td>Insecticides ad pesticides for rice</td>
<td>Chemical treatments in the fields</td>
</tr>
<tr>
<td>A special sprayer is supplied for that particular activity</td>
<td></td>
</tr>
<tr>
<td>Flemingia for contour line</td>
<td>Implementation of contour line</td>
</tr>
<tr>
<td>Buku Buruh + bolpen</td>
<td>Record of activities in the ICRAF fields</td>
</tr>
<tr>
<td>tools (cangkol)</td>
<td></td>
</tr>
<tr>
<td>Protection system against wild pigs (4 per farmers)</td>
<td>Control of animals</td>
</tr>
<tr>
<td>Round-up for new farmers for plot preparation for planting BLIG</td>
<td>Spraying in the fields</td>
</tr>
<tr>
<td>BLIG and seedlings from SUMSEL planting material</td>
<td>Plot preparation and planting</td>
</tr>
<tr>
<td>polybag for rubber and associated trees</td>
<td>Nurseries for rubber and associated trees</td>
</tr>
<tr>
<td>Plants of Sao for associated trees</td>
<td>collecting 20 seeds of Durian, 20 seeds of jengkol, 20 seeds of kemiri, 20 seeds of petai and 50 cinnamon for associated trees</td>
</tr>
</tbody>
</table>

## PROGRAMME OF TECHNICAL SUPPORT MISSIONS FROM BPS

Technical support mission from PBS (pak Hisar) are scheduled for Mid September, mid October and December.

The main activities will be the following:

### MID- SEPTEMBER

- Control of the activities to be implemented according to the programme of activities
- preparation of the rice experimentation
- control of the plot stacking for rubber, for the associated trees and for the plot division of each field.
- collection of soils samples by plot and by trials.

Two samples are collected per location: one for the 0-15 cm and one for the 15-30 cm. A sample is made with a minimum of 10 samples per plot and mixed together.

The soils samples to be collected is the following:

<table>
<thead>
<tr>
<th>TRIALS</th>
<th>number of plots per trial</th>
<th>number of trials</th>
<th>total number of soils samples per location to be collected</th>
</tr>
</thead>
<tbody>
<tr>
<td>RAS 2.2 a</td>
<td>6</td>
<td>2</td>
<td>12</td>
</tr>
<tr>
<td>RAS 2.2 b</td>
<td>4</td>
<td>4</td>
<td>8 (pak Badul + pak Muktar) + 2 (others) = 10</td>
</tr>
<tr>
<td>RAS 2.2 c</td>
<td>3</td>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>TOTAL</td>
<td></td>
<td></td>
<td>28 locations</td>
</tr>
</tbody>
</table>

Note: Only the 4 plots of pak Badul and Pak Muktar are sampled. The other RAS 2.2 b are all planted with the same local rice: in 1996: there is no 4 plots in term of rice experiment. So for the 2 other farmers (Pak Siam and pak Burham): only 1 sample per field.

TOTAL SOIL SAMPLES: 28 locations x 2 samples per location (0-15 and 15-30): 56 soil samples.

All soil samples should be processed in September and a report, with soil sample analysis and comments should be sent to E Penot in October 1996.

MID-OCTOBER

- Control of the activities to be implemented according to the programme of activities
- control of the rice experimentation
- control of the rubber planting
- control of the associated trees planting
- control of rubber fertilization according to the protocol
- control of rice fertilization according to the protocol
- control of the signs in the plots according to field maps
- information to farmers about the different treatments in the plots

DECEMBER

This mission will be a joint mission with PBS (pak Hisar), ICRAF (E Penot) and Pro-RLK (H Kramer and Pak Sofyan).
OTHER MONITORING ACTIVITIES to be implemented by Pak Sofyan

Paddy species survey:

Pak Sofyan may supervise a short survey on the local upland rice varieties used by the farmers. It will help us to select the best local variety, ie the best adapted to local conditions and appreciated by farmers, to be used in our trials. Survey file is in anex 3.

RAS Plot files

Each field should have its plot-file with all relevant information (data, growth monitoring, maps.....). Plot-files are available in the first SRAP report of march 1996 and have been translated.

Monitoring of labour

Each farmers should have a copy of the "buku buruh" and report in this book everytime he's going to SRAP plot the following:
The PPL should once a month that information is well collected by farmers. Pak Sofyan should check that labour monitoring is correctly done.

Technical training

Pak Hisar should train technically on rubber, rice and soil conservation the PPL and all staff from Pro-RLK/Disbun involved in our on farm experimentation in the fields.

Order of inputs.

See in anex the inputs requirements and the date of supply.
ANEXO 1

RAS 2.2 PROTOCOLES
RAS 2.2a TRIAL PROTOCOL

RUBBER + associated trees + intercropping

RUBBER FERTILIZATION

West-Sumatra province
East Pasaman
RAS METHODOLOGY

RAS 2.2a TRIAL PROTOCOL
RUBBER + associated trees + intercropping
RUBBER FERTILIZATION

TITLE
Clonal rubber in agroforestry environment: rubber + selected associated trees + intercropping / TREATMENT ON RUBBER FERTILIZATION

OBJECTIVE/HYPOTHESE

OBJECTIVES

As in jungle rubber system where rubber seedlings are associated with various kind of trees and plants, RAS 2.2 aims to associate useful trees (fruits and timber trees) with rubber, at a limited planting density, without substantial decrease in rubber yield. Rubber is planted at normal planting density of 550/ha as associated trees are planted at 92 trees/ha with a maximum number of 30 for big trees. In that case, fertilization of rubber may be a key factor in the trade-off between fertilization and level of weeding. In the case of East Pasaman area where fields are continuously cropped, weeding is not anymore a key factor as rubber trees are well weeded. The critical situation of the land: slope with high risk of erosion, poor soils, erratic rainfall and local severe drought during dry season as well as altitude implies that rubber should grow very fast during early stage after planting.

