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## Département territoires, environnement et acteurs Cirad-tera

**Agricultural Diversification Project  
Vietnam**

**Mission from 19<sup>th</sup> to 31<sup>st</sup> October 2000**

**Technical support for identification of a  
research programme of on-farm  
experimentation for rubber smallholder in  
coastal areas in central Vietnam.**

**Eric PENOT from CIRAD TERA/THI**

**N° TERA 85/00  
N° THI 56/00**





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## **Special Thanks**

We would like to thank especially Mme Tran Thi Thuy HOA, deputy director of RRIV, Frank Enjalric and Stéphane Boulakia, from CIRAD, as well as all the RRIV team in Pleiku and Mr and Mr Mai Van Son, Director of RRIV, for the organisation of this mission and their constant and perfect support to this mission.

We also thank the PPMU personnel as well as Estate staff that welcome us in the coastal provinces.

I would also like to thank personally Mr Jean Marie Eschbach -CIRAD-CP) who contributed greatly to this mission by sharing with us his 15 years experience of Vietnam and collaboration with RRIV.



# **Agricultural Diversification Project Vietnam**

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of on-farm experimentation  
for rubber smallholder in coastal areas in central Vietnam.  
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## **EXECUTIVE SUMMMARY**

### *Introduction*

This mission of technical support has been implemented within the frame of ADP project (Agricultural Diversification Project), according to scientific programming of year 2000, in support to the socio-economic component of adaptive research programme for rubber smallholders in collaboration with RRIV (Rubber Research Institute of Vietnam).

The visits in the field have been done with Mme TRAN THI THUY HOA, deputy director of RRIV, Mr Jean Marie Eschbach (CIRAD-CP), M Frank ENJALRIC, co-coordinator of R&D component of ADP, Mr Stéphane Boulakia, CIRAD-TERA (THI programme), based in RRIV/Pleiku, five heads of the RRIV scientific divisions (HCM/Saigon) and 2 researchers from RRIV station of Pleiku, working with S.B and M Henk ZWINDERMAN, Smallholder Rubber Development Specialist (SRDS/ADP)

The Agricultural Diversification Project (ADP) aims to promote i) crops diversification (in particular through development of rubber in selected areas: highlands and coastal areas) and ii) increase of rural incomes through land allocation, long term loans, institutional strengthening and technical support with small holder rubber cultivation. There is an smallholder rubber research programme which is implemented by RRIV with the scientific support from CIRAD (Centre de Coopération Internationale en Recherche Agronomique pour le Développement). CIRAD is involved in the project as two levels : as a member of PCU for the research component co-ordination and for cropping and farming systems research in partnership with RRIV.

This research component presents three strategies : i) a basic research in controlled areas, ii) an adaptive research under smallholder conditions and iii) a participatory research linked with farmer's socio-economic environment, in order to understand the conditions of technology adoption and innovation process. In the context of rural development based on a new crop for local farmers, rubber, in particular in coastal provinces, the primary aims of such research are : i) to have a better knowledge of agro-socio-economic environment of selected areas, ii) to create and adapt locally new agricultural technologies (various rubber cropping systems) ad iii) to determine agronomic and socio-economic conditions leading to a sustainable development.

Beside implementation of ADP diagnosis phase that should be done in 2001, it seems important to initiate on-farm research activities in the most dynamic provinces in coastal areas to be able to propose as soon as possible adapted technical recommendations to ADP for larger development of rubber in these areas.



These activities will also enable RRIV to strengthen its capability in on-farm trials implementation and in farming system understanding. The activities and methodologies proposed in this report are strictly related to on-farm experimentation.

### **Objectives of the mission**

This mission concerns coastal provinces that are involved in rubber planting in 2000 despite of difficulties of organisation. They need some support to set up on-farms experiments in attend to improve farmers' adoption of this new crop. The fields visits concerns mainly the Chu prong station in Pleiku (highlands) and the 3 coastal provinces of Hué, Quang tri and Quang Binh.

The overall objective of the mission is to initiate this programme of on-farms trials (OFT) of ADP research component in coastal provinces and the small farming system research (FSR) linked with OFT network based on small farming systems surveys (FSS). The second major objective was to present the OFT methodology to RRIV researchers.

The main outputs of the reports are presented as following :

- the analysis of field visits, the rapid rural appraisal and exploratory surveys done with some farmers are presented in chapter 5.
- a presentation of the methodology in chapter 6
- a preliminary programme of OFT protocols is presented in chapter 7.
- Farming System Survey (FSS) methodology is presented in chapter 8

ADP project has obviously difficulties to be set-up however there is great effort from local PPMU and institutions to begins rapidly actions in the fields and implement at least the re-scheduled programme. On the other hand, the research component, with a strong RRIV support, is developing its activities with satisfactory. The ground is very positive and with a great potential for further OFT activities in these coastal areas.

### **Main conclusions from the fields visit.**

#### ***1 Planning and availability of rubber planting material.***

A planning concerning planting material and planting programme is necessary in these provinces : in particular for those which do not produces themselves their planting material In other words, it is necessary either to establish a private sector of local nurseries with contracts for planting material, or establish budwood gardens and nurseries by the project it self in order to secure planting material. The second solution is an emergency solution when the first one appears to be the solution in the long term if self-development by farmers is expected in the long run. Planting material certification and availability, through development of a private sector, means that there will be a demand in the very next future in terms of organisational innovations.

#### ***2 A need for technical guidelines***

ADP has identified and published in a report (most of time not available at provincial level ) some technical guidelines of the project but it seems that nobody knows them. The main outcome is that decision-makers at provincial level use what they know : GERUCO technical guidelines which are NOT at all adapted for local smallholders. There is a large demand from all institutions (PPMU and others) for adapted guidelines. Therefore a very first priority is, for ADP and PPMU, to release officially real ADP technical guidelines and to verify if there fit coastal provinces environmental and socio-economical situations. There is probably a work to do to put them in a format that can be really usable for technicians.

A first objective could be for instance to collect all information available from RRIV already published in Vietnamese and organise diffusion of this material. A second objective could be to adapt and translate the "Rubber Book", published by Mrs Delabarre and D'Aquigno (1994), from the experience of SRDP/TCSDP rubber development project in Indonesia (also funded by World Bank), a very useful technical guideline with pictures. The results of OFT programme to be set up very soon should also be put into leaflets and small technical manuals to be used by ALL ADP staff.



### **3 Inter-cropping patterns**

There is an obvious demand for various type of inter-cropping patterns adapted to local soils, land preparation, climate and markets. There is a large scope for OFT implementation in order to cover that specific and real farmers' demand.

There are several axes that can be explored :

- ✓ intensive inter-cropping management - if no Imperata and no compacted soils.
- ✓ intensive inter-cropping with special land preparation and specific soil management using covercrops and no tillage practice.
- ✓ rotation based on upland rice and groundnut.
- ✓ extensive RAS 3 type management. (RAS 3 are Rubber Agroforestry Systems : type 3 currently tested in Indonesia in on farm experimentation to get rid of Imperata at lowest cost) if Imperata is a major threat.
- ✓ Integration of fodder into inter-cropping system in order to feed livestock if land is limited for pasture.
- ✓ integration of fruit crops : pineapple and bananas as well as fruit trees such as citrus, durian, longan, rambutan.... in various rubber spacing and density.

The management of rubber inter-rows, through inter-cropping annual or perennials, will definitely determine rubber growth. Both farmers and PPMU staffs are obviously looking for alternatives in optimising both production and labour productivity of intercrops with rubber as well as looking for profiting of the benefit of intercrops for rubber growth.

In a general way, we have remarked that farmers are very sensitive to soil fertility problems. They generally try to maintain soil fertility by providing organic matter and to improve productivity using fertilisation. This is a very favourable ground for experimenting no tillage techniques and systems with covercrops, in particular when fodder production can be included into cropping systems. We also observed that generally, soils characteristics are not taken into account in the new rubber plots selection process

### **4 Exploitation and tapping techniques**

In some areas , trees seems to be under exploited. Therefore a small survey should be done with farmers who have rubber fields already in production in order to have data on production and tapping frequencies. A small on farm experimentation could be implemented to see if the use of stimulation and adapted tapping practices, adapted to local climate, could be applied in order to optimise production and decrease labour requirement.

### **5 Fertilisation on rehabilitated plots.**

A small on-farm trial should be implemented with and without recommended fertilisation doses in order to verify, according to status of the rubber trees if fertilisation is really efficient and relevant.

### **6 Total number of OFT**

The budget has been scheduled for a total number of 54 fields with 24 fields in 2000 and 32 fields in 2001. This number seems to be reasonable for implementation of 10 trials with 5/6 replications each. The programme of 2000/2001 could be based on at least 3 trials with 5 replications and possibly 1 or 2 small size trials with 3 replications. The rest could be implemented in 2001/2002. The basic protocols of the proposed programme of trials are detailed in chapter 7.

### **7 Land certificate and use of ADP credit.**

It is certainly true that farmers are very interested by the land certificate provided by the authorities. It is also a guarantee for farmers that their future investment will be profitable in the long run. The use of credit should be carefully observed as most farmers still do not know exactly conditions of credit. Land preparation should be adapted and economically



acceptable for farmers. On-farm experimentation on that topic with no-tillage and covercrops technologies will provide very soon alternatives to very heavy and costly land preparation currently proposed to farmers. Information should be properly channelled to farmers according to different types of credit they can have access to in order to improve an efficient use of credit to what is really necessary.

#### *Methodology*

The main tools to be developed by RRIV to achieve such goals are the following :

- a network of on-farm trials : to test technical innovations in the context of coastal areas.

ADP has scheduled a total number of around 60 fields/farmers for such OFT network. Most of these OFT plots should be established in areas where rubber planting effectively occurs or will occur in the very next future. Coastal provinces and Kontum province in highlands seems to be most interesting areas for OFT implementation.

- the use of a participatory approach in order to obtain more rapidly adoptable and more operational technologies.

- A network of demo plots for diffusion for technologies already adapted or for technologies resulting from on-farm trials.

Some suggestions of draft protocols of On-Farm Trials are proposed in the report. These basic protocols will be discussed with farmers in selected areas.

#### **Proposal for a small Farming System Survey (FSS) on OFT farms network.**

In order to know conditions of experimentation and adoption of technologies experienced in OFT, it seems necessary to implement a small size Farming System Survey limited to farmers of the OFT network. The objectives of this limited FSS are i) to characterise farming systems of farmers involved in the On-Farm Trials network and ii) to have a better understanding of innovation adoption and impact of experimentation.

For the data analysis, we suggest that the team could use the software Winstat (a free CIRAD product) that is adapted to FSS data analysis. Mr Boulakia knows the software. A demonstration has been done to Mr Zwinderman. Some examples of questionnaires and data processing have been given to them for training.

In case of larger use of Winstat by several staff, from RRIV or ADP, a training can be organised through CIRAD.

FSS should be strictly limited on farmers involved in OFT network, at least for the first 2 years. The objective is also to train RRIV staff to FSS, step by step, to enable RRIV to deal with FSS and OFT independently, within a research process. One scientist, Mr Le van Ngoc, has been allocated by RRIV to Pleiku station to work with OFT team. Mr Boulakia could probably train Mr Ngoc to FSS methodology and Winstat for data processing.

Training can be done though the implementation of small FSS in Pleiku area, close to Chu prong station for instance, in villages to be selected by the team only in order to train RRIV staff. The first FSS can then be later implemented in the 3 villages (or more) to be selected in coastal provinces for OFT. A step by step approach is recommended (and presented in chapter 9), under the guidance of Mr S Boulakia, to ensure quality of data collected and analysis.

#### *Programme of activities for 2000/2001*

A programme of activities has been proposed in chapter 9 and is only indicative. It will depend on available resources, climatic constraints and organisation of activities.

Because the number of trials and FSR activities will require a constant and active presence in coastal areas, and following or accompanying the dynamism on rural development of these provinces, it seems therefore necessary to move some or all RRIV OFT team to coastal area within a year. We suggest the City of Huê as a base for both the CIRAD scientist and RRIV team. This location ensure good live and workplace conditions for researchers and certainly for ADP extension component.

The team might be composed of Mr Ngoc for FSR activities and another scientist (to be



identified ) in agronomy for local OFT trials setting-up and monitoring. It seems therefore essential for the pursuit of research activities in these coastal areas where rubber planting is very dynamic that the RRIV research ability should be reinforced, in the mid term, with additional field staff to monitor on-farm trials in these three coastal provinces.

### **Main conclusions**

The survey and visit to the fields in the 3 coastal provinces have shown that there is a current dynamic in rubber planting compared to the situation in highlands where coffee seems to be more currently favoured by smallholders (except in Kontum province where it seems that there is still a good scope for rubber). We confirm the report from a recent ADP mission in these zones in September 2000 which indicates that there is a strong demand for rubber development in these areas, and consequently, a strong demand from local farmers on various topics to adapt rubber cropping systems to local conditions. The challenge is to link as soon as possible farmers' settlement with research topics in a context of land intensification and adaptation of land preparation and cropping systems to fragile soils where erosion and soil fertility are key problems.

The main topics are clearly the following :

- 1 For rehabilitation of former Project 327 plots : there is no clear indication that rehabilitation will be effective and on farm in situ experimentation is necessary to validate or not the effect of a strong amount of fertiliser to recover these plantations.
- 2 New planting : a certain number of problems have been expressed by the team and local farmers :

Generally speaking, the GERUCO model and recommendations are not recommended for farmers conditions. In other words, rubber smallholders conditions are far different from that of Estates. On farm experimentation is aimed to define precisely rubber cropping patterns (including annual and perennial inter-cropping) for smallholding conditions.

These topics are summarised as following :

- ✓ land preparation : The GERUCO approach is definitely not adapted to smallholders.
- ✓ inter-cropping and agronomic practices: there is a strong demand for improved inter-cropping systems which have to be productive and sustainable. There is behind that topic the necessity to take into account soil-climate and agricultural practices effects on soil fertility. Soil fertility is a concern for most farmers who want to maintain intercrops production for at least the first four years with traditional spacing (7m x 2,5 m). There is also the possibility to explore other spacing such as double line and large inter-row in order to enable food production for 10 years or more. The demand is on increase, feasibility, productivity and sustainability of inter-cropping practices adapted to rubber. Fruit trees association with rubber seems to be also a very important topic as there is an increasing market for fruits in these areas.
- ✓ For rubber : type of planting material (polybag..), type of clones, spacing, fertilisation (rehabilitation), production of planting material... are key points to be tested. Clonal recommendations are also very important in that case and should be adapted to local variations.

It should be clearly identified what rubber cropping systems can be suggested to farmers : monoculture, monoculture with annual inter-cropping during immature period or agroforestry systems (such as those currently developed in Indonesia and Thailand). The visited coastal areas have shown that rubber is definitely an interesting options for poor local farmers who still rely on food-crops and some cash crops such as groundnuts and fruits. Land is still plentiful in piedmond area. Livestock is present everywhere and seems to be relatively important.

In terms of knowledge about farming systems and farmers strategies, it is important to consider to characterise and monitor these farming systems as there is strong ecological variations, diversified populations, various access to resources and different access to



markets, credit and technical information in these coastal provinces. FSR linked with OFT in the same network, implemented by a small team from RRIV, should be able to provide adapted and improved rubber based cropping systems as well as information on socio-economic conditions for a successful development.

