IRRDB annual meeting
Challenge for Natural Rubber in Globalization
Challenges for smallholders
15-16 September 2003
Chiang Mai, Thailand

Some lines of research for improving productivity on rubber-based smallholdings in Cameroon

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Abstract

Cameroon currently plays a marginal role on the world natural rubber market. Yet the country, and particularly the as yet under-developed smallholder sector, offers great potential for developing rubber cultivation.
Improving productivity on smallholdings is useful in alleviating rural poverty, and necessary for asserting the position of Cameroonian rubber on the world market.
In this paper, we therefore propose some lines of research based on an analysis of smallholder practices, namely:

- limiting the cost of setting up and maintaining plantations during the immature period, by producing planting material within the smallholder environment and proposing crop management sequences facilitating plantation management prior to tree opening,
- developing tapping systems enabling smallholders to improve work productivity whilst preserving their productive capital,
- limiting transport costs and adding value to smallholder production through post–harvest processing of rubber by smallholders,
- encouraging rubber smallholder groups, thereby enabling them to cope with problems that are difficult to solve individually, and to more effectively defend their interests.

Introduction

Cameroon occupies a marginal position in world natural rubber production; with 55,000 tonnes, it accounts for less than 1% of the 7.1 million tonnes produced in 2002.
Cameroonian rubber growing is primarily based on agroindustrial companies (CDC, HEVECAM and, to a lesser degree, SAFACAM). Two development projects of limited scope ("FONADER projects"), implemented by CDC and HEVECAM between 1978 and 1992,

gave rise to most of the small and medium-sized plantations[1] still in production today. Nevertheless, the smallholder sector remains very limited, accounting for only 10% of the areas planted and the number of producers is estimated at around 550.

Yet the country, and particularly the smallholder sector, offers major potential for developing this crop (Bouchitte A. *et al*, 1996; Fèvre E, 2002). Research undertaken at IRAD[2] with support from French cooperation has focused on helping to define ways of relaunching the rubber commodity chain based on small and medium-sized farms.

A diagnosis was launched in 1999. Several studies have been carried out. Michels (2001) conducted a survey among some thirty rubber growers located in the two zones covered by the FONADER project, around CDC and HEVECAM. The aims were: 1) to establish a diagnosis of the agro-economic situation in the smallholder sector, 2) propose a typology for the existing farms and 3) detect variability in practices on a plot scale, along with the agronomic consequences of those practices. Following on directly from that work, Plaza (2003) took the diagnosis further in the CDC project zone. A detailed survey conducted among 14 farmers mostly chosen from the Michels population set out to 1) more effectively characterize farm functioning, 2) detect changes in the farming system and any complementarity/competition phenomena between the different crops and 3) quantify production costs and income for the different types of farm. Chambon (2002) focused on farms with immature rubber plantings. An initial survey conducted among around thirty rubber growers in the CDC zone was intended to 1) characterize farms taking part in the planting process 2) study the installation of new plantings and management of the unproductive phase, and the interest shown by farmers in agroforestry practices 3) identify farmer requirements in terms of planting material, and 4) study food crop, cash crop, annual, multi-annual or perennial cropping systems, in order to identify crops that could be considered for intercropping with rubber. A second survey conducted among the same sample sought to specify factors that determined the decision to invest in tree crops, and the choice of crop type planted.

Based on the results of those studies, this paper sets out to propose some lines of research for improving productivity on existing rubber smallholdings. Indeed, this seems essential for promoting the development of rubber smallholdings. The stakes are high, since it involves both improving the living standards of rural populations making up the majority of the "poor" in Cameroon (Minagri, 2002), and strengthening the country's position on the world natural rubber market.

1. Setting up a planting and upkeep during the immature period: critical stages for family farms

In the second half of the 1990s, following a rise in natural rubber prices on the world market and the revalorization of Cameroonian export crops with the devaluation of the CFA franc in 1994, some farmers set up rubber plantings from their own resources. These were farmers who already had a rubber planting set up under the FONADER project, or who had set them up spontaneously at the time, or sometimes even before, or they were farmers or non−farmers who had not had a rubber planting up to the mid-1990s.

[1] These projects, funded by the National Rural Development Fund (Cameroonian government and World Bank) led to the creation of 1,343 ha of plantings, on credit, for 324 farmers. In the CDC zone, the projects indirectly contributed to the setting up of plantings, notably because each farmer received two plants per planting space; some were sold to other farmers not taking part in the project.

