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MISSION REPORT ON THE VISIT TO S.R.D.P. AND P.T.P. 13 SMALLHOLDINGS IN WEST KALIMANTAN

From 25th to 30th October 1989

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This mission falls under IRCA scientific cooperation with D.G.E. (Direktorat Jenderal of Estates), Ministry of Agriculture, Indonesia.

It was carried out in connection with S.R.D.P. (Smallholders Rubber Development Project), organized by Mr. Delabarre, S.R.D.P. Consultant (IRCA), accompanied by Mr. Bambang Priyono, Subdit P.T.O., Direktorat R.P.P. and Mr. Eddy, S.R.D.P. assistant.

Its purpose was to take stock of the phytosanitary situation on the *hevea* smallholdings created in West Kalimantan and to assess the possibilities of improving disease control methods in the context of T.S.S.D.P. (Transmigration Second Stage Development Project) initiation.

Meetings were organized with:

- Dr. Verghese, D.G.E. Consultant on N.C.T.P. (National Crop Protection Project, 1987-1990).

- Mr. Suryatna, P.T.P. 13 administrator.

- Mr. Karsan, Director of Plant Protection, West Kalimantan.

- Mr. Munsif, Head of Plant Protection Pathology and Weed Control Laboratory, West Kalimantan.

- Mr. Manga Barani, R.P.P. Technical Director.

A brief rundown was given to Mr. Soe Tardjo, R.P.P. Principal Director, at the end of the mission.

My sincere thanks go to D.G.E. for their excellent hospitality and to all the people who contributed towards ensuring that this mission went smoothly.

Situation in the field

In the vicinity of Sintang, the field visits took place in the P.T.P. nucleus and in the vicinity of Anjungan, visits were made to several smallholdings around Mandor (at Pak bulu, Ngarak, Kayu Tanam, Mandor and Krohok) and near Pak Kawin (Pak Laheng and Pak Kawin B.).

On the whole, the *hevea* trees planted in the West Kalimantan region are not in a very satisfactory general condition. Their development is often abnormally poor; the crowns are not dense enough and have small, crinkly, yellowish, drooping leaves.

This appearance of the foliage is probably mostly due to the poverty of the soils and their virtually permanent waterlogged state. In fact, certain richer and better drained zones enable better *hevea* development. Thus in the P.T.P. 13 nucleus, GT1 and PR228 trees were opened at 6 years, which is not too far behind. At Kayu Tanam, near Mandor, we also detected the existence of a very fine smallholding (S.R.P.D., 1983-1984), where the number of missing trees is under 5% and where foliage density exceeds 80% (in certain parts, the grass no longer grows there).

Soil analyses reveal very low cation exchange capacities, most often accompanied by a very high aluminium content. The *hevea* leaves also often show signs of zinc (photo 1) or boron (photo 2) deficiency-like symptoms. Other symptoms, perhaps also caused by nutritional deficiencies, were revealed locally, such as leaf reddening (photo 3).

In addition, the soil is rarely deep enough to enable normal tap root growth; the water table is sometimes only 60 cm below the surface.

Finally, smallholding upkeep is often inadequate (photo 4). The resulting nutritional competition is even more harmful to *hevea* development in that the soils are already very impoverished.

Under these particularly unfavourable conditions for *hevea* growing (apart from a few privileged areas), leaf disease pressure is highly substantial. The greatest damage is caused by *Colletotrichum gloeosporioides* attacks on young branches (photo 5). In th P.T.P. 13 nucleus, the 1981 GT1 plantings have undergone 7 leaf-falls in 1½ years (the normal rate is annual leaf-fall in July/August), causing 2% of the trees to die. Production in May, June and July fell from 4 kg/day to only 2.5 kg/day.

On young plantings, these successive leaf-falls lead to substantial delays in growth and they are probably the reason why buds start to open on the trunks, through destabilization of apical dominance (photo 6). The resulting swellings seriously jeopardize future tapping.

The PR 228 plantings are also affected, though to a lesser degree, along with the neighbouring seedlings.

