Socioeconomic Baseline Studies: Agroforestry and Sustainable Vegetables Production in Southeast Asian Watershed

Case Study:

Nanggung Sub-district, Bogor, Indonesia

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Research Report

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Introduction

This report is a farm/household level assessment focusing on vegetables farm and household budget analyses, part of the SANREM CRSP program 'Agroforestry and Sustainable Vegetable Production in Southeast Asia Watersheds' in Indonesia implemented by World Agroforestry Centre – ICRAF Southeast Asia and Bogor Agricultural University.   It provides an analytical basis for socio-economic impact assessment of integrated vegetable-agroforestry systems. The basic socio-economic data collected comprised of demographic data, farm characteristics, households' income and expenditure, gender roles, and labor availability. The data generated by this study will be used for economic analysis of vegetable farming, specifically: (a) analysis of the current of demographic data of farmers, and (b) analysis of the current of vegetable farm practices in social and economic.

The study was conducted in Kecamatan Nanggung, a sub-district located in the western part of West Java Province. Kecamatan Nanggung, endow with relatively good accessibility to two lucrative urban centers of Bogor and Jakarta, rich natural resources of forest and mineral, and an ideal climate for agricultural development. Those endowment hold advantages to support market-based agricultural commodities development through vegetables agroforestry innovation. Farmers in this sub-district are primarily smallholders on or below the poverty line with access to less than one hectare of land.   They have limited access to professional technical assistance and poor market linkage, particularly to more lucrative urban and regional market nearby Bogor and Jakarta.
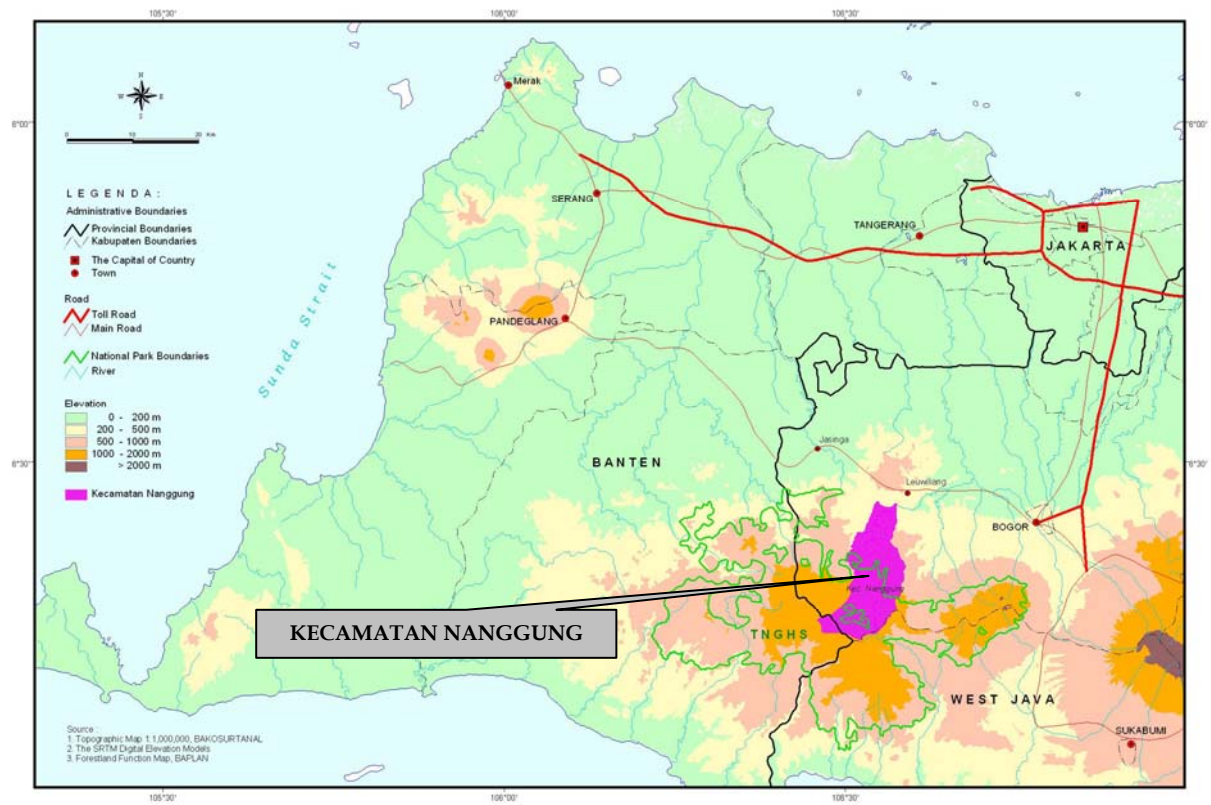
Figure 1. The Study Site