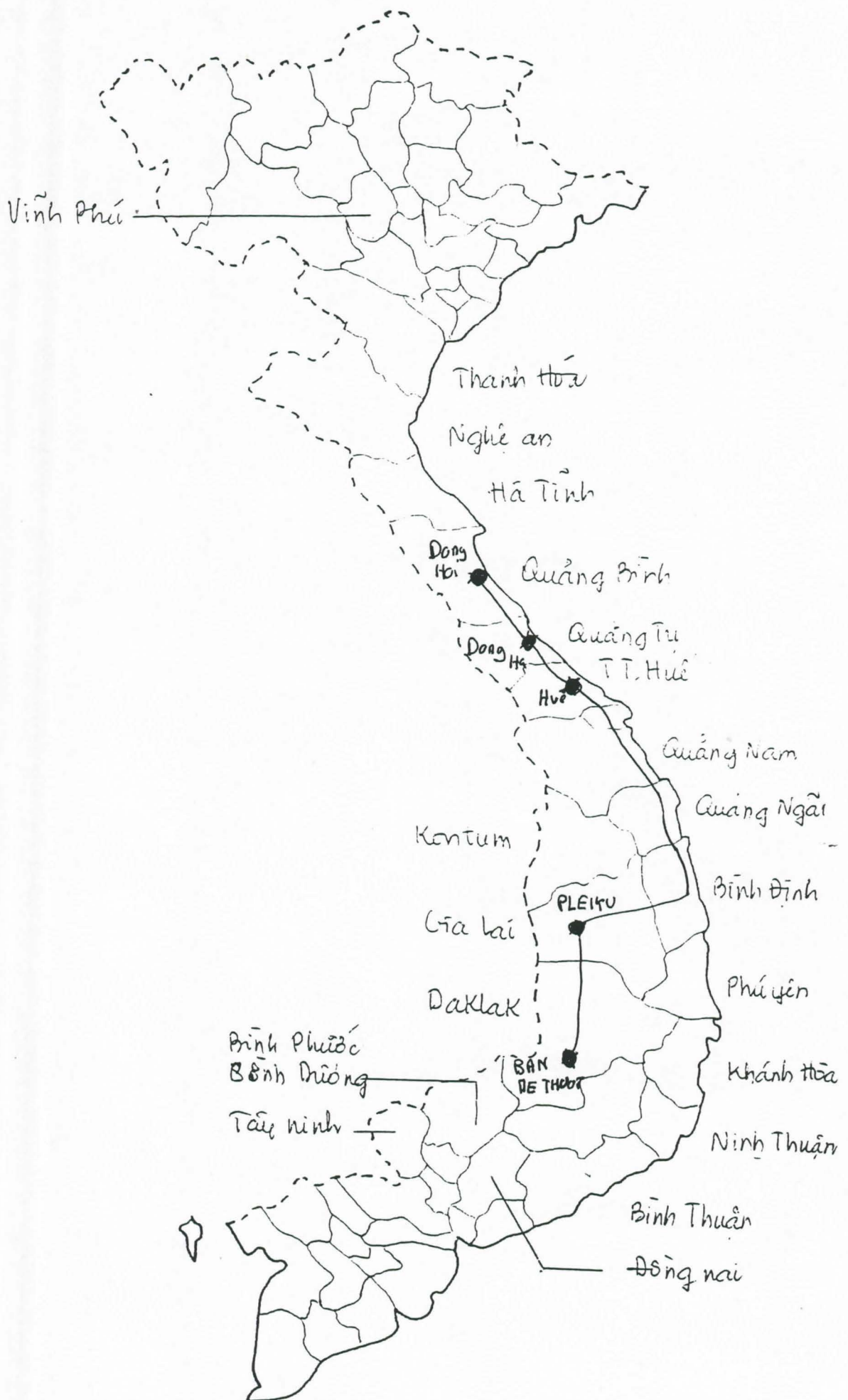


## **Acronyms and informations**

BG = Budwood garden  
FSS = Farming System Survey  
FSR = Farming System Research  
FSMN = Farming System Monitoring network  
OFT = On-Farm Trial  
RRIV : Rubber Research Institute of Vietnam

Price of rubber : 7 000 D/kilo  
1 US dollar = 14 330 Dong







# **Technical support for identification of a research programme of on-farm experimentation for rubber smallholder in coastal areas in central Vietnam.**

## **Content**

### **1 Introduction**

### **2 Context and background of ADP**

### **3 Objectives of the mission**

### **4 Rapid historic of rubber policy in Vietnam: the need for an adaptive research aimed to smallholders.**

### **5 Field visits**

#### **Introduction**

#### **5.1 Station of Chu prong station (Pleiku, RRIV, Highlands)**

#### **5.2 Province of Thua Tien Hué**

#### **5.3 Province of Quang Tri**

#### **5.4 province of Quang Binh**

#### **5.5 Conclusion from the fields visit.**

### **6 Main features of a Research and Development (R&D) methodology based on on-farm trials (OFT) and Farming system research (FSR).**

#### **6.1 Presentation of the methodology of intervention.**

#### **6.2 The main tools used in the R&D process**

#### **6.3 On farm experimentation and demo plots : two different approaches**

### **7 On-Farm Trials identification : some suggestions of draft protocols.**

#### **7.1 Proposal for the province of Thua Thien Hué : district of Nam Dong**

#### **7.2 Proposal fo the province of Quang tri (Dong Ha)**

#### **7.3 Proposal for the province of Quang Binh (Dong Hoi)**

### **8 Proposal for a small Farming System Survey (FSS) on OFT farms network.**

#### **8.1 General structure of the questionnaire**

#### **8.2 Implementation of FSS**

### **9 Proposal for an implementation OFT and FSS programme of activities**

### **10 Conclusion**

### **Annexes**

#### **Annex 1 : Programme of the mission.**

#### **Annex 2 : List of persons encountered**

#### **Annex 3 : Terms of references**

#### **Annex 4 : Conference paper on methodology**

#### **Annex 5 : Extract from the Extract from the report :**

**Mission WB / AFD / PCU, Coastal provinces and Highlands. 20 – 27<sup>th</sup> September 2000, Agricultural Diversification Project, GENERAL COMMENTS AND SUMMARY**

#### **Annex 6 : The research programme OF R&D ADP component.**

#### **Annex 7 : Photos**



## 1 Introduction

This mission of technical support has been implemented within the frame of ADP project (Agricultural Diversification Project), according to scientific programming of year 2000, in support to the socio-economic component of adaptive research programme for rubber smallholders in collaboration with RRIV (Rubber Research Institute of Vietnam).

This mission has been done in collaboration with Mr Jean Marie Eschbach from CIRAD-CP, rubber programme, in order to profit from the collaboration between CIRAD and RRIV researchers.

The visits in the field have been done with Mme TRAN THI THUY HOA, deputy director of RRIV, Mr Jean Marie Eschbach (CIRAD-CP), M Frank ENJALRIC, co-coordinator of R&D component of ADP, Mr Stéphane Boulakia, CIRAD-TERA (THI programme), based in RRIV/Pleiku, five heads of the RRIV scientific divisions (HCM/Saigon) and 2 researchers from RRIV station of Pleiku, working with S.B and M Henk ZWINDERMAN, Smallholder Rubber Development Specialist (SRDS/ADP)

The mission programme is in annex 1. The list of persons encountered is in annex 2.

## 2 Context and background of ADP and its research component

The Agricultural Diversification Project (ADP) aims to promote i) crops diversification (in particular through development of rubber in selected areas: highlands and coastal areas) and ii) increase of rural incomes through land allocation, long term loans, institutional strengthening and technical support with small holder rubber cultivation.

There is an smallholder rubber research programme which is implemented by RRIV with the scientific support from CIRAD (Centre de Coopération Internationale en Recherche Agronomique pour le Développement).

This research component presents three strategies :

- basic research in controlled conditions: to set up experimentation on various cropping patterns to select technologies that could be potentially adopted by farmers with emphasis on tree association with rubber and inter-cropping.
- adaptive research under smallholder conditions: mainly through establishment of an On Farm Trials network in order to adapt technologies (rubber cropping systems) to local social and agronomic conditions.
- participatory research linked with farmer's socio-economic environment, in order to understand the conditions of technology adoption and innovation process.

CIRAD is involved in the project as two levels : as a member of PCU for the research component co-ordination and for cropping and farming systems research in partnership with RRIV.



A scientific and technical collaboration is being developed since 1990 between CIRAD, RRIV (Rubber Research Institute of Vietnam) and also ISA (Institut des Sciences Agronomiques).

In the context of rural development based on a new crop for local farmers, rubber, in particular in coastal provinces, the primary aims of such research are :

- to have a better knowledge of agro-socio-economic environment of selected areas: though implementation of farming system research: farming system characterisation of farms involved in on-farm trials and local survey to better identify conditions of experimentation and its success.
- to create and adapt locally new agricultural technologies (various rubber cropping systems) which can improve soil fertility (and global sustainability of cropping systems) , labour productivity and yields of rubber based cropping systems : for rubber but also for annual intercrops (foodcrops) as well as other trees associated to rubber (fruit trees or timber trees)
- to determine agronomic and socio-economic conditions leading to a sustainable development.

This mission concerns coastal provinces that are involved in rubber planting in 2000 despite of difficulties of organisation. They need some support to set up on-farms experiments in attend to improve farmers' adoption of this new crop.

One can remark the poor current resources and means available in the fields for PPMU, however there is a real dynamic for rubber planting in these coastal provinces. The arrival of Mr H. Zwidermann, SRDS) should boost the situation and enable to obtain necessary means to develop activities in the fields.

RRIV is strongly committed to ADP research component and its presence in the fields (control of local budwood gardens, planting material disposal and demo plots) is obvious and efficient.

### **3 Objectives and actions of the mission**

The overall objective of the mission is to initiate the programme of on-farms trials (OFT) of ADP research component in coastal provinces and the small farming system research (FSR) linked with OFT network based on small farming systems surveys (FSS). The terms of reference are presented in annex 3.

The research component needs to improve knowledge on socio-economic environment and on all agricultural techniques able to manage crops associations with rubber tree in a sustainable way. This mission of the agro-socio-economist from CIRAD-TERA, aimed to develop adapted field experiment in coastal provinces through a review of current experimentation, field visits and a rapid rural diagnosis. It is important to set up some experiments in real farm environment in order to test available technologies in different cropping systems and their understanding and



potential adoption by local farmers in order to resolve technical or organisational constraints.

The second major objective was to present the OFT methodology to RRIV researchers.

It is an important issue for ADP to support the work carried out on cropping systems by RRIV and MM. Enjalric and Boulakia (CIRAD scientists) through direct scientific support from CIRAD programmes directly involved in the project (the rubber programme and the Humid and Insular tropics programme from CIRAD-TERA).

This mission has been implemented in the same time as that of Mr Jean-Marie Eschbach, rubber specialist, to allow an integrated approach of field experiment in this area. It has been a chance to link socio-economic constraints with agronomic constraints of coastal provinces.

The mission has :

☛ visited and checked the first on-station trials established in Chu Prong area, in controlled situation, by Stéphane BOULAKIA and RRIV team, in order to identify the use and finality of such activity.

☛ visited three coastal provinces with the PPMUs to assess the agro-ecological and socio-economical constraints of these areas and the needs for further research and on-farm experiments through a small rapid rural appraisal and exploratory survey with some local farmers as well as other actors of Research and Development institutions (PPMUs, Geruco Estates and Companies, local Agricultural services..... ).

Expected output :

*The Agro-socio-economic assessment will identify the most important farmers constraints in terms of socio-economic parameters and also agronomic factors as well. This diagnosis implemented with the participation of local communities will allow us to prepare an adapted programme of experiments in order to provide local farmers with adapted technical support concerning crops systems.*

The analysis of field visits, the rapid rural appraisal and exploratory surveys done with some farmers are presented in chapter 5.

☛ proposed some trials protocols according to the primary observations and conclusions, that are presented later in this report.

Expected output :

*The suggested agricultural technologies, including associated crops with rubber, use of cover crops, etc... should be adapted to local farming systems and fit farmers strategies in particular in providing sources of incomes during the immature period. The results of the mission should be analysed in order to set up a trials programme for the next future, adapted to the different agro-ecological environmental conditions of the coastal provinces as well as methodologies of implementation. This last point could concern the training of the RRIV researcher involved in the smallholder development.*

OFT topics and basic protocols are presented in chapter 7.



Participatory research with local farmers aims to a better understanding of farmers constraints to technology adoption.

☛ proposed a small farming system research programme aimed to the OFT farms network.

#### Expected output

*This first trials programme will be linked to a farm network (farming systems characterisation and trials implementation) in the aim of the release of operational results and further diffusion*

Farming System Survey (FSS) methodology is presented in chapter 8

Two conferences have been done in Pleiku and in HCM city in RRIV research stations and main office to present the OFT/FSR methodology. The methodology is introduced in chapter 6. The complete paper is in annex 4.

Beside implementation of ADP diagnosis phase that should be done in 2001, it seems important to initiate on-farm research activities in the most dynamic provinces in coastal areas to be able to propose as soon as possible adapted technical recommendations to ADP for larger development of rubber in these areas.

These activities will also enable RRIV to strengthen its capability in on-farm trials implementation and in farming system understanding. The activities and methodologies proposed in this report are strictly related to on-farm experimentation.

#### **4 Rapid history of rubber smallholder in Vietnam: the need for an adaptive research aimed to smallholders.**

The rubber area shift from 77 000 ha in 1975 to 250 000 ha in 1998, with a current production of 110 000 tons.

The current smallholder area, 87 220 ha, contributing to 22 % of total rubber area, is distributed as following :

- 74 % of plantations are located in the traditional Southeast area, 64 250 ha
- 15 % in highlands, 13 083 ha (total 54 000 ha)
- 9 % in the coastal areas, 7 850 ha.(total 18 000 ha)

35 % of smallholders have 2 ha or less of rubber, 55 % with 3 to 4 ha and only 10 % with more than 4 ha of rubber. The latest "big farmers" appear since 1995.

The rubber plot allocation process is based on plot distribution according to a governmental programme leading to the release of a land certificate. A credit is provided to the planter if he does invest directly. Latex harvest and sale is done through governmental Estate or traders.

The government has planned in 1994 to increase rubber area up to 700 000 ha with 200 000 ha for smallholders. ADP aimed to develop rubber in 10 provinces in highlands and coastal areas. The first phase aimed to plant 60 000 hectares in the first 5 years. Most new plantings occur in coastal areas which seems to be more dynamic and receptive to rubber as a good potential and interesting alternative for



local farmers.

Due to the particular land status and history in Vietnam, farmers who have access to land are keen to intensification. Therefore there is a great demand for inter-cropping with rubber. Beside that demand, poor land preparation or non-adapted methods, and soil fertility cannot ensure sustainability of production for several years. Therefore, research on adapted cultural practices to sustain production for at least 4 years in normal rubber spacing density is required. Even, sustainable food-crops or cash-crops production as intercrops should be explored with large double spacing of rubber to see if such systems are effectively adapted to local farmers.

Therefore one main challenge in coastal areas is to enable farmers with some others farming activities but no sufficient cash-crop to adopt clonal rubber plantations.

Land availability, share cropping, origin of local farmers and relations with migrants (if any)... are socio-economical factors to be identified in order to understand local situations. A farming system characterisation survey may provide relevant information to identify operational typologies of situations and farmers. Then, technical innovations can be proposed to farmers according to their real needs.

A constraints and opportunities analysis should provide a sufficient understanding of potential bottlenecks for further rubber development and in particular technical but also socio-economical conditions of feasibility of a new rubber planting dynamic within the next 10 years. The following recommendations for a research programme should provide the content for identification of a master plan for rubber and its evolution. Such adaptive research is aimed to solution farmers' problem of production. On-farm experimentation of rubber cropping systems or particular technologies will provide relevant information for identification of adapted rubber systems. These activities should reinforce ADP's efficiency in its programme implementation.

## **5 Field visits**

### **Introduction**

The fields visits concerns mainly the Chu prong station in Pleiku (highlands) and the 3 coastal provinces of Hué, Quang tri and Quang Binh (see map 1).

The programme of visits is in annex 1

During the visits in coastal areas : a part of available time has been allocated to discussions with key persons (PPMU, Local development institutions and some people' committee), for visits of rubber plots from local Companies as well as exploratory surveys with some farmers. The objective was to provide the team with some hypothesis of work for future OFT according to farmers' demands and local constraints.

The soils and climatic conditions of coastal areas have been already published and will be reminded in Mr J.M. Eschbach Report. There are favourable however really different from highlands or traditional areas in Southern region. They can be characterised by :

- a potential water deficit in dry season, in particular in Quang Tri province.



Adaptation of food-crops rotation and planting dates for inter-cropping should be studied.

- typhoon are potentially dangerous only in the first 30 km of coastal area. Most of the potential rubber zone is in the piedmont and is therefore out of typhoons effects.
- soils are very heterogeneous and should be considered as an important criteria for plot identification.

