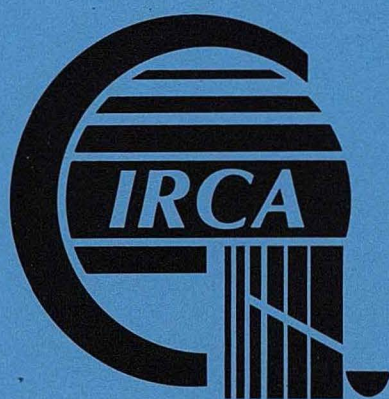


MISSION REPORT
SOCFINDO PLANTATIONS - INDONESIA
NOVEMBER 12 - NOVEMBER 20 1988
TRAN VAN CANH



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Annexes : protocols of the experiences with the proposed modifications

SOCFINDO STAFF MET DURING THE MISSION

Mr. BALOT	Principal Director
Mr. SUTIKSNO	General Manager
Mr. RUESCH	Estates Adviser
Mr. TAMPUBOLON	Head of Agricultural Department
Mr. SITEPU	Agronomist
Mr. SYANSUDDIN	Group Manager
Mr. IMAN	Manager - LIMA PULUH Estates
Mr. AMRI HALIM	Manager - AEK PAMIENKE Estates
Mr. AMIRUDDIN	Manager - TANJUNG MARIA Estates
Mr. BASUKI	Manager - TANA BESIH Estates
Mr. PASARIBU	Chief Assistant - HALIMBE Estates
Mr. SINURAYA	Staff member - Plant Protection
Mr. WIDARYONG	Staff member - Agricultural Department in charge of manuring program and experiments.

MISSION PROGRAM

Saturday, Nov. 12	Departure from Paris
Sunday, Nov. 13	Arrival in Singapore
Monday, Nov. 14	
8:30 am	Departure from Singapore
10:00 am	Arrival in Medan
11:00 am	Discussions with Messrs Balot and Tampubolon about the mission program
3:00 pm	Departure from Medan
5:00 pm	Arrival at Lima Puluh - Discussions with Messrs Sitepu, Tampubolon, Syansuddin and Iman.
Tuesday, Nov. 15	
7:00 - 10:30 am	Visit to the plantation (trial LP PA 01) with Messrs Tampubolon and Iman.
10:30 am	Departure from Lima Puluh
12:30 pm	Arrival at Aek Loba - Meeting with Mr Nouy from the IRHO
2:30 pm	Departure from Aek Loba
4:30 pm	Arrival at Aek Pamienke
4:45 - 6:00 pm	Plantation visit with Messrs Tampubolon and Amri
Wednesday, Nov. 16	
7:00 am - 1:00 pm	Visit to the Halimbe plantation (trials HA PA 01 and HA PA 02) with Messrs Tampubolon, Amri, Pasaribu and Sinuraya.
3:00 pm - 6:00 pm	Visit to the Aek Pamienke plantation (trial AP PA 01)

Thursday, Nov. 17

7:00 am	Departure from Aek Pamienke
9:00 am	Arrival at Lima Puluh
9:00 - 11:00 am	Checking of Fomes detection and treatment operations
11:00 am	Departure from Lima Puluh
12:30 pm	Arrival at Tanjung Maria
3:00 - 6:00 pm	Plantation visit with Messrs Ruesch, Tampubolon, Sitepu, Syansuddin and Amiruddin. (problems with old Hevea stumps)

Friday, Nov. 18

7:00 am	Departure from Tanjung Maria
8:00 am	Arrival at Tana Besih
8:00 - 12:00 am	Plantation visit with Messrs Sitepu, Syansuddin and Basuki
Afternoon	Return to Medan

Saturday, Nov. 19

8:00 - 10:00 am	Discussions with Messrs Ruesch, Tampubolon and Sitepu
11:00 - 12:00 am	Discussions with Messrs Balot, Sutiksno, Ruesch and Tampubolon.

Sunday, Nov. 20

12:00 am	Departure from Medan
3:00 pm	Arrival in Kuala Lumpur

Monday, Nov. 21

Visit to RRIM Research Station

Tuesday, Nov. 22

	Discussion with the RRIM phytopathologists
4:00 pm	Departure from Kuala Lumpur

Wednesday, Nov. 23

10:00 am	Arrival in Paris
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1) INTRODUCTION

The aim of this mission was twofold :

- ♦ analyze the Fomes trials and control methods at SOCFINDO in order to propose an approach to the Fomes problem on its plantations;
- ♦ examine the leaf diseases reported by SOCFINDO.

