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REPORT ON THE MISSION TO THE PHILIPPINES

19TH TO 29TH JULY 1989

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September 1989

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SCHEDULE

Wednesday 19th July

- ♦ Arrival in Manila - met by French Embassy staff.

Thursday 20th July

- ♦ Preparation of mission with Dr. Beatriz del Rosario, Director of PCAARD Planning and Development Division, Mr. Bastien, Scientific Attaché at the French Embassy and Mr. Dijan, who was to accompany us throughout the mission.
- ♦ Appointment to see Mr. Dar, Director of the Bureau of Agricultural Research (BAR) of the Department of Agriculture (DA).
- ♦ Work meeting with Mr. Dar, Dr. Lydia Olivia, DA Consultant, and two colleagues: Mr. Miguel Hernais and Cenon Atiena, accompanied by Messrs. Bastien and Dijan.
- ♦ Kind invitation to lunch at DA from Mr. Dar.
- ♦ Due to leave for Cagayan de Oro - flight cancelled.

Friday 21st July

- ♦ Departure for Cagayan de Oro.

Met by Mr. Amante, Regional Director of Agriculture and Mr. E. Siasno, Director of Research.
- ♦ Courtesy visit to see the President of Central Mindanao University (CMU), Mr. Chua.
- ♦ Departure for Bukidnon province, accompanied by the rubber research coordinator for the region, Mr. Gregorio Rom.
- ♦ Appointment to see the Provincial Director of Agriculture, Mr. Pacifico Oramos.
- ♦ Visit to CMU - met by Director of Research, Mr. H. Pava, accompanied by 5 professors; brief tour round the plantation.

- ◆ Meeting in Valencia with the Chairman of the Smallholders' Association in northern Bukidnon, Mr. Santiago Dablio.
- ◆ Return to Cagayan de Oro.

Saturday 22nd July

- ◆ Trip from Cagayan de Oro to Bayugan.
- ◆ Tour round the J.C.A. plantation and return to Butuan. Met by Mr. I. Elevazo, resident Manager and three colleagues.

Sunday 23rd July

- ◆ Journey from Butuan to Cagayan de Oro by road.
- ◆ Travel, by air, from Cagayan de Oro to Davao.
- ◆ Journey by road from Davao to the University of South Mindanao, accompanied by Mr. Bastien.
- ◆ Kind invitation to dinner from Dr. Pamplona.

Monday 24th July

- ◆ Working breakfast with the President of USM, Mr. K.E. Pahm and his colleagues.
- ◆ Visit to Cotabato DA, then the LALECO factory (Mr. Kurt Winneger) and Mr. Respicio's factory.
- ◆ Meeting with all the researchers involved in the rubber field, chaired by Mr. K.E. Pahm
- ◆ Visit to SMARC trials.

Tuesday 25th July

- ◆ Working breakfast with President K. Pahm, Dr. P. Pamplona and Dr. E. Alcala.
- ◆ Visit to SMARC trials and laboratories with Mr. Ariel Garcia and Mr. Reynaldo Callano.
- ◆ Meeting with Professor Cayudong, Chairman of the Department of Horticulture.
- ◆ Departure for Davao and visit, en route, of the Methodist Church processing centre and Mrs. Sandique's factory.
- ◆ Dinner with Dr. Pamplona.

Wednesday 26th July

- ◆ Travel by air from Davao to Manila.
- ◆ Visit to the Asian Development Bank, Mr. Rougé, Bank Administrator representing France, Germany, Italy, Spain and Belgium.
- ◆ Preparation of mission report.
- ◆ Meeting with Mr. d'Ollone, Cultural and Scientific Cooperation Adviser, French Embassy.

Thursday 27th July

- ◆ Discussion with Mr. d'Ollone and Mr. Bastien.
- ◆ Rundown on mission, with Mr. Miguel Hernais, BAR representative, Dr. del Rosario, PCAARD representative, Mr. Bastien, Mr. Democritos and Mr. Dijan.
- ◆ Kind invitation to dinner from Mrs. Sandique.

Friday 28th July

- ◆ Meeting with Mrs. Melchior, Commercial Adviser to the Economic Expansion Unit.
- ◆ Lunch with Mr. d'Ollone.
- ◆ Departure for Paris.

Saturday 29th July

- ◆ Arrival in Paris.

I - INTRODUCTION - MISSION OBJECTIVES

This mission, half funded by the French Foreign Ministry and half by CIRAD, set out to define and update the natural rubber research programme between the Philippines and France, proposed in December 1987 (1)

Since that date, only the mission by Dr. Pamplona (SMARC Deputy Director) to France and Côte d'Ivoire, from 26th November to 10th December 1988, has been able to take place.

It led on to recommendations, with a view to developing the "natural rubber" sector, in which the different partners in the Philippines are showing increasing interest.

The mission was divided up into two parts:

- ◆ compared to the 1987 mission, additional information about research and production structures in region X (North Mindanao).
- ◆ evolution of the research and development programmes, structures and projects.

(1) Mission report by H. de Livonnière and M. de La Serve, IRCA, December 1987.

II. NATURAL RUBBER RESEARCH AND RESEARCH/DEVELOPMENT STRUCTURES

II.1. General Organization

A complex and theoretically very elaborate set of research and research/development structures exists in the Philippines, which needs to be briefly recalled.

The Philippines Council for Agricultural Research, which subsequently became PCAARD, was set up in 1972 to programme and coordinate research activities at national level. "Multi-commodities" [4] or "Simple-commodities" [8] national research centres were created, along with regional research centres [8] spread between the university sector and the agricultural colleges.

The regional research centres have a mandate to respond to regional requirements through applied research on stations and smallholdings. The national research centres have a mandate to carry out strategic research on a world scale. In addition, there are experimental stations belonging to the Ministry of Agriculture (61) and the Ministry of Natural Resources (22); these stations have served as a framework for the establishment of Research-Development networks, RIARS (Regional Integrated Agricultural Research Stations), which became PRS in 1988.

Finally, 14 regional Consortia have been created since 1975, so as to pool resources and favour Research exchanges. It would appear that the development of activities at PCAARD and in the universities has led to stagnation at the Ministry of Agriculture experimental stations up to recent years.

The Bureau of Agricultural Research (DA-BAR) is currently in the process of revitalizing the Ministry of Agriculture's Research and Research-Development activities.