**Map1 : central Vietnam**



### **5.1 Station of Chu prong station (Pleiku, RRIV, Highlands)**

The objectives of on-station experiments in Chu prong are to establish the feasibility of some rubber cropping patterns : in particular association with perennials (fruit trees...) and annual food or cash-crops as well as testing the interest of several food-crops/covercrops association in an experiment called "matrix". This research can be used for inter-crops with rubber as well as for other component of production systems.

We have clearly seen that inter-cropping was an express demand form farmers as well as sustainable cropping systems as intercrops. Several problems faced farmers : poor soil fertility , degraded soils due to presence of livestock and climatic adaptation of cropping patterns in particular when double cropping per year is possible.

Therefore, experiments located in Chu Prong station enable RRIV to select most promising and interesting technologies for farmers according to their need and demands. Another point is to try to better integrate livestock and fodder production in cropping systems. To answer that point, as well as the point on soil fertility and sustainable production, a covercrops collection has been established in order to provide potential solutions as well as a stock of seeds for covercrops that would be used in several systems for fodder production, in anti erosion systems, as pastures or in soil fertility management in adapted cultural practices. It can be considered as a



platform for introduction, selection and multiplication of planting material which can be proposed to farmers through OFT.

Traditional rubber spacing 6 x 3 or 7x 2.5 are used in various combination as well as double rubber lines with large inter-rows of 13 or 15 meters in order to test the feasibility of long term crops such as fruits, coffee or annual crops for at least 10 to 15 years with sufficient light. Detailed maps , protocols and preliminary results are already available from this very interesting work and that will provide preliminary relevant information for on farm experimentation to be set up in other provinces. A complete data analysis should be done within a year, through a scientific publication in order to make information available at all level.

Some important innovations are being currently tested and should be monitored in order to see if there is a potential for them in other areas such as :

- ✓ coffee inter-cropping in large spacing (with Catimore variety)
- ✓ grafted durian + mango, in large spacing
- ✓ several fruit trees association with rubber in normal spacing
- ✓ use of *Bracharia spp* as a source of fodder for animals during the first 2 or 3 years
- ✓ use of various covercrops in association with food crops to control erosion, maintain or improve soil fertility....

As labour, cropping patterns (inputs ...) , yields and various source of variability (soil , climate and diseases) are recorded , it should be possible to do some simple economic calculation to identify most promising combinations. It will also enable RRIV team to do some proposals to farmers based on real results in the fields. Such on station experimentation enable the team to test not only possibilities of cropping systems but also its "hardiness" to real conditions.

Some other experiments can also be set up in order to test their interest such as cotton, cultural practices, land preparation.....Eventually, the plants collections in Chu Prong provide seeds and planting material for a wide range of covercrops that can be used in OFT.

In other words, it means that Chu prong experimentation should be maintained as it feeds topics and alternatives for further on-farm experimentation.

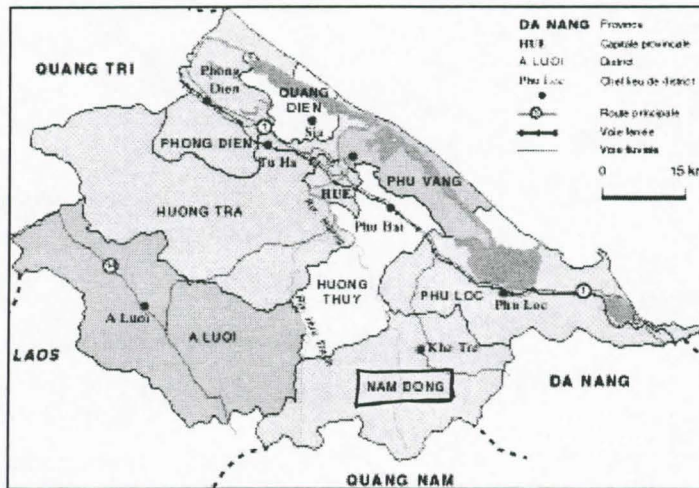
It should be mentioned that there is a great demand from RRIV for bibliography and books on FSR and OFT methodologies. A small number of books and papers have been provided during the mission. A list of other references is available in annex 4. An effort should be made to provide RRIV scientist with relevant information on FSR and OFT. On the other hand, the RRIV internal reports and other technical information obtained from the demo-plots programme should be used and may be profit from a greater diffusion. A further in depth analysis might be also profitable for further OFT.



## 5.2 Province of Thua Tien Hué

Visit of Nam Dong district (see map 2)

Map 2 : Province of Thua Tien Hué



Persons encountered :

Mr Hung : deputy director of local PPMU/

Mr Tam : deputy director of Nam Dong Cie (governmental forestry farm).

The area is characterised as a zone of piedmont with highly degraded and deforested hills. Some of them have been reforested with *Acacia mangium*, *A auriculiformis* and other types of *Eucalyptus* and *Pinus* by governmental companies. Local farmers are relatively poor. Their cropping systems are based on cassava, upland rice , fruit trees. Local environment is very aggressive with heavy rainfall during the short 3 months rainy season. Soils are often shallow and with poor fertility, especially in hilly areas. Some trials or demo plots have been previously established with RRIV (clones field trials...).

2000 ha have been already planted. The provincial government intends to plant 100 ha of rubber in 2000/2001 out of the 280 ha initially scheduled (with 256 families) (1200 ha have been allocated). The unit cost per hectare is supposed to be 8 millions Dongs/ha. 1600 ha should be also rehabilitated (from project 327).

Planning for 2001 aimed 600 to 700 hectares for new planting and 1600 ha for rehabilitation (5 000 ha for land allocation). The ADP budget will be used after completion of governmental provincial budget. There is an obvious motivation of local institutions to develop rubber compared to highlands. Planting material is supposed to be ordered in Quang Tri province. If motivation is clear, it seems that **planting material requirement and general information on ADP rubber planting guidelines are not fully known.**

The ADP approach is the following : identification of suitable areas, evaluation and selection of farmers in selected areas, measurement of farmers fields, establishment of a provisory land certificate ("red paper"), acceptance of a credit from ADP with this certificate, and then land preparation and planting by ADP.



There is also an ADP component on former rubber plot rehabilitation, with plot from former "project 327" (initiated in 1993). These plot are very heterogeneous : some with very poor rubber growth, some with an average growth (where it is not clear that any rehabilitation can be efficient)<sup>1</sup>. It seems **necessary to test before any policy concerning rehabilitation the efficiency of proposed packages** (mainly based on large amount of fertilisation).

There is a local demand for inter-cropping with rubber but climatic conditions and local soils required a preliminary on-farm experimentation to define precisely what can be done in these conditions. Some farmers have received a plot with tea in inter-cropping.

In Nam Dong district : 100 ha of new rubber planting are scheduled for 2000 and 500 ha in 2001. Rubber planting should occur in December 2000. It is therefore still possible to select farmers to establish very rapidly OFT. Usual planting are made directly in stumps. It should be highly desirable that **stump in polybag with one whorl should be rapidly adopted as recommended planting material** as it reduces consequently risks of crop failure during "dry season". Demo plots on such technology should be established rapidly. Planting dates and cultural practices have to be discussed with local farmers in order to fill up crop requirements with climatic constraints.

A clones field trial has been visited (from the 3 existing replications, only 2 are still available). The owner has tea as inter-cropped. He has build up a tea leaf dryer. The field is invaded by *Imperata cylindrica*.

**The presence of *Imperata* can be seen as a real severe constraint to intensive inter-cropping with rubber.**

Therefore 2 axes can be explored : i) intensive inter-cropping management and ii) extensive Rubber Agroforestry System<sup>2</sup> (RAS) to get rid of *Imperata* at lowest cost).

*Visit of a potential plot for rubber* : and discussion with a local farmer (from the Ka Tu ethnic minority). The farmer is self-consumption oriented and is looking for a source of cash : fruit trees and rubber. The amount and conditions of credit are not well known. He currently relies on slash and burn agriculture based on upland rice , cassava in separate fields Small amount of cassava are also sold for cash. Livestock feeding is a problem ; there is no sufficient land for pasture or grazing. Integration of fodder crop into agricultural cropping systems sounds interesting for that farmer. Organic manure is applied on irrigated rice. The area seems suitable for fruit production. There is according to local people a market for fruits (Areca catechu/betel nut, longan, rambutan, citrus...).

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<sup>1</sup> A former "project 327" plot has been visited which is supposed to be rehabilitated. There were no really matter of rehabilitation in this plot. Rehabilitation conditions should be more clear and tested on farm to see if the rehabilitation package is clearly efficient or not.

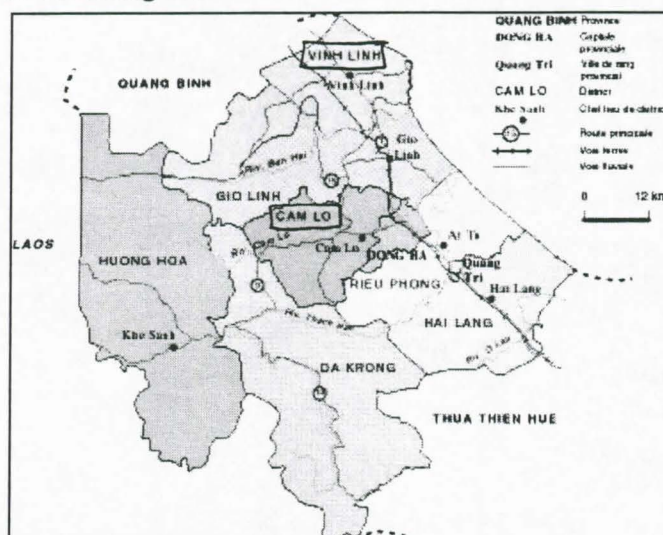
<sup>2</sup> RAS: type 3 is currently being tested in Indonesia through on-farm experimentation in similar areas in Borneo.



### 5.3 province of Quang Tri.

Visit of Cam Lô and Vinh Linh districts (see map 3)

Map 3 : province of Quang Tri.



Persons encountered :

Mr Dieu : Head of technical services of Agricultural services /PPMU (in Dong Ha).

Mr Minh : deputy director of GERUCO rubber Cie.

The current rubber area in the province is 10 451 ha from which 5 594 ha are smallholdings with the following distribution :

- District of Vinh Linh : 3 888 ha
- District of Gio Linh : 1 044 ha
- District of Cam Lo : 702 ha

For year 2000, 500 hectares have been planned with additional 1900 ha to be rehabilitated (from Project 327). 624 hectares have been recorded :

	Area	Families
- District of Vinh Linh :	154 ha	575
- District of Gio Linh :	325 ha	316
- District of Cam Lo :	145 ha	141

The province is planting rubber using provincial funds with a zero interest credit to farmers. In 2000/2001, they intend to use ADP credit (with interest).

Planting occurs in December. The selection of farmers is based on i) available land, ii) sufficient familial labour and iii) full time farming activity. Planting material is supposed to be produced in this province but sources of planting material and planning are not clear. Initially, planting material came from RRIV or from sources in the Southeast region.

*Visit of GERUCO Cie.* This Cie is providing most of the rubber planting material for other consumers as the Cie does not plant anymore for itself. A budwood garden of 2 hectares is available. It seems obvious **that there is no sufficient production of planting material for the planned planting programme.**

Visit of a RRIM 600 plot in order to see GERUCO technical guidelines applied in the fields.



*Visit of a clone field trial.*

*Visit of the budwood garden (BG).* RRIV has checked this budwood garden and does not recommend its use due to mixing up. **RRIV obviously plays its role, a very important role, in controlling quality and purity of budwood gardens.**

*Visit of clone field trial with inter-cropping (groundnut).*

## **District of Cam Lô**

*Visit of a RRIV demo plot on type of planting material (polybag) with groundnut inter-cropping. Village of Dau Binh Mot.*

The area is highly deforested. Soils are sandy and some time compacted due to livestock grazing. Lowlands are partially exploited with irrigated rice. Cash is obtained through groundnut cropping. Livestock is very extensive.

*Discussion with a farmer : Mr Tung.*

The demand is on inter-cropping of rubber with improved cropping patterns of a rotation based on upland rice and groundnut. The main problem seems to be, beside land shortage (however land seems to be plentiful), the low productivity of foodcrops, partially due to soil fertility and non adapted cultural practices. Trading fruits is difficult but there is a market for Groundnut. Cocoyam and taro are cropped for pork feeding. The farmer is interested by 2 hectares of rubber with intensified inter-cropping.

*Visit of a selected area for rubber planting in 2000 (same village, 3 km).* Soils are sandy and compacted (grazing) with potential flooding risks. Some plots are still covered with *Eucalyptus* shooting from previous cut trees.

**In these areas, land preparation related to soil status prior rubber planting seems to be a priority.**

When asked about rubber, local officials refer to technical information from GERUCO which are not at all adapted to such conditions.

## **District of Vinh Linh**

*Village of Vinh Lienh*

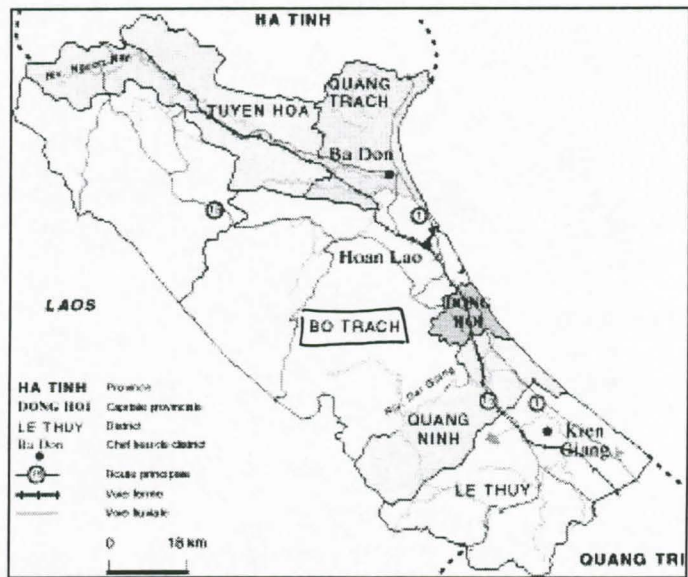
*Visit of 2 RRIV demo plots with rubber and intensive inter-cropping management with cocoyam, sweet potato, cassava, groundnut and *Pueraria triloba*.* Yields very high with very intensive management (external labour) : perfect demo-plot to demonstrate that inter-cropping can be very intensive. However, we observed a slow rubber growth with a girth of 17-18 cm instead of 25 cm (standard), despite intensification of intercrops systems.



5.4 Province of Quang Binh

Visit of Bo Trach district. (See map 4)

Map 4 Province of Quang Binh



Persons encountered :  
Mr Manh, head of technical department of “Viet Trung Cie”.  
Mr Xanh, deputy director.  
Mr Binh, PPMU

The rubber area is reaching 3700 ha from which 1 800 ha are being tapped according to last ADP report but local officials reports 6 300 hectares with 1900 ha being tapped (by the 2 Cies). All rubber smallholders plots are still immature. The province intends to plant 570 hectares in 2000 (700 hectare have been allocated), and 1 000 ha in 2001. The global objective is 10 000 ha of rubber.

The schedule planting programme for 2000 is the following :

District	year 2000	Total
Ne Thuy	50	1 777
Bo trach	80	2 710
Tuyeh Hoa	300	800
Minh Boa	140	1 250
Quang Ninh	100	227

Rubber yield in the 2 Cies is quite low : 1 to 1,1 tons/ha/year indicating may be a potential under use due to a low number of real tapping per year. There is one budwood garden recently checked by RRIV. RRIV is providing also budwood as local production is not sufficient. The rubber is being processed by the small Cie factory (crump rubber) which will not be sufficient for the planned production level, requiring the establishment of a new factory in some years. It seems that there is a local network of private nurseries

Visit of a nursery (Station of Phuong Ho, Bo Trach), well provided to produce plants of rubber as well as fruits plants and *A mangium*....



One main problem seems to be the small size of rubber stumps at the age of 10 months in nurseries without irrigation.