2) FOMES

2.1 Trial by trial analysis

2.1.1. AP PA 01 (Aek Pamienke plantation, Block 10, 85 planting)

2.1.1.1 Evolution of the disease

- Situation in January 1988

* 44 dead trees	4.4 %)		
)	8.1 %] i.e. an
* 37 diseased trees	3.7 %)] increase

- Situation in July 1988

* 44 dead trees	4.4 %)] of 10.5 %
)	18.6 %] in 6 months
* 142 diseased trees	14.2 %)] in 6 months

2.1.1.2 Origin of dead and diseased trees in July 1988

- Out of 44 dead trees :
 - * 10 were already diseased in Jan. 88
 - * 9 were in direct contact with foci in Jan. 88
 - * 25 had not been reported as being diseased or near foci in Jan. 88

- Out of 142 diseased trees :
 - * 6 were already diseased in Jan. 88
 - * 35 were in direct contact with foci in Jan. 88
 - * 101 were healthy in Jan. 88

Hence, in this plot, there are many new cases of dead and diseased trees.

2.1.1.3 Treatment effectiveness

In this trial, the recommended control method is as follows :

- Elimination of dead and infected trees
- Treatment of contaminated trees with Calixin (5 cc/l - 2 l/tree) and 2 neighboring healthy trees along the row (1 each side)
- Removal of old Fomes-infected Hevea stumps near dead and diseased trees (this operation only began at the time of our visit).

A comparison between the January 1988 map and that of July 1988 gives the following results :

- Out of 37 diseased trees in Jan. 88, the situation 6 months later was :
 - * 10 dead trees (27.1 %).
 - * 6 trees still diseased (16.2 %)
 - * 21 rhizomorph-free trees (56.7 %)

2.1.2.2 Origin of dead and diseased trees in July 1988

- Out of 17 dead trees :
 - * 5 were already diseased in Jan. 88
 - * 6 were in direct contact with foci in Jan. 88
 - * 6 had not been reported as being diseased or near foci in Jan. 88

- Out of 55 diseased trees :
 - * 19 were already diseased in Jan. 88
 - * 17 were in direct contact with foci in Jan. 88
 - * 18 were healthy in Jan. 88

Hence, despite the decrease in the number of dead and diseased trees between Jan 88 and July 88, there are still many new cases of dead and diseased trees among the treated trees.

2.1.2.3 Treatment effectiveness

In this trial, the recommended control method is as follows :

- Elimination of dead and infected trees
- Treatment of contaminated trees with Calixin (5 cc/l - 2 l/tree) and 2 neighboring healthy trees (1 each side)
- Isolation of forest stumps infected with Fomes.

A comparison between the January 1988 map and that of July 1988 gives the following results :

- Out of 99 diseased trees in Jan. 88, the situation 6 months later was :
 - * 5 dead trees (5.0 %).
 - * 19 trees still diseased (19.2 %)
 - * 75 rhizomorph-free trees (75.8 %)

- Out of 208 trees treated in Jan. 88, the situation 6 months later was :

- * 6 dead trees (2.9 %)
- * 18 trees still diseased (8.6 %)
- * 184 healthy trees (88.5 %)

Hence the effectiveness of Calixin to control Fomes is good in this trial.

2.1.3 HA PA 02 (Halimbé plantation, block 13, 82 planting)

2.1.3.1 Evolution of the disease

- Situation in January 1988

- | | | | |
|---------------------|-------|---|-----------|
| * 45 dead trees | 5.1 % |) | |
| | |) | 13.2 % |
| * 72 diseased trees | 8.1 % |) | |
| | |) | |
| | |) | i.e. a |
| | |) | reduction |

- Situation in July 1988

- | | | | |
|---------------------|-------|---|----------|
| * 30 dead trees | 3.4 % |) | |
| | |) | 13.0 % |
| * 84 diseased trees | 9.6 % |) | |
| | |) | |
| | |) | 0.2 % in |
| | |) | 6 months |

2.1.3.2 Origin of dead and diseased trees in July 1988

- Out of 30 dead trees :

- * 16 were already diseased in Jan. 88
- * 10 were in direct contact with foci in Jan. 88
- * 4 had not been reported as being diseased or near foci in Jan. 88

- Out of 84 diseased trees :
 - * 25 were already diseased in Jan. 88
 - * 36 were in direct contact with foci in Jan. 88
 - * 23 were healthy in Jan. 88

Hence, in this plot too, there are many new cases of dead and diseased trees.

