Semi-annual Report
Year 3
Socio-economic Monitoring Study

Suseno Budidarsono and Arif Rahmanulloh
World Agroforestry Centre - ICRAF

I. Executive Summary of overall progress for the past six months

The socio-economic team has identified vegetable cultivation technologies/practices within agroforestry systems, including the necessary inputs applied and the outputs has been done in close collaboration with all parties involved in the respective trials/experiments.

Out of six experiments carried out during Year 3 of the project, only shade management trial have been completed the experiments (the soil analysis was still in process). The rest, were still on going with different progresses. It is therefore, the focus of this semi annual report of the socio-economic team is shade management trials.

Although profitability assessment of shade management trial in vegetables cultivation has been carried out, there some important parameter left undisclosed, such as optimum labor requirement, optimum life cycle of the selected vegetables cultivated in the trial

II. Research progress by objective

Overall objective of socioeconomic team is *to assess the socio-economic impacts of integrated vegetable-agroforestry systems on small women and men farmers in Nanggung Sub-district.* It comprises of three main tasks: (1) **Identify** vegetable cultivation technologies/practices within agroforestry systems (*kebun*) that are socially acceptable, affordable and economically profitable, based on the six experiments carried out by the T team of TMPEGS; (2) Provide information on **adoption** of recommended vegetable cultivation technologies and practices by small women and men farmers in Nanggung Sub-district; and (3) **Assess socio-economic impacts** of recommended SANREM technology adoption on small women and men farmer incomes and welfare.

In the second half of Year 3 of the implementation of integrated VAF system in Indonesia (LTRA 5: Agro-forestry and Sustainable Vegetable Production Southeast Asian Watersheds), the socio-economic team has identified vegetable cultivation technologies/practices within agroforestry systems, including the necessary inputs applied and the outputs has been done in close collaboration with all parties involved in the respective trials/experiments. Hence, input- output data were collected using input-output data forms to be filled by field research attendants. If necessary, consultations with the field research attendant for data clarification were carried out. The farm input data recorded from every experiment/trials such as planting material (seeds or seedling) used, number of labor employed, fertilizers and pesticides application, and also water (these data include quantity and price to estimate

costs per ha. or smaller land size unit). Yield per ha of the respective trials are also to be collected. The data collected then will be used for the calculation of B/C ratios for various trials/experiment. Include soil and water conservation benefits as available.

As per 10 April 2008, six vegetables cultivation experiments have been carried out in three villages of Nanggung sub-district: Hambaro, Parakan Muncang and Sukaluyu . They are: (1) on-farm screening trials of vegetables grown in tree-based farming systems with; (2) NPK optimization, including phosphorus experiment; (3) indigenous vegetable trials at different spacing; (4) Indigenous vegetable with different fertilizer (5) drip irrigation trial and (6) integrated pest management. Out of the six experiments, only shade management trial have been completed the experiments (but still waiting for the soil analysis). The rest, were still on going with different progress. It is therefore, the focus of this semi annual report of the socio-economic team is shade management trials, as the followings.

Economic Assessment of Vegetable – Agroforestry System (VAF) on-farm trial

The Trial

The trial was conducted on August – November 2007. Eleven vegetables were nested with 3 times replication in each treatment during 16 planting weeks; they were represented of indigenous-vegetables such as Honje (*Etlingera elatior*), Terubuk (*Saccharum edule*), Katuk (*Sauropus androgynus* (L.) Merrill) and Kenikir (*Cosmos caudatus* Kunth); leafy-vegetables that is Kangkong (*Ipomoea aquatica* Forsskal) and Amaranth (*Amaranthus* sp.) and fruity-vegetables such as Chili (*Capsicum annuum* L.), Egg plant (*Solanum melongena* L.), Yard long bean (*Vigna unguiculata* (L.) Walp.), Green bean (*Phaseolus vulgaris* L.) and Tomato (*Lycopersicon esculentum* Miller). Tree species, tree density and basal area, tree height, canopy covered and height, light penetration (weekly), pH and humidity of soils in 15 cm depth (weekly), vegetable survival rate and vegetable pest-disease damaged are the independent variables, so vegetable height and diameter growth and vegetable yield are the dependent variables.