Typical *Corynespora cassiicola* attack symptoms were also identified (photo 7).

Root rot attacks were also detected in all the plantings (photos 8 and 9). In the 1982-83 smallholdings (S.R.P.D. 1) at Nagarak and Krohok, 20% missing trees and 30% dead trees were recorded. Their death and disappearance could be mostly due to *Rigidoporus lignosus* attacks.

As far as trunks and branches are concerned, apart from anarchic bud development on the trunks already mentioned, there are also numerous *Corticium salmonicolor* attacks (photo 10) and there are often cankers where trunk and branches join (photo 11); their origin is still a mystery.

Recommendations

Cropping techniques

The success of a *hevea* plantation depends first and foremost on the soil. It should be deep enough for minimum tap root development, should not be permanently waterlogged and, finally, should contain the nutrients required for good tree growth.

The first two properties should be taken into account when the land is chosen. Indeed, they are difficult to modify after the event. If these basic conditions are not satisfied, it is self-deceiving to imagine that *hevea* growing can be profitable.

On the other hand, the essential nutrients can be artificially added. This solution has already been adopted under the S.R.D.P., where fertilizer application is recommended at the time of planting. Nonetheless, these applications need to take into account the very particular conditions existing in West Kalimantan. It therefore seems important to set up fertilizer trials rapidly, so as to define a recommendation system specific to this region.

Also, in view of the soil's poor exchange capacity, it seems improbable that a single application when planting is really effective. It would certainly be preferable to spread applications out over the first 3 years (e.g. twice a year).

Finally, it would be a good idea to test micro-nutrient spraying in nurseries.

It should also be remembered that whatever the cropping conditions, good tree growth also greatly depends on land preparation and careful and regular plot upkeep.

Leaf diseases

The only parasite that currently causes any real damage to the leaves is *Colletotrichum gloeosporioides*, which has often been described as a weakness parasite, only causing serious damage on hosts lacking in vigour.

Hence, one of the solutions that can be recommended to control this parasite is to improve the general condition of the trees by providing adequate fertilizers. Indeed, *hevea* trees lacking in vigour will withstand the impact of the disease better. This solution should be adopted since it is bound to be beneficial for the plantings. Nonetheless, it will probably not be sufficient to limit damage to an acceptable threshold.

Another possibility is to plant more resistant clones than those distributed today. Clones PB235 and PB260, for example, reveal a very good performance with respect to *C. gloeosporioides* in North Sumatra. All the information on this subject in the different Indonesian research centres should be gathered together and be used to set up a clone comparative trial in West Kalimantan.

Such a trial (multi-site if possible) would also provide other very useful information.

A third solution is chemical control; the Pak Boulou budwood gardens are treated every fortnight with Dithane at 0.3% c.p./litre using hand operated continuous sprayers.

It should be noted that, generally speaking, it is preferable to increase the frequency of treatments rather than the dose applied. Better control of the disease will thus be obtained by treating every week with only 0.2% c.p./litre. It is also recommended to use conical nozzles for leaf spraying, rather than flat ones which are more adapted to herbicide applications.

This type of treatment could also be extended to young plantings.

In adult plantings, chemical control has not yet been fully mastered. Trials have been set up at Pak Laheng under the National Plant Protection Project using Delsene, Daconil, Tilt and Dithane, applied using mistblowers or hot-foggers. The initial results are relatively encouraging, but the cost price for such fungicide applications on all the smallholdings is likely to be prohibitive.

Finally, the last possibility known is anticipated artifical defoliation. Indeed the most serious *C. gloeosporioides* attacks occur when the appearance of new leaf shoots coincides with high rainfall. In principle, *hevea* follows a defoliation-refoliation cycle with an annual rhythm, with defoliation usually occurring during the periods of least rainfall.

A control method has been developed in Cameroon, with IRCA collaboration; it consists in accelerating leaf-fall, so that refoliation takes place during a period of least rainfall. This technique has been successfully applied since 1986 on the Nyété estates in South Cameroon.