2.1.3.3 Treatment effectiveness

In this trial, the recommended control method is as follows :

- Elimination of dead and infected trees
- Treatment of contaminated trees with Calixin CP
- Treatment of healthy trees next to dead and diseased trees with Calixin 750
- Isolation of forest stumps infected with Fomes.

A comparison between the January 1988 map and that of July 1988 gives the following results :

- Out of 72 diseased trees in Jan. 88, the situation 6 months later was :
 - * 16 dead trees (22.3 %)
 - * 25 trees still diseased (34.7 %)
 - * 31 rhizomorph-free trees (43.0 %)
- Out of 187 trees treated in Jan. 88, the situation 6 months later was :
 - * 10 dead trees (5.3 %)
 - * 36 trres still diseased (19.3 %))
 - * 141 healthy trees (75.4 %)

Hence the effectiveness of Calixin against Fomes in this trial is average.

2.1.3.4 Proposed changes

With the approval of Messrs Tampubolon, Amri and Sinuraya, all diseased trees and neighboring trees will be treated with Fomac or Calixin CP for comparison with HA PA 01 (treated entirely with Calixin 750).

2.1.4 LP PA 01 (Lima Puluh plantation, block 38, 84 planting)

2.1.4.1 Treatment effectiveness

The results obtained in July 1988 are given in Table 1, which shows that the treatments were not very effective.

Table 1 : Treatment effectiveness in trial Lp AP 01

A : Diseased trees (Mycelium visible at collar level)

Treatments	Diseased trees in Jan. 88	Dead trees in July 88		Trees still diseased July 88		Rhizomorph-free trees July 88	
	Number	Nb	%	Nb	%	Nb	%
B) Control	158	72	45.5	70	43.3	16	10.2
A) SAN 619	107	39	36.4	51	47.6	17	15.8
C) Calixin 750	224	69	30.8	111	49.5	44	19.6
D) Calixin CP	124	29	23.4	49	39.5	46	37.1

B : Treated trees (healthy trees in direct contact with foci (1 tree either side))

Treatments	Healthy trees in Jan. 88	Dead trees in July 88		Diseased trees in July 88		Healthy trees in July 88	
	Number	Nb	%	Nb	%	Nb	%
B) Control	158	4	2.5	37	23.4	117	74.5
A) SAN 619	163	5	3.1	33	20.2	125	76.8
C) Calixin 750	298	19	6.4	44	14.7	235	78.9
D) Calixin CP	223	19	8.5	19	8.5	185	82.9

From among the possible causes of this situation, one of the most obvious is the presence of old Hevea stumps which constitute permanent Fomes inoculum reservoirs. In effect, during our field visit, we noticed that there was always an old Hevea stump with carpophores or Fomes rhizomorpha next to these dead and diseased trees.

2.1.4.2 Modifications in this trial

- 1) Plot B (control without treatment) will be treated in January 1989 with the "basin + Fomac" method.
- 2) The rate for SAN 619 (plot A) will be increased from 0.1 % to 0.5 %, i.e. 5 cc of commercial product per liter.
- 3) A new plot (25 rows with 45-50 planting holes per row) will be chosen from the neighboring lot to test another fungicide product (Bayfidan at 0.5 g a.i./l, i.e. : 2 cc of commercial product per liter).
- 4) Treatments in plots C and D (Calixin 750 and Calixin CP) will stay the same.
- 5) Systematic eradication of dead and infected trees and old Fomes-infected Hevea stumps and removal of all infected wood (taproots and lateral roots) to beyond the plantation.

2.2 Observations on Fomes control methods

Many discussions and observations in the field have made it possible to better understand the reasons why current treatments are not very effective; in our opinion, there are at least two :

- 1) The first reason is simply the consequence of probably only superficially detecting the problem, which, in January 1988, resulted in classifying diseased trees as healthy. In effect, it is impossible in 6 months for healthy trees to die of Fomes, as seems to indicate Table 2, which shows that more than 19 % of the trees reported dead in July 1988 were not near established foci (dead, diseased and treated) during detection operations in January 1988, and, therefore did not receive required treatment (undetected foci in January 1988).

