Bulletin of the Rubber Research Institute of Sri Lanka, (2004) **45**, 55-59

INTERCROPPING – A WAY TO MAXIMISE THE LAND PRODUCTIVITY AND TO OBTAIN ECONOMIC STABILITY

V H L Rodrigo, S M M Iqbal and L S S Pathiratna

Global demand for natural rubber (NR) has been increasing continuously in order to cater the needs associated with the increase in world population and living standards of people. Health care connected with HIV infestation has opened a new dimension to the NR market. In Sri Lanka, industries based on NR are flourishing with that local consumption of our NR production has increased from 30% to 65% during last decade. Though the future prospects of the rubber industry are bright, sudden changes in the market can occur. Short-term declines in rubber prices pose a significant problem to the growers. Economic models for the price prediction are basically on demand and supply, however sudden changes in the economies of world giants in the NR market have had an influence on rubber prices beyond any prediction. Economic lifespan of rubber is *ca.* 30 years, hence once planted, rubber farmers have little option on alternative crops. When rubber prices are low, rubber growers become helpless and suffer seriously due to uneconomical cultivation. Although the need for increase in productivity has been repeatedly emphasized in order to minimize the cost of production, its practicality is dubious as growers are reluctant to afford any further investment on productivity improvement during the period of low prices. In Sri Lanka, no pricing mechanism is available to safeguard the rubber growers when rubber prices are low and even downstream activities have no role in securing the farm gate price for NR. Therefore, other options available to safeguard the rubber growers from poor prices have to be seriously looked into.

Rubber being a long-term crop, the farmers have to wait for a minimum of 5-6 years for commencement of obtaining any financial benefits. Moreover, smallholder farmers pay less attention to intercultivation of rubber plants during the immature phase as there is no immediate return on doing so. This causes a vicious cycle resulting in a poor growth and hence extended no income period. Apart from that, the yield potential of mature rubber trees is reduced. Situation in Sri Lanka is such that a large number of smallholders who do not practise intercropping are qualified only for few instalments of the rubber subsidy due to poor growth of rubber plants. In those situations, intercropping rubber with short-term crops provides a win-win scenario assuring early returns from the intercrop and reduced immature period of the rubber crop. Intercropping on rubber lands has been successful in increasing the overall land productivity, and more recently, research findings have shown that intercropping ameliorates the microclimate providing a better environment for the growth of rubber (Rodrigo *et al,*. 2001, Rodrigo *et al,*. 2004, Senevirathna *et al.*, 2003). Intercropped rubber reaches the tappable girth 4-6 months earlier than the sole cropped rubber (Rodrigo *et al.*, 2004). As a result of improved growth, latex yield that could be

obtained from intercropped rubber is greater than that from sole rubber (Rodrigo *et al.*, 2004).

In rubber plantations, the no income problem related to the immature phase of rubber is tackled by the annual replanting cycle of 3.3% of the total extent. Nevertheless, even in the plantation sector, activities on immature upkeep such as weeding and cover crop establishment are costly. Therefore, plantation managers are reluctant to carry out the above important cultural activities which will affect the growth of rubber plants. If intercropping is practiced, the cost on immature upkeep of rubber can be utilized in more productive manner converting to an additional income. Even under situations where the estate management is not prepared to invest on intercropping, it could be possible to minimise the expenditure on immature upkeep by leasing the land to someone else only for intercropping. This is a popular practice in the smallholder sector in some areas of Colombo, Gampaha and Kegalle regions and the conditions are such that tenant should take care of all activities of the rubber crop for five years, assuring successful growth whilst the land owner provides only the planting materials of rubber and any fertilizer received under the subsidy programme. In return, tenant has the right to earn through intercropping with cash crops. Estate workers are generally employed only during early hours of the day, and therefore perhaps, they would be happy to be engaged in such working arrangements as it would be an opportunity for them to earn an additional income during their off time.

With given benefits of intercropping, rubber growers should not select crops based only on perceived financial gains. Due consideration should also be given to climatic adoptability and socio-cultural acceptability. For instance, sugarcane is suitable only for the Intermediate zone with high radiation loads and particularly for Monaragala district where market exists for the harvest. Although pineapple could be grown in most parts of rubber growing areas, it is ideal for Colombo and Gampaha districts due to the facilities available for marketing. Price of passion fruit varies dramatically and hence one should not go for it unless price is assured by any means such as forward purchasing agreements. However, it is always important to acquire the basic knowledge on planting techniques before commencing any cultivation.

Rubber is a tree crop growing over 20 meters and so planting has to be done providing an adequate space for its growth at maturity. However, such spacing provides too much space for early stage of plant growth resulting in a waste of ground space and resources such as light. Therefore, any sun loving crop could be grown with rubber during its immature phase. Among the suitable crops, banana, pineapple, passionfruit and sugarcane are preferable. Seasonal crops such as vegetables could also be incorporated. However, it is important to select crops in accordance with both socio-economic and climatic suitability. Crops such as banana are suitable for the most areas of the country since its produce can be sold even in the local market and farmers are familiar with its growth requirements. It is not always necessary to limit the intercropping only for the immature phase of rubber, if due consideration is given to the crop selection and planting systems of rubber. However, with given priority for

generating income during the no income period, it is important to decide what crops should be used for intercropping during the immature stage of the rubber crop.

Perennial crops could be planted with rubber if they can tolerate the shade under the rubber crop. Crops such as coffee and cocoa are intolerant to the root competition given by the rubber if planted under mature rubber, hence should be established during the immature phase provided with temporary shades. Should sun loving commercially attractive long-term crops (*eg.* tea, cinnamon) be grown with rubber, planting density of rubber needs to be compromised facilitating adequate light penetration through the mature rubber canopy to the under storey crop. In this regard, the distance between rubber rows should be increased up to 12 m without changing the within row spacing (*i.e.* at 2.4m). If land size permits, instead of traditional single row system, a paired row system could be employed as recommended by the Rubber Research Institute of Sri Lanka (*e.g.* 3 × 3 m within the paired rows and 18 m between paired rows).

Any form of successful intercropping with combinations of perennial crops, facilitates pricing mechanism protecting the growers from market crashes. Moreover, intercropping enhances growth and yield of rubber. Greater the number of crops grown, lower the risk of crop failure. For instance, price of either tea or rubber has been attractive throughout the history hence the rubber/tea intercropping assures the continuous income to the growers. Therefore, every attempt should be made to popularise and promote intercropping among rubber growers. In order to do this, incorporation of intercropping as an essential component of the existing subsidy programme would be important. In the estate sector, intercropping could practically be promoted as a part of poverty alleviation programme of estate workers and a cost saving mechanism of immature upkeep.

Fig. 1. Intercropping systems for improved land use efficiency at low risk; *e.g.* a) rubber × banana × pineapple and b) rubber × tea intercrops

REFERENCES

Rodrigo, V H L, Stirling, C M, Teklehaimanot, Z and Nugawela, A (2001). Intercropping with banana to improve fractional interception and radiation-use efficiency of immature rubber plantations. *Field Crops Research* **69**, 237-249.

Senevirathna, A M W K, Stirling, C M and Rodrigo, V H L (2003). Growth, photosynthetic performance and shade adaptation of rubber (*Hevea brasiliensis*) grown in natural shade. *Tree Physiology* **23**, 705-712.

Rodrigo, V H L, Stirling, C M, Silva, T U K and Pathirana, P D (2004). The growth and yield of rubber at maturity is improved by intercropping with banana during the early stage of rubber cultivation. *Field Crops Research* (In press).