This trial is aimed to compare 3 level of fertilization on clonal rubber in RAS 2.2 system.

Hypotheses:

General hypotheses for RAS 2.2:
- It is expected that rubber growth during immature period will not be affected by associated trees competition as these selected fruits and timber trees have generally a slow growth pattern (in particular for durian, local fruits and timber species).
- It is expected that intercropping during the first 3 or 4 years of rubber immature period will create a favourable environment for a good rubber growth due to intercrop weedings and secondary effect of fertilization.
- Intercropping will limit the extent of weeds such as Imperata.

Specifically for RAS 2.2A in West-Sumatra:
- We do not know in the specific conditions of West-Sumatra if rubber need fertilization or not, and at which level.
RAS 2.2a protocol

EXPECTED OUTPUTS

To produce recommendations on components of RAS 2.2:
- rubber fertilization management required for successful growth of rubber clone in this environment

LOCATION: WEST SUMATRA, East Pasaman, village of Bankok

YEAR:
planting of rubber:
first planting: January 1996
Replanting: October 1996

DURATION
5 to 6 years for immature period. The first 2 years are critical in terms of growth and survivability. Then, if possible, a minimum of 3 years of production monitoring.

MATERIALS AND METHOD
Rubber + intercropping + associated trees: on all plots.

Treatments: on rubber fertilization

- PLOT A: "0 fertilization",

- PLOT B: "application of high amount of Rock Phosphate (RP) at planting time only (1 ton/ha or RP, 27.5% in the planting hole and 72.5% broadcast in the field at planting time)
So in the planting hole: 500 grams per tree (275 kg/ha)
- broadcast in the field at planting time: 725 kg/ha

- PLOT C: complete TCSDP fertilization programme for the first 2 years with RP at planting time and NPK fertilisation every 3 months).
RAS 2.2a protocol

TCSDP fertilization programme is the following:

IN GRAMMES/tree

<table>
<thead>
<tr>
<th>PLANTING TIME</th>
<th>+ 3 months</th>
<th>+ 6 months</th>
<th>+ 9 months</th>
<th>+ 12 months</th>
</tr>
</thead>
<tbody>
<tr>
<td>October 96</td>
<td>January 97</td>
<td>April 97</td>
<td>July 97</td>
<td>October 97</td>
</tr>
<tr>
<td>RP</td>
<td>200</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>UREA</td>
<td>50</td>
<td>50</td>
<td>50</td>
<td>50</td>
</tr>
<tr>
<td>SP36</td>
<td>40</td>
<td>40</td>
<td>40</td>
<td>40</td>
</tr>
<tr>
<td>KCL</td>
<td></td>
<td>40</td>
<td>40</td>
<td>40</td>
</tr>
</tbody>
</table>

The amount of each fertilizer to be supplied to the plots is calculated in anex for each farmer and for each plot.

EXPERIMENTAL DESIGN
Randomized block system
2 replications per farm.
2 farms
Total number of replication : 4 rep.

RUBBER
All rep are planted with RRIC 100.

FERTILIZATION
PLOT A : 0 fertilisation.
PLOT B : RP only at planting time
PLOT C : TCSDP fertilization programme only for the first 2 years. No fertilization later.

RUBBER PLANTING DISTANCE
Standart : 550 trees/ha : 3 x 6 meters.

RUBBER WEEDING :
6 weedings ayear , every 2 months, on a regular basis. Local observation and presence of alang² may change that pattern.
RAS 2.2a protocol

INTERCROPPING

RAINY SEASON
Rice is not a treatment in this trial. The same variety with the same amount for fertilization is cropped in all the field.
Local rice has been planted in 1995/96 without fertilization.
Local rice has been planted in 1996/97 without fertilization.
FOR 1997:
Rice will be planted in September 1997: improved rice + recommended BPS/Sembawa fertilization (100 kg urea + 130 kg SP 36 + 75 kg KCL). Urea is provided in 3 periods: planting time, + 40 days and + 80 days after planting.
Chemical treatment against pests and diseases.
Weeding: 2 weedings during growth.

DRY SEASON
According to farmers strategy: nothing or palawijas: such as groundnut which is the best intercrop for dry season.
No fertilization.

ASSOCIATED TREES
Planting density: 92 trees/ha: 9 x 12 meters.
Selected trees are durian, Petai, Jengkol, Kemiri and Cinnamon + other trees according to local situation. The associated trees frame should be the same for all trials, or similar.
Weeding: same as for rubber (6 weedings/year).

FIELD SIZE per farm

PLOT SIZE: 1000 m²
NUMBER OF PLOTS PER REPLICATION: 3 plots
NUMBER OF REPLICATION/farm: 2
NUMBER of FAMS: 2
REPLICATION/FARM SIZE: 6 plots: 6 000 m²

TOTAL SIZE OF THE TRIAL: 1.2 ha with 2 farmers
Total number of replication: 4

DATA TO BE COLLECTED

Standart data for all RAS 2.2:
RAS 2.2a protocol

**RUBBER**
- rubber growth measurements: diameter, height and width the first year every 3 months. Then girth the second year every 3 months. Sample of 30 trees per plot (according to field maps).
- Farmer’s labour for each plot.
- soil samples per replication on 0-15 and 15-30 cm.