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The cost of setting up a rubber planting and ensuring its upkeep during the immature period under smallholder conditions was estimated. Table 1 shows that the costs were around twice as much as those for the other main tree crops encountered in the samples: cocoa and oil palm.

Table 1: Cost of setting up a planting and ensuring upkeep during the immature period

	Setting up costs (US $/ha)	**Upkeep costs (US $/ha/immature period)**	**Total investment (US $/ha)**
Rubber bought clones	625	414	1039
produced clones	341	414	755
seedlings	244	414	658
Cocoa	102	247	349
Oil palm	233	227	460

Source: Plaza (2003)

These large differences in investment levels to obtain a mature planting can be explained by a higher planting material cost (planting density and/or higher unit cost for improved planting material), and by the much longer immature period for rubber (7 years as opposed to 4 for the other two crops).

1.1. Planting material: core factor for investment and determining factor for productivity

The choice of planting material is paramount for tree crops. Indeed, it determines the productivity of the plantation for a minimum period of 25-30 years depending on the crops.
In Cameroon, two types of rubber planting material, seedlings and budded plants, are used for plantations set up by smallholders from their own resources.

Unimproved planting material still being planted by smallholders

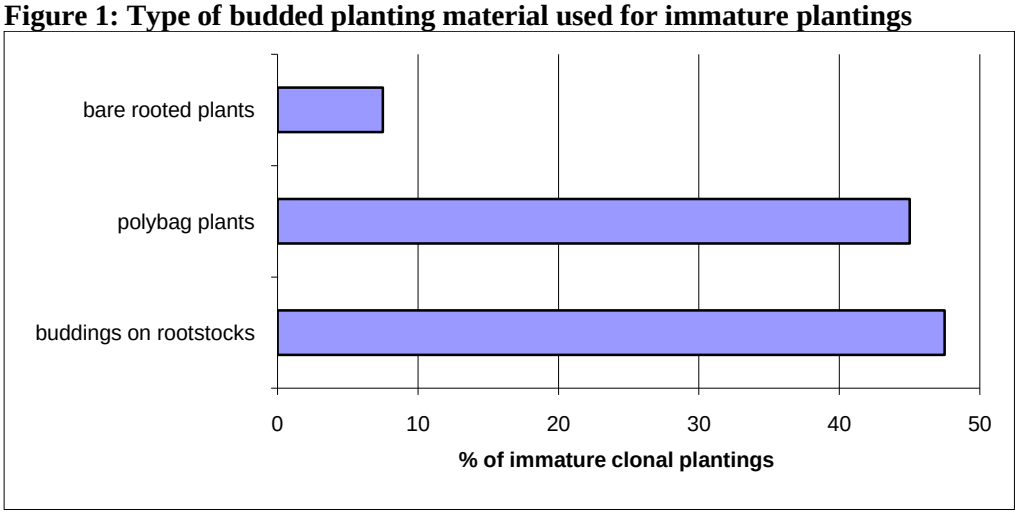
The survey of planting dynamics showed that around 40% of immature plantings on the farms visited had been set up with seedlings (Chambon, 2002). Many smallholders therefore planted a material with limited yields, which did not guarantee them maximized productivity from their land and from the work involved. Seedling use usually reflected the will of smallholders to limit investment; it also revealed the technical problems encountered by growers for budded material production, and their lack of information.

However, seedling use in recent plantings was lower than it was for plantings set up from personal resources during the FONADER period. This seems to indicate the positive impact of the programme: making farmers aware of the superiority of clones and easier access to budded planting material produced either by estates or by trained people (former budders). However, work still remains to be done to generalize the use of good quality budded planting material on all small and medium-sized farms.

The search for lower planting material costs to the detriment of quality

For immature plantings set up from personal resources at the initiative of the farmer, the type of budded planting material used varied. Field buddings were the most frequent, followed by polybag plants. The use of bare rooted plants was marginal (see figure 1). Although bare rooted plants are easier to transport from the nursery to the plantation, they did not interest farmers in the survey zone due to their poor striking rate. Moreover, little planting material of this type was distributed in the CDC zone where planting dynamics were observed; this estates only produced polybag plants.

Figure 1: Type of budded planting material used for immature plantings



Source: Chambon (2002)

In Cameroon, the main two sources of budded planting material supplies for smallholders are:

- estates, which sells polybag buddings (CDC) or bare rooted buddings (HEVECAM).
- preparation of plants on the family farm, passing through a nursery or budding in the field. The nursery is usually set up and run by the head of the farm. However, in two thirds of the cases encountered, budding was carried out by a technician, usually trained by the estates (Chambon survey, 2002).