It would therefore seem that the structures are moving towards the following situation:

Basic Research	Applied Research	Adaptive Research	Extension
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	Colleges and universities	
	(SCVS)	

	Department of Agriculture	
	(DA)	

For natural rubber, the following structures are, or may be, involved:

- ◆ SMARC Natural Rubber National Research Centre and Regional Research Centres.
- ◆ PICRI (Industrial Crops), set up in 1985, but not operational.
- ◆ DA Department of Agriculture Stations.

In addition, there exist 5 Consortia on the island of Mindanao

- ◆ NOM CAARD created in 1978 for region X, in which Central Mindanao University (CMU) participates.
- ◆ SMARRDEC created in 1987 for region XI, in which the University of South Mindanao (USM) participates.
- ◆ WESMARRDEC created in 1987 for region IX
- ◆ CEMARRDEC created in 1988 for region XII

Two constraints appeared important to the members of the mission:

- Research is funded on a one-off basis, as and when projects are accepted, hence for a limited duration.
- Research is undertaken either by teaching academics, or by Ministry of Agriculture agronomists covering numerous crops and there are therefore no permanent senior staff specialized in the natural rubber sector.

II.2. Research and Research-Development

* *Within the universities*, research is undertaken in the Universities of South-Mindanao (USM) or Central Mindanao (CMU).

- USM/SMARC

At Kabacan, SMARC has an 18 ha plantation, 2.5 ha of which are being tapped; in addition, USM has a large concession near Aracan Valley (80 km from USM), with a 75 ha estate, 25 ha of which are being tapped.

At the Kabacan site, the following trials are under way:

- Clone collection: approximately 100 clones (see annex 1); however, the identity of certain clones is uncertain.
- A trial, set up in 1983, comparing the effect of 3 cover crops on growth and production. The more substantial production observed after intercropping with *Pueraria phaseolides* must be due to increased growth; tapping of the trees in this design could have begun 6 months before the other designs.
- A high stump planting trial. Flooding of the plot led to this trial being halted.
- A crown grafting trial set up in 1985, with a view to controlling *Corticium salmonicolor* and wind damage: crown of PB 5/51, PB 217, RRIM 600, PB 255 or GT 1 onto an RRIM 600 or GT 1 trunk and a stump of Tj1 ill. Tree growth is low.
- A tapping trial on trees opened up in May 1989 (RRIM 600 aged 5 years 9 months on opening), but with no statistical design (30 trees/treatment); treatments are as follows: S/1 d/2, S/2 d/3, S/2 d/4 ST ET, S/2 d/6 ST ET, S/2 d/2 (control). Stimulation is given on scraped bark 4 times/year. It was recommended to add an S/2 d/3 ST ET treatment and provide panel stimulation.
- There would appear to be a clone trial (not visited), which has just been set up.

The processing and technology field:

Under the authority of Prof. Gomez (a chemist by training), then Prof. Eusébio O. Layert Ong, now Chairman of the Horticulture Group, USM possessed and operated rubber processing and drying facilities between 1958 and 1984.

The most substantial investment was made with UNESCO funds in 1970. At that time, the University was exploiting a tapped 100 ha estate.

Existing equipment includes:

- ♦ A 3,000 litre bulking tank, three planters' 1,000 litre compartmentalized coagulation tanks, a bank of three pairs of rollers driven by a car engine, various experimental smoke houses, various tanks, a manual press. Training courses in processing were given up to 1985 and, from time to time, students undertake work on the development of local coagulants.

The current plantation only covers 3.5 ha, two of which are being tapped. An extension to 25 ha maximum is programmed for agronomy trials. The quantity of rubber produced will therefore be limited and will only enable laboratory research and training trials to be conducted.

USM has been allocated a 4,000 ha concession, 1,000 ha of which are reserved for *hevea* growing in the Arakan valley, 80 km to the North of the University. Seventy-five ha have already been planted, 25 of which are being tapped.

A training centre has been created on site and accommodates 100 high school students (BTS). These initial facilities could constitute the nucleus of a much larger installation. Our contacts are considering the creation of a veritable factory, which, in 10 years' time, could process the rubber from the estate belonging to USM, but also that from neighbouring small and medium sized farms.

There would therefore seem to be the means required to set up an experimental industrial factory on site, to compare processing procedures leading to TSR qualities and traditional qualities, and to take an in-depth look at the matter of cooperative processing centres adapted to the Philippine context. This installation would therefore be a remarkable training base.

Quality Control Laboratory Project

Attempts have been made in the 1970s to create a quality control laboratory, in connection with a UNESCO funded project. During a detailed tour round the laboratories in 1987, the members of the mission noted certain items of equipment: centrifuges, two baffle furnaces, atmospheric pressure or vacuum ovens, two compressors, a vane pump, an autoclave, a press, an open cylinder mixer (standard size), a Wallace plastometer (exists but not seen), a Perkin Helmer flame spectrophotometer, three Bausch and Lomb UV spectrophotometers, glassware and equipment for nitrogen titration (Kjeldhal).

Apart from the odd N or P titration operation, for example, this equipment has not been used for nearly ten years, due to a lack of technicians and qualified supervision.

Since the IRCA mission in 1987, USM/SMARC, jointly with the DA, has asked Dr. Multes Creantia to conduct a feasibility study for the creation of a central, natural rubber, technical specification laboratory (ISO Standard 2000). A project was prepared with Dr. E. Alcalá, a copy of which was given to the members of the mission.

If this laboratory comes into being, it will make it possible, of course, to acquire better knowledge of the physicochemical characteristics of the various grades of rubber produced by the Philippines and thereby choose those which best meet the requirements of local manufacturers and the international market. It will also be the manager of SPR (Standard Philippine Rubber) quality. Finally, it will constitute a training facility for engineers and technicians in the laboratories that already exist in factories.

- CMU

The University has 120 ha of plantations, 83 ha of which are being tapped. The basic purpose of this estate is to provide income for the University.

This year, under the USM budget, 25 clones will be planted in performance trials (RRIM 701, 705, 605, 606, 628 - PB series, PR series, IAN, AVROS 49 and GT 1) In 1987, 10 clones had been planted in performance trials.

CMU has put forward research project proposals to the DA/BAR, concerning plantation upkeep, soil characterization, identification and control of root rot, integration of animal husbandry and *hevea* growing (see annex 2). These projects are interesting and fit in with a long-term research programme and are not merely one-off studies.