**Total number of soil samples for the 2 farms**: 6 plots x 2 rep x 2 soil depths = 24

**ASSOCIATED TREES**
- tree growth measurements: girth every year at planting anniversary time for all trees per plot.

**RICE**
- date of planting
- date of harvest
- yield of each plot with a sample of 100 grams to be sent to ICRAF/Bogor for water content measurement.

Labour requirement per plot, recorded by farmers and controled by PPL.
RAS 2.2b TRIAL PROTOCOL

RUBBER + associated trees + intercropping

RICE EXPERIMENTATION:

VARIETY X FERTILIZATION

West-Sumatra
East Pasaman
RAS METHODOLOGY

RAS 2.2b TRIAL PROTOCOL
RUBBER + associated trees + intercropping
RICE EXPERIMENTATION : VARIETY X FERTILIZATION

TITLE
Clonal rubber in agroforestry environment: rubber + selected associated trees + intercropping / TREATMENT ON RICE VARIETIES AND AMOUNT OF FERTILIZATION.

OBJECTIVE/HYPOTHESE
OBJECTIVES

As in jungle rubber system where rubber seedlings are associated with various kind of trees and plants, RAS 2.2 aims to associate useful trees (fruits and timber trees) with rubber, at a limited planting density, without substantial decrease in rubber yield. Rubber is planted at normal planting density of 550/ha as associated trees are planted at 92 trees/ha with a maximum number of 30 for big trees.
Rice intercropping provides to rubber a indirect good weeding management and good conditions for growth. The objective is to optimize in farmers conditions rice cropping with the best adapted technological package adoptable by local farmers

Hypotheses

General hypothesis for RAS 2.2:
- It is expected that rubber growth during immature period will not be affected by associated trees competition as these selected fruits and timber trees have generally a slow growth pattern (in particular for durian, local fruits and timber species).
- It is expected that intercropping during the first 3 or 4 years of rubber immature period will create a favourable environment for a good rubber growth due to intercrop weedings and secondary effect of fertilization.
- Intercropping will limit the extend of weeds such as Imperata.
- There is an indirect benefit of rice fertilization on rubber.

Specific for RAS 2.2 b:
- We do not know in the specific conditions of West-Sumatra what are the best adapted rice varieties and their management (weedings and fertilization) as well as the best adapted crop rotation.

EXPECTED OUTPUTS

To produce recommendations on components of RAS 2.2:
- Rice varieties, fertilization level and rotation (with palawijas).

LOCATION: WEST SUMATRA, East Pasaman, village of Bankok
YEAR:
- planting of rubber: January 1996
- Replanting: October 96

DURATION
5 to 6 years for immature period. The first 2 years are critical in terms of growth and survivability. Then, if possible, a minimum of 3 years of production monitoring.

MATERIALS AND METHOD
Rubber + intercropping + associated trees on all plots.

DRAFT
Treatments: A (rice varieties) x B (fertilization level):

Treatment A
- local rice or improved rice: + 0 fertilisation.

Treatment B
- Local rice or improved rice + recommended CRIFC fertilization programme.

Treatment C
- Improved rice (wayararem/Jatiluhur) + 0 fertilization

Treatment D
- Improved rice (Wayararem/Jatiluhur) + recommended CRIFC fertilization programme.

Urea is provided in 3 periods: planting time, + 40 days and + 80 days after planting. Chemical treatment against pests and diseases. Weeding: 2 weedings during growth.

"CRIFC fertilization dose" is the dose recommended by CRIFC/Bogor for JAMBI.

FERTILIZATION DOSE

<table>
<thead>
<tr>
<th>DOSE IN KG/HA</th>
<th>UREA</th>
<th>SP 36</th>
<th>KCL</th>
</tr>
</thead>
<tbody>
<tr>
<td>CRIFC</td>
<td>150</td>
<td>220</td>
<td>150</td>
</tr>
</tbody>
</table>

EXPERIMENTAL DESIGN
Split plot with main treatment: variety and sub treatment: fertilization

1 replication per farm. 4 plots per farm
4 farms
Total number of replication: 4 rep.
All are planted with PB 260

**RUBBER**

**FERTILIZATION of RUBBER**

TCSDP fertilization programme only for the first 2 years. No fertilization later.

TCSDP fertilization programme is the following:

<table>
<thead>
<tr>
<th>IN GRAMMES/tree</th>
<th>PLANTING TIME</th>
<th>+ 3 months</th>
<th>+ 6 months</th>
<th>+ 9 months</th>
<th>+ 12 months</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>October 96</td>
<td>January 97</td>
<td>April</td>
<td>July</td>
<td>October</td>
</tr>
<tr>
<td>RP</td>
<td>200</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>UREA</td>
<td>50</td>
<td>50</td>
<td>50</td>
<td>50</td>
<td></td>
</tr>
<tr>
<td>SP36</td>
<td>40</td>
<td>40</td>
<td>40</td>
<td>40</td>
<td></td>
</tr>
<tr>
<td>KCL</td>
<td>40</td>
<td>40</td>
<td>40</td>
<td>40</td>
<td></td>
</tr>
</tbody>
</table>

The amount of each fertilizer to be supplied to the plots is calculated in anex for each farmer and for each plot.

**RUBBER PLANTING DISTANCE**

Standart: 550 trees/ha: 3 x 6 meters.

**RUBBER WEEDING:**

6 weedings ayear, every 2 months, on a regular basis. Local observation and presence of alang may change that pattern.

**INTERCROPPING**

**RAINY SEASON**

See treatments ON RICE

**DRY SEASON**

According to farmers strategy: nothing or palawijas: such as groundnut which is the best intercrop for dry season.

