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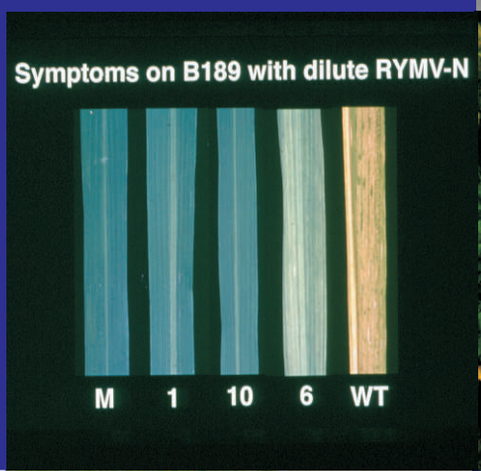
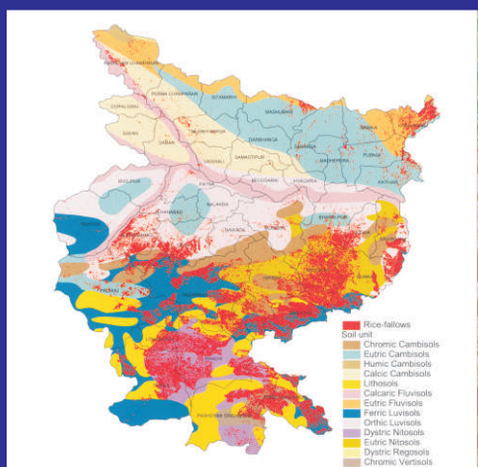
Part I - Narrative





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Developing rubber-based cropping systems that improve not only latex yield but also the livelihoods of the rural poor; case studies in Sri Lanka.[a]

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Intercropping of immature rubber has been demonstrated to have major benefits on the livelihoods of the rural poor in terms of income generated from the land and also from the enhanced growth of rubber. A personal case study is given, showing the significant improvement in the livelihoods of an individual rural family, which in turn should also have a positive effect on the local community and economy.

Introduction

Natural rubber provides a major source of income to more than 20 million farmers worldwide, most of whom have low incomes and are land-poor. Although traditionally grown on large estates, land reform throughout the last century has fragmented rubber lands and the smallholder sector now accounts for over 80% of the world natural rubber production (Rubber Statistical Bulletin, 1997). Hence, any global research strategy for natural rubber must take into account the needs and constraints of the primary producer – the smallholder farmer.

Aim of study

Research undertaken jointly by the Rubber Research Institute of Sri Lanka, the University of Wales, Bangor and the University of Durham addressed a major problem faced by smallholder producers, namely the 6-7 year gap in income suffered after replanting of rubber. Many farmers try to bridge this gap in income by interplanting the young rubber trees with shorter duration subsistence cash crops, otherwise known as intercropping (Fig. 1). Because these smallholders rely on subsidies to cover a large proportion of the costs of replanting, they are largely bound by extension recommendations for intercropping. These recommendations are rarely based on a systematic evaluation of how different crop combinations interact but are designed to minimise any negative impact on the growth of the rubber trees. This assumes that rubber is the only crop of importance rather than an integral component of the smallholder farming system. We believe that future expansion of rubber cultivation and improvements in yield can only be achieved by adopting a systems

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approach to rubber cultivation which, if done properly, will not compromise the growth of rubber.

Discussion

Our research has shown that intercropping of immature rubber, even at high intercrop densities, can have major benefits in terms of both income generation from the land and enhanced growth of rubber. For example, if we take one of the most common crops interplanted with immature rubber – banana – prior to our findings the recommended practice for intercropping was for a single row of banana planted between rubber rows. Our studies showed that by raising planting density from one to three rows of banana, a 350% increase in profit could be achieved (Rodrigo *et al*., 2001). Not only is there the potential to exploit the wide row spacing in the immature rubber system, intercropping also has the potential to promote vigorous growth of rubber, thereby reducing the length of the immature period. Latex yield per hectare was also significantly improved by intercropping due to the presence of a higher proportion of tappable trees. The important message here is that not only can intercropping help address the needs of smallholders but better integration of rubber with traditional crops can also benefit the growth of rubber too.