In the second half of the 1990s, estates only played a secondary role in supplying budded plants to smallholders[3]. Only 28% of new plantings were set up with planting material purchased from estates. Yet the latter is a guarantee of planting material quality. CDC sells polybag plants for 76 US cents each[4]. Transport costs have to be added to the price of a plant: 5 to 41 US cents/plant depending on the distance between the production site and the village, and on the quantity of plants transported (Chambon, 2002). Under current supply conditions, the planting material purchased from estates amounts to two thirds of the investment necessary for setting up a planting, and 40% of total investment from land clearance to the start of production[5] (Plaza survey, 2003). The cost is considerable, unaffordable for many smallholders; farmers who had been able to buy polybag plants from CDC all had a source of supplementary income in addition to their farming activity (Chambon, 2002).

In order to limit investment, many smallholders produced part or all of their plants on the farm. Two thirds of the plants produced were budded in field. The head of the farm therefore made savings on the price of polybags and labour costs to fill them and possibly transport them[6]. Costs were minimized, since they were generally limited to paying the budder, 8 US cents/successful budding, i.e. 46,5 US $/ha. Field budding also offered smallholders the advantage of avoiding the need for a nursery, which they did not always master (Chambon, 2002). But in practice, this technique had a certain number of drawbacks, notably that of

[3] Unlike what Michels (2001) found taking into account all plantations, including those set up through a project, or spontaneously at the same period.
[4] CDC does not produce bare rooted plants.
[5] Transport costs are not taken into account.
[6] The reference here is the polybag nursery, as farmers show little interest in bare rooted plants.

increasing the work load in the first year due to a much more extensive area requiring upkeep (Delabarre M, Serier JB, 1995).
When producing plants, only a quarter of the farmers met said they had bought budwood. Estates is currently the only supply source; the existing budwood gardens are under–used[7] (Gobina Mokoko S. *et al*, 2002) but farmers were not always informed of the possibilities of obtaining budwood from CDC (Chambon, 2002). The scions were usually taken from branches in the CDC clonal plantations or from FONADER plantations. Consequently, in most cases, the origin of the budwood raised the problem of the quality of the budded plants produced and planted on smallholdings (genetic conformity and clonal purity).

It clearly appears that under current planting material supply conditions, the development of rubber smallholdings in Cameroon is limited by the price of the plants sold by CDC, and by heavy farmer dependence on outside assistance (estates, budders). Access to planting material limits the productivity of smallholdings, established with seedlings, and consequently the interest of smallholders in rubber growing. The question facing research is: how can supplies of quality budded planting material for small and medium-sized farms be improved?
Some budded material production initiatives have been undertaken on family farms, but they have certain limits, notably regarding the quality of the plants produced. It appears necessary to accompany and optimize these farmer practices. One possible way would be to set up village budwood gardens based on experiments conducted for several years now in Indonesia (Penot E. *et al*, 1998). Combined with effective farmer training in the management of budwood gardens and nurseries, and in budding techniques, it would enable family farms to overcome their dependence on estates and to plant quality planting material adapted to their agricultural and socio-economic conditions at lower cost.
This research topic seems essential for smallholder rubber growing in Cameroon. It should not only enable an extension of the areas planted, but also lead to the renewal of the productive capital of rubber growers. Plantations set up in their great majority at the end of the 1970s and beginning of the 1980s are ageing and yields are declining.

1.2. Upkeep in rubber plantings during the immature period

During the immature period, smallholdings remained virtually unfertilized: 82% received no fertilizer. When fertilizers were applied, most farmers limited it to the first year, and fertilization never went beyond three years. In all cases, only clonal plantings were fertilized (Chambon, 2002). It should be noted that the CDC zone, where recent plantings were set up, the soils are rich and fertilizer use is not always essential. Thus, none of the plantings set up under the FONADER project were fertilized (Michels, 2001).

Weeding on smallholdings is carried out by hand. Irrespective of the number of years after planting:

- most farmers completely weeded the plot (row and interrow),
- upkeep in young plantings was far from what is recommended to guarantee optimum rubber tree growth (Chambon, 2002).

