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Investigation of rubber-based intercropping system in Southern Thailand

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ABSTRACT

The objectives were: to investigate the differences in the socio-economic characteristics of rubber farmers who operate either a rubber mono-cropping system (RMCS) or a rubber-based intercropping system (RBIS), to identify RMCS farmer's attitudes toward RBIS, to determine the decision-making factors influencing the adoption of RBIS, and to examine the different types of intercrop available. The study areas were in Kaopra sub-district, Songkhla province and Tamod sub-district, Phattalung province, Thailand, since in these areas there is already some practice of RBIS. The findings revealed that the size of the rubber tapping area is a significant factor in the adoption of either RMCS or RBIS. The significant factors positively influencing RMCS farmers toward adopting RBIS were: members in the household, level of RBIS knowledge, attendance at an RBIS workshop, and rubber growing experience. The study's findings suggest that rubber intercropping tutorials are a driving force behind the adoption of RBIS. Whilst, it would seem to be a good idea to promote the expansion of the RBIS area in the future, this will be quite difficult to achieve in practice if left to happen naturally and there should be positive measures adopted to promote this expansion.

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Introduction

Rubber is a perennial plant grown traditionally as an important cash crop which generates income as well as having a fundamental influence on the way of life for many rural people in Thailand, particularly in the south of the country. Furthermore, Thailand has been the world's largest rubber producer and exporter since 1991. The price of rubber has generally increased due to world demand and the expansion of the world economy. Additionally, China, which is Thailand's most important rubber trading partner, is demanding more natural rubber mainly for use in the

manufacture of tires. This has made rubber production more attractive and has led farmers to plant more rubber as confirmed by the Office of Agricultural Economics. Between 2006 and 2013, the average area of agricultural land devoted to rubber plantations increased from 14.37 million rai to 22.18 million rai.

Based on movements in the rubber price at The Hat Yai Central Rubber Market, the average price of Rib Smoked Sheet-3 (RSS3) was THB 30/kg in 2002. Over the next decade there was a gradually increasing trend as shown in [Figure 1](#), culminating in the highest average price for RSS3 of THB 146/kg, recorded in February 2011. The percentage growth in the RSS3 price between 2002 and 2011 was approximately 15 percent per year ([Charenjiratragul, Satsue, & Romyen, 2015](#)). Since then, however, the price of RSS3 has fallen sharply to approximately one third of its highest value, standing at THB 54.20/kg in October 2014

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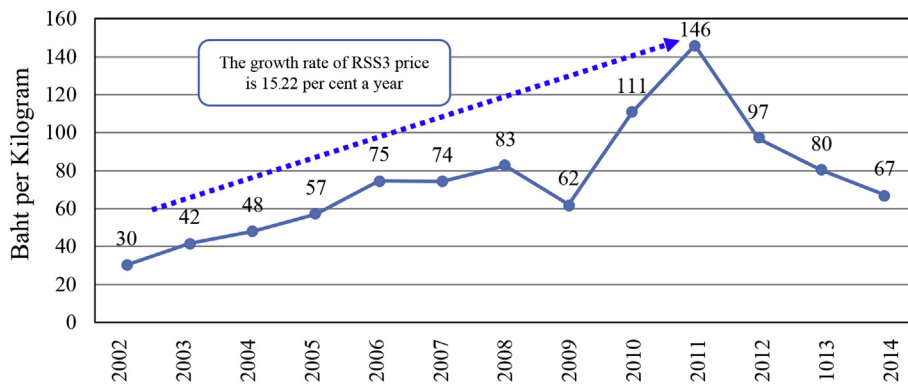


Figure 1 Average price of RSS3 at The Hat Yai Central Rubber Market between 2002 and 2014 (Rubber Research Institution of Thailand, 2014). Note: The percentage growth rate has been calculated using the exponential curve, $Y = ab^T$. Source: Charennjiratragul et al. (2015)

(Rubber Research Institution of Thailand, 2014). The reason for this fall is that the supply of natural rubber has outpaced demand by industry sources. Moreover, this rubber surplus could increase further as some tire-producing countries, such as China, the USA, Japan, and countries in Europe reduce their domestic tire production.