**ASSOCIATED TREES**

Planting density: 92 trees/ha: 9 x 12 meters.

Selected trees are durian, Petai, Jengkol, Kemiri and Cinnamon + other trees according to local
situation. The associated trees frame should be the same for all trials, or similar.
Weeding: same as for rubber (6 weedings/year).

FIELD SIZE per farm
PLOT SIZE: 1000 m²
NUMBER OF PLOTS PER REPLICATION: 4 plots
NUMBER OF REPLICATION/farm: 1
REPLICATION/FARM SIZE: 4 plots: 4 000 m²
Number of farms: 4
TOTAL SIZE OF THE TRIAL: 1.6 ha with 4 farmers
Total number of replication: 4

DATA TO BE COLLECTED

Standart data for all RAS 2.2:

RUBBER
- rubber growth measurements: diameter, height and worts the first year every 3 months. Then
girth the second year every 3 months. Sample of 30 trees per plot.
- Farmer’s labour for each plot.
- soil samples per replication on 0-15 and 15-30 cm.

**Total number of soil samples for the 2 farms**: 4 plots x 2 rep x 2 soil depths = 16 (Badul
and Muktar)
2 fields x 2 soil depth = 4 (siam and
Burham)
Total = 20

ASSOCIATED TREES
- tree growth measurements: girth every year at planting anniversary time for all trees per plot.

RICE
- date of planting
- date of harvest
- yield of each plot with a rice sample of 100 grams to be sent to Bogor to control the water
content

Labour requirement per plot.
RAS 2.2c TRIAL PROTOCOL

RUBBER + associated trees + intercropping

COMPARISON CLONAL RUBBER AND POLYCLONAL SEEDLINGS (BLIG)
RAS METHODOLOGY

RAS 2.2c TRIAL PROTOCOL
RUBBER + associated trees + intercropping
COMPARISON CLONAL RUBBER AND POLYCLONAL SEEDLINGS (BLIG)

TITLE
Clonal rubber in agroforestry environment: rubber + selected associated trees + intercropping / Comparison between rubber planting material: Clone vs BLIG

OBJECTIVE/HYPOTHESE

OBJECTIVES
As in jungle rubber system where rubber seedlings are associated with various kinds of trees and plants, RAS 2.2 aims to associate useful trees (fruits and timber trees) with rubber, at a limited planting density, without substantial decrease in rubber yield. Rubber is planted at normal planting density of 550/ha as associated trees are planted at 92 trees/ha with a maximum number of 30 for big trees.

Various types of rubber planting material are available in particular clones and BLIG (polyclonal seedlings from North and South Sumatra): the aim is to do a comparison between rubber planting material: rubber clone vs BLIG (polyclonal seedlings from LONDON SUMATRA, North Sumatra). BLIG is a polyclonal seedlings from the Bah Lias Isolated Garden.

Hypotheses
- Clonal rubber requires more weeding and maintenance than polyclonal seedlings.
- Use of polyclonal rubber seeds is less expensive than clones and easier to use (direct planting).
- The selected clones are resistant to leaf diseases as BLIG seems to be very susceptible (as it has been observed in West-Pasaman).
- Clones productivity is higher than that of polyclonal seedlings.
- Polyclonal seedlings are very heterogeneous (30% of the trees produce 70% of the total production) leading to more attention and caution for tapping.
- Growth of polyclonal seedlings is supposed to be more vigorous than that of clones, however this may not be true with fast-growing early starter clones such as those selected for RAS (PB 260 and RRIC 100)

General hypothesis on RAS 2.2
- It is expected that rubber growth during immature period will not be affected by associated trees competition as these selected fruits and timber trees have generally a slow growth pattern (in particular for durian, local fruits and timber species).
- It is expected that intercropping during the first 3 or 4 years of rubber immature period will create a favourable environment for a good rubber growth due to intercrop weedings and secondary effect of fertilization.
- Intercropping will limit the extent of weeds such as Imperata.
EXPECTED OUTPUTS

To produce recommendations on components of RAS 2.2:
- rubber planting material suitability between BLIG and clones for East Pasaman conditions.

LOCATION: WEST SUMATRA, East Pasaman, village of Bankok

YEAR:
- planting of rubber: CLONE and BLIG:
  - January 1996
  - replanting: October 1996
- Seedlings from SUMSEL:
  - October 1996
These seedlings have been sold by a South-Sumatra project as BLIG planting material but does not seem to be the same type as BLIG.

DURATION
5 to 6 years for immature period. The first 2 years are critical in terms of growth and survivability. Then, if possible, a minimum of 3 years of production monitoring.

MATERIALS AND METHOD
Rubber + intercropping + associated trees on all plots.

Treatments
PLOT A. Control:
Clonal Rubber PB 260 (1 rep in one farm, pak Udin) and RRIC 100 (1 rep in one farm: Pak Budiman)

PLOT B. BLIG from North-Sumatra

PLOT C. Seedlings from South-Sumatra

EXPERIMENTAL DESIGN
Randomized block system
1 replications per farm
2 farms:

RUBBER

FERTILIZATION
TCSDP fertilization programme only for the first 2 years. No fertilization later.
TCSDP fertilization programme is the following:

**IN GRAMMES/tree**

<table>
<thead>
<tr>
<th></th>
<th>PLANTING TIME</th>
<th>+ 3 months</th>
<th>+ 6 months</th>
<th>+ 9 months</th>
<th>+ 12 months</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>October 96</td>
<td>January 97</td>
<td>April</td>
<td>July</td>
<td>October</td>
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<tr>
<td>RP</td>
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</tr>
<tr>
<td>UREA</td>
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<td>50</td>
<td>50</td>
<td>50</td>
<td></td>
</tr>
<tr>
<td>SP36</td>
<td>40</td>
<td>40</td>
<td>40</td>
<td>40</td>
<td></td>
</tr>
<tr>
<td>KCL</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**RUBBER PLANTING DISTANCE**
Standart : 550 trees/ha : 3 x 6 meters.