Figure 1. Rubber intercropping in Sri Lanka.

For rubber cultivation to be attractive, smallholders not only want greater latex yield, but they also want to see benefits in terms of a more complex array of factors that contribute to improved livelihoods. In our inter-disciplinary research an in-depth socio-cultural analysis of rural livelihoods in traditional and non-traditional rubber growing regions of Sri Lanka has produced many examples of where rubber

cultivation has contributed significantly to improving the livelihoods of the rural poor. A personal case study is described (Box 1).

In a separate case study the financial income and outgoings of a family were recorded in great detail. The overall annual income was 39040 rupees and intercropped rubber accounted for 50.4% of the total (Fig. 2a). Cash generated from the bananas alone accounted for a significant proportion (45.7%) of income generated from intercropping (Fig. 2b).

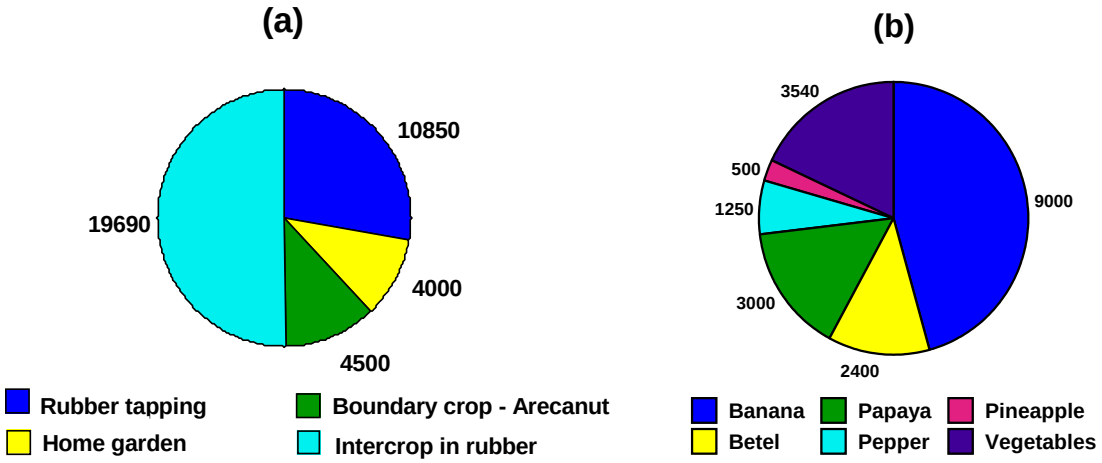

Figure 2. (a) Annual income generated for a typical smallholding family in Sri Lanka (b) Annual income from crops intercropped with rubber. Income in Sri Lankan Rupees.

Box 1. An analysis of demand for rubber intercropping. A personal case study in Monaragala

In the South east of Sri Lanka lies the district of Monaragala. The village of Walam in the southern region of this district is typical of many in that area. Resting between the Kumbuk *oya* (river) and Terrapahuwa Mountain, the village was under jungle cover and remained uncultivated until the late 1960's. During this time the Government had imposed a restriction on food imports so people were forced to increase cultivation. The land here was originally divided into allotments of 15 acres, which were offered to "middle class" people that had an income exceeding 2000 rupees a month. Conditions attached to the offer outlined that the land had to be fenced and cultivated. However, most of the middle class owners didn't live on the land. Indeed some hired labourers to work the land but they didn't maintain it well and the scheme failed. Later, after a number of the divided plots had been abandoned the original agreement was cancelled and the land reallocated. Today most of the village has been settled and land is divided amongst middle class owners and squatters or encroachers, some of whom have acquired land permits. Farmers in this area say that between the 1960's and 70's land was so fertile anything could grow. A sugar factory was set up with an out grower system. This meant that cultivation of sugarcane became very profitable and so the whole of the village was planted with that crop.