The three different shade level were: (1) No Shade; (2) tree scattered system with medium light level and low tree density, 3) tree-scattered system with low light level/ high tree density. Characteristics of the three plot are shown below:

Table 1: Plot characteristics

	Treatment (plot)		
	No Shade	Medium Light	Low light
Total area (m2)	300	450	575
Previous land use activity	grassland	Crop and agroforest	Abandonded kebun campur
Effective area (%)	58%	39%	30%
Tree density ($n.ha^{-1}$)	0	400	626
Canopy covered (m^2)	0	294.4	380

Method, Data and Data collection

Simple benefit-cost (B/C) analysis was applied in the assessment; hence a system with B/C > 1 means the system is feasible and a system with B/C < 1 indicates the reverse.

The farm input data used and yield of the experiments were recorded using input – output data form provided by the team and filled up by the field research attendant. Farm input data comprises of planting material (seeds or seedling) used number of labor employed (in person-day), fertilizers and pesticides application. Output data mainly yield of the vegetables grown. Those data include quantity and price to estimate costs per ha. or smaller land size unit.

All inputs and output data were monetary valued using current nominal farm gate prices. Prices data (of every farm input used, the marketable vegetables output and the current labor wage) were collected from local market, where farmers usually market their product, and any necessary farm input.

Vegetable tree-based farming practices

The trial started at the middle of dry season and finished at the beginning of rainy season. Observation noted that there were only 21 rainy days out of 120 planting days (the trial period). Regarding agricultural undertaking, as shown in Table 2, ten activities were observed during the trial that require farm inputs, and it varies among vegetables cultivation.

Each vegetable has different cultivation period. It also varies among vegetable species between 25 and 120 days, counted from the first planting day until the last harvesting activity. It needs to note that until the end of trial period (day 120), *honje* and *terubuk* has not gain any yield yet. These two vegetables were not included in the economic assessment.

Table 2: Vegetables cultivation practices of the shade management trial

Cultivation activities	Vegetable species										
	Amaranth	Kangkong	eggplant	chilly	tomato	yard long bean	green bean	kenikir	katuk	honje	terubuk
Land preparation	X	X	X	X	X	X	X	X	X	X	X
Fertilizing	X	X	X	X	X	X	X	X	X	X	X
Nursery			X	X	X						
Install stick (ajir)				X	X	X	X				
Planting	X	X	X	X	X	X	X	X	X	X	X
Replanting			X	X		X	X	X			X
Watering	X	X	X	X	X	X	X	X	X	X	X
Coppicing (wiwil)				X							
Weeding	X	X	X	X	X	X	X	X	X	X	X
Harvesting	X	X	X	X	X	X	X	X	X		
Life cycle / observation time (days)	90	25	90	120	90	75	75	75	90	120	120

Results of the assessment

There are many biophysical parameters have not been included in this assessment, as the data analyses of the experiment has not yet completed yet. At present the focus will be given to the labor requirement and profitability using B/C analysis.

1. Labor requirement

Figure 1 shows the quantity of labor employed for each vegetable cultivation in the three trial plots. The data shows that labor requirement positively corelate to the effective planting area. No-shade vegetable cultivation is the highest in number of labor employed; chilly cultivation employed 185 person-day in 120 cultivation day.

Besides, signicant component that affects total labor requiremnet was land preparation activity. It varies between 42% and 63%. In detail, labor requirement for land preparation of the three plots are: 78 person-day/1000 m^2 for no-shade plot and respectively 53 person-day/1000 m^2 and 31 person-day/1000 m^2 for medium-light plot and low-light plot. These figures need to be understood with care. It is much higher than National average of lebor requriement for vegetables cultivation. National statistics on horticultual cultivation (http://ditsayur.hortikultura.go.id) shows the average of labor requirement for land preparation is 85 person-day/hectare (10000 m^2).