The processing field:

The processing centre has three compartmentalized coagulation tanks, three manual rollers and a dryer. The equipment enables ADS production by the conventional method: 200 kg/day on average. Unfortunately, due to inadequate supervision, the entire installation is badly run and does not operate under ideal conditions of cleanliness or scientific or industrial rigour.

Certain resources therefore exist for undertaking applied research and training work in the processing field - coagulation methods, rolling and drying. A Group Processing Centre could easily be set up.

* *Within the Department of Agriculture (DA)*

The Bureau of Agricultural Research (BAR) is in charge of planning, implementation, coordination and evaluation of DA research.

At regional and provincial level, the agricultural bureaux have been organized in four divisions since 1988:

- ◆ Field Operation
- ◆ Regulatory
- ◆ Administration
- ◆ Research

The Research Division has 4 units: fisheries, livestock, socio-economic post harvesting, crop farming system; *hevea* growing is covered by the fourth unit.

Thus, in the province of Zamboanga del Sur, the research budget was 3 million pesos (1 million French francs) in 1988, 120,000 pesos of which were for rubber. On the IPIL station (DA), a clonal trial was planted in 1982 and has just been opened for tapping; it contains the following clones: PB 235, 310, 311, 330, 5/51 - RRIM 600, 700, 701, 703, 712, 717, GT 1. One intercropping trial is under way with annual crops: rainfed rice, maize, groundnut, beans. Finally, as development support, seeds and budwood are distributed to village headmen (mayors) for collective nurseries, so as to satisfy smallholders' wishes for extension.

In the province of North Cotabato, the research budget represents 7.3% of the Agriculture Bureau's total budget, i.e. 145,000 pesos, and no action appears to be devoted to *Hevea*. As regards the development of *Hevea* cultivation, nurseries are created and grafted plants are sold for 6 pesos each; this year the nursery only had 20,000 plants.

* *Within private companies*

A visit to the JCA (DACON Group) plantation in the province of Agusan de Sur, confirmed the role of prime mover that commercial estates can have in the development of *Hevea* growing in a country; indeed, in the context of the DACON Group, specialized in the agro-industrial field, a Research-Development department employing five people has just been set up and is working on the improvement of existing techniques, i.e. for *Hevea* planting: tapping trial, rainguard trial, die-back control in the nursery, etc. (see annex 3). Identification of the agent responsible for die-back in the nursery, a new disease which appeared for the first time on the JCA estate this year, has been entrusted to USM.

During our previous mission, we had already been able to see the technical progress made in commercial estates on the island of Basilan.

III - THE NATURAL RUBBER SECTOR

III.1. Reminder (see previous mission report)

Hevea growing covers approximately 70,000 hectares of the 15 million hectares of arable land in the Philippines. However, only the island of MINDANAO is reputed as being unaffected by typhoons and thus suitable for planting *Hevea* (trials are also to be set up on the island of WISAVAS).

The main producing provinces are, in order of importance:

- ◆ ZAMBOANGA DE SUR
- ◆ NORTH COTABATO
- ◆ BASILAN
- ◆ AGUSAN DE SUR
- ◆ BUKIDNON
- ◆ ZAMBOANGA DE NORTE

Of the 80 to 90,000 tonnes produced, 60,000 t are consumed locally, 30,000 t by the tyre sector and 15,000 t by the shoe industry. The TAIWAN market is particularly attractive for raw rubber exports.

Smallholder plantations (< 40 ha) represent 70% of the area planted, though perhaps only 50% of national production.

Rubber is sometimes processed at the production site (ADS, PAUS, crepe) and, in this case, the product obtained is usually good; in the opposite case, the cup lumps or coagula are of very variable quality.

III.2. Additional information and sector evolution

This mission enabled us to discover two new *Hevea* growing zones: the province of BUKIDNON (5,000 ha) and the province of AGUSAN DE SUR (8,000 ha) in the North of the island, and provided us with a better understanding of how the research structures and the rubber market operate; it was thus possible to perceive the evolution of this sector.

III.2.1. Production

The will of smallholders and of agricultural development officials (DA) to extend or replant clearly exists. Since December 1987, there has been a very distinct sudden awareness of the role that can be played by *Hevea* in the existing farming systems (reforestation, development of

undulating land, regular income, etc.) and of the future in store for natural rubber, given the good balance that exists between supply and demand.

For a smallholder, after fruit trees (Durian, Rambutan, etc.), *Hevea* provides the highest income per hectare, 12,000 pesos/kg/yr, i.e. twice the real income derived from a coffee or cocoa plantation, or three times that from a coconut plantation (see annex 4).

In addition, producers have formed an association, so as to improve their techniques or their contacts right down the production line: Smallholders Association of North and South BUKIDNON and of ZAMBOANGA DE SUR.

As regards the large estates, the agrarian reform process which is under way, despite the fact that the application of this reform to *Hevea* plantations has been deferred for 10 years, gives rise to a certain wait-and-see policy. Nonetheless, at national level, there has been a revival of the "National Federation of Rubber Planters", whose Technical Committee has been meeting regularly since November 1988.

The will of the authorities is expressed, not only through the creation of nurseries, but also by sending 9 provincial and regional officials from the DA for training in Thailand for 4 months at the beginning of 1989.

This motivation of the entire sector should be expressed on 11th and 12th August 1989, on the occasion of the National Conference on Natural Rubber.

Finally; this mission made it possible to confirm the need to work towards:

- ♦ diversification of clones (RRIM 600, a clone susceptible to *Phytophthora* and wind damage, is the only clone currently distributed to smallholders),
- ♦ a reduction in tapping frequency and improvement of tapping quality.

III.2.2. Quality Control

The different qualities of rubber produced in the Philippines:

We invite the reader to refer to pages 20 to 29 of the IRCA Report on the Mission to the Philippines in December 1987. The terms are still valid for 1989 and will be completed by the following observations:

International market tendencies in July 1989 (IRSG Bangkok):

- ♦ Centrifuged latex: dramatic overproduction, leading for a long period to prices below RSS1 and preventing any new developments for at least 5 years.
- ♦ Dry rubber, TSR and sheet: the relative price slump due to a downturn in purchases by Eastern Block countries should come to an end; an upturn is expected for the end of 1989, due to the continuing good health of the car industry and a probable resumption of purchases by the Eastern Block countries.
- ♦ In the long term, natural rubber retains a sure value, for the reasons mentioned on page 11 of the IRCA 1987 mission report.
- ♦ From a technical point of view, the attention of smallholders and processors should be brought to bear on the cleanness of the rubber, whereas the international scientific community should reflect upon the development of trials making it possible to assess certain rubber processing criteria, rheological properties, plastification rate.