**The main favourable point is that there is obviously a very good dynamic in this province not only to plan rubber planting but also with an important effort to produce required rubber planting material.**

A general budwood gardens inventory has been done by RRIV. Availability of good quality planting material (clonal purity as well as stump size) is a major problem for further development.

*Visit of a farmer's plot* in Bo Trach District, village of Quan Nhan. Discussion with Mr Cuong. This village is partly inhabited by former or still military staff. Some land with rubber has been allocated to them (Project 327).

In a 1993 rubber plot, we observe an obvious problem of rubber growth due to excess of land preparation (ploughing too close to rubber trees...) during 8 crops of groundnut in 4 years. In that case, inter-cropping has a negative impact on rubber growth, showing the necessity to adapt inter-cropping to local conditions and real integration with tree crops.

*Visit of 2 rehabilitation plots* : one with groundnut, the other one with *Crotalaria* spp to improve soils structure. Rubber growth is very low (girth is 12 cm after 6 years). The coverage of *Crotalaria* is clearly not sufficient.

The feasibility of rehabilitation for these plots is highly questionable and preliminary OFT is really necessary prior to any action in this domain with such plots. It seems necessary to identify properly at what level and with which technical criteria it is more interesting to replant than to rehabilitate.

In that area, there is a market for sugar cane. An OFT could be implemented in order to see if sugar cane can be grown with rubber without any major negative impact on rubber growth.

*Visit of a plot prepared for new planting* with strong ploughing (Bulldozer) and 3 passages of riper. The land is obviously not properly prepared for smallholder conditions. Total cost, reaching more than 3 millions Dong/ha, is totally unacceptable for farmers however they think it might be good for groundnut cropping. But they do not have any information of land preparation cost that they are supposed to reimburse as it is part of the total credit. This is typically an example of mis-information to farmers and potential misuse of credit which can lead to failure. More than 200 hectares have been prepared that way.

**Preliminary technical information on how such land preparation jeopardise future planting and soil fertility should be provided very soon to decision makers** which, again, refers to GERUCO references without any other relevant technical information from ADP. On-farm experimentation on land preparation, no tillage and minimum land preparation seems to be a priority.

In other words, it is also necessary to involve farmers right from the beginning in their rubber planting. It is necessary to avoid an approach based on turn key project such as NES (Nucleus Estates Smallholders Scheme).



## **5.5 Conclusions of fields visit**

The ADP project has obviously difficulties to be set-up however there is great effort from local PPMU and institutions to begins rapidly actions in the fields and implement at least the re-scheduled programme. On the other hand, the research component, with a strong RRIV support, is developing its activities with satisfactory. The ground is very positive and with a great potential for further OFT activities in these coastal areas.

### ***Planning and availability of rubber planting material.***

A planning concerning planting material and planting programme is necessary in these provinces : in particular for those which do not produces themselves their planting material In other words, it is necessary either to establish a private sector of local nurseries with contracts for planting material, or establish budwood gardens and nurseries by the project it self in order to secure planting material. The second solution is an emergency solution when the first one appears to be the solution in the long term if self-development by farmers is expected in the long run. Planting material certification and availability, through development of a private sector, means that there will be a demand in the very next future in terms of organisational innovations.

### ***A need for technical guidelines***

ADP has identified and published in a report (most of time not available at provincial level ) some technical guidelines of the project but it seems that nobody knows them. The main outcome is that decision-makers at provincial level use what they know : GERUCO technical guidelines which are NOT at all adapted for local smallholders. There is a large demand from all institutions (PPMU and others) for adapted guidelines. Therefore a very first priority is, for ADP and PPMU, to release officially real ADP technical guidelines and to verify if there fit coastal provinces environmental and socio-economical situations. There is probably a work to do to put them in a format that can be really usable for technicians.

A first objective could be for instance to collect all information available from RRIV already published in Vietnamese and organise diffusion of this material. A second objective could be to adapt and translate the "Rubber Book", published by Mrs Delabarre and D'Aquigno (1994), from the experience of SRDP/TCSDP rubber development project in Indonesia (also funded by World Bank), a very useful technical guideline with pictures.

The results of OFT programme to be set up very soon should also be put into leaflets and small technical manuals to be used by ALL ADP staff.

### ***Inter-cropping patterns***

There is an obvious demand for various type of inter-cropping patterns adapted to local soils, land preparation, climate and markets. There is a large scope for OFT implementation in order to cover that specific and real farmers' demand.

There are several axes that can be explored :



- ✓ intensive inter-cropping management - if no Imperata and no compacted soils.
- ✓ intensive inter-cropping with special land preparation and specific soil management using covercrops and no tillage practice.
- ✓ rotation based on upland rice and groundnut.
- ✓ extensive RAS 3 type management. (RAS 3 are Rubber Agroforestry Systems : type 3 currently tested in Indonesia in on farm experimentation to get rid of Imperata at lowest cost) if Imperata is a major threat.
- ✓ Integration of fodder into inter-cropping system in order to feed livestock if land is limited for pasture.
- ✓ integration of fruit crops : pineapple and bananas as well as fruit trees such as citrus, durian, longan, rambutan.... in various rubber spacing and density.

The management of rubber inter-rows, through inter-cropping annual or perennials, will definitely determine rubber growth. Both farmers and PPMU staffs are obviously looking for alternatives in optimising both production and labour productivity of intercrops with rubber as well as looking for profiting of the benefit of intercrops for rubber growth.

In a general way, we have remarked that farmers are very sensitive to soil fertility problems. They generally try to maintain soil fertility by providing organic matter and to improve productivity using fertilisation. This is a very favourable ground for experimenting no tillage techniques and systems with covercrops, in particular when fodder production can be included into cropping systems.

We also observed that generally, soils characteristics are not taken into account in the new rubber plots selection process

### ***Exploitation and tapping techniques***

In some areas , trees seems to be under exploited. Therefore a small survey should be done with farmers who have rubber fields already in production in order to have data on production and tapping frequencies. A small on farm experimentation could be implemented to see if the use of stimulation and adapted tapping practices, adapted to local climate, could be applied in order to optimise production and decrease labour requirement.

### ***Fertilisation on rehabilitated plots.***

A small on-farm trial should be implemented with and without recommended fertilisation doses in order to verify, according to status of the rubber trees if fertilisation is really efficient and relevant.

### ***Total number of OFT***

The budget has been scheduled for a total number of 54 fields with 24 fields in 2000 and 32 fields in 2001. This number seems to be reasonable for implementation of 10 trials with 5/6 replications each.

The programme of 2000/2001 could be based on at least 3 trials with 5 replications and possibly 1 or 2 small size trials with 3 replications. The rest could be implemented in 2001/2002. The basic protocols of the proposed programme of trials are detailed in chapter 7.



***Land certificate and use of ADP credit.***

It is certainly true that farmers are very interested by the land certificate provided by the authorities. It is also a guarantee for farmers that their future investment will be profitable in the long run.

The use of credit should be carefully observed as most farmers still do not know exactly conditions of credit. Land preparation should be adapted and economically acceptable for farmers. On-farm experimentation on that topic with no-tillage and covercrops technologies will provide very soon alternatives to very heavy and costly land preparation currently proposed to farmers

Information should be properly channelled to farmers according to different types of credit they can have access to in order to improve an efficient use of credit to what is really necessary.



## **6 Main features of a Research and Development (R&D) methodology based on on-farm trials (OFT) and Farming system research (FSR).**

### **6.1 Presentation of the methodology of intervention.**

The objective of a R&D research based on a creation-diffusion process is, globally, to optimise farmers' income through identification and adoption of adapted rubber cropping patterns and a process of adoption, diversification or re-plantation (rehabilitation included).

Emphasis is put on the operational aspect of such research. The contribution of farmers in the process from diagnosis, trials identification and implementation up to results analysis increase "potential adoption" of technical innovations proposed to farmers for local experimentation..

The methodology is based on the following points that create a framework for implementation:

#### **- ➡ Diagnosis**

---> a preliminary diagnosis based on the study of all available information (bibliography, data collection, key-persons) and an exploratory survey. ADP has scheduled to implement a complete diagnosis of the selected project areas, initially scheduled in 2000, and probably to be implemented in 2001.

Beside this general diagnosis, a simple diagnosis based on a rapid rural appraisal and preliminary exploratory discussions with a few number of farmers has been done during the mission in order to identify main constraints, potential research topics and select potential areas for further OFT.

#### **- ➡ A farming system characterisation survey (FSS):**

---> to understand constraints, opportunities, income and labour productivity of each cropping systems and farm activities. The data analysis should provide an operational typology.

This survey should be done at large scale during the global diagnosis phase in 2001.

A small FSS can be implemented, during 2001, limited to farmers involved in OFT network. The objective of such activity is first to train some RRIV scientist to such methods and second, to obtain basic information on OFT network farmers in order to be able to understand adoption procession and conditions of success in experimenting various cropping patterns. A small programme of activities is suggested in chapter 9 as well as basic methodology with components of future questionnaires in chapter 8.

#### **- ➡ On-farm experimentation programme identification**

---> the identification of a potential on-farm experimentation programme aimed to solve technical constraints (technical innovations) or social constraints (organisational innovations). On Farm trials protocols should be identified according to typology. A prioritisation of experiments should be made.



Some proposals are suggested in chapter 7.

### **On farm experimentation and demo plots : two different approaches**

It seems necessary to clearly show the differences between the two approaches.

Demo plots are established to show the feasibility of planting a specific crop (rubber !) or to demonstrate the superiority of a certain well known technology (type of planting material, fertilisation, tapping technique, inter-cropping, association with other trees..... ) without any risk for farmers. With a demo-plot: you demonstrate a result already known. Therefore demo plots are based on previous results from research (for instance type of planting material...) or from OFT research (for instance: type of inter-cropping...).

A on-farm trial is aimed to identify the best technology in local conditions. The results is not known before experimentation however it is generally guessed. There is a certain risk as some factors (technologies) might not be adapted to farmers conditions, even if risk has to be obviously limited. With OFT : you search for a result

The following table summarise features of both approaches :

Features	On-farm Trials (OFT)	Demo plots
Objectives	To test and adapt technologies	To demonstrate technologies
Results	Not known	Known
Risks	Limited	No risks
Number of replications	5 to 6	1 or 2
Size	0,5 hectares	Normal size of local fields (for rubber up to 1 ha)
Treatment	1 with several factors	1 with 1 factor
Statistical analysis	Simple : ANOVA	No
Type of observations	Trees growth, intercrops yields....	Idem or no data monitoring
Type of monitoring	Important	Limited
Location	Repetitions should be located in an homogenous environment (1 village)	Can be scattered in several villages
Representativeness	Important : it's a trial.	Not necessary : it's a demonstration

### **- 🐾 Implementation of On-farm experimentation**

---> Implementation of on-farm identification using participatory approach in a on-farm trials network.

A programme of activity is suggested in chapter 9

### **- 🐾 Farming systems monitoring**

---> implementation of a "farming systems monitoring network (FSMN) with farms of reference" in order to monitor technical change, adoption of innovations and assess its impact as well as its externalities at farming systems level and at a regional level as well.



It has been agreed that ADP will take the lead in the diagnosis phase as well as the implementation of FSMN.

Beside development of these tools that will permit to measure the ADP global impact, it seems really necessary to monitor "OFT farms network" to measure impact of trials and of technologies tested with these farmers. Therefore, RRIV scientists, trained for FSS, can continue to do this monitoring, limited to OFT network farmers. With such process, RRIV can acquire experience in FSR with emphasis on OFT farmers monitoring.

**- ➤ Analysis and re-assessment of the research programme**

---> Feedback analysis with farmers, extension and research institutions and re-assessment of on-farm trials in an constant and evolving process of R-D

**Conclusion**

A technical support to research can be provided in order to apply methodologies of work, a general framework of activities linked with operational aims to solution farmers' problems concerning production, quality, re-plantation, rehabilitation, cropping systems improvement or income diversification through the adoption of rubber.

A agronomic approach through on-farm experimentation linked with a socio-economic approach (farming systems analysis, typology, etc.....) should provide adapted technical pathways or improved cropping systems to farmers as well as conditions for adoption and appropriation (of innovations) by farmers according to various situations encountered in terms of further rubber development.

The main tools to be developed by RRIV to achieve such goals are the following :

➤ a network of on-farm trials : to test technical innovations in the context of coastal areas. ADP has scheduled a total number of around 60 fields/farmers for such OFT network. Implementation should be done in the next two to three years in order to be able to release as soon as possible technical recommendations on rubber cropping patterns.

Most of these OFT plots should be established in areas where rubber planting effectively occurs or will occur in the very next future. Coastal provinces and Kontum province in highlands seems to be most interesting areas for OFT implementation.

➤ the use of a participatory approach in order to obtain more rapidly adoptable and more operational technologies.

➤ A network of demo plots for diffusion for technologies already adapted or for technologies resulting from on-farm trials.

RRIV has already established a certain number of demo plots with the "An loc RRIV station". This programme will be completed in 2001. It should be very interesting to review this demo-plots programme and measure its impact.



## 7 On-Farm Trials identification : some suggestions of draft protocols.

The methodology is, after having identified local constraints and farmers' demands, to set up some basic protocols to be proposed and discussed with farmers in selected areas.

### 7.1 Proposal for the province of Hué : district of Nam Dong

Main features : presence of Imperata. Demand for fruit trees association with rubber.

- OFT : plots of 1000 m<sup>2</sup> or 1500 m<sup>2</sup> : we suggest 1500 m<sup>2</sup> if number of plots is 3 per repetition and 1000 m<sup>2</sup> if number of plots is 5 per repetition.
- rubber normal planting density 7 x 2,5 : 571 trees/ha (ADP recommendations)

Suggested trials :

☞ **Trial 1 : rehabilitation trial on plantation from project 327 : with and without fertilisers.**

☞ **Trial 2 : Rubber + fruit trees : 3 plots of 1500 m<sup>2</sup>**

✓T1 : control : rubber + upland rice 2 years farmers practices

rubber : in normal planting density :

✓ T2 : pineapple 2 lignes 0,5 x 0;4 x 2 , banana...en 6x6, possibly papaya

Rambutan (counter-season) + longan : total 28 trees (275 trees/ha with spacing 6 x 6)

+ covercrops *Arachis pinto*

✓T3 : fruit trees : in large spacing double inter-rows planting density rubber 3x2,5x13 : with 500 trees/ha.

: citrus (orange, pomelo) with spacing 6x6 m, improved grafted durian (30 trees /ha).

+ covercrops *Arachis pinto* ( september 2001) or *Cassia rotundifolia*

upland rice first year : décembre 2000

☞ **Trial 3 : RAS 3 trial type in Imperata invaded plot with low management intensity : 4 plots of 1000 m<sup>2</sup>**

✓T1 : Control : local practice

✓T2 : Covercrops "plant and forget" (*Flemingia congesta*, ...) + fast growing trees (*A mangium* , *auriculiformis*...planted at 3x3 m.

✓T3 : MPT (Multi Purpose Tree) type *Calliandra* (control *Imperata* + forage) + fast growing trees (*A mangium* , *auriculiformis*...planted at 3x3 m.

✓ T4 : *Bracharia brizanta* ou *ruzizensis* : (control *Imperata* + forage), possibly mixed up with *Stylosanthes guyanensis*.

*A mangium* cut for firewood between year 4 and 6.



#### **☞ Trial 4 : Rubber + annual intercrops :**

- ✓T1 : Control : local practice
- ✓T2 : Cassava : target 30 t/ha with adapted fertilisation
- ✓T3 : upland rice with adapted fertilisation target 1,5 t/ha in rotation + Sorgho in sequential.
- ✓T4 : upland rice with adapted fertilisation 1,5 t/ha + legumes (type mungbean) or covercrops in sequential or in rotation.
- ✓T5 : according to farmers needs (to be identified locally).

Note : inclusion of forage covercrops in between food-crops cycles if necessary : to be discussed with local farmers.

#### **☞ Trial 5 : Rehabilitation of tea as inter-crop.**

A certain number of plots with tea have been distributed to farmers (Project 327 : 100 ha). This topic : fertilisation on tea has been initially proposed and scheduled by JM Eschbach in 1997. It seems that no further action took place concerning that point. It should be explored if it is still interesting or important for local farmers.