To verify this hypothesis, 20 or so basins were dug around trees reported healthy during the last inventory which were near diseased or dead trees. In fact, more than 50 % of these trees proved to be carrying Fomes, either on the taproot or on lateral roots 10-20 cm deep.

Table 2 : Origin of dead trees in the different trials

Trial No.	Number of dead trees in July 88	Including trees reported diseased in Jan 88	Including healthy trees in Jan 88	
			In contact w/ focus	Not in contact w/focus (No treatment)
HA PA 01	44	10	9	25
HA PA 01	17	5	6	6
HA PA 02	30	16	10	4
LA PA 01	201	137	43	21
TOTAL	292	168 (57.5 %)	68 (23.3 %)	56 (19.2 %)
			42.5 %	

- 2) The second reason why treatments were not effective is the presence of many stumps, which are veritable nutritive bases for Fomes, whose rhizomorpha go from stump to stump, linking them together. This makes it possible, as has often been observed, for the Fomes to wait out fungicide product remanance and develop again further along the link later on. These stumps must absolutely be eliminated.

2.3 Conclusions

In July 1987, 3 identical trials were set up at 3 different sites of 2 ha each :

- Aek Pamienke block 10 (AP PA 01)
- Halimbe block 22 (HA PA 01)
- Halimbe block 13 (HA PA 02)

The aim of these trials was to compare, over a period of 3 years, a control without treatment to 3 different fungicide treatments : Calixin 750, Calixin CP and Sandoz 619. Another trial was set up at Lima Puluh (block 38, 84 planting, trial no. LP PA 01) whose aim is to test the same formulae but with an application methodology which take into account the distribution of diseased trees and the position of trees likely to be contaminated (direct or indirect neighbors).

A year after setting up the trials, the results show that the application method has a positive effect.

Nonetheless, this positive effect was obtained through comparision with a control without treatment, not with a "basin + Fomac" control, which is a commonly used technique in North Sumatra. The trials are therefore modified (see annex : original protocols and changes made). After a year's time, the results obtained are not sufficiently conclusive to recommend changing the standard methods (basin + Fomac), given cost-effectiveness (Calixin and Sandoz 619 are expensive).

After discussions with SOCFINDO management, it was decided, for 1989 and until more conclusive results are obtained with the new chemical treatments, to continue with the treatments currently used :

Detection :

- Twice a year for 85-86 planting
- Once a year for the other planting
- Systematic tree by tree examination by clearing away the soil around the girth and lateral roots down to 10 cm.
- In-depth examination down to 40 cm for infected trees and their neighbors.

Marking :

- A cross (X) with black paint on infected trees to be eliminated (leaf symptoms and necrotic taproot)
- A black band on infected trees to be treated (no leaf symptoms, healthy taproot, one or several infected lateral roots - these infected roots should be cut off).
- A red band on contaminated trees.
- A blue band on trees neighboring dead or diseased trees.

Treatments :

- the "basin + Fomac" method (once a year)

Eradication :

Total eradication of dead tree stumps or those of infected trees (marked with an X) and old Hevea stumps near dead or diseased trees.

3) LEAF DISEASES

According to Mr. Tampubolon, Colletorichum attacks were observed last year on several blocks (about 500 ha) in the northern part of the Aek Pamienke plantation. During our visit (November 15), the foliar density of the trees in these blocks was estimated to be 60-70 % of normal foliage.

We propose that observations be carried out this year on defoliation and refoliation cycles to situate exactly when the attack begins. Should attacks develop, it will be necessary to carry out small-scale fungicide treatments, to find out whether or not these treatments improve foliar density.

At Halimbe (block 22, 83 planting) foliage had become normal again by the time of our visit.

A N N E X E S

FOMES EXPERIMENTAL DESIGN FOR AEK PAMIENKEAP. PA. 011. Objective

The objective of this experiment is to observe the development of the root disease and to confirm the efficiency of the control method.

2. Methodology

- A 2-ha plot (1000 sites) was selected and marked off so that it can be identified easily in the batch.
- Dead and infected trees as well as those to be protected are recorded on a chart following identification by the disease detection team.
- Every 6 months after the first monitoring operation, readings are taken row by row in the same plot and compared with the preceding observations. This will show the changes in infected and protected trees as well as recently infected or dead trees.

3. Location

Twenty rows--10 rows on each side--of 50 sites were selected in Block 10 of the 1985 crop in the Aek Pamienske plantation.