Artificial defoliation is provoked by the aerial application of an aqueous 5.6% ethrel solution at a rate of 40 litres of solution/ha. If the application is made at the right time, almost all the leaves fall after 2 weeks.

For the time being, this method can only be used on commercial type estates. It could be worthwhile examining the possibilities of adapting a similar technique on smallholdings.

Root Rot diseases

The main control method for limiting the incidence of root rot diseases, especially *R. lignosus*, is to carefully clear plots before planting. All the old stumps should be removed or isolated by digging deep drains around them.

Likewise, during cultivation, all the woody substrates likely to be invaded by the fungus should be removed from the plantations (new stumps with their lateral roots, dead trees, dead branches).

These operations are intended to reduce the number of trees attacked by the parasite by limiting the number of inoculum sources.

Despite all these precautions, certain trees risk being contaminated. If no treatment is given, contamination turns into infection and the tree is then condemned.

It is recommended to undertake detection rounds twice a year, to identify contaminated or infected *heveas*. The method consists in removing the soil from around the tap root to a depth of around ten centimetres and checking for necroses and rhyzomorphs on the underground parts uncovered.

A tree will be considered as infected if the tap root bears necroses and contaminated if there are rhyzomorphs, though without necrotized areas on the tap root.

Trees with infected tap roots cannot be saved at the current time; they have to be eliminated.

On the other hand, contaminated trees can often be saved by drenching with a fungicide every 6 months.

Up to very recently, calixin by BASF (a.i.: tridemorph) was the best product known for carrying out this type of treatment. However, the latest results in trials conducted by IRCA have shown that other fungicides in the triazoles range are more active than calixin, particularly Alto by Sandoz (a.i. cyproconazole) and Bayfidan by Bayer (a.i.: triademefon).

A trial could be set up to check the effectiveness of these products under the conditions prevailing in West Kalimantan, using the standard calixin treatment as a reference.

The protocol to be followed is given in the annex.

Trunk diseases

Corticium salmonicolor attacks can be controlled with calixin applications (a.i.: tridemorph).

Trials to test doses and application methods have been set up by Mr. Delabarre. They should rapidly lead to precise recommendations under local conditions.

The problem of cankers where branches meet the trunk is likely to be more difficult to solve. Indeed, these cankers may follow on from fungal attacks (an experimental fungicide application on a few affected plants could provide a few answers on this subject). However, it is more probable that they are the expression of physiological imbalance caused either by a poor nutritional balance, or by parasite attacks in the crown.

A N N E X E S

ANNEX

CHECKING THE EFFECTIVENESS OF FUNGICIDES AGAINST ROOT ROT

Purpose:	Check of cyproconazole and triadimenol effectiveness in controlling *R. lignosus*.
Location:	Mandor, Pok kawin and Sintang.
Design:	Each type of treatment will be applied on 20 blocks of approximately 1 ha, i.e. a total of 60 blocks for the 3 treatments.
Frequency:	Treatments will be carried out every six months (in January and July for example), following detection rounds. The trees already treated will have to undergo at least 3 consecutive treatments, even if they are classed as healthy during the following detection rounds.
Treatments:	2 litres of solution at the foot of: - contaminated trees and their immediate neighbours along the row. - immediate neighbours of eliminated trees following root rot attacks.
Treatment A:	Calixin at 1% (a.i.: tridemorph)
Treatment B:	Alto at 0.5% (a.i.: cyproconazole)
Treatment C:	Bayleton at 0.5% (a.i. triadimenol, very similar to triadimefon, which is currently unavailable in Indonesia).
Observations:	Inventories will be made every 6 months after the detection rounds. During these rounds, the trees to be eliminated (infected or dead following a root rot attack) will be marked with a black cross; the trees to be treated will be marked with a C for contaminated and an N for neighbour, using the colour specific to each detection round (red, yellow, green, blue, etc.).

For each plot, the following information should be recorded:

- the number of healthy trees never treated.
- the number of infected or dead trees which are eliminated during the round, noting whether or not they had been previously treated, and how many times.
- the total number of missing trees, after elimination following the last detection round.
- the number of freshly treated trees, following the detection round, in 2 categories: contaminated and neighbours.
- the total numbers of trees being treated, in 2 categories: contaminated and neighbours.