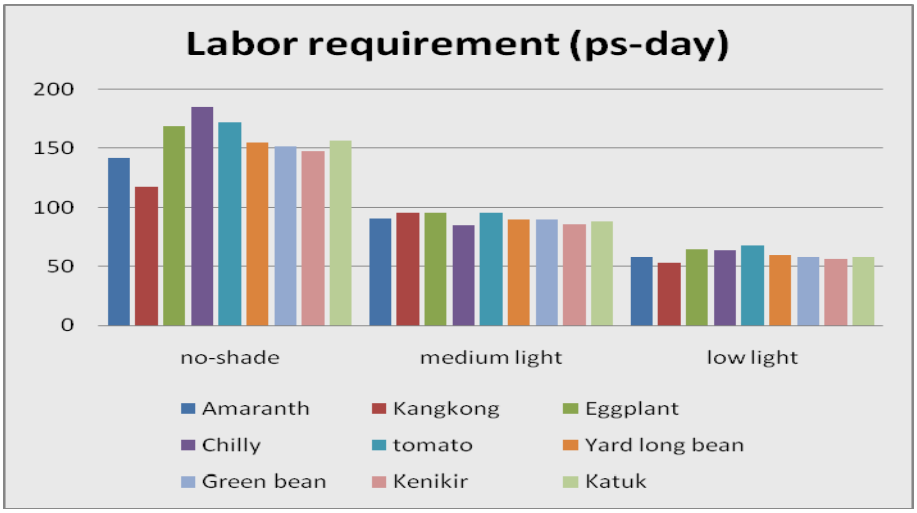

Figure 1. Labor requirement by plot type and vegetables species

2. Benefit-Cost ratio

Figure 2 shows bar chart of the B/C ratio of vegetable cultivation by plot type. It shows that the medium- light plot give the highest profitability for all vegetables cultivation. Reversely, low-light plot or heavy shade plot give the lowest profitability for all vegetables cultivation. The data also need to be treat with care. Not all vegetables cultivated in the experiment reach its optimum production cycle. Katuk, for example, it can be harvested many times during five years of its life cycle. Assuming that all vegetable cultivation in this trial had been optimized producing its yield, Figure 2 shows only chilly cultivation as the most feasible VAF practices.

It does also relate to effective planting area. No-shade plot has the largest effective planting area that consequently needs more effort in vegetables cultivation: more labor for watering, as it is noted that there were only 21 rainy day out of 120 cultivation day of the trial. Plot with higher tree density or low-light plot have conceivably lower effective planting area. Although it need lower efforts but it also gains less yield.

Figure 2. B/C ratio of vegetables cultivation in three different light level

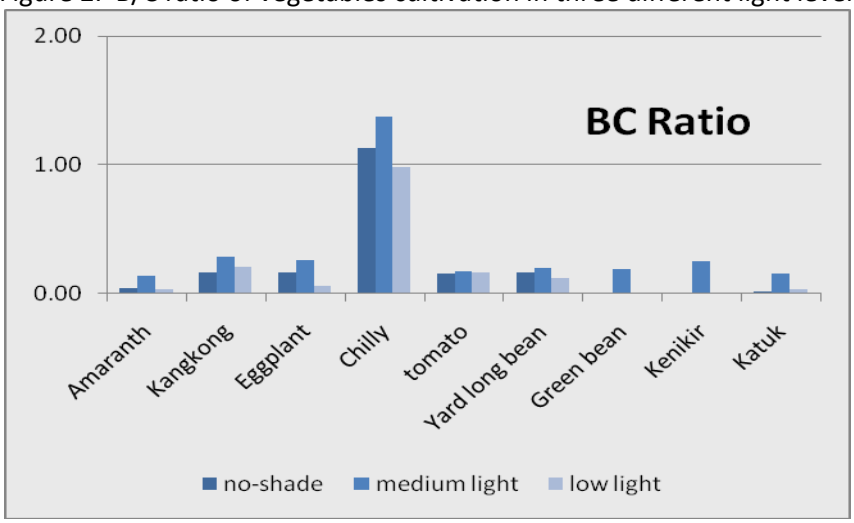

Table 3 provide the production cost of each vegetable cultivated in the experiment. It shows the cost of the production per unit of produce, except chilly, were higher than the comparable market price. It explains why the B/C ratio of most vegetables cultivation are less than 1; not profitable.

Table 3. Prduction cost of VAF experiment versus marker price

Vegetables	Production cost Rp/kg			Commodity Price	
	no-shade	Medium-light	Low-light	Nanggung	West Java 2005*
Amaranth	20,449	6,634	26,606	800	
Kangkong	19,890	10,138	13,721	2,500	
Eggplant	10,620	6,689	29,971	1,500	1,308
Chilly	6,169	5,028	6,984	6,000	9,372
Tomato	29,758	26,250	28,597	4,000	2,023
Yard long bean	27,918	22,686	36,046	4,000	
Green bean		11,816		2,000	1,456
Kenikir		18,629		4,000	
Katuk	144,470	40,243	80,752	2,200	

Concluding remark

1. The three selected sites for the shade management trial have different land use history that might contribute to the result of the experiment.

2. Regarding the period of experimentation versus selected vegetables species, some vegetables selected for the trial has far more longer life cycle than the trial period. It does matter to the profitability of the vegetables cultivation; hence the optimum point of profitability could not been achieved only in the first planting session (16 week cultivation).

3. The experiment shows the medium light plot seems to be more feasible than no-shade plot and low-light plot. However, there are some biophysical variables have not been included in the assessment that might contribute to the yield and cost of input.

4. It was observed that the trial employed farmers mostly as laborer.

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