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BIODATA

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Table 1. SITE CHARACTERIZATION OF PROJECT AREAS

factors	West Kalimantan Forest margins with poor soils and transmigration areas.	Jambi Forest margins	West Sumatra Very degraded land
ethnic groups	a) Dayak (Christians) b) Javanese transmigrants (Muslim).	Melayu (Muslim)	Minang (Muslim)
population density	a) low with plenty of land b) high with limited land (2 ha)	low with plenty of land	low with limited land (marginal lands)
ecological environment	a) secondary forest, jungle rubber and tembawang (*1), poor soils. b) degraded sheet imperata land, poor soils.	a) forest and jungle rubber on steep slopes (foothill of the barisan mountains). b) forest and jungle rubber on flat areas (peneplains)	Imperata infested land with steep slopes, poor soils, erosion and maximum elevation for rubber (500 to 600 meters)
farmers behavior and strategies	a) extensive systems slash and burn for local upland rice, willing to accept a low level of intensification. b) intensive with sawah and rubber on uplands. Not willing to accept intensification of upland.	a) extensive, limited upland rice, slash and burn for cinnamon planting. Reluctant to accept labour intensification. b) extensive, slash and burn for rice and palawija production. Willing to accept a certain level of intensification.	Very intensive with continuous food intercropping on tree based systems (rubber). Very keen to intensify.
Main constraints	a) low productivity of jungle rubber, Imperata infested. b) very degraded land with Imperata on a very limited cropping area (2 ha). High pressure of Colletotrichum (leaf disease)	a) low productivity of jungle rubber, vertebrate pests on new rubber plantations, b) low productivity of jungle rubber Mikania Pigs and Monkeys	no sustainable continuous foodcrops systems, Imperata, erosion on very steep slope, erratic rainfall, Remote area, Elevation : maximum for rubber. Rubber leaf disease Low availability of inputs. Pigs depredation
opportunities	a) available land Presence of SRDP/ TCSDP *3 Existing old complex agroforestry practices b) farmers motivated	land available Existing old complex agroforestry practices very good access to markets	very good motivation for intensification
On Farm trials priority	a) RAS 1 and RAS 2 b) RAS 2 and RAS 3	RAS 1 RAS 2	RAS 2

*1) =Tembawang are indigenous fruit and timber based complex agroforestry systems where the main tree is often Illipe nut tree.

*2) = Imperata and Mikania are major weeds which limit growth of crops.

*3) = SRDP and TCSDP are rubber development projects funded by World Bank based on monoculture.

Table 2. TYPOLOGY OF ON-FARM TRIALS AND NUMBER OF FARMERS INVOLVED

RAS Type	RAS 1	RAS 2.1 and RAS 2.2	RAS 2.5	RAS 3
Type of trials	Clones in jungle rubber environment	rubber + associated trees + intercrops	rubber + cinnamon	rubber + associated trees + covercrops
Jambi	15	7	8	0
West Kalimantan	25	22	0	15
West Sumatra	0	8	0	0
Total farmers	40	37	8	15

RAS = Rubber Agroforestry System

Total number of farmers involved in on-farm RAS trials : 100 (1 farmers = 1 replication with 1 or 2 treatment, 1 treatment has several plots).

ANNEX

TABLES 4.x : RESULTS FROM A FARMING SYSTEMS SURVEY IN JAMBI and WEST KALIMANTAN in 1997 by, A Kelfoun, Ph Courbet & E Penot. SRAP.

In 1997, ICRAF/SRAP implemented a farming system survey in order to characterize farming systems in Jambi province (kabupaten Bungo Tebo), in 5 villages with 68 farmers and in West Kalimantan (Kabupaten Sanggau, Sekadau and Sintang) in 8 villages with 156 farmers. The sampling method was based on the selection of SRAP farmers (those who have a RAS trial) and non project farmers, selected on a randomized basis (but with farming as their main activity). All costs and incomes calculation of that of July 1997.

MAIN OUTPUTS IN JAMBI PROVINCE

CROPPING SYSTEMS LEVEL

Table 4.1

Comparison of various cropping systems net benefit :

Cropping systems	Net income (.000 Rp/ha/year)
rubber jungle rubber	1 341
clonal monoculture	2 937
Sawah local varieties	697
Improved varieties	1 120
Ladang (upland rice)	529
Cinnamon	2 000

Table 4.2

Comparison between different cropping systems in terms of return to labour in Rp/manday

Cropping Systems	Net income (.000 Rp/manday)
Hévéa jungle rubber	22 300
Clonal monoculture	54 200
Sawah local varieties	4 800
Improved varieties	8 200
Ladang	8 000

FARMING SYSTEM LEVEL

Table 4.3 : NET INCOME FROM RUBBER PER FARM PER VILLAGE

	Sepunggur	Muara Buat	Rantau Pandan	Sukadamai	Saptamulia
Type of village	Plain	Piedmont	Piedmond	Transmi Gration	Transmi Gration
Average Production per farm (kg/year)	3651	2140	2206	2920	8824
Value of the production (.000 Rp/year)	3459	2033	2041	2392	8383
Net income from hévéa ³ (.000 Rp/year)	3411	2015	2003	2283	7951

TOTAL FARM INCOME

Table 4.4 : Total average farm income per village

	Sepunggur	Muara Buat	Rantau Pandan	Sukadamai	Saptamulia
Total average farm income (.000 Rp/year)	4325	4925	6660 <i>non representative sample</i>	1679 young plantation	9831 mature plantation

³ NB : Income is calculated with production value minus inputs costs (labour not included).