Method

Working hypothesis of the study is that the socio-economic characteristics of farmers' household influence the type of their vegetable farm system and its economic productivity. The data collected by this survey, therefore, comprise of three interrelated aspects: (1) socio-economic aspect of households farmers, such as demographic, education, employments, landholdings, incomes and expenditure; (2) vegetable farming and agricultural activities and system of production; and (3) market aspects that will be focusing on marketing practices of agricultural and farm production.

A sample household survey technique was selected to accomplish the study and was carried out in June - July 2006. The survey was conducted in three sample villages (out of the sub-districts ten villages) that were purposively selected according to their potential for vegetable production, their physical characteristics and demography Table 1 presents the three sample villages and their key characteristics.

Table 1. Characteristics of three sample villages

Attributes	Hambaro	Parakan Muncang	Sukaluyu	Kecamatan Nanggung
Physical characteristics				
1. Altitude *(m above sea level)*	400 – 700	300 – 400	300 – 700	200 – 1800
2. Area *(ha)*				
~ Total Area	355.78	605.2	207.3	10,999.10
~ Agricultural Land *(Excluded national park)*	270	516.8	142.75	7,022.60
~ Paddy fields	225	268.8	7.75	1,740.70
~ *Ladang/Kebun*	45	248	87	1,836.50
Demography				
~ Population *(person)*	6,044	10,722	4,530	75,109
~ Number of households *(hh)*	1,268	1,536	1,047	19,321
~ Population Density *(ps km^{-1})*	1,699	1,772	2,185	683
~ Agriculture Density *(ps ha^{-1})*	22	21	32	11
Accessibility *(km)*				
~ Distance to Nanggung Market	6.5	2	6	
~ Distance to Leuwiliang Market	12	10	11	
~ Distance to national park	23 – 24	18 – 19	22 – 23	
~ Distance to State Forest Company (SFC) Land	2 – 3	8 – 9	1 – 2	
~ Distance to Gold Mining	11 – 12	11 – 12	10 – 11	

Source: Survey data

A total of 185 households were selected in three sample villages to be interviewed. Within each household the head of household, defined as adult with significant decision-making authority in the households' financial matters, were interviewed. Multistage Purposive sampling technique was applied in this survey; with the intended target population being farmers who control land and practice vegetable farming. Households cencus was done in the three villages, of the 4,302 households, 2,940 households control land. The household samples were selected in accordance with landholding size. The population is divided into six subpopulations (strata) base on land holding size. Proportionally with population percentage, household samples are randomly selected from each stratum. Only household with vegetable farming practice experience selected as sample respondent.

Table 2. Population and Sample Size

	Hambaro			Parakan Muncang			Sukaluyu			Total		
1. Inhabitants of Village	1,257			1,880			1,165			4,302		
2. Population of the Study (Households controlling land)	577			1,545			818			2,940		
3. Sample by Land Size (m²)	n Pop	n samples	(% of Pop)	n Pop	n samples	(% of Pop)	n Pop	n samples	(% of Pop)	n Pop	n samples	(% of Pop)
5 – 100	194	20	(3.5)	670	26	(1.7)	128	10	(1.2)	992	56	(1.9)
101 – 1000	267	28	(4.8)	620	24	(1.6)	169	12	(1.5)	1056	64	(2.2)
1001 – 2000	72	7	(1.2)	149	6	(0.4)	140	10	(1.2)	361	23	(0.8)
2001 – 4000	28	3	(0.5)	71	3	(0.2)	152	11	(1.3)	251	17	(0.6)
4001 – 6000	9	2	(0.3)	13	2	(0.1)	102	8	(1.0)	124	12	(0.4)
> 6000	7	2	(0.3)	22	2	(0.1)	127	9	(1.1)	156	13	(0.4)
Total (households)	577	62	(10.7)	1545	63	(4.1)	818	60	(7.3)	2940	185	(6.3)