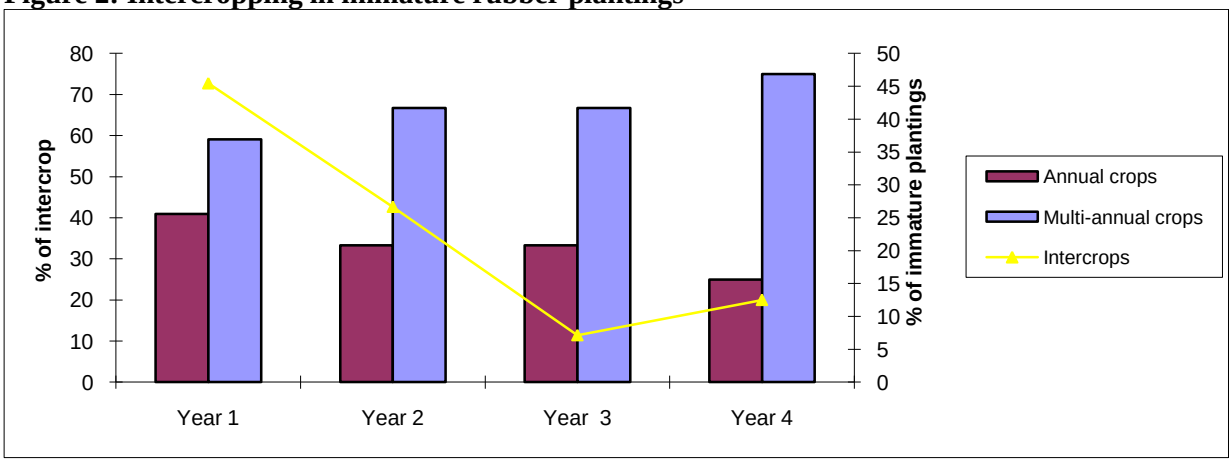
Michels (2001) showed that plantings with an annual weeding rate not exceeding 2 rounds displayed substantially retarded growth. Beyond two rounds, growth rates were acceptable. Yet only a third of the plantings visited in 2002 were weeded more than twice a year, at least in the first two years (Chambon, 2002).
Plantation upkeep during the immature period was seen as a considerable financial burden for family farms, particularly as the size of the plots set up in the second half of the 1990s was

[7] CDC has suspended its planting programme. Since 1996, the areas planted have virtually stagnated. Many budwood gardens are no longer maintained.

large, at around 4 ha on average (Chambon, 2002). Usually, plantation upkeep was ensured by hired labour from outside the family paid on a piece work basis. The annual cost of weeding with two rounds per year amounted to around 59 US $/ha (Plaza 2003). This was the capital that smallholders were prepared to invest.

In order to facilitate upkeep in immature plantings, a certain number of smallholders had planted intercrops in the rubber interrow at some time or another.
This practice involved over half the immature plots in the survey sample. The other plots were left bare; cover crops were rarely used. Intercrops were usually planted in the first year after rubber planting. They then decreased steadily each year (see figure 2). Canopy closure should usually prevent a fourth year, but here the development of the rubber trees (low growth, partial destruction by fire) had sometimes made them possible.

Figure 2: Intercropping in immature rubber plantings



Source : Chambon, 2002

The type of intercrops varied as the plantation aged: multi-annual crops tended to replace annual crops. Cassava, cocoyam, maize, egusi melon and plantain banana were the most frequently encountered crops. Cassava and plantain were sometimes planted as pure crops in the rubber interrow, but usually, as seen in plots reserved for food crops, mixes of crops were usually grown..
Intercrops were usually managed by family labour, which sometimes ensured all the technical operations from land preparation to harvesting. However, it was not rare for land preparation and weeding to be left to outside labour hired on a piece work or daily wage basis, or the work was carried out within a mutual aid group.
Intercrops could also be planted by women who did not belong to the family, or by other farmers who did not have enough land to grow food crops. The women or farmers did not pay rent for the land and the owner received none of the production, though he did have a say in the intercrops planted (for example, one farmer banned cassava which he felt exhausted the soil too much).

When crops were intercropped with rubber, they were not systematically planted over the entire plot. The cultivated areas varied substantially; some farmers practised shifting agriculture within their rubber plantation. The factor limiting the cultivated area was usually the work force, or possibly land conditions: too steep a slope, expected yields were too low so food crops were sown on other land (Chambon, 2002).