## **7.2 Proposal fo the province of Quang tri (Dong Ha)**

Main features : compacted soils, potentially lowland soil with seasonal flooding, sandy soils. Local demand for inter-cropping.

On fields already planted and distributed to local farmers :

- Trial on tapping system with a true D3 with 2/4 stimulations on fields to be opened in 2000.
- trial comparing rubber tree girth at opening : 45 and 50 cm.

Suggested trials :

#### **☞ Trial 1 : Rubber + annual intercrops : rubber standard 7x2.5**

- ✓T1 : Control 1: local practice : monoculture rice
- ✓T2 : control 2 : local practice : monoculture groundnut
- ✓T3 : Year 1 : upland rice with adapted fertilisation target 1,5 t/ha in rotation + year 2 : Groundnut 2 t/ha.
- ✓T4 : year 1 : annual rotation : upland rice with adapted fertilisation 1,5 t/ha + Mil (low rainfall between April and July) .  
year 2 : annual rotation : groundnut with adapted fertilisation 1,5 t/ha + Mil (low rainfall between April and July).  
Year3 : same as year1  
year 4 : same as year2
- ✓T5 : Year 1 : Cocoyam with adapted fertilisation target (to be identified) in rotation + year 2 : sweet potato. To be verified through discussions with farmers.



### ☞ Trial 2 : Rubber + annual intercrops with rubber at different spacing

- ✓T1 : Control 1: local practice : monoculture rice
- ✓T2 : Year 1 : upland rice with adapted fertilisation target 1,5 t/ha in rotation + year 2 : Groundnut 2 t/ha.  
spacing : 6x2,9 m : 550 trees/ha.
- ✓T3 : same + spacing 7 x 2,5 m standard
- ✓T4 : same + spacing 8 x 2,2 m

## 7.3 Proposal for the province of Quang Binh (Dong Hoi)

Suggested trials :

### ☞ Trial 1 : Rubber + annual intercrops : rubber standard spacing 7x2.5 m

- ✓T1 : Control 1: local practice : monoculture rice
- ✓T2 : control 2 : local practice : monoculture groundnut
- ✓T3 : Year 1 : upland rice with adapted fertilisation target 1,5 t/ha in rotation + year 2 : Groundnut 2 t/ha.
- ✓T4 : year 1 : annual rotation : upland rice with adapted fertilisation 1,5 t/ha + Mil (low rainfall between April and July) .  
year 2 : annual rotation : groundnut with adapted fertilisation 1,5 t/ha + Mil (low rainfall between April and July).  
Year3 : same as year1  
year 4 : same as year2
- ✓T5 : sugar cane. 1,5 m from the rubber line (5 lines ) + pineapple from 0,5 to 1,5 meter from the rubber line (2 lines)

It is clear, in terms of methodology, that this OFT programme is only indicative. It will be used as a framework and will be completed after discussions with local farmers and PPMU according to local priorities and resources.



## 8 Proposal for a small Farming System Survey (FSS) on OFT farms network.

In order to know conditions of experimentation and adoption of technologies experienced in OFT, it seems necessary to implement a small size Farming System Survey limited to farmers of the OFT network.

**The objectives** of this limited FSS are i) to characterise farming systems of farmers involved in the On-Farm Trials network and ii) to have a better understanding of innovation adoption and impact of experimentation.

### 8.1 General structure of the FSS questionnaire

#### *General information on the farmer : Localisation and identification*

code

location (province , village ....)

date survey

name surveyor

ethnic group

Number of persons in the family : total family members

Labour assessment : labour unit

(code : Man : 1, Woman : 0.8 to 1, Children above ten effectively working on the farm : 0,5, Eldery 55 to 70 : 0,5, Above 70 = 0...)

Number of children in school,

Number of children in University

Education level of the man

Education level of the woman

#### *Identification of cropping systems and livestock system*

##### *Per cropping system :*

Yield

area

total Production

product price farm-gate if sold

value of the production

Input cost

Extra labour cost : separate exchange of labour and seasonal workers

Cost of an external manday labour

Total production cost

Gross benefit = value of the production - Total cost

Net benefit : gross benefit –financial cost (credit)

Idem per hectare

Total labour

Return to labour (per manday)

##### *Agronomic features :*

Year of cropping if rotation

Year of cropping after S&B

Variety

Type of inputs : herbicides, fertilisers, pesticides, organic manure : intermediate table

Type of land preparation

Date of sowing

Cycle length

Date of harvest



### *Livestock system*

Number of animals per type : idea of capitalisation level  
Number of animals sold in the year  
Number of animals lost in the year  
Record and impact of local diseases  
Number of animals purchased  
---> total sale of animals  
inputs : foodstuffs and forage purchased  
other cost : vaccination.....  
total input cost

### *Perennial cropping system*

#### *Question in addition :*

Year after planting  
Girth for rubber (average 30 trees on the plot)  
Crop succession if inter-cropping

### *Home garden*

Self-consumption  
sales

### *Farming system level*

Total production cost  
Total value of production  
Gross income  
Total financial cost  
Net income

### *Total family rice needs : rice consumption*

Part of the rice produced used in self consumption (conversion paddy to rice)  
Part of the rice produced used for sale  
Part of the rice bought for self consumption  
Rice price farm gate for sale  
Rice price (purchase)  
--->total rice sales  
---->total rice purchase  
net income from agriculture after self-consumption = net production sales – production costs

### *expenses :*

rice purchase  
Total other food expenses  
Education expenses  
Health expenses  
Other expenses  
Total expenses  
Total expenses + savings = net income  
*Use of the savings ?*  
Money in a bank account....

### *To be included in total cost :*

Other extra labour expenses if any  
Other inputs expenses if any : materials.....investments

Extra salary from off-farm activities

Total income = net income from agriculture + off farm salary.



## **Data analysis**

We suggest that the team could use the software Winstat (a free CIRAD product) that is adapted to FSS data analysis. Mr Boulakia knows the software. A demonstration has been done to Mr Zwinderman. Some examples of questionnaires and data processing have been given to them for training.

In case of larger use of Winstat by several staff, from RRIV or ADP, a training can be organised through CIRAD.

## **8.2 Implementation of FSS**

We suggest that FSS should be strictly limited on farmers involved in OFT network, at least for the first 2 years. The objective is also to train RRIV staff to FSS, step by step, to enable RRIV to deal with FSS and OFT independently, within a research process. One scientist, Mr Le van Ngoc, has been allocated by RRIV to Pleiku station to work with OFT team. Mr Boulakia could probably train Mr Ngoc to FSS methodology and Winstat for data processing.

Training can be done through the implementation of small FSS in Pleiku area, close to Chu prong station for instance, in villages to be selected by the team only in order to train RRIV staff. The first FSS can then be later implemented in the 3 villages (or more) to be selected in coastal provinces for OFT.

A step by step approach is recommended (and presented in chapter 9), under the guidance of Mr S Boulakia, to ensure quality of data collected and analysis.

## **9 Proposal for an implementation OFT and FSS programme of activities**

We suggest the following indicative programme for the next months :

✓ End of October : discussions with scientists of Pleiku RRIV research station of the OFT protocols, presented in chapter 7 to be proposed to farmers. Protocols should be formatted on a small paper in order to provide a basic discussion with PPMU and farmers. During this time Mr Ngoc could be trained for using the software Winstat and prepare FSS questionnaire for farmers involved in OFT programme.

✓ November 2000 : mission to coastal areas, in three districts :

- final selection of the areas and villages for OFT implementation
- selection of farmers involved in OFT : creation of "group of interest" with farmers (as "replications" involved in one trial)
- selection of plots
- marking and plotting of selected fields
- discussions with farmers on the trials features : identification of a final protocol.
- providing of technical or agronomic information on trials's content.

✓ December : rubber planting, establishment of other associated crops, depending on type of trials and climatic conditions.

✓ February 2001 : first post-planting visit to the trials fields :

- replacement for rubber trees



- discussions with farmers
  - FSS implementation of OFT network farmers
- ✓ April 2001 : second post-planting visit :
- evaluation of the trial implementation
  - discussion of FSS results and analysis with farmers group at village level.
- ✓ June 2001 : preparation of the second series of trials
- exploratory surveys in other villages
  - discussions with farmers
  - identification of trials' protocols

It is clear that this programme is only indicative. It will depend on available resources, climatic constraints and organisation of activities.

Because the number of trials and FSR activities will require a constant and active presence in coastal areas, and following or accompanying the dynamism on rural development of these provinces, it seems therefore necessary to move some or all RRIV OFT team to coastal area within a year. We suggest the City of Huê as a base for both the CIRAD scientist and RRIV team. This location ensure good live and workplace conditions for researchers and certainly for ADP extension component. The team might be composed of Mr Ngoc for FSR activities and another scientist (to be identified ) in agronomy for local OFT trials setting-up and monitoring.

It seems therefore essential for the pursuit of research activities in these coastal areas where rubber planting is very dynamic that the RRIV research ability should be reinforced, in the mid term, with additional field staff to monitor on-farm trials in these three coastal provinces.

Therefore, the ideal team might be composed of the following members :

Staff	position	Location
S Boulakia	Associated scientist	Huê
Phuc	On station experimentation	Chu Prong, Pleiku
XXX could be Mr Ngoc and one RRIV young scientist (staff from An Loc and Quang Tri could be affected )	OFT experimentation	Quang tri or Huê
Field assistant	1	Province of Huê
	2	Province of Quang Tri
	3	Province of Quang Binh

The RRIV field assistants, for instance one per province, could be trained to i) implement and monitor OFT and ii) implement FSS under the guidance of Mr Ngoc. Of course, these suggestions are indicative and should comply with available resources.

We should acknowledged the excellent collaboration between RRIV and CIRAD. There is a real interest to develop the research component in the fields through OFT.



However , means and resources are still relatively poor. The establishment of trials at Chu prong is remarkable. The team will need very soon at least a car (initially scheduled on ADP budget but currently blocked). Computer for data entry and processing will be needed (included fixed or portables).

## 10 Conclusion

The survey and visit to the fields in the 3 coastal provinces have shown that there is a current dynamic in rubber planting compared to the situation in highlands where coffee seems to be more currently favoured by smallholders (except in Kontum province where it seems that there is still a good scope for rubber).

We confirm the report from a recent ADP mission in these zones (see annex 6) in September 2000 which indicates that there is a strong demand for rubber development in these areas , and consequently, a strong demand from local farmers on various topics to adapt rubber cropping systems to local conditions.

The challenge is to link as soon as possible farmers' settlement with research topics in a context of land intensification and adaptation of land preparation and cropping systems to fragile soils where erosion and soil fertility are key problems.

The main topics are clearly the following :

1 For rehabilitation of former Project 327 plots : there is no clear indication that rehabilitation will be effective and on farm in situ experimentation is necessary to validate or not the effect of a strong amount of fertiliser to recover these plantations.

2 New planting : a certain number of problems have been expressed by the team and local farmers :

**Generally speaking, the GERUCO model and recommendations are not recommended for farmers conditions. In other words, rubber smallholders conditions are far different from that of Estates. On farm experimentation is aimed to define precisely rubber cropping patterns (including annual and perennial inter-cropping) for smallholding conditions.**

These topics are summarised as following :

✓ land preparation : The GERUCO approach based on strong ploughing and 3 passages with a ripper is leading to erosion problem as well as a severe decrease in organic matter content of local soils. Moreover, the high level of expenditure could be an important and initial financial charge for farmers if they get a loan for that purpose.

✓ inter-cropping and agronomic practices: due to the particular history of Vietnam where land is belonging to the State (since 1954 in the North and 1975 in the south) and is generally not available to local farmers, most farmers want to intensify their rubber plot and profit from the land to crop cash crops (groundnut, pineapple....) or food-crops (upland rice, cassava, cocoyam, sweet potato). There is a strong demand



for improved inter-cropping systems which have to be productive and sustainable. There is behind that topic the necessity to take into account soil-climate and agricultural practices effects on soil fertility. Soil fertility is a concern for most farmers who want to maintain intercrops production for at least the first four years with traditional spacing (7m x 2,5 m). There is also the possibility to explore other spacing such as double line and large inter-row in order to enable food production for 10 years or more.

The demand is on increase, feasibility, productivity and sustainability of inter-cropping practices adapted to rubber.

Fruit trees association with rubber seems to be also a very important topic as there is an increasing market for fruits in these areas.

Many experiences in Sri Lanka, Indonesia, Gabon, RCI, India;... have shown a very positive impact of inter-cropping on rubber growth. We have seen however that bad practices, i.e. 8 groundnut crops in 4 years with ploughing close to rubber trees leading to a very poor soil fertility could be disastrous on rubber growth. It seems therefore essential to test the potential best practices and combinations to enable a highly productive inter-cropping system and a good rubber growth. Stock farming and use of covercrops for pasture or fodder should also be considered and possibly integrated into cropping systems as livestock is important for most farmers.

✓ For rubber : type of planting material (polybag..), type of clones, spacing, fertilisation (rehabilitation), production of planting material... are key points to be tested. Clonal recommendations are also very important in that case and should be adapted to local variations.

Various proposals have been suggested in this report to try to provide to local farmers a wide range of alternatives through several on farm trials protocols.

It should be clearly identified what rubber cropping systems can be suggested to farmers : monoculture, monoculture with annual inter-cropping during immature period or agroforestry systems (such as those currently developed in Indonesia and Thailand).

Other crops, currently implemented by farmers should be well identified and documented in order to compare incomes and labour productivity of various rubber systems compared to other crops. It should be also verified if labour is still available for rubber at farm level: in other words if rubber can be easily adopted and integrated into local and current farming systems without break-up or major problems.

If there is already some cash-crops and consequently less land available for rubber development, the visited coastal areas have shown that rubber is definitely an interesting options for poor local farmers who still rely on food-crops and some cash crops such as groundnuts and fruits. Land is still plentiful in piedmont area. Livestock is present everywhere and seems to be relatively important.

In terms of knowledge about farming systems and farmers strategies, it is important to consider to characterise and monitor these farming systems as there is strong ecological variations, diversified populations, various access to resources and different access to markets, credit and technical information in these coastal provinces. FSR linked with OFT in the same network, implemented by a small team



from RRIV, should be able to provide adapted and improved rubber based cropping systems as well as information on socio-economic conditions for a successful development.



## **Annexes**



## **Annex 1**

### **Programme of the mission :**

Friday 20/10	Arrival of CIRAD experts in HCMC
Saturday 21/10	6.35 am – 7.30 am : Flight HCMC-ban Me Thuot and trip to Pleiku (4 hours) . Afternoon : Trials visit on Chu Prong station. Discussion on means and topics to be adapted to smallholders' conditions.
Sunday 22/10	Conference on OFT/FSS methodology. Pleiku Trip by car Pleiku-Hue.
Monday 23/10	Trip to Hué. Visit and assessment of the different areas of ADP District of Nam Dong
Tuesday 24/10	Nam Dong
Wednesday 25/10	Trip to Dong Ha, province of Quang Tri. Visit of the plantation of Quang tri.
Thursday 26/10	Visites in the districts of Cam Lo, Vinh Linh, trip to Dong Hoi.
Friday 27/10	Dong Hoi, Quang Binh. Viet Trung Estate. Nursery in Phuong Ha.
Saturday 28/10	District of Bo Trach. Village of Quong Nanh.
Sunday 29/10	Trip from Dong Hoi to Hue and return by plane to HCM city.
Monday 30/10	Morning : conference on OFT and FSS methodologies at RRIV, HCMcity. Afternoon : discussions about the OFT protocols. Debriefing meeting in RRIV offices
Tuesday 31/10	Last discussion on FSS methodology and departure to France
Wednesday :	Arrival in Montpellier, France.