Source: Survey data

It needs to note that prior to the survey, a village level study was carried out applying Rapid Rural Appraisal (RRA)[1] technique to gather data and information about Kecamatan Nanggung as basis for village selection (Budidarsono *et al*. 2006).

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[1] RRA consist of short, intensive and informal field surveys that focuses on people own views of their problem (Khon Kaen University 1987; Chambers *et al*, 1989). Generally, the method involves open-ended exploration of important issues and more focused understanding on important themes from key informants' perspectives. Two data collection techniques were applied i.e., field observation and in-depth interview with key informants using semi structured interview guide.

Findings

Physical characteristics

Kecamatan (sub-district) Nanggung, located in the western part of West Java Province, is endowed with good accessibility to two lucrative urban centers, about 100 km away from Jakarta and about 45 km away from Bogor. The Sub-district covers a total area of 109.99 km², spans from Bogor – Rangkasbitung intercity road in the North to the mountain ranges of Gunung Halimun National Park in the South (See Figure 2). Topographically the area constitutes of uplands, characterized with gently undulating to steep landscape with the altitude is ranging between 400 and 1800 m above sea level. Annual rainfall is varies between 3,000 mm to 4,000 mm and the average annual temperature ranging between 22°C   and 34°C.
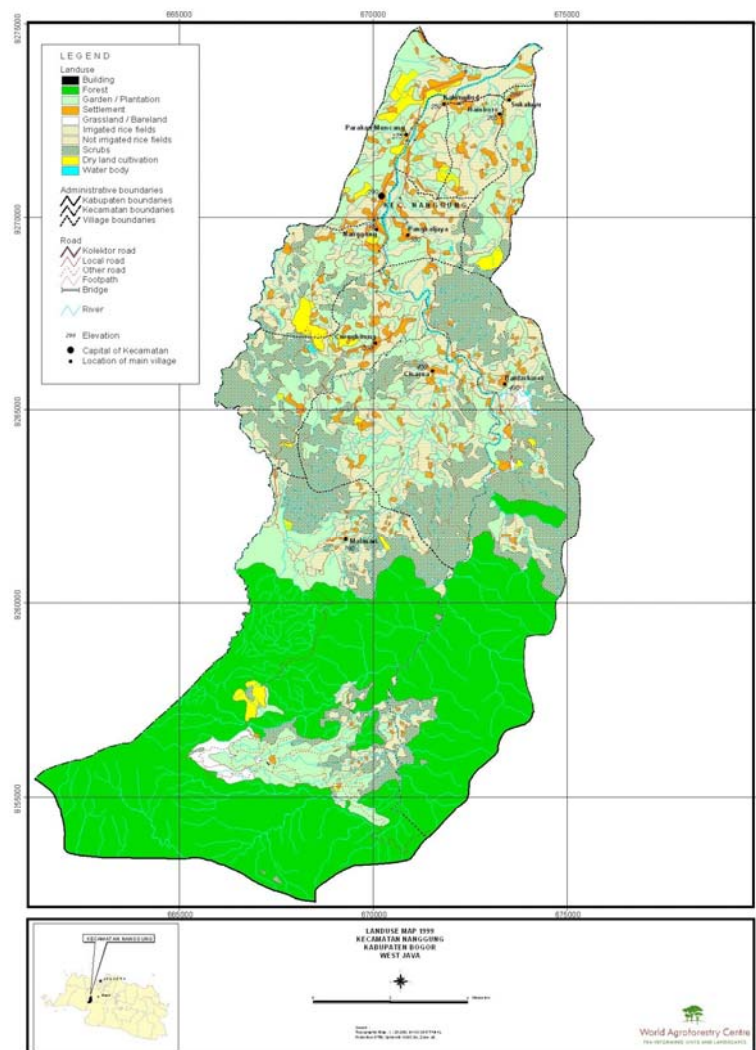
Figure 2. The Villages Map