**RUBBER WEEDING :**
6 weedings ayear, every 2 months, on a regular basis. Loca observation and presence of alang² may change that pattern.

**INTERCROPPING**

**RAINY SEASON**
Rice is no a treatment is this trial. The same variety at the same amount for fertilization is cropped in all the field.
Local rice has been planted in 1995/96 without fertilization.
Local rice has been planted in 1996/97 without fertilization.
FOR 1997 :
Rice will be planted in september 1997 : local rice + recommended Sembawa fertilisation (100 kg urea + 130 kg SP 36 + 75 kg KCL). Urea is provided in 3 periods : planting time, + 40 days and + 80 days after planting.
Chemical treatment againts pests and diseases.
Weeding : 2 weedings during growth.

**DRY SEASON**
According to farmers strategy: nothing or palawijas : such as groundnut wgich is the best inter crop for dry season.

**ASSOCIATED TREES**
Planting density : 92 trees/ha : 9 x 12 meters.
Selected trees are durian, Petai, Jengkol, Kemiri and Cinnamon + other trees according to local situation. The associated trees frame should be the same for all trials, or similar. Weeding: same as for rubber (6 weedings/year).

**FIELD SIZE per farm**

**PLOT SIZE**: see field maps  
**NUMBER OF PLOTS PER REPLICATION**: 3 plots for BLIG, seedlings and clone.  
**NUMBER OF REPLICATION**: 2

**DATA TO BE COLLECTED**

Standart data for all RAS 2.2:

**RUBBER**
- rubber growth measurements: diameter, height and weight the first year every 3 months. Then girth the second year every 3 months. Sample of 30 trees per plot.  
- Farmer's labour for each plot.  
- soil samples per replication on 0-15 and 15-30 cm.

**Total number of soil samples for the 2 farms**: 3 plots x 2 rep x 2 soil depths = 12

**ASSOCIATED TREES**
- tree growth measurements: girth every year at planting anniversary time for all trees per plot.

**RICE**
- date of planting  
- date of harvest  
- yield of each plot with a sample of 100 grams to be sent to ICRAF/Bogor for water content measurement.

Labour requirement per plot.
ANEX 2

PLOTS SITUATION
Augustus 1996

RAS: 2.2a
emphasis: comparison 3 amounts of fertilizers for rubber
farmer: WARNI
field size: 5 500 m²
number of rep: 2
number of plot per rep: 3
Plot size: 900 m²
total number of plots per field: 6
TOTAL SIZE OF THE FIELD: 5400 m²

Slope: MEDIUM
Current status: entirely cropped, remaining rubber is well weeded
Rice: partly cropped in 95/96 with rice
Cropped in 1996 with local rice without fertilization
, planted the first week of july
Palawijas: cassava, groundnut in 1995/96

RUBBER:
clones: RRIC 100
date of planting: January 1996
apparent number of dead trees: 30 % inmarch 96, 80 % in Augustus 96
Available stock of plants in polybag: sufficient
Replanting will occur in October 1996
Contour line: correct

ASSOCIATED TREES:
already planted on the field: few kemiri.

OBSERVATIONS:
The stacking of the plot has been done to identify the 6 plots (2 rep of 3 plots).
Replanting will occur in October 1996. The fertilization of rubber will follow the protocol:
3 plots with A/O fertilization, B/dose RP at planting time and C/ TSDP fertilization
programme. We can consider that this trial, due to very high mortality, is initiated again
in October 1996.
Augustus 1996

**RAS:** 2.2a

- **emphasis:** comparison 3 amounts of fertilizers for rubber
- **farmer:** EMA (daughter of Warni)
- **field size:** 5 600 m²
- **number of rep:** 2
- **number of plot per rep:** 3
- **Plot size:** 900 m²
- **total number of plots per field:** 6

**Slope:** medium to high

**Current status:**
- Rice: entirely cropped, rubber is well weeded
- Palawijas: partly cropped in 95/96
- Cropped with local rice without fertilization in 1996/97

**RUBBER:**
- clones: PB 260
- date of planting: January 1996
- Replanting: October 1996
- apparent number of dead trees: 30 % in March 96, 80 % in Augustus 96.
- Available stock of plants in polybag: sufficient

**ASSOCIATED TREES:**
- already planted on the field: few kemiri.

**OBSERVATIONS:**

The stacking of the 6 plots has been done.

Replanting will occur in October 1996. The fertilization of rubber will follow the protocol: 3 plots with A/O fertilization, B/dose RP at planting time and C/ TSDP fertilization programme. We can consider that this trial, due to very high mortality, is initiated again in October 1996.

Same situation as EMA.
Augustus 1996

RAS: 2.2b
emphasis: Rice experimentation
farmer: SIAM
field size: 5 500 m²
number of rep: 1
number of plot per rep: 4
Plot size: 1 300 m²
total number of plots per field: 4

Slope: high
Current status: cropped with palawijas in dry season 96.
             Cropped with local rice (Nias and Jarum peark)
without fertilization in 1996 + palawijas (mais, sugar cane, chili, cassava and banana).
the rice experiment is cancelled in 1996
Rice: in rainy season 95/96.
Palawijas: groundnut, sweet potato and cassava in 95/986

RUBBER:
clones: PB 260
date of planting: January 1996
Replanting: October 1996
apparent number of dead trees: 25 % in March 96
Rubber growth: correct, average with 2 payung but growth is stopped by drought.
Available stock of plants in polybag: sufficient
Good level of weeding. Some cassava are still to be removed in the upper part of the plot (too much shadow).