When Sudu Kumari first came to the village, a temporary shelter was constructed on the boundary of what is now her land. She stayed in that dwelling for three years cultivating *chena* crops such as cowpea, maize and millet. Seventeen years ago she moved to her present dwelling, constructed from wattle and daub with *illuk* grass and tile roofing, and began to cultivate additional crops such as sugarcane, aubergine, lime and coconut. At that time Sudu Kumari faced many problems with wild boars attacking the coconut shoots. Three years ago she cultivated mulberry for silk worm production on the present rubber land as part of an internationally funded project. However the project failed due to the low price of cocoons, high cost of fertiliser and disease problems and the mulberry was removed in 1999. Following the failure of the mulberry project, Sudu Kumari and Vijee decided that they wanted to grow rubber because it would be possible to get a small income from tapping for a number of years. Also they believe that the shade provided by rubber will control the growth of weeds and provide less protective cover for wild animals thereby solving the wild boar problem. Furthermore Sudu Kumari is convinced that she will have peace of mind, as there will be something for her grandchild's future.

In September 1999 an acre of land was cleared of the mulberry and weeds and after some rain the land was ploughed, holes dug and the rubber shoots planted. As well as aubergine other intercrops were planted such as maize, chillies and *thala* (used to make sweetmeats). Due to recurring illness, particularly malaria, there have been problems with maintaining the rubber land but they have persevered, even buying rubber shoots to fill vacant holes. The spatial arrangements of intercrops on this land, which is dominated by "karamati" (clay) soil, was based on the age of the intercrop. Vijee said, "*We did it depending on the life time of the crop…now chillies will be there for three years, maize four and a half months, aubergine one year"*. Maize and millet were harvested first in March and April (2000). They were kept for home use. Aubergine is sold weekly and, when there is sufficient rain, can yield up to 50kg a week with prices ranging from 8-12 rupees per kg. Chillies are still being harvested, some of which are sold. Sudu Kumari estimated that she had made 4000 rupees so far from the sale of chillies. By June 2000 they had planted twelve "ambul" and "alukasel" banana suckers. Vijee was not sure about the banana because of previous experience with disease but they wanted to provide shade for the young rubber plants. He plans to plant more banana when the rains come.

Both Sudu Kumari and Vijee believe that intercropping with immature rubber has been beneficial. Sudu Kumari is pleased that she can provide a long-term source of income for her grandson's future. At the same time she has been able to cultivate staple foods, such as maize, chilli and millet, for the household and raise sufficient income with the successful sale of aubergine and chillies. She plans to replant the same crops when the rainy season starts again in September.

Rubber cultivation offers many potential benefits to smallholders, particularly the land poor in developing countries. Our experience in Sri Lanka has shown that whilst there may be reluctance to replant rubber in traditional rubber growing areas because of current low prices, in non-traditional regions farmers are very keen to introduce a perennial tree crop such as rubber into their present annual cropping systems. The introduction of rubber offers many of these poorer farmers security of property rights with respect to their land, which is an important step on the road to encouraging more efficient and sustainable agricultural practice. As a long-term perennial crop that can be grown on soils of low fertility and which sheds its leaves during winter, rubber also has the advantage of helping farmers maintain soil fertility and structure.

Natural rubber production depends very heavily on small-scale farmers and the future of rubber must rely on research that addresses the problems unique to this social group. In this respect, intercropping offers a very practical and acceptable means of raising productivity, not only of rubber but also of the land in general, in a sustainable and environmentally friendly way.

References

Rodrigo, V.H.L., Stirling, C.M., Naranpanawa, R.M.A.K.B. & Herath, P.H.M.U. (2001). Intercropping of immature rubber; present status in Sri Lanka and financial analysis of rubber intercrops. *Agroforestry Systems* 51: 35-48.

Rubber Statistical Bulletin. (1997). Vol. 51, No. 6. International Rubber Study Group, Empire Way, Wembley HA9 0PA, UK.