MAIN OUTPUT IN WEST KALIMANTAN

CROPPING SYSTEMS LEVEL

Table 4.5 NET INCOME PER TYPE OF CROPPING SYSTEM, per year and per ha

	Rubber system	No of farmers	Net income (.000 Rp/ha/year)
Bali	<i>Jungle rubber</i>	11	1 008
Engkayu	<i>Jungle rubber</i>	19	837
Embaong	<i>SRDP</i>	9	2 285
Kopar	<i>Jungle rubber</i>	17	732
Pariban baru	<i>Jungle rubber</i>	11	811
Sanjan	<i>SRDP</i>	14	2 021
Trimulia	<i>Jungle rubber</i>	1	702
Sukamulia	<i>Jungle rubber</i>	3	595

Table 4.6 Comparison of various cropping systems income

Cropping systems	Net income (.000 Rp/ha/year)
rubber jungle rubber	820
clonal monoculture	2 124
Sawah local varieties	460
Improved varieties	948
Ladang (upland rice)	289

RETURN TO LABOUR for VARIOUS CROPPING SYSTEMS

Table 4.7 : Comparison between different cropping systemes in terms of return to labour

Cropping Systems	Net return to labour (.000 Rp/manday)
Hévéa jungle rubber	9 600
Clonal monoculture	27 200
Sawah local varieties	4 000
Improved varieties	8 100
Ladang	2 100

FARMING SYSTEM LEVEL

These calculations take into account the average area per cropping system per farm.

RUBBER

Average price of rubber in July 1997 is 1100 rp/kg of slab , so 2200 rp/kg of dry rubber 100 % DRC in the area.

NET INCOME FROM RUBBER PER FARM PER VILLAGE

Table 4.8 Net income from hévéa⁴(.000 Rp/year)

Village	Bali	Kopar	Pariban baru	Sanjan	Suka-Mulia	Trimulia	Embaong	Engkayu
Net income	990	674	807	2 253	596	750	2 177	837

TOTAL FARM INCOME

Calculated farm income is the sum of incomes from all cropping systems.

Cash flow is the real income available (basically rice from sawah and ladang is never sold but self-consumed)

Table 4.9

Village	Bali	Bali	Kopar	Pariban baru	Sanjan	Suka-mulia	Trimulia	Embaong	Engkayu
Net income									
Calculated total income	5013	2022	1613	3816	4701	4914	2414	3940	1627
Real cash flow			1058	2954	4127	4231	1970	3553	1094
Income after food purchases	4405	1714	1079	2147	1954	2783	1345	2007	1173
Main source of income	Oil palm	Oil palm	Jungle rubber	Jungle rubber	Clonal rubber	Off farm	Off farm	Clonal rubber	Jungle rubber

The difference between real cash flow and incomes after food purchase for the villages of Kopar and Engkayu comes from the sales of fruits.

⁴ NB : Income is calculated with production value minus input costs (labour not included).

TABLE 5.1. BIOMASS AND NUTRIENT CONTENT OF LITTER ACCUMULATION UNDER DIFFERENT VEGETATION SYSTEM

Vegetation	Biomass (Kg/ha)	Nutrient (Kg/ha)					Total Nutrient (Kg/ha)
		N	P	K	Ca	Mg	
Rubber	3000	100	14	46	46	25	231
Natural Forest	8400	140	10	60	63	40	303

Source ; Gunatilleke et. al., 1995

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TABLE 5.2. NUTRIENT REMOVAL OF DIFFERENT CROPS ACCORDING TO YIELD

Crop	Yield (Kg/ha)	Nutrient removal (Kg/ha)				Total
		N	P	K	Mg	
Rubber	1000	11	3	10	2,5	25,5
Tea	3000	200	10	65	10	285
Coconut	1500	65	18	57	17	157

Source : Samarappuli, 1996 C.

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Table 6. Estimates of Floral Biomass Potential for Various Ecosystems

Ecosystems	Biomass dry weight (t ha ⁻¹)	References
Humid tropical evergreen forest		
Malaysia: Pasoh	475-664	Kato, <i>et.al.</i> , 1978
Mulu	210-650	Proctor, <i>et.al.</i> , 1983
Thailand: Khao Chong	331	Kato, <i>et.al.</i> , 1980
New Guinea:	295-310	Edwards, <i>et.al.</i> , 1977
Brazil: Manaus	473	Jose, <i>et.al.</i> , 1986
Hevea rubber plantations		
Five years (Fertilizer trials)	60.1-76.8	Sivanadyan, <i>et.al.</i> , 1984
(Commercial)	48.6	Shorrocks, 1965a
Eleven years	206.1	Shorrocks, 1965a
Twenty-four years	248.6	Shorrocks, 1965a
Thirty-three years	444.9	Shorrocks, 1965a
Thirty-three years (untapped)	963.8	Shorrocks, 1965a
Oil palm plantation		
Five years	40.1	Ng. <i>et.al.</i> , 1968
Eleven years	69.5	

Estimate of biomass mainly made for above ground plant parts

* Biomass estimates for Khao Chong (Kato *et.al.*, 1978)

Source: Sivanadyan K. & Norhayati Moris

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