The sub-district includes 7,022.3 (63.8%) hectare of arable land[2] comprised of paddy field (1,740.7 ha.), ladang/kebun (1,836.5 ha.), community forest (144 ha.), and Perhutani/State Forest Corporation (SFC) land (2,050 ha.). The remaining area is housing and other infrastructures and other uses . Table A1 in the annex presents details of the land uses figures. A closer look at Table A1, combined with information provided by kecamatan officers, enables us to assume that all paddy fields, ladang/kebun lands and community forests are privately owned. In total these privately held (farmer owned) lands compose 3,721.3 ha (52.3%). The rest (47.7%) are officially under the management of SFC and other large scale plantations. However, discussion with farmers/government officials and observation found that there are patches of government land that is being cultivated by farmers, however detailed data is not available to quantify this situation.

Infrastructure and public utilities

It is commonly agreed that infrastructure such as transportation infrastructure, domestic water and electricity supply, marketing facility and telephone line are essential for economic development as well as upliftment of the population. Table A2 of the Annex provides an overview of physical infrastructure available in the study area.

a) Transportation

There are 70 km paved/asphalted road (road density 636 m/km^2) categorized as all weather road that passable for four-wheeled vehicle, connecting most villages of Kecamatan Nanggung to the provincial road network (Bogor – Rangkas Bitung). There are also graveled and dirt roads connecting all settlements in this study area to the main asphalted road network. Road density of those two type of roads are 1,004m/km^2 and 1,058m/km^2. Unpaved (dirt and gravel) roads may have limited accessibility by four-wheeled vehicles, particularly during rainy periods. Reliable access to some of these unpaved roads may be restricted to *four- wheel- drive* vehicles or motorcycles. There is ojeg[3]   services (public transportation by motorcycles) available to all villages. Four wheel public transport, largely restricted to the paved roads, is available daily, transporting people and goods from kecamatan's market canters in Curug Bitung and Nanggung to the nearest bigger market centre in Leuwiliang and vice versa.

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[2] Land that suitable for cultivation
[3] a transportation mode using motorbike; cost per trip (service) depend on the distance and road condition.

b) Public utilities

Statistics of kecamatan Nanggung records that there are 7,619 (43.4%) out of 19,321 households has electricity for their houses (Kecamatan Nanggung. 2006). The rest use privately owned power generator or just kerosene lamp. Regarding telephone line, PT. Telkom serves seven out of ten villages of Kecamatan Nanggung. There are 1,010 households (5.2%) with private telephone lines and there are four private enterprises (concessions) thata provide public telephone services (wartel).

Clean water services provided by the local government (PDAM) is available in the sub-district. But it only serves a few (2%) households in two villages (Nanggung and Parakan Muncang). Most people in Kecamatan Nanggung get clean water for domestic use from springs or shallow wells.

c) Market

Four markets service the sub-district. Three markets are within the kecamatan boundary – the weekly Nanggung weekly market, twice a week Curug Bitung market, and daily Cibeber market. The largest readily accessible market is the daily market in the neighboring sub-district of Leuwiliang.

d) Education

Based on Kecamatan Nanggung Monthly Report (March, 2006), there were 44 primary schools in ten villages, with 157 teachers and 8,780 pupils, and a junior secondary school (SLTP) located in kecamatan centre with 15 teachers and 439 pupils. All primary and juniors secondary school are public school. There is also a private senior secondary school, with 14 teachers and 78 pupils. The education situation of Kecamatan Nanggung will be elaborated in further detail using demographic data of the surveyed household.

Economic activities

Agriculture is an economic mainstay of Nanggung population. According to the Statistics of Kecamatan Nanggung, 63.4% of working population (economically active population) engages in agriculture, higher than national data (46.3%) (Budidarsono *et al*. 2006). Food production is main focus of agriculture activity in this study site and paddy cultivation constitutes an important farming activity in 'wetland', while maize, cassava, sweet potatoes and vegetables and dry-land paddy are common on dry upland areas.