Contour line: correct

ASSOCIATED TREES:
already planted on the field: very few

OBSERVATIONS

The stacking of the plots has to be done according to field map. The plots will be used for the 1997 rice campaign.
Rice experiment is cancelled in 1996 due to planting of local rice by the farmer in July.
Augustus 1996

RAS:
emphasis
farmer:
field size:
number of rep:
number of plot per rep:
Plot size:
total number of plots per field
Slope:
Current status:
Rice:
Palawijas:

2.2b
Rice experimentation
BU RHAM
4 500 m²
1
4
1 100 m²
4
high but well protected by contour line
cropped with local rice in 1996 (Nias) without fertilization
local rice in rainy season 95/96.
groundnut, cassava, chili, papaya in 96

RUBBER:
clones:
date of planting:
Replanting:
apparent number of dead trees:
Available stock of plants in polybag:

PB 260
January 1996
October 96
30 %.....
sufficient

Weeding should be done in certain place: too much shadow close to cassava for instance.

Contour line: correct

ASSOCIATED TREES:
already planted on the field:
kemiri, durian

OBSERVATIONS

The stacking of the plots has to be done according to field map. The plots will be used for the 1997 rice campaign.
Rice experiment is cancelled in 1996 due to planting of local rice by the farmer in July.

Same situation as Pak Siam.
Augustus 1996

RAS: 2.2c
emphasis
farmer:
field size:
number of rep for clone:
number of plot per rep:
Plot size: according to field map
number of rep for BLIG: 1
number of for seedlings SUMSEL :1
Plot size:
total number of plots per field

Slope: medium to high
Current status: entirely invaded by alang and weeds in March 1996.
Entirely weeded and clan in Augustus 1996. Cropped with local rice (Nias) without fertilization.
Rice: not in rainy season 95/96 and no palawijas
Palawijas: no

RUBBER:
cloness:
date of planting: january 1996
Replanting: October 1996
Planting of seedlings SUMSEL: October 1996
apparent number of dead trees: more than 50 %.
Available stock of plants in polybag: sufficient

Contour line: seems to be correct

ASSOCIATED TREES:
already planted on the field: No

OBSERVATIONS

The stacking of the plot with 3 plots will be done according to field map.

Seedlings SUMSEL and replanting of dead rubber clones will occur in October 1996.
Augustus 1996

RAS: 2.2c
emphasis Comparison between clone and BLIG
farmer: BUDIMAN
field size: 6 400
number of plot per rep: 3
Plot size: according to field map
number of rep for clone: 1
number of rep for BLIG: 1
number of rep for seedling SUMSEL: 1
Plot size:
total number of plots per field 3

Slope: medium to high
Current status: Cropped with local rice (Nias and Pudung Patir) without fertilization.
Rice: in rainy 95/96 season
Palawijas: paddy, groundnut, cassava, chili in 96

RUBBER:
clones: PB 260
date of planting: January 1996
Replanting: October 1996
Planting of seedlings SUMSEL: October 1996
apparent number of dead trees: more than 50 %
Available stock of plants in polybag: sufficient
Good weeding
Contour line: correct

ASSOCIATED TREES:
already planted on the field: Kemiri

OBSERVATIONS

The stacking of the plot with 3 plots will be done according to field map.

Seedlings SUMSEL and replanting of dead rubber clones will occur in October 1996.

Same situation as Pak Udin.
Augustus 1996

RAS: 2.2b
emphasis Rice experimentation
farmer: BADUL
field size: ???? m²
number of rep: 1
number of plot per rep: 4
Plot size: 1000 m²
total number of plots per field 4

Slope: high
Current status: belukar S & B in june/july 96
Planting of improved rice in october 96 according to RAS 2.2b protocol: 2 plots with Jatiluhur and 2 plots with Wayararem.

Rice: not in 95/96.
Palawijas: no

RUBBER:
clones: PB 260
date of planting: October 96

Contour line: has to be done after weeding.

ASSOCIATED TREES:
already planted on the field: no

OBSERVATIONS

Plots has to be implemented according to field map.
Augustus 1996

2.2b

RAS:

emphasis
farmer:
field size:
number of rep:
number of plot per rep:
Plot size:
total number of plots per field

2.2b

Rice experimentation

MUJTAR

field size: ???? m²
number of rep: 1
number of plot per rep: 4
Plot size: 1 000 m²

Slope: MEDIUM
Current status: CROPPED partly with rice, partly weeded for being planted with Wayararem, according to field map.

Rice:
Palawijas:

CROPPED partly with rice, partly with alang² in 95/96 and in March 96
groundnut, cassava on 50 % of the plot

RUBBER:
clones:
date of planting

RRIC 100
October 96

Contour line: has to be done.