Situation in the Philippines:

- 1) The Estates and certain medium sized farms (20 ha and over) are capable of producing rubber whose quality is equal or superior to international standards.
- 2) The quality of rubber from small farms (0.5 to 5 ha) is usually very mediocre.
- 3) According to our contacts, the FOB price for Philippine natural rubber on export is, whatever the quality, 10 to 15% lower than the international market level.

Why ?

Exports go either directly to Korea, Taiwan and Japan or to Singapore, where the dry rubber (PAUS or ADS, 2 X brown crepe), or wet rubber (slabs from smallholdings or cup lumps) is reconditioned and sold under the SSR 20 label (Standard Singapore Rubber).

Most of the manufacturers in Korea, Taiwan and Japan are not very demanding as far as rubber quality is concerned; they are mainly interested in the price, which should be as low as possible, and the technical level of the articles produced is often mediocre. The processors in Singapore look for low quality rubbers, bought at rock-bottom prices, to blend them with other, better rubbers and take advantage of the difference in price between a TSR 20 and a downgraded rubber.

Philippine rubber does not therefore have a good commercial reputation. However, certain manufacturers in Manila are ready to buy poor quality rubber at prices higher than those on the world market, such as ADS rubbers, for example; produced by CMU, sold at 27 pesos/kg DRC (US\$ 1 = 21 pesos; RSS1 price in July, approximately US\$ 0.9/kg DRC CIF).

In order to improve this situation, the members of the mission renew the recommendations made in 1987 (see pages 25, 26 and 27 of the corresponding report):

- ♦ encourage smallholders to produce rubber of better quality, by introducing regulations at a regional level, involving a deduction for coagula which are too contaminated or preserved in water.
- ♦ creation of a central quality control laboratory, which would make it possible to place Philippine rubber more in context with respect to that from the other ANRPC producing countries; by participating in inter-laboratory trials in connection with IRRDB "Round Robin Tests", the laboratory will have international approval and SPR will then be internationally recognized; the ways in which this laboratory will intervene with respect to factory laboratories and regional laboratories, and the rules according to which specification certificates will be attributed, will remain to be determined.

A document serving as a feasibility study was supplied to the members of the mission. This document needs to be completed by an examination of the real requirements of those in the production network, both small and large producers, dealers, local consumers, existing laboratories. A new laboratory layout plan was proposed by the mission members.

IV - RECOMMENDATIONS

IV.1. For Research

- ♦ Complete the clone collection and set up several large-scale clonal trials on stations (USM, CMU, IPIL station, etc.). It will only be possible to undertake an Improvement programme at a later stage, as a long term prospect, with full-time staff and a budget ensured over a long period.
- ♦ Set up fertilizer trials:

MINDANAO soils differ considerably: from the loamy sand - silty clay soils of DAVAO DE NORTE, to the alluvial soils of AGUSON DE SUR, pH values vary from 4 to 6 (study carried out by REYNALDO S CALLANO on soils planted to *Hevea*). It is therefore necessary to set up multi-site fertilizer trials, so that recommendations correspond to the economic optimum.
- ♦ Set up agronomy performance trials

Depending on soil conditions, the climate and the height above sea level, 3 to 4 clones should be tested, so as to be able to recommend the best adapted clones, especially in the province of BUDKIDNON, where *Hevea* growing is being extended into a zone located at around 1000 m above sea level.
- ♦ Set up tapping trials

The tapping system conventionally used in the Philippines is S/2 d/2. For many years now, IRCA, in particular, has been demonstrating the interest of a reduced tapping frequency compensated for by stimulation: increased production per tapper per day, reduced bark consumption, increased production per hectare. Tapping trials should therefore be set up and should take rainfall conditions into account.
- ♦ Set up intercropping trials

Reforestation, erosion control, soil improvement are all reasons for setting up permanent intercropping trials on different types of relief (flat or undulating). In particular, trials involving double rows of *Hevea*, intercropped with annual or perennial crops in the double interrows could be set up. These types of trials could be set up at Mount CARMEN, among other places, which is a privileged USM site, for studying farming systems, and at the ARACAN VALLEY site, the USM extension zone.
- ♦ Conduct coagulation trials, to find out the effects of using local coagulants on the final quality of the product.

- ◆ Carry out mixed sun-wood drying trials, taking advantage of the experience acquired at USM through the practice of certain farmers and of the knowledge gained from the IRCA drying programme.
- ◆ Develop a press designed to make 33.3 kg bales from smoked sheet or ADS.

Finally, as regards structures, it seemed to the mission that a Rubber Research Institute, with a staff and budget remaining stable over a long period, was essential for implementing a coherent Research policy. All the operations currently being conducted, or almost all, either do not correspond to requirements, or are too ineffective due to lack of resources or supervision.

IV.2. For Development

- ◆ The production of planting material should be encouraged; the creation of village nurseries, with the supply of certified seeds and budwood seems to be a good solution. Nonetheless, favouring planting leads to the need to watch over the proper maintenance of these plants. Farmers need to be trained in herbicide use.
- ◆ Tapper training needs to be provided (diploma). In this respect, private initiatives could see the light of day and be supported.
- ◆ The links between estates and smallholdings should be strengthened.
- ◆ New poles should be developed, either in nucleus estate/plasma form, or in FELDA type block form. Research structures should be the first to benefit from these developments, so that they are guaranteed a certain amount of self-financing, so as to be able to diffuse their results on a wide scale.
- ◆ The creation of the central specifications laboratory is an important element of development, insofar as it will enable better valorization of Philippine rubber.
- ◆ The creation at USM, CMU and on the ARACAN VALLEY site of a Group Processing Centre: coagulation, processing and drying centre (production of smoked sheet or ADS).
- ◆ Organization of collection systems adapted to local constraints.

Annex 5 contains the text of the recommendations given at the end of the mission. It was planned to fax these recommendations to the DA-BAR before the national rubber meeting on 11th and 12th August 1989, but transmission from Paris was impossible (lines out of order).

V - PROGRAMME PROPOSAL

There is therefore a need to set up a Rubber Research Institute. To do this, it will be necessary to develop the existing estates and processing centres. This will have to be done over a large area - 500 to 1,000 ha, so as to ensure adequate self-financing for subsequent research.