4. Work Schedule

- | | | |
|-------------|--|----------------|
| July 1987 : | Disease detection and recording of observations | |
| | Treatment: dead and infected trees: eradication | |
| | contaminated and surrounding trees: Calixin 750, | |
| | 10 cc/liter; 2 l/tree | |
| | Eradication of old <i>Hevea</i> stumps near the dead or infected trees | |
| Jan. 1988 : | Disease detection and recording of observations | First reading* |
| | Treatment and eradication: as in July 1987 | |
| July 1988 : | Same operations | Second reading |
| Jan. 1989 : | Same operations | Third reading |
| July 1989 : | Same operations | Fourth reading |
| Jan. 1990 : | Same operations | Fifth reading |
| July 1990 : | Same operations | Final reading |

* To be done by IRCA; the July 1987 and January 1988 readings should be sent.

.../... _

Proposed changes (November 1988)

Given that the removal of infected stumps had only just begun when we arrived (Nov. 88), this trial, with the approval of Messrs Tampubolon, Amri and Sinuraya, will be started again in January 1989 with the following changes :

- The northern part of the trial will be treated with the Basin-Fomac or Calixin CP methods;
- The southern part of the trial will be treated with Calixin 750.

FOMES EXPERIMENT DESIGN AT AEK PAMIENKEHA.PA.011. Objective

The objective of this experiment is to observe the development of the root disease and to confirm the efficiency of the control method.

2. Methodology

- A 2-ha plot (with 906 sites), was selected and marked off so that it can be identified easily in the batch.
- Dead and infected trees as well as those to be protected are recorded on a chart following identification by the disease detection team.
- Every 6 months after the first monitoring operation, readings are taken row by row in the same plot and compared with the preceding observations. This will show the changes in infected and protected trees as well as recently infected or dead trees.

3. Location

Sixteen rows with 906 sites were selected in Block 22 of the 1983 crop in the Halimbé plantation (Aek Pamienke).

4. Work Schedule

July 1987	: Disease detection and recording of observations Treatment: dead and infected trees: eradication contaminated and surrounding trees: Calixin 750, 10 cc/liter; 2 l/tree Eradication of old <i>Hevea</i> stumps near the dead or infected trees	
Jan. 1988	: Disease detection and recording of observations Treatment and eradication: as in July 1987	First reading*
July 1988	: Same operations	Second reading
Jan. 1989	: Same operations	Third reading
July 1989	: Same operations	Fourth reading
Jan. 1990	: Same operations	Fifth reading
July 1990	: Same operations	Final reading

* To be done by IRCA; the July 1987 and January 1988 readings should be sent.

FOMES EXPERIMENTAL DESIGN FOR AEK PAMIENKEHA. PA. 02)1. Objective

The objective of this experiment is to observe the development of the root disease and to confirm the efficiency of the control method.

2. Methodology

- A 2-ha plot (887 sites) was selected and marked off so that it can be identified easily in the batch.
- Dead and infected trees as well as those to be protected are recorded on a chart following identification by the disease detection team.
- Every 6 months after the first monitoring operation, readings are taken row by row in the same plot and compared with the preceding observations. This will show the changes in infected and protected trees as well as recently infected or dead trees.

3. Location

Fourteen rows with 887 sites were selected in Block 13 of the 1982 crop at the Halimbe plantation (Aek Pamiénke).

4. Work Schedule

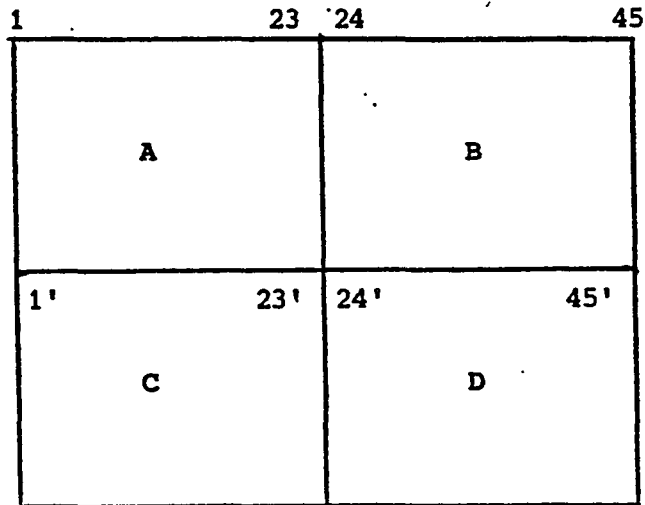
July 1987 :	Disease detection and recording of observations	
	Treatment: dead and infected trees: eradication	
	contaminated and surrounding trees: Calixin 750,	
	10 cc/liter; 2 l/tree	
	Eradication of old <i>Hevea</i> stumps near the dead or infected trees	
Jan. 1988 :	Disease detection and recording of observations	First reading*
	Treatment and eradication: as in July 1987	
July 1988 :	Same operations	Second reading
Jan. 1989 :	Same operations	Third reading
July 1989 :	Same operations	Fourth reading
Jan. 1990 :	Same operations	Fifth reading
July 1990 :	Same operations	Final reading