## Annex 2

### List of persons encountered

#### RRIV, ADP and CIRAD

Mai Van Son	Director of RRIV
Tong Viet Thinh	Director of RRIV Pleiku research station
Madame Hoa	RRIV, deputy director
Do Kim Tranh	RRIV, exploitation and physiology
Franck Enjalric	CIRAD, HCMcity
Stéphane Boulakia	CIRAD, Pleiku
Huynh Tran Quoc	ISA, director of farming systems, HCMcity
Mr Henk Zwinderman,	ADP project

#### Staff from RRIV Pleiku

Pham Hai Duong	Selection hévéa
Tran Minh	Exploitation hévéa
Tran Nam Viet	Fertilisation et plantes de couvertures
Le Gia Trung Phuc	Systèmes de culture
Vi Van Toan	Responsable de la station de Chu Prong
Cao Thi Phuong Nhi	
Nguyen Van Ngoc	

#### Staff from various institutions in the provinces

Lan	Deputy director : plantation of Krong Buk
X	Director of the plantation of Eah Leo
Cu	Deputy director plantation of Kontum
X	Plantation of Mang Yang
Khanh	Director of plantation of Chu Se 1
Binh	Deputy director plantation of Chu Prong
Hoang	Vice president of the people committee : province of Thua Thien Hue
Khim	PPMU province of Thua Thien Hue
Hung	Deputy director of Agriculture (TT Hue)
Ngon	Director plantation of Lam dong
Minh	Deputy director plantation of Quang Tri
Dieu	PPMU, head of technical department (Agriculture Q. Tri)
To	PPMU province of Quang Binh
Binh	PPMU, Quang Binh
Manh	Director, technical services of the plantation Viet Trung



## **Annex 3**

# **AGRICULTURAL DIVERSIFICATION PROJECT**

## **TERMS OF REFERENCE**

### **CIRAD Expert Mission Agro-socio-economist October 2000**

#### **1 Subject**

Technical assistance on "On Farm" research, including rapid rural diagnosis and identification of local strategies.

#### **2 Context and background**

- The Agricultural Diversification Project (ADP) aims to promote crops diversification and increase of rural incomes through land allocation, long term loans, institutional strengthening and technical support with small holder rubber cultivation.

- There is an smallholder rubber research programme which is implemented by RRIV with the scientific support from CIRAD (Centre de Coopération Internationale en Recherche Agronomique pour le Développement). This research component presents three strategies (i) basic research in controlled conditions, (ii) adaptive research under smallholder conditions and (iii) participatory research linked with the farmer's socio-economic environment.

- CIRAD is involved in the project as a partner of MARD for the research component co-ordination and participatory approach.

- In the context of rural development based on a new crop, rubber, in coastal provinces, some of the primary aims of the research is (i) to have a better knowledge of the agro-socio-economic environment of the selected areas, (ii) to create new agricultural technologies which can improve soil fertility, labour productivity and yields of rubber based cropping systems and (iii) to determine conditions leading to a sustainable development.

- Coastal provinces are involved in rubber planting in 2000 despite the difficulties of organisation. They need some support to set up on-farms experiments in order to improve farmers' adoption of this new crop.

- The challenge is to link as soon as possible the research topics with farmers settlement in a context of land intensification on fragile soils. Participatory research with local farmers aims to a better understanding of farmers constraints to technology adoption.

#### **3. Objectives of the mission**

- The research component needs to improve knowledge on the socio-economic environment and on agricultural techniques able to manage crops associations with rubber tree in a sustainable way. So, this approach will include rapid rural diagnosis, rubber cropping pattern assessment, farming systems appraisal and identification of local strategies in the different areas visited.

- Presentation and training on "On Farm" research methodology. This mission of an agro-socio-economist from CIRAD-TERA, could enable to develop adapted field experiment in the coastal provinces according to a clear methodology, the review of the current experimentation and a rapid diagnosis.

- A conference as a training course could be planned to the attention of the RRIV researchers, GERUCO staff and extension staff involved in smallholders development. "On Farm" research methodology could be very useful.

- It is important to set up some experiments in the real farm environment in order to test available technologies in different cropping systems and their understanding by local farmers.

- It is also an important issue for ADP to support the work carried out on rubber tree, cropping systems by RRIV and MM. Enjalric and Boulakia through technical assistance from the CIRAD programme directly involved in the project. This mission should be done by Eric PENOT (also a rubber specialist from CIRAD-TERA) to give a direct scientific support to the CIRAD expert, Stéphane BOULAKIA (CIRAD-TERA team) who is involved in this subject.



This mission should be in the same time than Mr Jean-Marie Eschbach, rubber specialist, to allow an integrated approach of field experiment in this area. It could be a chance to link the socio-economic constraints with the agronomic research.

The mission should have :

- . To visit and check the first trials established in Chu Prong area by Stéphane BOULAKIA,
- . To visit the coastal provinces with the PPMUs to assess the agro-ecological and socio-economical constraints of the area and the needs for further research and experiments.
- . To propose some trials protocols according to the primary observations and conclusions.
- . To present "On Farm" research methodology.

The overall objective is to initiate the programme of on-farms trials of the ADP research component in the coastal provinces.

#### 4. Location

Chu Prong station and the ADP areas in the coastal provinces of T.T. Hue, Quang Binh and Quang Tri, according to the different PPMUs.

#### 5. Timing

The mission of Mr Penot last for approximately 8 days including fields visit in Chu Prong and coastal provinces and discussions with RRIV staff and CIRAD experts. The mission should be planned from 20<sup>th</sup> to 30<sup>th</sup> of October 2000 according to the availability of Mr. ESCHBACH (CIRAD-CP). *Some logistic support will be asked to the PPMUs of the respective provinces on providing agricultural and climatic data of the ADP areas and also to contact some key people (translator recommended).*

Friday 20/10	Arrival of CIRAD experts in HCMc
Saturday 21/10	6.35 am – 7.30 am : Flight HCMc-Pleiku. Trials visit on Chu Prong station. Discussion on means to adapt the results to smallholders.
Sunday 22/10	trip by car Pleiku-Hue (7.30 – 17.00)
Monday 23/10	Hue
Tuesday 24/10	Hue Visit and assessment of the different areas of ADP.
Wednesday 25/10	Q. Tri and farms visits.
Thursday 26/10	Q. Tri
Friday 27/10	Q. Binh (details to be defined with PPMUs...)
Saturday 28/10	Q. Binh
Sunday 29/10	Dong Hoi - Hue (by car # 5 h), Hue- HCMc (by plane, dep : 14.30)
Monday 30/10	Meeting RRIV, conference on "On farm" experimentation methodology.
Tuesday 31/10	Debriefing meeting in RRIV offices. Departure to France (AF 255 19.05)

#### 6. Participants

Mr. Penot will be accompanied by 2-3 RRIV staff and the two CIRAD experts located in Vietnam for the ADP project (F.Enjalric and S. Boulakia).

#### 7. Expected results

The Agro-socio-economic assessment will identify the most important farmers constraints in terms of socio-economic parameters and also agronomic factors as well. This diagnosis implemented with the participation of local communities will allow us to prepare an adapted programme of experiments in order to provide local farmers with adapted technical support concerning crops systems.

The suggested agricultural technologies, including associated crops with rubber, use of cover crops, etc... should be adapted to local farming systems and fit farmers strategies in particular in providing sources of incomes during the immature period in a context where erosion and soil fertility are key problems.

The results of the mission should be analysed in order to set up a trials programme for



the next future, adapted to the different agro-ecological environmental conditions of the coastal provinces as well as methodologies of implementation. This last point could concern the training of the RRIV researcher involved in the smallholder development.

A better understanding of “On farm” experimentation for RRIV researchers following the conference and the proposals which will established together.

This first trials programme will be linked to a farm network (farming systems characterisation and trials implementation) in the aim of the release of operational results and further diffusion.

A final report in English (4 copies : 2 PCU, 2 RRIV) will be produced.



## **Annex 4**

### **Methodologies and actions for a rubber research programme aimed to rubber smallholders.**

#### **Global features and the case of Vietnam : some proposals.**

#### ***Content***

**1 Introduction : a rapid history of rubber in Vietnam**

**2 Environment and potential for a large rubber development in Vietnam.**

**3 The current smallholding situation**

**4 Methodology for farming system research and experimentation.**

**4.1 Introduction to the methodology**

**4.2 Main tools and outputs developed in such approach**

**4.3 Detailed operations**

**4.3.1 Diagnosis**

**4.3.2 A farming system characterisation survey :**

**4.3.3 On-farm experimentation programme identification using  
participatory approach**

**4.3.4 Implementation of On-farm experimentation**

**4.3.5 Farming systems monitoring**

**4.3.6 Analysis and re-assessment of the research programme**

**5 Conclusion**

**Anex : selected bibliography.**



**Methodologies and actions for a rubber research programme  
aimed to rubber smallholders.**  
**Global features of a socio-economic research programme  
and the case of Vietnam : some proposals.**

A conference paper given to IRCV, Vietnam, October 2000,  
by E Penot, CIRAD-TERA/Programme THI.

**Introduction : a rapid history of rubber in Vietnam**

The first rubber planting in Vietnam occurred in 1897 at the Botanical garden of Saigon (Mission "Raoul"). The first rubber plantations have been established by settlers ("colons"), and then by Private Estates (SPTR, SIPH & SHTN, later, Michelin...). Grafting is introduced in 1929. 36 % of planting is already clonal in 1936. The first plantations were located close to Saigon with further extension in the "terres rouges" (red lands) where land was plentiful. Rubber yield are quite high (1200 kg/ha/year in 1960) compared to other Asian countries (800 kg/ha/year) (Serier 1990). In 1970, the gap was even larger (1800 vs 1000 kg/ha/year). This shows a high technical level of rubber growers in Vietnam and an history of high quality products. The rubber from Indochina was considered as one of the best available on the market. 24 estates were present in 3 administrative areas : the southern zone on the grey and red soils, the central area (the current highlands) and the northern area (Binh Tri Thien). Since 1976, GERUCO is a governmental company that manages these 24 estates.

RRII (Rubber research Institute of Indochina) was created in 1941 and evolved into IRCV in 1957. After several institutional changes, IRCV in its current shape dates from 1990.

Smallholder plantations (including small and middle holdings) began to be developed in 1954. The number of these farms increased very fast, linked with the "reclaiming land programme" launched by the Saigon regime in the years 1957-1963. Part of these plantations have been destroyed or heavily damaged during the war (GERUCO. Ministry of Agriculture and food industry 1994). After 1975, the major part of these rubber areas were regrouped under state-run companies. After 1986, according to the implementation of the land law and governmental policy, smallholders began to plant again rubber.

In 1994, the prime Minister assigned the rubber industry to reach 700 000 ha in 2005. The current World Bank funded project of development for smallholder was launched with preliminary studies in 1994. 550 000 ha have been identified as very suitable (and 1 241 000 ha as moderately suitable).

The aim was to provide smallholder with 3 to 6 ha of rubber plantations according to labour availability per family. The total target is 83 400 households.

Rubber exploitation has been retrained during the second world war and, partially during the two wars (1947-1954 and 1965-1975). Since 1975 and reunification of the



country, political stability and, later, adoption of a liberal economy at the end of the 1980's (introduction of the "Do Moi") enable a development of a smallholding sector. Nowadays, the smallholder sector represents 87 200 ha from the total area of 390 000 ha. The government aims to plant within the next 10 years 500 000 ha of rubber from which 300 000 ha would be smallholding.

Such rubber history and political history of the country, characterised by a state of war for almost 35 years from 1940 to 1975 has not been very favourable for a rapid extension of rubber cultivation by local smallholders until it became possible in the 1980's. However, there is obviously a dynamic for rubber in some areas of the country.

The rubber sector in Vietnam has been dominated by the Estates sector, firstly private (up to 1975) and then governmental until now.

Such history has not permitted the diffusion of technical information as well as planting material about rubber, generally considered as an Estate crop, at least not as fast as in other Asian countries. Such situation about the rubber sector of Vietnam is rather similar to Cambodia but differs largely from the rubber history of neighbouring countries : mainly Thailand, Malaysia and Indonesia. In Malaysia and Indonesia, the Estates sector has initiated a rubber boom, rapidly dominated in term of areas by smallholders as soon as 1935 (Indonesia). In Thailand, the entire sector is almost concerning smallholding (more than 95 %).

However, rubber has been identified by governmental agencies as a potential crop for development in other areas than traditional ones.

It is therefore essential to have a good and relevant picture of current or potential rubber farmers situations and strategies. In other words, a comprehensive and adapted Research-Development (R-D) programme including a strong socio-economic component, seems to be essential prior to any further and large rubber programme implementation.

Rubber is still a new crop for most farmers, in particular in non traditional areas (all areas except southern Vietnam around Ho Chi Minn city). Rubber has been also introduced for smallholders in Vietnam through the NES concept (the "project 327" for instance), largely controlled by governmental Estates.

Eventually, Vietnam's economy is evolving very rapidly and seems to be quite dynamic.

Therefore, it is very important to have a better knowledge of smallholders' sector : its dynamic, farmers' strategies, potential alternatives in terms of crops or other off-farm activities, diversification of activities....

If some documents have been already produced, preliminary diagnosis are still essential and local socio-economic surveys can help to identify the particularities of each region.



## **2 Environment and potential for a large rubber development in Vietnam.**

Rubber seems to be a rather attractive crop. A better knowledge of local farming systems constraints and opportunities should enable decision-makers to select areas where rubber can be effectively well adopted. Other alternatives crops (and information on income/ha and labour productivity in particular), off-farm activities and farmers' strategies should be well characterised and identified in order to be able to provide to farmers adapted technical or organisational innovations<sup>1</sup> on rubber.

The 1994 master plan for rubber in Vietnam is aimed to implement 700 000 ha of total plantations within the next 10 years (2010) with 210 000 ha for GERUCO, 100 to 150 00 ha for the provincial Estates and 300 to 350 00 ha for smallholders (GERUCO. Ministry of Agriculture and food industry 1994) In 2010, the smallholder sector should represent 43 % of the rubber planting. (GERUCO, 1997).

Emphasis is clearly put on smallholder development.

The selected area for further rubber development are the highlands, the costal areas and traditional areas in southern Vietnam. The concept of development is based on the PMU<sup>2</sup> approach (Binh 1997).

Rubber can be a valuable source of income as well as an interesting and diversified activity as rubber farming systems offers a wide range of possibilities from monoculture to agroforestry systems.

It seems therefore more important to be able to replace the importance of rubber in current farming systems compared to other crops, in particular coffee and stock farming in the highlands for instance as well as rice, vegetables, corn, sugar canne, pepper or peanuts in the coastal areas (Eschbach 1997) (Eschbach 1988).

An important positive point is also the possibility to valorise rubber wood for the furniture industry. Rubber timber as a financial output enables generally to cover the cost of re-plantation with clones at least for the first year.

Two areas have been selected for further rubber development : the highlands and the coastal region.

### ***The highlands***

The main features of the area seems to the following :

- shortage of land.
- other crop alternatives : coffee and stock raising.
- relations between local communities and migrants.
- Serious soil constraints and fertility problems.
- A move from slash and burn agriculture to intensified rubber cropping based production systems for local people.....

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<sup>1</sup> We understand " technical innovations " as improved technologies for rubber production and " organisational innovations " as all techniques or means that may improve on an organisational point of view farmers ability to better produce (farmers' organisation, trading, quality control, local credit scheme, information chanel, social aspects ....) .

<sup>2</sup> PMU = Project Management Unit, a concept largely used by World Bank rubber projects.



### ***The coastal areas.***

The main features of the area seems to the following :

- shortage of land in the immediate area close to the shore with serious population density. Such situation is not anymore existing in the piedmont.
- other crop alternatives : upland rice , vegetables in the piedmont, irrigated rice in the plains.
- Possibility of typhoons, potential constraints of water deficit in some areas.....

In those areas, the socio-economic environment can be characterised as following : an heterogeneous population and diversified farming systems.

These constraints are related to land (availability and tenure), labour (some areas are over crowded) and capital (presence or not of projects or crop alternatives to raise capital).

But still , rubber represents a great opportunity of development for farmers in highlands, piedmont along the coast as well as in isolated areas where few opportunities can be developed.