The technical assistance of 4 researchers - 2 seniors and 2 juniors - for at least three years will provide the necessary support for setting up and running the research programmes defined in the previous section, as well as for short and long term training.

The Asian Development Bank can intervene in two ways to fund this programme:

- ◆ funding of investments (plantations, infrastructures and factory) through a loan (6.5% interest rate + exchange risk),
- ◆ in the form of a technical assistance subsidy, which could possibly come from the French contribution to this fund (in this case, the agreement of France is necessary).

The DA should consult the ADB on this matter, as IRCA is ready to make its contribution to the implementation of this project. In the first instance, given the strong motivation in the Philippines for the development of *Hevea* growing, with the support of a national research institute, the mission recommends that the programme indicated in the table on page 19a be undertaken, with French bilateral cooperation funding).

The Junior Researchers will be responsible for the following:

◆ Agronomy

- . trials at the stations: improvement, phytotechny, exploitation,
- . on-farm trials and, where applicable, assistance to the agrarian reform operation,
- . training

◆ Technology

- . participation in the final third of laboratory construction.
- . ordering, taking delivery and setting up of equipment,
- . training for laboratory technicians,

- . improvement of the CMU rubber processing factory,
- . rehabilitation of the USM rubber processing factory,
- . training.

The mission recommends that the two junior researchers be made available at the same time (complementarity and synergism).

Accommodation and standard operation could be provided by the Philippine research structures, with the French Government providing funds for a 4 wheel-drive vehicle and a motorbike.

The prerequisite to these two researchers being made available is the guarantee of funds for setting up and running the specifications laboratory.

The choice of the two researchers depends on financial constraints; however, if there is greater bilateral funding, associated with French support for the agrarian reform, a senior researcher could be sent on detachment, to complete this team.

As far as training is concerned, it is necessary to lay the foundations of the future institute, through the long-term training of two researchers, one in physiology, the other in technology.

If work begins on the laboratory in 1990, short-term training (2 months in France) for a chemist should be programmed.

The mission (invitation) of Mr. F. Garcia, provided for under the former programme, should go ahead, whatever the results of the meeting on 11th and 12th August, or the problems associated with the laboratory, since he is already conducting research programmes which need to be backed up by a visit to France and Africa. The same applies for the shipment of planting material, which was already awaited in 1988 (and for which stumps had already been prepared). This material will be harvested at the collections station in GUADELOUPE and the cost of the shipment has been estimated at FFrs 20,000.

Technical support missions to assist the junior researchers will be carried out from France and Asia, as indicated in the table on page 19a.

PROPOSAL FOR A COOPERATION PROGRAM

	<u>1990</u>	<u>1991</u>	<u>1992</u>
<u>Scientific and Technical Cooperation</u>			
◦ Setting up of trials on centers	} ----- Agronomist Junior -----		
◦ Setting up of on-farm trials			
◦ Processing	} ----- Rubber Specialist Junior -----		
◦ Setting up of a specification laboratory			
Despatch of clones	X		
Invitation	<ul style="list-style-type: none"> . Mr. Garcia (20 days : FR - C.I.) . X, Chemist (2 months : France) 		
Training :	<ul style="list-style-type: none"> . Rubber Technologist 	French University March	
	<ul style="list-style-type: none"> . Biologist 		French University March
Support mission and lectures (IRCA expert from France (FR) or Asia)	2 x 15 days (FR)	2 x 15 days (FR) 2 X 20 days (Asia)	2 x 15 days (FR) 2 x 20 days (Asia)

19a

N.B. In the course of the year 1991, A.D.B.'s complementary financing should occur.

VI - CONCLUSION

Compared to December 1987, the mission noted a much stronger motivation among the Philippine partners at all levels, both research and development, for the development of natural rubber. This motivation gave rise to a meeting at national level on 11th and 12th August, where all the problems associated with natural rubber development were to be touched upon, particularly:

- ° definition of a national, natural rubber policy, with the creation of a Philippine Rubber Development Board,
- ° creation of a National Rubber Research Institute and, within this Institute, a central quality control laboratory,
- ° development of local research-development, estates-smallholdings, producers-consumers networks,
- ° definition of a natural rubber development strategy.

The creation of the Institute requires resources of an international funding level, in that it will need to be relatively independent of existing structures, whilst still benefitting from their assistance, with a particular need for full-time experts in agronomy and technology, to define, undertake, monitor and coordinate the programmes mentioned in this report or in the document drawn up by Dr. P. Pamplona (annex 6).

Once the conclusions of the meeting on 11th and 12th August 1989 are known and as soon as the problem of laboratory funding has been clarified, French intervention should make it possible to contribute to the launching of operations.

The possible integration of part of the rubber programme into the wider context of France's contribution to the agrarian reform, is worth looking into, since Hevea growing plays an important role in the socio-economic fabric of the island of Mindanao.

It is regrettable that the absence of a positive stand by the Philippine Government on the natural rubber issue has so far prevented effective and coherent cooperation from being established, unlike in other Asian countries : Thailand, Indonesia, because the scientific (Universities) and industrial potential exists and dialogue is easier with Philippine contacts who have an outlook closer to our own.

FIELD LAYOUT

Block I

Date Planted JAN. 1984

1. AVROS 1350
2. FX 1042
3. GA 337
4. GT 1
5. GT 127
6. GT 446
7. GYT 577
8. GYX 1102
9. GYX 142
10. GYX 20819
11. Havbel 1
12. IAN 113
13. IAN 713
14. PBIG
15. PB 275
16. PB 5/51
17. WAR 4
18. RRIM 606
19. RRIM 623
20. RRIM 625
21. RRIM 701
22. RRIM 703
23. RRIM 513
24. PB 330
25. TJIR 16
26. AV 1258
27. AV 642
28. GT 161
29. PR 261
30. RRIM 717
31. AV 634
32. GL 1
33. RRIM 605