In fact, the determination of rubber prices depends substantially on the world spot and future markets such as the Tokyo Commodity Exchange (TOCOM), the Singapore Commodity Exchange (SICOM), and the Future Exchange of Thailand (AFET). Additionally, many countries including Vietnam, Lao People's Democratic Republic, Myanmar, Cambodia, and Pakistan also trade in the global rubber market. The Thai government is therefore unable to either control or influence rubber prices and Thailand has little bargaining power in the face of movements in rubber prices even though it is the largest rubber producer in the world.

In common with other commodity prices, rubber prices within domestic markets in Thailand tend to fluctuate over time since these prices result partly from cyclical movements in the world market influenced by both demand and supply. The emergence of unstable prices for rubber inevitably affects rubber planters since rubber prices are the major determinant of household incomes and livelihoods, particularly for smallholders producing predominantly rubber. Most rubber planters in Thailand have traditionally practiced a rubber mono-cropping system (RMCS) so they are prone to suffer because of fluctuations in the rubber price and uncertainty about the level of their earnings. In order to reduce the risks associated with price fluctuations and to improve efficiency at the farm level, operating a rubber-based intercropping system (RBIS) seems to offer an alternative method of practicing agriculture which could diversify crop production and enable farmers to earn extra income (Rodrigo, 1997, 2001; Tournebise & Sinoquet, 1995). Therefore, the objectives of this paper were: (1) to investigate the differences in socio-economic characteristics between rubber farmers who operate either RMCS or RBIS; (2) to identify the attitude of mono-cropping rubber farmers toward RBIS; (3) to determine the decision-making factors that influence the use of RMCS; and (4) to examine the variety of crops which mono-cropping rubber farmers are interested in growing using RBIS.

Literature Review

RBIS Situation

Since the industrial revolution in the 1950s, natural rubber has been one of the raw materials needed in industry. The demand for natural rubber in industrialized countries generated a rubber boom and the high price of rubber enticed farmers to cultivate latex-producing trees (Joshi et al., 2002). Large areas of primary forests have been converted into rubber plantation using a mono-cropping system practiced by smallholder farmers, particularly in Southeast Asia. Deforestation has rapidly taken place over the past decades in many part of Indonesia such as Jambi province, Sumatra, Indonesia (Ekadinata, Widayati, & Vincent, 2004; Feintrenie & Levang, 2009). Similarly, the Chinese central government sees natural rubber as an essential product and critically important to national security (Yi, Canono, Chen, & Swetnam, 2014). Consequently, 20 years ago in Xishuangbanna, Southwest China, primary forests have been replaced at a remarkable rate by monoculture rubber plantations (Li & Yuan, 2008; Qiu, 2009; Ziegler, Fox, & Jianchu, 2009). In Thailand, most rubber farmers use RMCS, whereas practicing RBIS is rare, with the latter estimated at around 2 percent of all rubber farmers in both Songkhla and Phattalung provinces (Charennjiratragul et al., 2015). Somboonsuke, Wetayaprasit, Chernchom, and Pacheerat (2011) reported that a rubber agroforestry system is an alternative form of agriculture to complement biological integrity, crop diversity, and financial stability. RBIS can be divided into three main systems: (1) intercropping rubber-food crop system, (2) rubber-fruit crop system, and (3) rubber-timber species system. The conversion of natural forests to rubber monoculture plantations brings many unfavorable circumstances such as a loss of extra revenues generated from other mixed plants and species and a loss of ecological integrity.

Economic Advantages of RBIS

RBIS has tremendous beneficial aspects. A survey by Joshi et al. (2002) found that smallholder rubber farmers generated approximately 70 percent of the total household

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