Where ever possible, farmers cultivate paddy continuously for their own consumption. Paddy rice is cultivated in flood plains and even in a steep land that can be irrigated (by creeks or springs). All paddy rice areas are terraced. Although food security is the

main objective of rice cultivation, some rice is also. Paddy field in Nanggung covers an area of 1,741 hectare (15.83%) plus some area within Perhutani land.

Two private plantation companies operate in the sub-district : (1) a tea plantation (971 ha) in Malasari, purchased by PT. Sari Wangi in 2002 from the previous owner (PT Nirmala Agung); and (2) a rubber plantation run by PT Hevea Indonesia (94 ha). The rubber plantation was established in 1994 but stopped operating in 2000; some of the land in the rubber plantation is cultivated by local farmers.

Mineral extraction also exists in the study area, specifically sand, bentonite and gold mining. Sand mining is found in Sukaluyu and Kelong Liud, while bentonite mining is mainly in Curug Bitung and Cisarua, with the bentonite collector based in Curug Bitung. Although PT Aneka Tambang has exclusive legal rights to gold mining operations in the sub-district, traditional household level gold extraction operations are common in the villages neighboring PT. Aneka Tambang operations. Traditional gold extraction operations are called gurandil[4], and considered illegal government authorities. No official statistics exist regarding the number of gurandil. Gurandil enterprises claim they legally scavenge for gold from the wastes of PT Aneka Tambang. This waste, primarily in the form of mud, is sold by the company for Rp 90,000/50-kg-sack. However the company claims that till, which has not yet been processed for gold extraction, is often stolen from the concession area and sold for up to Rp 200,000/50 kg-sack, with price depending on the quality of the till.

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[4] *Gurandil* is a sundanese word. This term is used to mention the people who work as illegal gold mining.

Socio Economic Characteristics

Demography

Population statistics of Kecamatan Nanggung shows that total population at present (March 2006) as 75,109 inhabitants, 104.1 sex ratio (meaning there are 104 males for every 100 females) in 19,321 households. Population growth during the last three years (since 2003) was 0.40% per year; it is lower than West Java Province (2.20%) and even than national growth (1.50%) (BPS, 2003). Population density of the area is 683 persons per square kilometers (ps.km^{-2}) which is lower than for West Java in year 2003 (1,100 ps.km^{-2}). At village level, population density varies from 155 ps.km^{-2} in Malasari (the upper most village) to 2,347 ps.km^{-2} in Kalong Liud. Looking at agricultural density (ratio between number of people to arable land), the figures indicate that agriculture intensification is necessary in many villages of Kecamatan Nanggung. Agricultural density of Kecamatan Nanggung is 11 ps/ha, while at village level the ratio varies from 6 ps ha^{-1} (Malasari) to 33 ps ha^{-1} in Sukaluyu. Seven out of 10 villages are above the kecamatan average.

Regarding demographic characteristics of the household samples, the study considered three aspects to describe: household size, age structure and labor force. These are summarized in Table 3. Total population of households surveyed was 960 persons. There is no significant different in household size among the three sample villages, which ranges from 1 to 12 persons, and averages 5.2 per households, it is higher than West Java Province (3.5) and even than national data (3.8) (BPS, 2003). In further detail, however, Sukaluyu is the highest in number of households with household size of four persons or less (48.3% of the sample households), while in Hambaro and Parakan Muncang, 33.9% and 33.3% of sample households surveyed. There are extended families among the household surveyed. About five percentages of household sample in all villages are extended family.

Looking at the age structure, 66.1% of family member of the household samples are of working age or part of the economically active population (15 to 65 years old), higher than West Java Province (60.6%) and even than national data (65.7%) (BPS, 2003). Comparing the three villages, Parakan Muncang has the highest proportion of the working age population (72.3%), thus the dependency ratio[5] of the households in

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[5] Ratio indicating the number of dependants family members (aged 0-14 and over the age of 65) to the total working age population (aged 15-64)

Parakan Muncang is the lowest. This indicates that labor force[6] of Parakan Muncang is higher than the two other villages.