FIELD LAYOUT

Block I*

Date Planted October 1985

- | | |
|---------------|--------------|
| 1. GW 5 | 26. GT 532 |
| 2. GYX 101 | 27. AV 1256 |
| 3. GYX 19007 | 28. GA 308 |
| 4. AV 1996 | 29. AV 163 |
| 5. AV 1301 | 30. GYX 370 |
| 6. AV 1581 | 31. GYX 157 |
| 7. PB 86 | 32. RRIM 712 |
| 8. GV 21 | 33. AV 1153 |
| 9. PB 255 | |
| 10. TJIR 1 | |
| 11. GYX 183 | |
| 12. DR 107 | |
| 13. RRIM 705 | |
| 14. GYX 99 | |
| 15. RRIM 612 | |
| 16. SMRX 1 | |
| 17. IAN 873 | |
| 18. GT 252 | |
| 19. GYX 182 | |
| 20. GYX 20986 | |
| 21. AV 1447 | |
| 22. GYX 232 | |
| 23. AV 608 | |
| 24. GYT 19007 | |
| 25. AV 1972 | |

FIELD LAYOUT

Block III

Date Planted November 1985

1. AV 1792
2. AV 1126
3. AV 1256
4. RRIM 527
5. PB 310
6. PB 235
7. RRIM 628
8. AV 1531
9. GT 499
10. GT 252
11. RRIM 625
12. RRIM 703
13. P₃
14. P₁
15. IAN 113
16. GYX 20819
17. ED - 5
18. GT 711
19. AV 49
20. IAN 711
21. GA - 308
22. AV 1352
23. AV 1236
24. GYX 20906
25. GYX 157
26. GYX 370
27. AV 163
28. GT 532
29. AV 1972
30. AV 608
31. AV 1328
32. GYX 232
33. AV 1447

RUBBER RESEARCH PROPOSALS SUBMITTED TO THE
BUREAU OF AGRICULTURAL RESEARCH (BAR), DA, QUEZON CITY

PROJECTS

1. Technical and Economic Aspects of Weed Control, Fertilizer Application and Branch Pruning on Newly Productive Rubber Trees - Prof. Ediberto F. Flauta
 - Study 1 - Influence of Weed Control Methods and Frequencies on the Girth Increment, Bark Renewal, Cuplump Yield and Return on Newly Productive Rubber Farms - Prof. Ramon C. Pahunang
 - Study 2 - The Influence of Fertilizer Application and Branch Pruning on the Cuplump Yield, Return, Growth and other Horticultural Traits of Nine Year Old Rubber Plants - Prof. Edilberto Flauta
2. Soil Characterization and Lime/Fertilizer Trials in Areas Grown to Rubber in Mindanao - Prof. Editha L. Agus
 - Study 1 - Characterization and Genesis of Soils Grown to Rubber in Mindanao - Prof. Nonilona P. Daquiado
 - Study 2 - The Effects of Lime and Varying Levels of Nitrogen and Phosphorus on the Growth and Latex Production of Rubber in Mindanao - Prof. Editha L. Agus
3. Some Studies in Hevea Rubber Root Diseases in Mindanao - Prof. Expedito E. Danlag
 - Study 1 - Survey and Identification of Major Root Diseases of Rubber in Mindanao - Prof. Expedito E. Danlag
 - Study 2 - Biological Control of White Root Disease fungus, Rigidoporus legnossus (Kutxsch) Imazeki of Hevea brasiliensis - Prof. Lolito N. Capili
4. Plantation Crop, Pasture and Livestock Integration - Prof. Lorenzo J. Curayag
 - Study 1 - Evaluation on the Agronomic Performance of a Grass-Legume Combination of Pastures Established under Rubber Plantation- Prof. Lorenzo J. Curayag
 - Study 2 - Beef Cattle Production From Pastures under Rubber Plantation- Dr. Elmedio T. Rivas
 - Study 3 - Sheep Production Under Rubber Plantation - Mr. Renato P. Abbu
5. Sheep Integration Under Rubber Plantation - Dr. Elmedio T. Rivas
 - Study 1 - The Effect of Grazing on the Growth and Yield Performance of Rubber Tree Plantation - Dr. Elmedio T. Rivas
 - Study 2 - The Effect of Integrating Sheep in Rubber Plantation on Soil Conditions - Mr. Romeo Bagares

2.
Study 3 - The Effect of Grazing on the Control of Weeds of Rubber
Tree Plantation - Mr. Renato P. Abbu

Study 4 - Evaluation on Adaptability and Growth Production Performance
of Sheep Raised Under Rubber Plantation - Dr. Elmedio T. Rivas

STUDY(IES)

1. Incidence of Rubber Diseases as Influence by the Application of
Yield Stimulants - Dr. Nonito S. Franje
2. Preliminary Study on Puncture Tapping and Ethrel Stimulation on
Four Year Old Rubber Plants - Prof. Edilberto F. Flauta
3. Rubber Seed Meal as Protein Source for Feedlot Fattening -
Dr. Elmedio T. Rivas

Annex 3VISIT TO THE JCA ESTATE

This estate belongs to the DACON GROUP COMPANY, which has 9 companies operating in the agricultural, mining and timber sectors. In the agricultural field, the Group is involved in *hevea* growing, livestock husbandry, cocoa and coffee (*arabica*) plantations.

Past Events

- ◆ 1962 to 1965 : creation of a 1,000 ha *hevea* estate on a former forest concession belonging to J.C. AQUINO, Governor of AGUSAN.
- ◆ 1970 to 1978 : successive hiring out of the estate.
- ◆ 1978 to 1989 : acquisition of the estate by David ACONANCO.

Description of the Estate

- ◆ Undulating relief.
- ◆ Clones: 60% PB 86 and TJ1, RRIM 600, 605, 606, HARBEL 1, GA 330, AVROS 9, PR 107, IAN.
- ◆ Replanting:
 - 25 ha in 1984, not maintained,
 - 80 ha in 1989, well set up.
 - target
 - . 200 ha/yr, including 100 ha of RRIM 600
 - . 20 ha/yr PB 280
 - . 20 ha/yr PB 260
 - . 60 ha/yr GT 1
- ◆ Planting
 - current density: 113 trees/ha for an original density of 416 trees/ha (3 m x 7.5 m).
 - trees sometimes over-exploited from 1970 to 1978.
- ◆ Under the Agrarian Reform, this estate underwent "volunteer offer selling".

- ◆ Very wet climate with rain in the mornings from November to February (50 days/year).
- ◆ Tapping system: S/2 d/2 ST ET 5% 1/1 5/y, but most often anarchic tapping before felling.

Trials

- ◆ Tapping trials on RRIM 600
S/2 d/2, S/2 d/3 ST, S/2 d/4 ST and S/2 d/6 ST.