Once the plantations were established, upkeep throughout the immature period was one of the major problems facing smallholders wishing to plant rubber trees. The question research

needs to answer is: how can rubber-based farming systems be improved during the immature period of plantations? Based on smallholder practices, which reveal the interest shown by many farmers in intercrops in rubber interrows[8], thought can be given to ways of optimizing these practices. It is necessary to develop technical recommendations adapted to Cameroonian agronomic and socio-economic conditions, so as to facilitate management of the immature period in rubber plantations. To that end, it is worth mentioning the good results obtained by the "Smallholder Rubber Agroforestry Project" (CIRAD/ICRAF) in Indonesia concerning the feasibility of integrating forest regrowth in rubber tree interrows. It would also be interesting to test this agroforestry strategy in Cameroon, insofar as it saves on fertilizers and labour in the immature period. It may more effectively correspond to the conditions on some farms than intercrops do.

2. Tapping systems to be optimized

In Cameroonian rubber smallholdings, tapping is usually carried out by a full-time tapper. However, the head of the farm frequently has to change tappers due to absenteeism and non−respect of the instructions given (Michels, 2001).

In 1999/2000, most smallholdings were tapped every three days (D3)[9]; only a few plantations were tapped in D2 (Michels, 2001). In the sample of farms surveyed in the CDC zone, many plantations tapped in D3 or even D4 switched to D2 in 2002. Moreover, for the same frequency, the number of annual tappings differed considerably (84 to 154 days in D2 for example); this was linked to the number of tapping months per year, which usually varied from 5 to 8, and only reached 11 in a few cases. Tapping was very irregular[10]. The variability depended on the person carrying out the work. Indeed, given the long delays in CDC payments for rubber, farmers had problems paying their tappers (Plaza, 2003). If they found other opportunities for immediate income, they did not bother with the rubber trees[11]. It seems that thereafter, once they resumed tapping, they intensified the tapping system, which might explain the increase in tapping frequency between 1999/2000 and 2002. Given the poor functioning of the commodity chain in the CDC zone, it was worth limiting the tapping time to give tappers the possibility of having other more rewarding activities.
In addition, the size of the tapping task was small (340 trees on average for the sample surveyed by Plaza) compared to the size of a reference task (550 trees). The plantations were partially damaged by *Fomes* (root disease) or by fire, so the planting density was reduced. Work output per tapper was therefore reduced due to time lost on "unproductive" rounds. Moreover, as reported by Michels (2001), a certain number of tappers had retired from estates

[8] An interest also expressed by some farmers who kept their plantation as a monoculture through a lack of technical information and for fear of harming their rubber trees (Chambon, 2002).
[9] This is the tapping frequency that CDC seems to have recommended for some time. In the HEVECAM intervention zone, the initial recommended frequency was D. However, the smallholdings then switched to D3 when the estate adopted that frequency; moreovier, farmers believe that a plantation that is tapped more often produces more (Michels, 2001).
[10] Records for rubber deliveries to CDC by smallholders in 2000/01 and 2001/02, seem to indicate that the irregular tapping seen for a limited sample became generalized (there was an increase in 2001/02 compared to the previous year).
[11] In order to cope with tapper absenteeism, a change seems to be under way in tapper remuneration in the CDC zone. In 1999/2000, a tapper was usually paid according to the number of kg of rubber produced: 4 to 10 US cents/kg of wet rubber (Michels, 2001). In 2002, tappers were much better remunerated on the basis of harvest sharing: tappers earned half the production and all the inputs were at the expense of the owner (according to Michels, in 1999/2000 production was divided by two after deducting the cost of inputs and transport). The income of tappers was therefore substantially increased and it was in their interest to come and tap the trees (Plaza, 2003).

and were old, which limited the size of their task (working speed and endurance rate) hence their output. Under these conditions, tapper remuneration did not exceed 1.35 US $/working day[12] (Plaza, 2003).

In order to compensate for their low work output, many tappers intensified the tapping system (Michels, 2001). They increased the number of cuts on the tree: up to three simultaneous cuts were found. This practice increased plantation production in the short term, and work output was therefore effectively improved. However, it reduced the economic life span of the plantation and its productivity in the medium and long terms. There was therefore a conflict of interests between the tapper and the owner. Increasing the number of cuts seemed to be a recent phenomenon, linked to the drop in rubber prices in 1997. It tended to maintain a certain income level. Another practice observed by Michels (2001) was the premature switch to upward tapping to improve production levels. In fact, given the age of productive plantings, upward tapping should only have concerned a limited number of farms, but many plantations had already entered that phase.