* To be done by IRCA; the July 1987 and January 1988 readings should be sent.

.../...

5. Location

Block 38, 1984 crop.



Treatment A : Sandoz 619	rows 1 - 23
Treatment B : Check	rows 24 - 45
Treatment C : Calixin 750	rows 1' - 23'
Treatment D : Calixin CP	rows 24' - 45'

6. Date when trial was established : 7 July 19877. Duration of trial : 3 yearsProposed changes (November 1988)

With the approval of Messrs Tampubolon, Amri and Sinuraya, all diseased trees and neighboring trees will be treated with Fomac or Calixin CP for comparison with HA PA 01 (treated entirely with Calixin 750).

FOMES EXPERIMENTAL DESIGN FOR AEK PAMIENKE
LP.PA.01

Testing of various fungicides against Fomès

1. Objective.

The objective of the trial is to test the efficiency of the control of Fomes with Calixin (750 and CP) and with SAN 619 F, so that to reduce the infection of the trees.

2. Treatments.

- a) Pouring with SAN 619 1g/l and 2 l/tree.
- b) Control without treatment.
- c) Pouring with Calixin 750, 10 cc/l and 2 l/tree.
- d) Calixin CP application.

3. Methodology.

In this trial, three groups are defined :

- . 1st Group :
infected trees by Fomes : the mycelium can be seen on the collar and the toproot is necrosed.
- . 2nd Group :
contaminated trees by Fomes : the mycelium can be seen on the collar and the toproot is healthy at a depth of 10 cm.
- . 3rd Group :
the two adjacent trees in direct contact with the : healthy trees but directly neighboured with contaminated trees or dead trees by Fomes.

4. Identification.

Trees bear coloured bands :

- . one black band shows that tree is infected at the setting up of the trial ;
- . one red band = a contaminated tree ;
- . one blue band = healthy tree neighboured with sick or dead trees.

WORK SCHEDULE FOR TRIAL LP-PA-01

July 1987 : Disease detection and recording of observations

Treatment : B - Check without treatment

D - Calixin Colar Protectant

Dead/infected trees + leaf symptoms = eradication

Black + red + blue bands = Calixin CP

C - 1% Calixin 750

Dead/infected trees + leaf symptoms = eradication

Infected, without leaf symptoms =

Calixin CP

Red + blue bands = 1% Calixin 750

A - 0.1% Sandoz 619

Dead/infected trees + leaf symptoms = eradication

Infected, without leaf symptoms =

0.1% Sandoz 619

Red + blue bands = 0.1% Sandoz 619

Eradication of old *Hevea* stumps near dead and infected trees (except for the check treatment)

Jan 1988 : Disease detection and recording of observations First reading

Treatment and eradication : same operations

July 1988 : Disease detection and recording of observations Second reading

Treatment and eradication : same operations

Jan 1989 : Idem Third reading

July 1989 : Idem Fourth reading

Jan 1990 : Idem Fifth reading

July 1990 : Idem Final reading

Proposed changes (November 1988)

- 1) Plot B (control without treatment) will be treated in January 1989 with the "basin + Fomac" method.
- 2) The rate for SAN 619 (plot A) will be increased from 0.1 % to 0.5 %, i.e. 5 cc of commercial product per liter.
- 3) A new plot (25 rows with 45-50 planting holes per row) will be chosen from the neighboring lot to test another fungicide product (Bayfidan at 0.5 g a.i./l, i.e. : 2 cc of commercial product per liter).
- 4) Treatments in plots C and D (Calixin 750 and Calixin CP) will stay the same.
- 5) Systematic eradication of dead and infected trees and old Fomes-infected Hevea stumps and removal of all infected wood (taproots and lateral roots) to beyond the plantation.