ASSOCIATED TREES:
already planted on the field: no

OBSERVATIONS

Plots has to be implemented according to field map.
ANEX 3

PADDY SURVEY
<table>
<thead>
<tr>
<th>NAMA JENIS PADDI LADANG</th>
<th>WAKTU PANEN BERAPA BULAN</th>
<th>ORIGIN DARI MANA</th>
<th>OBSERVATIONS Observasi</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 NIAS</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 Jarum perak</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 Pudung patir</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4 ........</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td></td>
<td></td>
<td></td>
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<td>6</td>
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<td>7</td>
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<td>8</td>
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<td></td>
</tr>
<tr>
<td>10</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Dari mana : asli, dari Jawa, dari lain, dari proyek (yang proyek....)  
Semua informasi tentang produksi.........  
Harus tulis yang jenis petani lebih suka.
ANEX 4

RUBBER GROWTH MONITORING
MEMO / RAS METHODOLOGY

RUBBER TREES GROWTH MONITORING IN RAS EXPERIMENTS

The first 6 month are very important in term of growth as rubber trees should develop correctly up to 5/6 whorls (normally 1 per month in good conditions). Then, the canopy and the girth begin to develop. Therefore, the growth monitoring of rubber trees may be done as following:

- **A - during the first year:**

  3 measurements:

  - 1 - Diameter 10 cm above grafting point.

  - 2 - number of whorls
    control the distribution of trees with 1, then 2, 3, 4 and 5 (or more) whorls every 3 months in order to see the possible delay in growth compared to a standard growth (1 whir1 per month in normal conditions).

  - 3 - The height of rubber trees should also be monitored, in particular in comparison with the average height of the forest regrowth in the interrow for RAS 1. Same frequency as for the number of whorls and diameter.

  These 3 measurements may be done on the data file for RAS.

- **B - at 12 months and every plantation birthday:**

  control of the circumference of rubber trees at 1 meter above ground level with a selected number of trees per plot. For tree sampling, refer to annex (from Rubber/CIRAD-CP) with 30 trees per plot to be monitored.
ANEX 5

INPUTS REQUIREMENTS
per farmer
per plot
<table>
<thead>
<tr>
<th>FARMER</th>
<th>type of RAS</th>
<th>RAS name</th>
<th>CLONE</th>
<th>Date of planting</th>
<th>ACTUAL TOTAL AREA real</th>
<th>Number of rubber trees</th>
<th>Number of rep /farm</th>
<th>Number Of plots</th>
<th>TREATMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>EMA</td>
<td>RAS 2.2a</td>
<td>Rubber fertilization</td>
<td>RRIC 100</td>
<td>Jan 96</td>
<td>0.56</td>
<td>550</td>
<td>308</td>
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<td>6</td>
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<td>Rubber fertilization</td>
<td>PB 260</td>
<td>Jan 96</td>
<td>0.55</td>
<td>300</td>
<td>2</td>
<td>6</td>
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<td>SIAM</td>
<td>RAS 2.2b</td>
<td>Rice experimentation</td>
<td>PB 260</td>
<td>Jan 96</td>
<td>0.55</td>
<td>300</td>
<td>1</td>
<td>4</td>
<td>2 varietiesxdose(0, CRIFC) cancelled in 96</td>
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<td>BURHAN</td>
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<td>Rice experimentation</td>
<td>PB 260</td>
<td>Jan 96</td>
<td>0.45</td>
<td>248</td>
<td>1</td>
<td>4</td>
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<td>UDIN</td>
<td>RAS 2.2c</td>
<td>Clone/BLIG comparison</td>
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<td>231</td>
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<td>Clone/BLIG comparison</td>
<td>PB 260</td>
<td>Jan 96</td>
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<td>3</td>
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<td>Rice experimentation</td>
<td>PB 260</td>
<td>Oct 96</td>
<td>0.8</td>
<td>440</td>
<td>2</td>
<td>8</td>
<td>2 varietiesxdose(0, CRIFC)</td>
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<tr>
<td>MUKTAR</td>
<td>RAS 2.2b</td>
<td>Rice experimentation</td>
<td>RRIC 100</td>
<td>Oct 96</td>
<td>0.8</td>
<td>440</td>
<td>2</td>
<td>8</td>
<td>2 varietiesxdose(0, CRIFC)</td>
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**BURHAM** extra plot Rice experimentation
# Fertilizers Requirement for 1996

<table>
<thead>
<tr>
<th></th>
<th></th>
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<tbody>
<tr>
<td></td>
<td>Planting</td>
<td>Later</td>
<td>PLOT</td>
<td>CRIFC</td>
</tr>
<tr>
<td></td>
<td>PLOT</td>
<td>BPS</td>
<td>100</td>
<td>150</td>
</tr>
<tr>
<td>EMA</td>
<td>A</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>B</td>
<td>1,000</td>
<td>12</td>
<td>15</td>
</tr>
<tr>
<td></td>
<td>C</td>
<td>62</td>
<td>12</td>
<td>12</td>
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<tr>
<td>WARNI</td>
<td>A</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>B</td>
<td>1,000</td>
<td>0</td>
<td>0</td>
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<tr>
<td></td>
<td>C</td>
<td>60</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>SIAM</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BURHAN</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>UDIN</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>BUDIMAN</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BADUL</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MUKTAR</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TOTAL</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Notes:**
- No Rice fertilization in 1996, except new plot planted with seedlings/sowmed
- Local: jatuluhur, wayararem

**Rice Requirement for 1996**
- PLOT
- SP36
- Urea
- KCL

**Fertilization Details:**
- To be supplied in Dec for January 97
- Per Field

**Total:**
- 2,488
- 98
- 122
- 98
- 0
- 0
- 0
- 113
- 75
- 75
- 30
- 30
<table>
<thead>
<tr>
<th>TOTAL REQUIREMENT FOR RUBBER</th>
<th>RP</th>
<th>SP36</th>
<th>UREA</th>
<th>KCL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total kg</td>
<td>2488.4</td>
<td>98</td>
<td>122</td>
<td>98</td>
</tr>
<tr>
<td>Oct 96</td>
<td>to be supplied in January 1997</td>
<td></td>
<td></td>
<td></td>
</tr>
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</table>