In Cameroon, many smallholders stimulate their rubber trees. A few cases of over–stimulation have been seen; but there is also a tendency to reduce the stimulation frequency compared to recommendations. This would seem to be linked to the fact that technical supervisors in the CDC zone encouraged low stimulation rates, to avoid over–exploiting the trees (Michels, 2001).

Generally speaking, labour is a limiting factor for activities on family farms. Farmers therefore seek to improve their work output. For small and medium-sized rubber farms in Cameroon, this is usually done to the detriment of medium and long-term production (over–exploitation). Stimulation, which should improve productivity whilst maintaining the long-term production potential of the plantation, is practised, but it is not optimized.
However, it is necessary to improve work output in rubber plantations without damaging their production potential, in order to compensate for the current malfunctions in part of the commodity chain, and to compete with other tree crops, notably cocoa, for which work output was much higher in 2002[13] (Plaza, 2003).
Consequently, it is essential to develop tapping systems that are adapted to smallholder conditions, and which increase work output whilst preserving the long-term productive capital of the plantations. This means monitoring farms over a sufficiently long period, in order to study variations in the tapping system depending on socio-economic conditions. It also means setting up on-farm experiments to test different tapping systems. This research work needs to be accompanied by training for farmers and/or tappers; it is currently insufficient, which is reflected in poor tapping quality: numerous wounds hindering bark regeneration and excessive bark consumption, which limit the economic life span of the plantation (Michels, 2001).

3. Post-harvest processing of natural rubber on smallholdings: adding value to production

Marketing of their products is a recurring question for all farmers; all the more so for rubber growers whose production is necessarily delivered to a factory (in its raw or pre–processed state) for processing into end-products.

[12] A working day is paid 2.5 US $ in the CDC zone.
[13] Year characterized by an exceptionally high cocoa price.

The factories of the three agroindustries are currently the only outlets for rubber produced on smallholdings. Small and medium-sized farms therefore have no choice about marketing. There was a time when smallholders in the Southwest could sell their production to traders from neighbouring Nigeria, but the government soon banned exports of untreated rubber, which deprived the CDC factories, a public estates, of their supplies, when they were far from saturated (Gobina Mokoko S. *et al*, 2002). In addition, it was compulsory for all the yields from plantations set up under the FONADER programme to be sold to the estates, which was the technical operator for its implementation (HEVECAM in the South and CDC in the Southwest).

For a long time, the agroindustries transported production from smallholdings to the factory; rubber collection was billed at a lump sum (8.5 US $/farm by CDC; 2 US cents/kg dry by HEVECAM). With privatization (at the end of 1996 for HEVECAM and under way for CDC), the agroindustries gradually withdrew from a certain number of the services rendered to small and medium-sized farms. CDC stopped collecting rubber from rubber smallholdings[14]; HEVECAM only ensured transport for plantations near its concession[15]. Consequently, producers had to organize themselves to move their production to the factories: they used private hauliers (pick-ups, small trucks). In fact, the withdrawal of the agroindustries did not lead to the emergence of private collectors, as exists for cocoa for example. For rubber, the marketing circuit was simple: there was no middleman between the farm and the factory. In this new situation, excess costs were incurred by the farm, leading to a drop in profits (Michels, 2001).

Transport costs are directly linked to the distance between the plantation and the factory; that distance varies considerably from one plantation to the next, particularly in the CDC zone, where it could reach 80 km in the survey sample. However, the average distance in that zone is 47 km, which is well above the average in the HEVECAM zone, at 22 km. Transport costs are also linked (inversely proportional) to the amount of rubber transported. This situation led some small farms to group their production for transportation to reduce costs.
The cost of transport varies depending on the farms. In the HEVECAM zone, it amounts to 1.3% on average of the gross income of a rubber plantation. In the CDC zone, the average is 16.6%; in some cases, transport costs can reach 40% of gross income (Michels, 2001). Outside the estates intervention zones, particularly in East province, the distance from a plantation to a factory is such (around 800 km) that producers stop delivering their production when rubber prices are low. It is then no longer profitable to tap the rubber trees.
There is therefore an interesting way open for improving the profits of existing rubber plantations. The challenge is also to maintain tapping in rubber plantations and develop new plantations outside the direct intervention zones of the agroindustries, and at long distances from the rubber processing factories.

Smallholder production in Cameroon is exclusively marketed in coagulum form. This practice offers the advantage of minimizing labour costs at tapping time. Generally, farmers assemble

[14] Since the launch of the FONADER project, the number of factories processing smallholder production has halved. Transporting distances have increased; coagulum collection from small and medium-sized farms is no longer cost-effective (Michels, 2001). It also seems that CDC lacks trucks in working order to ensure collections. Harvest collection has become increasingly sporadic, up to being no longer ensured at all in most villages.

