Rubber-based Agroforestry System toward Livelihood of Thai Rubber Smallholders under Sufficiency Economy



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Introduction

Under the falling of rubber price and climate change these affect livelihood that Thailand has to increase incomes for rubber small holders. One of crucial policies is trying to use lands efficiently for having more biodiversity that will increase rubber smallholder incomes



Definition of Agroforestry System

Forestry

Many such examples can be found worldwide in regions.

Agriculture



Agroforestry in Latin America

Building Forests through Agriculture

Agroforestry

Agroforestry in Africa



Agroforestry in Southeast Asia



Smallholding Rubber-based Agroforestry System Framework (SRAS)



(Source : Somboonsuke, B, Shivakoti, and Demaine, 2002)

SRAS inThai Rubber Ecological Zones

Characteristic	Zone III: High land	Zone II: Unfolded plain	Zone I: Flooded plain
Topographic	High land	Unfolded Plain	Flooded plain
High altitude (m)	80-500	20-80	0-20
Slop	>20°	5-20 °	0-5°
Soil texture	Loam soil, Loam clay soil, Sandy clay soil	Clay soil, Loam clay soil	Clay soil, Sandy clay soil
Soil pH	4.5-5.5	4.5-5.0	4.5-5.5
Rubber-based farming system	 Rubber monoculture Rubber-fruit tree farm Rubber-rice farm Rubber-intercrop Rubber-livestock 	 Rubber monocultury Rubber-intercrop Rubber-rice farm Rubber-fruit tree farm Rubber-livestock Rubber-integrated farm 	 Rubber monoculture Rubber-intercrop Rubber-rice farm Rubber-fruit tree farm Rubber-livestock

(Source : Somboonsuke 2014)

Typology of SRAS in Thailand

1. Food crop mixed system

The main food crops grown with rubber are pineapple, rice, maize and vegetables grown during the initial unproductive period of rubber, i.e. up to 3 years. The decision to intercrop depends on soil, topography, labor availability and market access.



Rubber-Pineapple (Source : Somboonsuke, 2014)

Rubber-Papaya

Rubber-Rice

Typology of SRFS in Thailand

2.Fruit trees mixed system(or Rubber multi-crop)

Fruit trees such as durian, Salacca, Gnetum, mangosteen and Longkong are commercial crops.



Rubber-Salacca

Rubber-Longkong

(Source : Somboonsuke, 2014)

Typology of SRFS in Thailand

3.Timber species mixed system

The main timber species are Neem and Teak used normally for construction and furniture.



Rubber-Neem

Rubber-Teak

Functions of Rubber Based Agroforestry System



Social security functions

Environmental functions

1) **Resilient incomes**

First 3 years old rubber

- Incomes from rubber intercrops

More than 3 years old rubber

Incomes from rubber associated crop or

rubber multi-crops and rubber sheet, rubber latex, Cup lump, scrap, and timber

Example: Rubber Intercrop Rubber with Pineapple





Spacing 40x80 cm. Approximately 22,000-25,000 bulbs/ha Product : 1st harvest 30 Tons/ha 2nd harvest 15 Tons/ha Bulb 25,000 bulbs/ha Income : 45,000 kg. x 6THB.=270,000 THB./ha Bulb 25,000 x 1THB.= 25,000 THB./ha



Example: Rubber Intercrop Rubber with hot pepper



Spacing 65x75 cm. Approximately 8,750 trees/ha



Product : 17.5 Tons/ha/crop (7 months) Income :17,500 kg.x20 THB. = 350,000THB./ha/crop Note :Irrigation (Somboonsuke, 2014)



Example: Rubber Intercrop Rubber with Banana



Product : 5.5 Tons/yr/ha Income : 5,500 kg. x 6.0 THB. = 33,000 THB./yr/ha

(Somboonsuke, 2014)

Example: Rubber Intercrop Rubber with Sweet-Potato



Spacing 40x80 cm. Approximately 22,000-25,000 branches/ha/crop Product : 4.5 Tons/ha/crop (5 months) Income :4,500 kg.x4 THB. =18,000THB./ha/crop (Somboonsuke, 2014)

Example: Rubber Intercrop Rubber with Long-bean



Spacing 40x80 cm. Approximately 22,000-25,000 holes/ha Product : 8 Tons/ha/crop (4 months) Income :4,500 kg.x30 THB. =240,000THB./ha/crop (Somboonsuke, 2014)