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<thead>
<tr>
<th>TOTAL REQUIREMENT FOR RICE</th>
<th>RP</th>
<th>SP36</th>
<th>UREA</th>
<th>KCL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total kg</td>
<td>75</td>
<td>113</td>
<td>75</td>
<td></td>
</tr>
<tr>
<td>to be supplied in Sept 96</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>TOTAL REQUIREMENT FOR RICE and RUBBER</th>
<th>RP</th>
<th>SP36</th>
<th>UREA</th>
<th>KCL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total kg</td>
<td>2,488</td>
<td>173</td>
<td>235</td>
<td>173</td>
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</table>

<table>
<thead>
<tr>
<th>TO BE ORDERED for September 1996</th>
<th>RP</th>
<th>SP36</th>
<th>UREA</th>
<th>KCL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Price in rp</td>
<td>2500</td>
<td>200</td>
<td>250</td>
<td>200</td>
</tr>
<tr>
<td>TOTAL COST</td>
<td>500,000</td>
<td>100,000</td>
<td>125,000</td>
<td>100,000</td>
</tr>
<tr>
<td>total fertilizer cost</td>
<td>825,000</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
ANEX 6

SRAP BUDGET IN WEST SUMATRA
### OPERATING COST OF SRAP IN AUGUSTUS 1996

**GAPKINDO+PRO-RLK**

**In roupiah**

<table>
<thead>
<tr>
<th>INPUT</th>
<th>quantity</th>
<th>Price/kg or l</th>
<th>TOTAL COST</th>
<th>GAPKINDO USAID</th>
<th>PRO RLK</th>
</tr>
</thead>
<tbody>
<tr>
<td>COST OF TRIALS ESTABLISHMENT/West Sumatra</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Round-up</td>
<td>10</td>
<td>25000</td>
<td>150,000</td>
<td>ICRAF</td>
<td></td>
</tr>
<tr>
<td>rice seeds</td>
<td></td>
<td></td>
<td></td>
<td>825,000</td>
<td></td>
</tr>
<tr>
<td>fertilizers for rice AND RUBBER</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Furadan</td>
<td></td>
<td></td>
<td></td>
<td>200,000</td>
<td></td>
</tr>
<tr>
<td>pesticides/Insecticides for rice</td>
<td></td>
<td></td>
<td></td>
<td>200,000</td>
<td></td>
</tr>
<tr>
<td>Plants of sao : 10 /farmers</td>
<td>80</td>
<td>5000</td>
<td>400,000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sprayer for rice</td>
<td></td>
<td></td>
<td>150,000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Traps for pigs</td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tools</td>
<td>120</td>
<td>3500</td>
<td>420,000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>polybag for associated trees</td>
<td></td>
<td></td>
<td>100,000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>COST FOR Rao’s nursery</td>
<td></td>
<td></td>
<td></td>
<td>300,000</td>
<td></td>
</tr>
<tr>
<td>Other inputs/miscellaneous</td>
<td></td>
<td></td>
<td></td>
<td>600,000</td>
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<tr>
<td><strong>TOTAL COST FOR INPUTS</strong></td>
<td></td>
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<td>COST FOR SIGNS</td>
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<td><strong>500,000</strong></td>
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<tr>
<td><strong>TOTAL COST</strong></td>
<td></td>
<td></td>
<td><strong>3,945,000</strong></td>
<td><strong>2,945,000</strong></td>
<td><strong>1,000,000</strong></td>
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<tr>
<td>farmers’s training/PPL bangkok</td>
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</table>

A total amount of 3 000 000 rp will be transferred on Pro-RLK account for SRAP activities.

Note: the balance of 1 000 000 rp from Pro-RLK is approximative. The original amount is 2 millions minus previous expenses.
PROPINSI SUMATERA BARAT

PROGRAM MENBERSIHKAN LAPANGAN PERCOBAAN PETANI

ALL RAS 2.2 BANGKOK

BAGIAN 2 : 6 MENBERSIHKAN per tahun untuk pohon karet dan pohon lain
membersihkan di barisan karet saja
Di lorung ada tupangsari

<table>
<thead>
<tr>
<th>Waktu tanaman</th>
<th>Mulai</th>
<th>+ 2 bulan</th>
<th>+ 4 bulan</th>
<th>+ 6 bulan</th>
<th>+ 8 bulan</th>
<th>+ 10 bulan</th>
</tr>
</thead>
<tbody>
<tr>
<td>December 95</td>
<td>Mulai</td>
<td>March</td>
<td>May</td>
<td>July</td>
<td>September</td>
<td>November</td>
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<td></td>
<td>Mulai</td>
<td>Mulai</td>
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<td>Mulai</td>
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<td></td>
<td></td>
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<td></td>
<td>January</td>
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</table>
PROGRAM PEMUPUKAN LAPANGAN PETANI RAS

PUPUK PER POHON KARET
IN GRAMMES/tree

<table>
<thead>
<tr>
<th></th>
<th>WAKTU T-ANAMAN</th>
<th>+ 3 bulan</th>
<th>+ 6 bulan</th>
<th>+ 9 bulan</th>
<th>+ 12 bulan</th>
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<tbody>
<tr>
<td></td>
<td>October 96</td>
<td>JANUARY 97</td>
<td>APRIL 97</td>
<td>JULY 97</td>
<td>OCTOBER 97</td>
</tr>
<tr>
<td>RP</td>
<td>200</td>
<td>50</td>
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<td>50</td>
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<tr>
<td>UREA</td>
<td>40</td>
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<td>40</td>
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<tr>
<td>KCL</td>
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