### **3 The current smallholding situation**

The current smallholder area, 87 220 ha, contributing to 22 % of the total rubber area, is distributed as following (Enjalric 1999) :

- 74 % of the plantations are located in the traditional Southeast area, 64 250 ha
- 15 % in the highlands, 13 083 ha (total 54 000 ha)
- 9 % in the coastal areas, 7 850 ha.(total 18 000 ha)

35 % of smallholders have 2 ha or less of rubber, 55 % with 3 to 4 ha and only 10 % with more than 4 ha of rubber. The latest "big farmers" appear sine 1995.

The rubber plot allocation process is based on plot distribution according to a governmental programme leading to the release of a land certificate. A credit is provided to the planter. Latex harvest and sale is done through the governmental Estate.

Therefore one main challenge is to enable farmers with others farming activities (coffee ..) to move to clonal plantations.

Clonal recommendations are very important in that case and should be adapted to local variations. It should be clearly identified what rubber cropping systems can be suggested to farmers : monoculture, monoculture with annual inter-cropping during immature period or agroforestry systems (such as those currently developed in Indonesia and Thailand).

Other crops, currently implemented by farmers should be well identified and documented in order to compare incomes and labour productivity of various rubber systems compared to other crops. It should be also verified if labour is still available



for rubber at the farm level: in other words if rubber can be easily adopted and integrated into local and current farming systems without break-up or major problems.

Land availability, share cropping , origin of local farmers and relations with migrants (if any)... are socio-economical factors to be identified in order to understand local situations. A farming system characterisation survey may provide relevant information to identify operational typologies of situations and farmers. Then, technical innovations can be proposed to farmers according to their real needs.

A constraints and opportunities analysis should provide a sufficient understanding of potential bottlenecks for further rubber development and in particular the technical but also socio-economical conditions of the feasibility of a new rubber planting dynamic within the next 10 years. The following recommendations for a research programme should provide the content for the identification of a master plan for rubber and its evolution. Such adaptive research is aimed to the solution of farmers' problem of production.

On farm experimentation of rubber cropping systems or particular technologies will provide relevant information for the identification of adapted rubber systems.



## **4 Methodology for an operational farming system research and experimentation.**

### **4.1 Introduction to a generic methodology**

The following methodology has been implemented (by CIRAD and associated National Research Centres) in several countries for various crops and, for rubber, especially in Indonesia, Cambodia and Vietnam as well as in Cameroon, Gabon, Colombia and Ghana).

The objective of a research based on a creation-diffusion process is to optimize farmers' income through the identification and adoption of adapted rubber cropping patterns and a process of adoption, diversification or re-plantation.

Emphasis is put on "operationality" of such research. The contribution of farmers in the process from diagnosis, trials identification and implementation up to results analysis increase the "adoptability" of innovations.

The methodology is based on the following points that create a framework for implementation:

#### **- 📌 Diagnosis**

---> a preliminary diagnosis based on the study of all available information (bibliography, data collection, key-persons) and an exploratory survey.

#### **- 📌 A farming system characterisation survey :**

---> to understand constraints, opportunities, income and labour productivity of each cropping systems and farm activities. The data analysis should provide an operational typology.

#### **- 📌 On-farm experimentation programme identification**

---> the identification of a potential on-farm experimentation programme aimed to solve technical constraints (technical innovations) or social constraints (organisational innovations). On Farm trials protocols should be identified according to typology. A prioritisation of experiments should be made.

#### **- 📌 Implementation of On-farm experimentation**

---> Implementation of on-farm identification using participatory approach in a on-farm trials network.

#### **- 📌 Farming systems monitoring**

---> implementation of a "farming systems monitoring network of reference" in order to monitor technical change, adoption of innovations and assess its impact as well as its externalities at the farming systems level and at a regional level as well.

#### **- 📌 Analysis and re-assessment of the research programme**

---> Feedback analysis with farmers, extension and research institutions and re assessment of the on-farm trial in an constant and evolutive process of R-D



A technical support to research can be provided in order to apply methodologies of work, a general framework of activities linked with operational aims to solution farmers' problems concerning production, quality, re-plantation, rehabilitation, cropping systems improvement or income diversification through the adoption of rubber.

A agronomic approach through on-farm experimentation linked with a socio-economic approach (farming systems analysis, typology, etc.....) should provide adapted technical pathways or improved cropping systems to farmers as well as the conditions for adoption and appropriation (of innovations) by farmers according to various situations encountered in terms of further rubber development.

## **4.2 Main tools and outputs developed in such approach**

The main tools used in such research process are the following :

- a network of on-farm trials : to test technical innovations.
- the use of a participatory approach in order to obtain more rapidly adoptable and more operational technologies.
- "Inter-village visits" between farmers from different locations in order to obtain a feedback and create discussions between farmers having a research plot and those who don't.
- surveys for on-farm characterisation.
- A network of demo plots for diffusion for technologies already adapted or for technologies resulting from on-farm trials.

The results and outputs are the following :

- rubber cropping patterns or technologies (technical pathways for monoculture, monoculture with annual intercrops, agroforestry systems .....)
- demos plots for diffusion (old trials which succeed can also be used as demos plots later on ).
- Manual and publications for extension and diffusion.
- An operational typology of situations and farmers leading to the identification of "recommendation domains".
- A global vision of possible rubber technology adoption according to farmers strategies and local conditions.



In other words, it seems essential to search for improved and adapted rubber technologies taking into account farmers' socio-economic environment in order to optimise innovations adoption.

Of course these methodological proposals should take into account what has been already done and built on what is already currently available in terms of information and technologies.

### **4.3 Detailed operations**

#### **4.3.1 Diagnosis**

A preliminary diagnosis is based on the study of all available information (bibliography, key-persons) in order to provide the support for further analysis as well as a "knowledge database" in order to identify what do we know, what we do not know ?

Several hypotheses can be raised.

An exploratory survey should provide the necessary lacking information.

#### **4.3.2 A farming system characterisation survey :**

A general survey is implemented in order to obtain the relevant information on the structure of the production systems, their constraints, their strategies and the way production factors (land, labour and capital) are used.

The objective is to understand constraints, opportunities, various sources of income and labour productivity for each cropping or livestock systems and other farm activities.

The survey use a systemic approach.

The production systems are identified through their cropping or livestock systems. Each cropping systems used a part of land, labour and capital. Other sources of income , using or not factors of production should be identified. Off-farm activities should be identified.

A calendar of activities is related to each cropping systems. Treasurer-ship should be recorded in order to see if activities generate funds management problems.

Some example of cropping systems :

- coffee
- slash and burn agriculture for upland rice , or groundnut in rotation
- rubber.....

Some examples of livestock systems :



- cattle for beef production
- cattle for milk production
- cattle for calves production (less than a year old).....

Data can be stored and processed using an adapted software such as WINSTAT (CIRAD-TERA). A training can be organised. WINSTAT offers great possibilities : in particular in generating the same format for the questionnaire and data entry, limiting therefore further errors in data computing.

Another interest is the homogeneity of data collection , processing and analysis when different teams in different areas use the same tool.

Numbers of surveys have been already processed in Indonesia, Cameroon and other countries using this software.

The data analysis should provide an operational typology of situations/farmers. Such typology will enable the identification of recommendations domains”

WINSTAT has a statistical data capability in AFC/ACP and other survey data analysis methods that can be used to identify potential typologies. On the other hand, a manual analysis for identifying an operational typology can be preferred depending on the type of situations encountered in reality.

#### **4.3.3 On-farm experimentation programme identification using participatory approach**

The knowledge acquired on farming systems enable to identify constraints, to prioritise them and also to search for opportunities to be developed.

The identification of a potential on-farm experimentation programme aimed to solve technical constraints (technical innovations) or social constraints (organisational innovations).

On-farm trials protocols should be identified, discussed with farmers according to typology in order to be sure that technical innovations proposed through trials will be adapted to local situation and will provide a technology that remove such constraints. A prioritisation of experiments should be made, according to constraints priority and also to available funds and means which are generally rather limited.

The participatory approach is based on farmers participation in elaborating the experimentation programme as well as its implementation. Protocols can be discussed prior to implementation as well as regularly during implementation : for instance once a year for rubber trials with a duration of 6 or 7 years..

The objective of participatory approach is double :



- First to identify the real constraints in term of technology implementation by farmers themselves.
- Second : to increase the adoptability of technology by defining it with the final users : farmers

Preliminary discussions at village level, then at farmers' group level are aimed to identify first, trials' structure and second, to identify future farmers' groups that can be really operational. Motivation and representativeness are the two most important criterias to select farmers group. Such group, generally focused on one type of trial, at least at the beginning, are called 'group of interest'.

A type of contract can be signed between researchers and farmers.

Such "contract" is first based on the trial's protocol and second on who is doing or providing what ?

Generally, farmers provide land and labour. Research provide inputs and technical information, including training if necessary (for grafting for instance...).

A good trial is a simple trial. Trials should be based on one treatment with a maximum number of plots such as 5 or 6. All trials should include a control plot. 5 or 6 replications are necessary. One farmer' field is one replication.

For instance the treatments can be :

- number of weeding per year : with plots with 2, 4 6 weedings per year
- type of combination of perenials with rubber : with 3 plots with Durian, rambutan and coffee.
- Type of systems : comparison between large inter-rows with crops and normal planting density....
- Etc....

The data analysis should be very simple : a simple variance analysis (ANOVA) is generally sufficient.

A serie of replications should be located in the same area with the same ecological conditions in order to reduce field variability. For instance, a serie of replication of one trial can be located in one village with one group of farmers. If the trial is going to be replicated in several locations in order to compare the effect of ecology, then each trial is implemented with 5 or 6 replications in each locations.

#### **4.3.4 Implementation of On-farm experimentation**

Implementation of on-farm trials begins as soon as "groups of interest" have prepared their fields according to protocols defined between researchers and farmers and when planting material is ready to be planted.

The on-farm trials are regrouped into a network.



Monitoring should be done as long as it has been recommended in protocols. Some farmers will abandon or not follow these protocols. It should be expected that potentially 30 % of trials can be lost. Therefore it is necessary to schedule at least a minimum of 5 or 6 replications of each trial .

The replication that are not in accordance to trial's protocol is relegated into a simple observation plot and not anymore included in data analysis.

#### **4.3.5 Farming systems monitoring**

The objective of a farming system monitoring is to monitor and follow-up technical change and adoption of innovations by farmers: both farmers involved in the experimentation process and others who can copy the technology and change it as well.

Another objective is to assess the impact of experimentation and technology adoption as well as its externalities at farming systems level and at a regional level as well. Adopting a specific innovation or changing from one cropping pattern to another one can have positive or negative externalities. It is therefore important to record them.

Such monitoring is implemented in a "farming systems monitoring network" composed of "farms of reference". A certain number of farms are selected, according to the typology and monitored.

It is logically a continuation of data valorisation of the first farming systems survey.

The farming system survey is aimed to characterise farming systems.

The farming systems monitoring network aimed to record technical change and its impact on farms' resources and management.

Again, WINSTAT can be used to store and process data.

#### **4.3.6 Analysis and re-assessment of the research programme**

A constant feedback is necessary to assess if the R&D activities are still aimed to its original objectives and to see if its impact is relevant.

Analysis with farmers, extension and research institutions and a re-assessment of on-farm trials efficiency as well as farming system monitoring in an constant and evolutive process of R-D.



5 Conclusion

The methodology of R&D is based on the knowledge of farming systems (as systems of production) as well as farmers strategies according to their constraints and also their opportunities for development.

Such analysis is a systemic analysis where several systems are taken into account linked with a certain level of analysis :

Type of system	Level of analysis
Cropping system	Field or plot
Livestock system	Herd and fields (pasture)
Production systems	Farm
Agrarian systems	Region

It takes into account not only the physical and ecological environment but also , and mainly the socio-economical environment : men (producers) and minds (strategies).

All innovation process which is not recorded or studied though its users would probably lead to a failure. The producers, generally small farmers in that case, are key actors in production, innovation adoption and generation as well as in development as a whole.



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## ANNEX

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## **Annex 5**

### **Extract from the report :**

**Mission WB / AFD / PCU**  
**Coastal provinces and Highlands**  
**20 – 27<sup>th</sup> September 2000**  
Agricultural Diversification Project

### **GENERAL COMMENTS AND SUMMARY**

#### **1. Context, background and observations:**

The last PCU/WB/AFD/RRIV mission, last March, point out that the 3 northern coastal provinces have shown good progress in carrying out the first steps of the project (land measurement and allocation, farmers registration, etc). This point has been confirmed and these provinces are going to plant about 1500 ha. The project is not going so far in other provinces, mainly because of the delays of procedures on land allocation and loans attribution.

The shortage of planting material is also a problem for the different PPMUs and the mission has been very concerned by the availability and quality of the planting material.

All the PPMUs complain on the delays of reimbursement from MoF or for the availability of advances funds ; that point appears to be a real problem for the implementing activities of land survey and allocation, and even for planting material preparation. Some PPMUs seem to be not enough aware of the project procedures.

An general information campaign should be done at different levels in each province (radio and newspapers announcements, posters, leaflets, ...) in order to present the project (ADP) to the population, farmers, extension staff, etc... Farmers still have a very low knowledge about the project !

#### **2. Provincial Project Management Units (PPMUs) and fields visit :**

##### **2.1. T.T. Hue**

Land allocation activities have been carried out with efficiency although the advance has been available only in August after the contract signature in last April. 1200 ha must be registered this year.

280 ha for 256 families are planned. 240 ha of land are already prepared.

Delays are linked with the highly difficult administrative procedures for the farmers registration and access to the loans.

The PPMU presents some difficulties due to : (i) the low capacity of farmers understanding and ability to follow the instructions, (ii) the complicated procedures from VBARD, (iii) lack of technical support to the farmers. PPMU planned to set up some support through key farmers in a rate of 10 families to 500 ha.

PPMU proposed that the staff involved in the project should receive some allowances or indemnity. MoF refused and the management rules will be published next October.

2001 planning : 1000 ha of new rubber plantations ( 600-700 ha seem to be more realistic), 1600 ha for rehabilitation and 5000 ha for land allocation.

Planting material has been discussed and it has been reminded that RRIV is only responsible to the quality of planting material if they are asked and involved by the PPMU.



RRIV is not responsible of planting material supplying even if the institute will try to facilitate this issue. The very urgently follow up action is to get rubber seeds now, and to prepare nurseries for the 2001 planting.

## **2.2. Quang Binh (Dông Hoi)**

The province is aware of Rubber cultivation (3700 ha with 1800 ha tapped) and believe on rubber for sustainable rural development. Land survey is done on about 4000 ha from 7059 ha available.

600 ha should be planted this year. 709 ha will be allocated before October 15<sup>th</sup> and land preparation is carried out (507 ha were already prepared). Planting material is ready (2100 VND /stump) ; the budwood has been supplied by RRIV. The planting is planned from 15/10 to 15/11.

2001 planning : 1000 ha.

Because VBARD has refused some loans, it has been reminded that the land attribution doesn't induce automatically loan attribution. VBARD must check the eligibility of each farmers and ask some help from the PPMU to have more information on the farmers. VBARD didn't agree on the weakness of its involvement on loans attribution arguing that the PPMU is not enough involved in helping the farmers. Staff allowances are still a problem

## **2.3. Quang Tri (Dong Ha)**

Field visit. Cam Tiem commune.

65 ha planned in 2000 included 11 ha for 10 ethnic minority farmers. There are separate training course for the ethnic minorities. 32 ha are registered with the people committee and 33 ha already measured have to be allocated.

## **2.4. Dak Lak**

Most of ADP activity is in Dak Lar'p district in the south of the province.

Report : 86,2 ha planted in 2000. (31,7 ha village 4 Dak Tih, 43 ha in Dak Buk So, 24,5 ha village 6 Quang Tin and 7 ha in Quang Tan)

The first constraint seems to be the land allocation procedures because most of the land is coming from states and provincial farms. The shortage of land appears evident ! In Dak Lar'p district, loans have been done for all farmers who met the requirements. But there is no enough land in Ea H'leo, no land for rubber in Krong Nang, VBARD didn't receive any registration forms. Land is not enough available even if there are numerous farmers. The provincial authorities want to limit land allocation and have to monitor the process because 40 % of land are used by farmers and the last 60 % are from state farms with only 50 % available.

Some problems appears on short term credit ; delays are due to the lack of clear instruction about associated crops : short term credit or included in rubber establishment ?