GT 1 :
S/1 d/4, S/1 d/6 ST, S/1 d/8 ST.

10 trees per treatment with no replication. Stimulation is at 4% with coconut oil medium (60%).
- ◆ Rain protection trial: Rainguard and collection recipients.
- ◆ Fungicide application trial in nursery, bearing in mind heavy rainfall.
- ◆ Trial to control vascular die-back in the nursery, using Bayfiden (no control).

The Group's Research-Development Department is based at JCA and wishes to orient its work towards disease control and selection, injection tapping. Support seems to be required for research programming.

A FEW ECONOMIC INDICATORS

- ◆ Cost of setting up 1 ha of *hevea*, up to tapping:
25,000 Pesos (clearing with chain-saw).
- ◆ Minimum wage : 69 P/day (Makilala) to 74 P/day.
- ◆ Sharecropping: 30-70% (50/50 on opening).
- ◆ Rubber selling price:
 - * Farm gate price:
 - latex 21 Pesos/kg dry
 - cup lumps 7 to 10 Pesos/kg dry, depending on
where sold
 - * Export price (CAF):
 - latex 30 Pesos/kg dry
 - pale crepe 22 Pesos/kg dry - class 1
 - 21 Pesos/kg dry - class 2
 - 20 Pesos/kg dry - class 3
 - brown crepe 13 Pesos/kg dry
 - Grade 20 crumb 13 Pesos/kg dry
 - * Farm gate selling prices of other agricultural
products:
 - Cocoa 30 Pesos/kg
 - Coffee 20 Pesos/kg
 - Rice 3 to 5 Pesos/kg (Paddy)
 - Coconut 30 Pesos/kg

IRCA MISSION

H. de LIVONNIERE - M. de LA SERVE

JULY 19 - 28, 1989

RECOMMENDATIONS

1. Setting up according to actual organizations - SMARC or PICRI - or new organizations of a National Philippino Rubber Research Institute.

It could be founded on the research centers USM and CMU and on the network research and development of DA-BAR.

It could have a constant budget and permanent researchers for the two programmes (agronomy and processing technology).

2. Agronomy

- To complete the clonal collection and set up several large scale trial clone fields in the stations of USM, CMU, IPIL and other DA-BAR stations.

- To set up manuring trials : Davao de Norte Agusan de SUR.

- To set up phytotechnic trials according to soil, climatic, altitude conditions - 3 or 4 among the most well-known clones.

- To set up tapping system trials : tapping frequency reduction with stimulation in order to reduce bark consumption and increase the production ratio (tapper/day) without changing the annual production kg/ha/year.

- To set up intercropping trials : soil valorization, reforestation, crops diversification, permanent crops trials in double intercrow of hevea. MONT CARMEN, USM, ARACAM VALLEY.

3. Chemistry, processing and technology

- To set up a quality control and specification laboratory according to existing laboratories.

- To revamp the processing pilot plant of CMU and to set up in the same place one GPC (Group Processing Center).

- To set up in USM and in ARACAN Valley GPC for demonstration, training and valorization of NR already produced.

4. Development

- To encourage the budwood production delivered with origin certificates for smallholders.

- To train the tappers.

- To promote a better collaboration between estates and smallholders.

- To set up Nucleus Estates organization.

- To incite smallholders to collect, to preprocess and to store their raw rubber out of contamination.

- To incite the setting up of associations or cooperatives for collection, processing and marketing of NR.

5. Suggestions for specification laboratory

Ref. Draft final report "Feasibility study of establishing a standard Philippine rubber laboratory testing center at USM" - Dec. 1988.

- To refer and include the existing ISO standard

- To re-evaluate the equipments budget

- To study the laboratory drawing again according to the following document "Plan d'un laboratoire de contrôle de qualité".

- This document could be in accord with the existing equipments in USM and estimating need of technical network in MINDANAO.

ORGANIZATION OF LABORATORY

This laboratory is subdivided in 5 rooms (total 100-200 m²)

A. Reception, registration and homogeneization of samples

1. Standard open mill
2. Shelve - storage
3. Desk
4. Small press for sample manufacture (colour test)

B. Oven room

Equipped with laboratory benches with cupboard, one sink, fume cupboard mineralization apparatus and gas burning device.

5. Muffle oven - ash content
6. Mineralization apparatus - nitrogen content
7. Gas device - ash content
8. Volatile matters determination oven
9. Kjeldalh equipment - nitrogen content

C. Dirt content room

Equipped with laboratory benches, cupboards, sink and a fume cupboard over heating plates.

10. Oven - dirt content
11. Heating plates - dirt content
12. Oven glassware
13. Filtration - dirt content
14. Device for preparation of dirt content samples

D. Physical test room

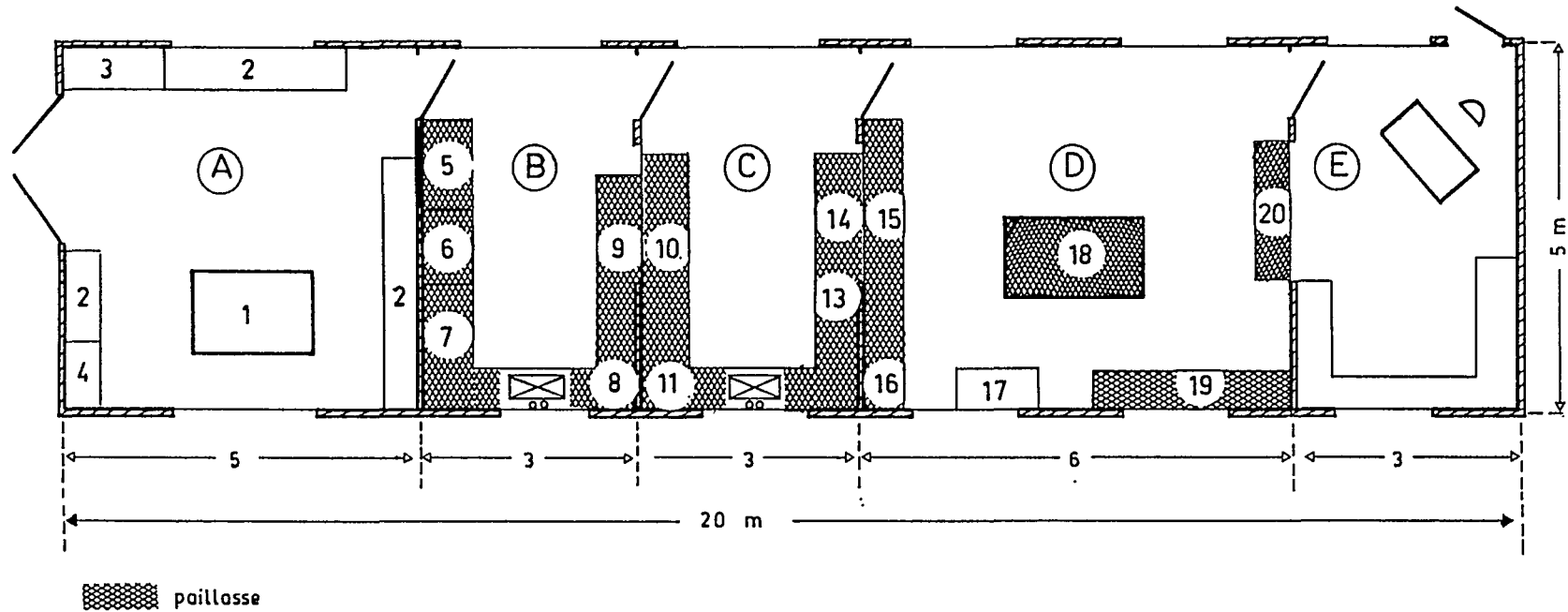
Equipped with benches and cupboards, air-conditioned.