[15] The way in which smallholdings developed differed slightly for the two agroindustries. Around CDC, many smallholders with land wished to benefit from the aid to plant rubber trees. The plantations are therefore scattered. In the HEVECAM zone, the small number of smallholders jeopardized the implementation of the programme. HEVECAM had to develop part of the land on its own concession to set up plantations intended for smallholders from outside. The smallholdings were set up in blocks.

and dispatch production to a factory once a month. However, the price paid per kg is also lower, since the rubber content is lower. Moreover, by marketing coagulum, 30 to 45% water is transported, and it seems worthwhile to try and reduce the water content of rubber sold by smallholders. This would lead to a drop in the cost per kg of rubber transported, and an increase in the profits of rubber plantations, hence of farms.

Post-harvest processing on family farms would therefore make it possible to increase the dry rubber content of the product sold. Apart from the reduction in transport costs, post-harvest processing of the rubber would offer new marketing possibilities for smallholder production by selling it on the local market[16]. The advantage for smallholders is that they would be paid at the time of the sale; at the moment, payment takes at least a month from HEVECAM and can reach several months for CDC. Another advantage would be to benefit from competition between buyers, which would doubtless enable producers to obtain better prices.

Rubber post-harvest processing by smallholders has been practised for a long time already in Southeast Asian producing countries. Smallholders commonly produce dried sheets or more rarely smoked sheets. As early as the 1980s, trials were conducted to show the feasibility of crepe production by smallholders using mini-crepers as an alternative to other types of products (Suwardin Didin, 1988). The question raised for research is as follows: can rubber crepe or sheet production techniques be transferred to rubber producers in Cameroon? The introduction of such techniques would have consequences for family farms on several levels, notably:

- work organization on the farm. Post-harvest processing leads to extra work. In Cameroon, smallholders largely call upon hired labour for tree crops. This is particularly the case for tapping, which is usually carried out by full-time labour (contrary to Asian countries, notably Indonesia, where the family usually takes care of tapping, and of post-harvest processing). The Cameroonian situation raises the question of labour availability, and especially task-sharing between the owner and the tapper if any post-harvest processing activity is launched on the farm.
- producer organization. The cost of a mini-creper or a hand-operated roll mill means that it cannot be acquired by a single farm. Consequently, for post-harvest processing of rubber, producers would have to be organized around this new activity. Its viability would doubtless be linked to the creation of geographically highly localized producer associations. The conditions for such producer grouping for processing purposes remain to be studied.
- making producers responsible for the quality of the products marketed. Post–harvest processing will have to guarantee that the products sold by small and medium-sized farms are of good quality; to date, Cameroonian rubber has benefited from a good reputation that it is essential to conserve. Coagulum processing should even help to improve the quality of smallholder rubber. The technological properties of products pre-processed under Cameroonian conditions will have to be analysed.
- financial offshoots. Producers must be able to gain from the additional work involved through savings in transport costs, and through a more rewarding selling price. The question raised is that of the profitability of post-harvest processing by smallholders in Cameroon.

[16] At the moment, virtually all rubber is exported. Only a small quantity is processed locally (car and bicycle tyre production). However, this does not rule out the search for new outlets on the local market.

It therefore seems essential to set up on-farm trials to test the merits and the feasibility of these techniques that have been tried and tested in Southeast Asia, under the conditions on small and medium-sized farms in Cameroon.

4. Towards rubber producer structuring

The smallholder rubber sector is only weakly structured at the moment; there are virtually no farmer groups. In the HEVECAM zone, three producer organizations have developed. In 1989, under pressure from the estates, an organization was set up in a village near the concession. The aim was to involve farmers in the management of their village and its social infrastructures. HEVECAM deducted 5 US cents/kg of rubber sold to fund its operation. Management problems and the dissatisfaction of its members (persuaded that they were being swindled by HEVECAM) virtually led to the disbandment of the cooperative. It no longer operates, but it continues to figure in the register of cooperative societies and joint initiative groups. In 1999, in the same village, the farmers spontaneously set up another group more in relation to rubber growing. Its aim was to develop the areas planted to rubber, search for technical and financial support, and improve marketing conditions for their production (free sales). In 1997, at the request of HEVECAM, an organization grouping together all the producers in three villages around the concession was also set up. Its purpose was to promote rubber growing in rural zones. In the CDC zone, a few producer groups (officially registered or not) were also set up in villages, but their activities were limited and their objectives were not always clearly defined.