Readjustment of project areas could be planned to March 2001. Prospect activities will be studied and reviewed because the initial aims are clearly not possible. PPMU needs guidelines and instructions to pursuit on crop diversification and livestock.

**2.5. Gia Lai** No planting. Delays due to procedures and shortage of funds and planting material.

**2.6. Kon Tum** No planting. Delays due to procedures and shortage of funds.



## **Annex 6**

### **Extract from AGRICULTURAL DIVERSIFICATION PROJECT**

#### **Note on Research component**

1999 annual report of activities  
and 2000 prospects

#### **FIRST PART : 1999 activities**

##### **2. Research component**

The aims of the research component are (i) to insure the success of the project, (ii) to find out optimal conditions to support rubber integration in local farming systems and (iii) identify new agricultural methods and practices for the future.

The most important challenge is to link the objectives and topics of the research with aims and constraints of the farmers involved in the project. According to that, the research component could be able to identify new farming systems and new crops systems adapted to the small holders conditions.

So, the main objectives and strategies of the research component are :

- Identify aims and constraints of the farmers through rural appraisal and farm systems studies and monitoring ;
- Create and set up new agricultural practices and crops systems adapted through both controlled and adaptive researches ;
- Check the suitability then the use and diffusion of new techniques for farmers through a farmers involving research supported by a farms network.

##### **3. Research component : Topics presentation**

The Rubber Research Institute of Viet Nam (RRIV) is the implementing agency for this research component with CIRAD scientific support, and must assure, as far as necessary, the structural cooperation with potential scientific Vietnamese institutes as partners

**Topic 1 :** Identification of agro-socio-economic factors linked with the integration of rubber tree into a sustainable agriculture.

Because we want to secure the integration of rubber tree in these new areas and in the same time to settle efficient and appropriate crop systems to the local conditions, it appears essential to acknowledge and to monitor the environment of such a project covering all aspects of agronomy through sociological and economical approach. This agro-socio-economic approach will be reached through a rural diagnosis followed by and the setting up of a farms network according to the farms typology. This network is an essential tie between the research, extension and development components.



## **Topic 2 : Experiment on crop systems and soil fertility management.**

Agricultural diversification is a key to allow farmers to increase their incomes. Its success lies on the elaboration of efficient and productive crop systems designed for the needs of farmers. These crops systems must allow an improvement and maintenance of the soil fertility and, at the same time, an agricultural production able to assure regular incomes to the small holders. They are based upon the control of the vegetal cover of the ground to ensure a long-term fertility to the fields and the rubber inter rows.

## **Topic 3 : Rubber cultivation techniques and experiments**

Previous trials set up on different areas of the project by RRIV would provide information which might be valued by the extension program of the project, so they will be monitoring. The ways to shorten the immature period of rubber trees and to improve soil protection and fertility management will be carry out to help the planting of new surfaces and also to rehabilitate the existing plantations.

## **4. Research component : 1999's realizations**

### **Topic 1 : Knowledge of the project environment**

- \* Setting up of relationships with the provincial authorities to monitor the implementing conditions for executing the project and to explain and discuss the research component.
- \* Several visits to the first six provinces involved lead to a good knowledge of the different areas of the project
- \* Establishment of good first partnership with the head members of the farming systems department and planning and research management of IAS which could be very useful for ADP research component but also for RRIV in the future, according to the new involvement of RRIV in rubber smallholders research.
- \* Issue of a information meeting on Farming systems for RRIV staff
- \* Study of a scientific activities and protocols to prepare an agreement of co-operation between RRIV and IAS for implementing rural diagnosis. Mr. Huynh Tran Quoc leadership from IAS is taken into consideration for the implementation of the rural appraisal.

### **Topic 2 : Experiment on crop systems and soil fertility management**

- \* Elaboration of protocols for the future trials on crops systems in accordance with our first knowledge of the agronomic and sociologic constraints. These trials are aimed to set up a demonstration of different kind inter-cropping systems based on food crops, cash crops and pasture with different levels of production factors as labour time and inputs. They will be established inside the rubber fields already planted.
- \* Establishment of collections for food, cover and pasture crops both on Pleiku center and Chu Prong station. Collecting and exchanging crops seeds was a good mean to establish relationships with IAS and VASI.
- \* Land preparation for setting up the matrix experimental unit for crops systems
- \* Monitoring of a trainee on soil characterization in Pleiku (Gia Lai)

### **Topic 3 : Rubber cultivation techniques and experiments**



Most of all the RRIV trials in High Lands have been checked for their efficiency and availability to produce results in different subject as breeding, fertilization, tapping systems, crop protection and cover crops and most of them have been selected to be monitored along the project.

Getting available surfaces for controlled research in Chu Prong was a great occasion to set up some new trials on rubber. So some have been established to create new technical and agronomic guides. The first advantage of controlled research is to assume most of the risks linked to protocols with wide ranged treatments which cannot be usually settled up in normal plantations.

One clone trial has been established to study clones behaviour, one on planting design to assess availability of inter cropping according with space row and kind of crops, one on fertilization to evaluate new hypothesis on rubber tree use needs of fertilizers.

A mission of a CIRAD expert happened in November. The scientific program and the different planned protocols have been discussed.

## **SECOND PART : 2000's scientific prospects**

All the scientific activities according to the 3 topics already described are detailed inside the scientific program for the year 2000. In this document, we will focus on the main objectives, the general actions, training and organization with some attention to the planning which is described in annex.

### **Topic 1 : Identification of agro-socio-economic factors linked with the integration of rubber tree.**

. Preparation and signature of the agreement between RRIV and IAS concerning the farming systems diagnosis. This point is the most essential for the next weeks.

. The rural diagnosis should be carried out as soon as possible at the beginning of 2000 according to the availability of funds and the signature of RRIV/IAS agreement on scientific cooperation. Its main conclusions should permit us, in the coming months :

- to assure the adequacy of the research topics with the farmers
- to establish a farms typology with statements on personal references and families to check on the spot the definite categories during the zoning for agro-socio-economic purposes, still in collaboration with IAS.
- to establish a network of referential farms on the priority zones in order to assure the link between the research and the farmers. Farmer/ researcher is an essential channel for the elaborating-appropriating process of the technical message.

### **Topic 2 : Experiment on crop systems and soil fertility management**

The main aim is the elaboration of efficient and productive crop systems which must allow an improvement and maintenance of the soil fertility and, at the same time, an agricultural production able to assure regular incomes to the small holders. Those types of culture, based on a long-lasting management of land resources including soil protection against erosion, will mostly use the management of the vegetal cover and techniques of direct sowing.

The experiments will be carried out in controlled places as well as in farm fields, by and with the farmers, according to their needs and priorities.

\* Trials on different crop systems in controlled situation will be established in Chu Prong station



⇒ Set up an experimental process for the creation of crop systems (4ha).

This experiment must result in defining a wide range of competitive and productive crop systems which take into account food and annual crops, animal husbandry (pasture and grain production) and perennial species. Their elaboration will be supported by a matrix approach combining species, cultural techniques and different levels of investment (inputs and labor). Land clearing will be necessary in the first 3 months of year 2000.

⇒ Maintenance, monitoring and extension of collections to (i) evaluate and multiply the types and varieties of cover plants and annual plants according to their real and/or potential interest within the framework of crops association and farming systems, (ii) assess setting up and management of annual crops.

⇒ Trials of associated crops on rubber plots trees planted in 99. Valuation of the available trial on rubber trees density already planted in 99. Five over 7 ha are able to attract trials of associated crops with rubber tree as non-irrigated coffee / useful trees / food crops and others crops. The criteria for selection of the associations are based upon the investment capacity and the term of return on investment.

\* Trials on different crop systems will also have to be carried out in farms fields as participatory research. Setting demonstration plots on farms

⇒ Settlement of productive and adapted crop systems that enable planters consequent incomes and concurrently improve the soil fertility.

These crop systems and the management of the covering vegetation will follow various strategies adopted by farmers as agricultural diversification, labor time reduction, increase of production, or others... and will have to be suitable for different situations according to the results of the rural appraisal and the commune identification of the farmers with PPMUs.

⇒ Plots of rubber trees for rehabilitation :

The management of vegetal covering of the inter rows especially in regards to the soil fertility and the control of weeds will be oriented in accordance with the two complementary strategies dealing with the limit of maintenance costs and concurrently reduce the competition of weeds

\* The point of demonstration visits (field day) for reciprocal information among involved and non involved farmers, researchers, PPMUs and agricultural services is very important and will have to be set up as soon as possible when the first farmers will have planted something.

### **Topic 3 : Techniques and experiments on rubber trees**

\* The following RRIV protocols will be monitored until new checking.

- Clone assessment ⇒ 13 trials : STPC87, CTKT85, CTDC86, CTMY88, CTKB89, CTMY92, CTCS93, CTEL97, QTCP85, CTCP98, CTQT88, CTTT97, STCP99.

- Tapping systems ⇒ 4 trials : KTCS93, KTM97, KTCP98, KTEL98.

- Fertilization ⇒ 5 trials to be monitored : FBTK92, FBM97 A and B, FBCP99, FBM90

- Cover crops ⇒ 1 test to be monitored : TFCS97

\* New trials on rubber in Chu Prong station

- Clones trial (1 unit of 8 ha) planned for July 2000



- Setting up of bud wood garden for distribution of improved vegetal material to the extension services under RRIV control in the project areas.
- Trial to shorten the immature period of rubber trees within the available standard (7 X 2.5 m) through the influence of line and inter row .

**\* Trials out of controlled conditions**

Agricultural techniques assessment to adapt rubber tree in less favorable conditions of environment, soils, climate, parasitic pressure. Techniques of planting, fertilization, clone evaluation could be carry out in small holder conditions. Trials will be proposed on the basis of protocols proposed by the different divisions of RRIV. Setting up of clones trials (coastal provinces) among small holders might be done as soon as possible

**General activities planned for 2000 year :**

\* Investments to assume efficiency of the research in Pleiku centre must be realized as previously planned in the budget :

- (i) build a refrigerated chamber (important to multiply and preserve interesting crop types and varieties)
- (ii) build a store house (for fertilizers, phytosanitary products, farming tools and others materials),
- (iii) purchase of farming materials (sowing wheels, tools...)
- (iv) Order agricultural and laboratory equipment planned

\* Settle the procedure to issue regular symposiums on scientific topics in accordance with the ADP objectives as soil fertility management, farming systems studies, etc

\* Plan and organise the missions of scientific support on crop systems, on farming systems, on smallholders management, on tapping systems, ... Scientific assistance, experts from CIRAD

\* External training of RRIV researchers in the framework of regional cooperation or with CIRAD and along with conference meetings. Schedule the different training courses for RRIV staff on different topics Training for Mr Phuc

\* Missions of accompaniment and monitoring by experts and partners. visits to SAM project

\* Establishment of relationships with other research structures to identify and determine the fields of cooperation (WASI, IAS, SOFRI, Universities...) within the framework of the conditions for the implementation of the project.

\* Training and expertise : Establish training planning on farming systems study, on physiology, and as far as RRIV is involved, try to identify one RRIV researcher to be trained on socio-economic approaches for rubber smallholder research and extension.

\* Set up new relationships with scientific partners as WASI, SOFRI, universities of BMT, or Can Tho, or HCMc, or Hué to identify and determine the fields of cooperation, to elaborate common protocols, to order planting material,... Elaboration of contracts of cooperation with the identified structures on the basis of the commonly definite technical protocols



\* Reception of trainees on subjects as Farming systems, Soil fertility management, Plants competition assessment, Rubber tree root system assessment, ...



NB : Acronyms used

CIRAD : Centre de Coopération Internationale en Recherche Agronomique pour le Développement

RRIV : Rubber Research Institute of Vietnam

IAS : Institute of Agricultural Sciences

SOFRI : SOuth Fruit Research Institute

WASI : Western Agroforestry Scientific and technical Institute

BMT : Buon Ma Thuot

VASI : Vietnam Agricultural Scientific Institute

SAM : Systèmes Agraires de Montagne



## Annex 7 PHOTOS

Photo n° 1 : Chu Prong station. Rubber inter-cropped with upland rice.

Photo n° 2 :Province of Huê. Lam Dong. Clone field trial with tea inter-cropping.





Photo n° 3 : Province of Huê. Young rubber trees inter-cropped With pineapple.

Photo n° 4 : livestock grazing under rubber trees.





Photo n° 5 : Province of Quang Tri. Demo plot with various intercrops : sweet potatoes and cocoyam.

Photo n° 6 : Clones field trial with sweet potato inter-cropping.





Photo n° 7 : province of Quang Binh. Poor rubber plot from project 327. Age : 7 years. Girth : 12 cm. Tentative of soil fertility improvement with *Crotalaria spp.* Plot normally dedicated to rehabilitation.

Photo n° 8 : strong land preparation with ploughing and ripping : totally un-adapted to smallholder conditions.





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# **Agricultural Diversification Project**

## **Vietnam, Mission from 19<sup>th</sup> to 31<sup>st</sup> October 2000**

**Technical support for identification of a research programme  
of on-farm experimentation for rubber smallholder in coastal areas in central Vietnam.**  
Eric Penot from CIRAD TERA/THI

### **SUMMMARY**

This mission of technical support has been implemented within the frame of ADP project, according to scientific programming of year 2000, in support to the socio-economic component of adaptive research programme for rubber smallholders in collaboration with RRIV (Rubber Research Institute of Vietnam). The visits in the field have been done with Mme TRAN THI THUY HOA, deputy director of RRIV, Mr Jean Marie Eschbach (CIRAD-CP), M Frank ENJALRIC, co-coordinator of R&D component of ADP, Mr Stéphane Boulakia, CIRAD-TERA (THI programme), based in RRIV/Pleiku, five heads of the RRIV scientific divisions (HCM/Saigon) and 2 researchers from RRIV station of Pleiku, working with S.B and M Henk ZWINDERMAN, Smallholder Rubber Development Specialist (SRDS/ADP).

The Agricultural Diversification Project (ADP) aims to promote i) crops diversification (in particular through development of rubber in selected areas: highlands and coastal areas) and ii) increase of rural incomes through land allocation, long term loans, institutional strengthening and technical support with smallholder rubber cultivation. There is an smallholder rubber research programme which is implemented by RRIV with the scientific support from CIRAD.

This research component presents three strategies : i) a basic research in controlled areas, ii) an adaptive research under smallholder conditions and iii) a participatory research linked with farmer's socio-economic environment, in order to understand the conditions of technology adoption and innovation process.

Beside implementation of ADP diagnosis phase that should be done in 2001, it seems important to initiate on-farm research activities in the most dynamic provinces in coastal areas to be able to propose as soon as possible adapted technical recommendations to ADP for larger development of rubber in these areas. These activities will also enable RRIV to strengthen its capability in on-farm trials implementation and in farming system understanding. The activities and methodologies proposed in this report are strictly related to on-farm experimentation.

The overall objective of the mission is to initiate this programme of on-farms trials (OFT) of ADP research component in coastal provinces and the small farming system research (FSR) linked with OFT network based on small farming systems surveys (FSS). The second major objective was to present the OFT methodology to RRIV researchers. The main outputs of the reports are the following : an analysis of field visits, a presentation of the OFT/FSS methodology, a preliminary programme of OFT protocols and Farming System Survey (FSS). The fields visits concerns mainly the Chu prong station in Pleiku (highlands) and the 3 coastal provinces of Hué, Quang tri and Quang Binh. The main conclusions from the fields visit concerns: the planning and availability of rubber planting material, the need for technical guidelines, inter-cropping patterns, exploitation and tapping techniques, fertilisation on rehabilitated plots, land certificate and use of ADP credit.

A programme of activities has been proposed and is only indicative. It will depend on available resources, climatic constraints and organisation of activities.

The survey and visit to the fields in the 3 coastal provinces have shown that there is a current dynamic in rubber planting compared to the situation in highlands.. The challenge is to link as soon as possible farmers' settlement with research topics in a context of land intensification and adaptation of land preparation and cropping systems to fragile soils where erosion and soil fertility are key problems.

*Key Words : Vietnam, Rubber, On farm trials, farming systems, methodology.*