Photo 1 : Symptômes foliaires ressemblant à une carence en zinc

Photo 2 : Symptômes foliaires ressemblant à une carence en bore

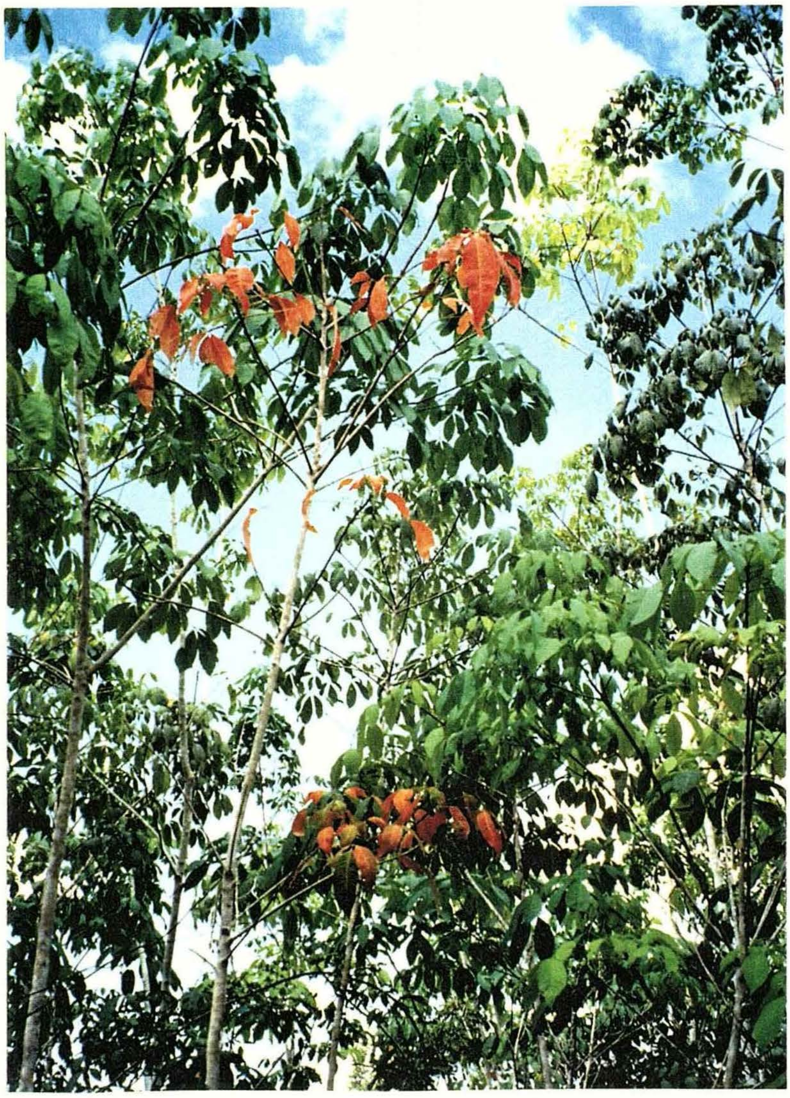

Photo 3 :

Rougissement des feuilles

Photo 4 : Jeune plantation insuffisamment entretenue

Photo 5 : Attaques de Colletotrichum gloeosporioïdes sur les jeunes poussées foliaires

Photo 6 :

Déformation des troncs probablement consécutive aux attaques de *Colletotrichum gloeosporioïdes* dans la couronne

Photo 7 : Symptômes caractéristiques des attaques de *Corynespora cassiicola*

Photo 8 :

Clairière due aux attaques de *Rigidoporus lignosus* dans une plantation

Photo 9 : Carpophores de *Rigidoporus lignosus* sur les racines latérales d'un arbre mort

Photo 10 :

Symptômes caractéristiques des attaques de *Corticium salmonicolor*

Photo 11 : Chancre de l'union porte greffe-greffon