The weak structuring of farmers is undoubtedly linked to strong State presence in the rubber growing sector, through public development companies (CDC and HEVECAM, which was only privatized at the end of 1996). A large number of services, such as input supplies, technical supervision, and marketing, were ensured by the company. Up until very recently, farmers therefore had no reason to structure themselves, apart from defending their interests in relation to these companies. In addition, many producers could still remember the unfortunate experiences of the cooperatives set up in the past, notably for cocoa growers[17]. This did not encourage them to embark upon another cooperative movement.
More generally, producer organizations remain few in number in Cameroon. Most of them were created and supported by public or private (NGOs, churches) initiatives. At the beginning of the 1990s, many groups persisted with outside assistance but did not become autonomous (Boitias M, 1991). Ten years later, the situation does not appear to have changed much (Minagri, 2002).

Yet for research, development organizations and donors, the merits of producer groups for family farms are widely accepted. They are assumed to enable individual farmers to solve problems encountered in their agricultural activities and to defend their interests. They can also be a means of funding agricultural activities on each farm, by setting up systems to generate internal and external savings. However, farmers in Cameroon do not seem to be aware yet of the advantages they could derive from setting up producer organizations.

For rubber growers, grouping could doubtless be a solution to a certain number of their problems. Although they are not really structured organizations, we mentioned the pooling of coagula from some small farms prior to transportation, to limit costs. The production of budded planting material and post-harvest processing already mentioned could also be

[17] In the CDC zone, which contains over 80% of the small and medium-sized farms in Cameroon, many rubber growers are also cocoa growers.

undertaken within producer organizations. Funding for their activities, particularly rubber plantings, is a recurring problem for farmers. In addition, they are against the way prices are fixed by the estates, and the dry rubber rate applied for its calculation. If farmers were grouped in an organization, they would have more negotiating power. Rubber growers also complain about the lack of information, particularly technical, but also on rubber prices in Douala (FOB price) or on the international market. If producers were organized, it should facilitate the production and circulation of information not only between smallholders, but also between producers and the outside. Lastly, funding agencies are increasingly turning to producer groups and no longer to individuals. Consequently, in the absence of structuring, rubber growers are excluded from certain funding sources. Nevertheless, it is important to avoid creating organizations of a purely opportunistic nature, whose sole objective is to obtain outside aid, without any local dynamics backed up by one or more clear economic or social objectives (Diagne D, Pesche D, 1995). All these elements suggest that rubber growers would gain from setting up well-structured farmer organizations, with clearly defined objectives.
It therefore seems worthwhile analysing a few of the groups existing in the rubber growing sector, but also in others. This would make it possible to scientifically demonstrate the advantages that Cameroonian rubber producers could derive from being structured, and identify the conditions required for the emergence and operation of efficient organizations that could help to improve productivity on rubber smallholdings, and thereby help to develop smallholder rubber growing.

Conclusion

Rubber smallholdings in Cameroon benefit from relatively ample room for manoeuvre to develop and improve productivity. This therefore opens up the way for:

- increasing farm incomes and thereby improving the living standards of numerous rural families,
- increasing national rubber production, thereby improving Cameroon's position on the international market in a context where experts are forecasting a natural rubber shortage in the medium term (Burger K, Smit HP, 2001).

Nevertheless, an increase in productivity presupposes the support of agricultural research; it needs to be in a position to propose or optimize technical and organizational innovations, in order to improve the competitiveness of smallholder rubber growing. Producers will also have an active role to play through on-farm experiments; the partnership between researchers and producers will have to be strengthened.
More than twenty years after directly intervening to develop rubber smallholdings through public agroindustries, the Cameroonian State still has a role to play in supporting agricultural research and also, on a more general level, in adopting a panoply of measures in favour of smallholder agriculture (access to credit, actions in favour of producer organizations, etc.). The rural sector development strategy document (Minagri, 2002) states the government's will to develop "smallholdings around production poles operating in synergy with the companies in the South, Littoral and Southwest provinces in particular". A study was commissioned in 2002 by the FAO and the World Bank on the conditions for relaunching the rubber and oil palm commodity chains. All the necessary conditions seem to be in place for greater involvement of the Cameroonian government in relaunching the rubber smallholder sector.

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