Example: Rubber Intercrop Rubber with Guava

Spacing 3x7m. Approximately 475 trees/ha Product : 15.9 Tons/yr/ha Income : 15,900 kg.x12THB. = 190,800 THB. (Somboonsuke, 2008)

Example: Rubber multi-crop Rubber with Gnetum



Product : 2.9 Tons/yr/ha Polybag 898 trees/ha Income :2,900 kg.x40 THB. =116,000THB./yr/ha 898 trees x15THB. =13,470 THB./ha

(Somboonsuke, 2014)



Spacing 3x7 m. Approximately 475 trees/ha



Ex.3 Rubber with Long kong



Spacing 3x7 m. Approximately 475 trees/ha (After rubber 10 yr) Product : 3.0 Tons/yr/ha Income :3,000 kg.x25 THB. =75,000THB./yr/h Note :Springer Irrigation

(Somboonsuke,2014)

Example: Rubber multi-crop Rubber with Salacca





Product : 7.1 Tons/yr/ha S Income : 7,100 kg.x40 THB. = 284,000THB./yr/ha A (Somboonsuke, 2014)

Spacing 3x7 m. Approximately 475 trees/ha

Example Rubber with Mangosteen



Spacing 9x9 m. Approximately 137 trees/ha

Product : 3.5 Tons/yr/ha

Income :35,000 kg.x20 THB. =70,000THB./yr/h

(Somboonsuke, 2014)

Example Rubber with Durian



Spacing 7x6 m. Approximately 230 trees/ha

Product : 4.7 Tons/yr/ha

Income :4,700 kg.x25 THB. = 117,500THB./yr/ha

(Somboonsuke, 2014)

Example: Rubber with Levistona



Spacing depends on farmer

Income : 4 THB./Leave (Somboonsuke, 2014)

Economic functions (Continuous)

- 2) **Production efficiency**
- Increase in land use efficiency and crop yield increases



• Another example: crop yield increase



Farmers found that irrigating salacca in summer helped increase rubber yields by about 5-10 % in rubber plantation in Songkhla.

(Somboonsuke, 2014)

• Reduction of input expenditure for farming



Plant nutrient cycling
Free of chemical since 1992

Product and income from some intercrops and multi-crops in 2014

Rubber inter/multiple crop	Product (Ton/ha)	Total Income (THB/ha)
1.Pineapple	45	270,000
2.Banana	5.5	33,000
3.Chili	17.5	350,000
4.Long-bean	8.0	240,000
5.Sweet-potato	4.5	18,000
6.Guava	15.9	190,800
7.Durian	4.7	117,500
8.Salacca	7.1	284,000
9.Gnetum	2.9	116,000
10.Mangosteen	3.5	70,000
11.Longkong	3.0	75,000

(Somboonsuke, 2014)

Economic functions (Continuous)

3) <u>Family expenditure</u> <u>reduction</u>

RSAS provides not only various incomes but also farm products for self-consumption.



Rubber with Livistona plot



Eco-friendly products



- Decompose faster than plastic
- Reduce fuel use for transportation

Environmental functions

1) land conservation

More canopies of SRAS <u>will prevent</u> <u>rain drops</u> <u>attacking the</u> <u>topsoil directly</u>.

Meanwhile, various root systems of plants will hold topsoil, <u>thus preventing</u> <u>soil erosion</u>.



Rubber & Eagle wood's root system holding topsoil in a SRAS plot in Songkla province.

Environmental functions

Upper stream area



Environmental functions

- 5) Storm resistant
- 6) Air purification
- 7) Carbon sequestration
- 8) Biodiversity



A SRAS plot in Songkhla province mostly resisted the storm in November 1, 2010



Most mono rubber trees fallen when hit by the storm in November 1, 2010

1) Products charity

2) Good health

Because the farmers usually work in rubber plot under shady and refreshing circumstances and eat organic products from associated crop in the plot.







3) Knowledge sources



SRAS Community Learning

4) Traditional decent



Rubber with bamboo plot



4) Traditional decent



Rubber with Yellow Palm plot





Social security functions 5) Social grouping





The group of forestation in Phatthalung province, up to now, planted rubber associated trees like iron wood, neem, mahogany, eagle wood more than 20,000 trees in 100 acres.