15. Colour test
16. PRI oven
17. Viscosimeter
18. Wallace Plastimeter fully equipped
19. ASHT test
20. Balances

E. Air-conditioned office

F. Optional : room for sample storage

FIGURE 1



PLAN D'UN LABORATOIRE DE CONTRÔLE QUALITÉ

RESEARCH AND DEVELOPMENT FOR PHILIPPINE
INDUSTRIAL CROPS RESEARCH INSTITUTE

1. Research and Development Activities for Rubber

1. PJ. 1.. Regional Screening of rubber clones in Region IX
 - Study 1. Evaluation of rubber clones in Region IX
 - Study 2. Evaluation of rubber clones in Region X
 - Study 3. Evaluation of rubber clones in Region XI
 - Study 4. Evaluation of rubber clones in region XII
2. PJ. 2. Cultural management studies on rubber
 - Study 1. Growth and yield response of rubber to sustained application of single and combined organic and inorganic fertilizers
 - Study 2. Influence of planting materials and density of planting on the growth and yield of rubber
 - Study 3. Field evaluation of non-conventional covercrops for additional income to farmers
3. PJ. 3. Intercropping studies on rubber
 - sub-project 1. Intercropping rubber with perennial crops
 - sub-project 2. Evaluation of different varieties of corn, sorghum and field legumes as intercrops for immature rubber
4. Project 4. Comparative evaluation on the productivity and profitability of ruminant species under immature rubber plantation in Mindanao
 - Study 1. Productivity and profitability of dairy goat production in rubber plantation
 - Study 2. Productivity and profitability of sheep production in rubber plantation
 - Study 3. Evaluation of the profitability of rubber-based cattle fattening
 - Study 4. Carabao production component

5. PJ. 5. Development of an integrated crop protection management strategy against major pests of rubber in the Philippines
 - Sub-project 1. Pest and disease management studies on rubber
 - Sub-project 2. Weed management in nurseries, immature and mature rubber plantations in the Philippines
6. PJ. 6. Tissue culture studies in rubber
 - Study 1. Test tube rubber: Determination of culture medium for different plant parts
 - Study 2. Light and temperature requirements of rubber callus growth and differentiation
7. PJ. 7. Quality control studies in rubber
 - Study 1. Quality and properties of raw, semi-processed and processed rubber in the Philippines
 - Study 2. Influence of "clones" on the quality of processed rubber
 - Study 3. Use of indigenous materials for coagulating rubber
 - Study 4. Preservation of rubber latex using indigenous materials
8. Project 8. Design, development and improvement of processing equipments for small growers
 - Study 1. Development of latex processing equipment for smallholders
 - Study 2. Improvement of the locally manufacture rubber sheeter
 - Study 3. Improvement of rubber solar and agro-waste fed dryers
 - Study 4. Design and development of low cost baling press
 - Study 5. Design and development of mechanized tapping knife
9. Project 9. Socio-economic aspects of rubber production in the Philippines
 - Sub-project 1. Economic studies on rubber production and marketing
 - Sub-project 2. Sociological aspects of rubber production

10. PJ. 10. Development and evaluation of communication resources in supports of the rubber industry
- Sub-project 1. Assessment of communication resources and adoption of rubber technology
 - Sub-project 2. Development and evaluation of communication support materials for the rubber industry
 - Sub-project 3. Communication participation of rubber extension agents, community leaders and farmers in rubber technology dissemination and utilization

DEVELOPMENT COMPONENT

- Project 1. On-farm evaluation of intercropping field crops in immature rubber plantations
- Project 2. On-farm evaluation of most promising rubber clones under different agro-climatic zones
- Project 3. On-farm verification trial on the growth of RAJM 600 using different cover crops
- Project 4. On-farm verification of high stumped planting of rubber
- Project 5. On-farm verification of rubber processing facilities and equipment for small rubber holders
- Project 6. A pilot project on: Sheep production under immature rubber plantation in Mindanao

POSSIBLE AREAS OF COOPERATION BETWEEN USMARC AND IRCA

1. Confirmation of the recommendations of the mission of Mr. de Livonniere and Mr. de la Serve in 1987.
2. Confirmation of the recommendation of Dr. Pablito P. Pamplona in connection with his mission to France and Ivory Coast in 1988.
3. Reinforcement of the following recommendations in two missions mentioned above as follows:
 - a) IRCA to make available to the Philippines for trial 20 promising clones indicated in the recommendation.
 - b) Conduct joint experiments with IRCA staff on tapping and stimulation management.
 - c) Jointly conduct training on tapping management among technicians and plantation managers.
 - d) IRCA to provide assistance in the establishment of quality control laboratory at USMARC.
 - e) IRCA to provide training for the laboratory technicians to handle the quality control laboratory at USMARC.
 - f) IRCA to provide training on utilization of rubber such as gloves, balls, swimming gadgets, rubber boozing, rubber bands and rubber balloons.
 - g) IRCA to provide more grants on observation and travel tour to develop rubber research institutes and attendance to related symposiums.