Table 3. Family Size, age structure and labor force by Village

	Hambaro		Parakan Muncang		Sukaluyu		Total	
	n = 62		n = 63		n = 60		n = 185	
Family member								
1. Total household members (*persons*)	343		328		289		960	
2. Sex Ratio	111.73		105.00		97.95		105.13	
Male	181		168		143		492	
Female	162		160		146		468	
3. Household Size								
1 – 4	21	33.9%	21	33.3%	29	48.3%	71	38.4%
5 – 8	32	51.6%	40	63.5%	26	43.3%	98	53.0%
> 9	9	14.5%	2	3.2%	5	8.3%	16	8.6%
4. Range Household Size (*persons/household*)	2 – 11		1 – 12		2 - 10		1 - 12	
5. Average family size	5.5		5.2		4.8		5.2	
6. Nuclear Family Member	330	96.2%	311	94.8%	276	95.5%	917	95.5%
7. Extended Family Member	13	3.8%	17	5.2%	13	4.5%	43	4.5%
Age Structure								
< 15	121	35.3%	79	24.1%	97	33.6%	297	30.9%
15 – 65	216	63.0%	237	72.3%	182	63.0%	635	66.1%
> 65	6	1.7%	12	3.7%	10	3.5%	28	2.9%
Labor Force								
- Proportion of Labor Force	216	63.0%	237	72.3%	182	63.0%	635	66.1%
- Average labor force per household	3.5		3.8		2.9		3.4	
Dependancy Ratio	58.8%		38.4%		58.8%		51.2%	

Source: Household survey data

In relation to respondents' occupation, as presented in Table 4, most of the respondents are self employee (working for themselves) as farmers, carpenters and traders/merchants or in home industries; very few of the respondents work as employees such as civil servants or for private companies. In general, most of respondents (59.4%) engage in agriculture as their main occupation. But of the other family members' of the household surveyed only 7.1% consider farming to be their main occupation.   Overall, 17.1% of surveyed population engage in agriculture as their main occupation.

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[6] The term 'labor force' in this study is identified as working age/economically active population, hence age group of 15-65 years old

Table 4. Percentage distribution of respondent and family member by occupation

Working age population	Hambaro		Parakan Muncang		Sukaluyu		Sample Villages	
	% of n= 62	% of n= 281	% of n= 63	% of n= 265	% of n= 60	% of n= 229	% of n= 185	% of n= 775
Main Occupation								
1. Farmer	56.5	6.8	34.9	3.8	33.3	8.3	41.6	6.2
2. Farm laborer	9.7	0.7	23.8	0.8	20.0	1.3	17.8	0.9
3. Trader/merchant	24.2	7.1	17.5	6.8	20.0	3.9	20.5	6.1
4. Home industry			1.6		1.7		1.1	
5. Gold extraction		0.4				0.4		0.3
6. Services								
~Transport	1.6		3.2	0.8	5.0	0.9	3.2	0.5
~Other services				1.1	3.3		1.1	0.4
7. Civil servant	3.2	1.1	12.7	3.4	10.0	0.4	8.6	1.7
8. Private company employee		0.4	1.6	1.1		2.6	0.5	1.3
9. Off farm laborer	3.2	1.8	3.2	1.9	3.3	3.5	3.2	2.3
10.Unemployee	1.6	20.3	1.6	29.8	3.3	16.2	2.2	22.3
Total (%)	100	38.4	100	49.4	100	37.6	100	41.9
Side occupation								
1. Farmer	22.6	1.1	46.0	0.4	50.0	0.4	39.5	0.6
2. Farm laborer	24.2	1.8	6.3	0.4	1.7	0.9	10.8	1.0
3. Trader/merchant	11.3		1.6	0.4	5.0	0.9	5.9	0.4
4. Home industry					1.7		0.5	
5. Gold extraction					1.7		0.5	
6. Services								
~Transport								
~Other services			3.2		1.7		1.6	
7. Civil servant	4.8		1.6		1.7	0.4	2.7	0.1
8. Off farm laborer	1.6	0.4	1.6	0.4	8.3	0.9	3.8	0.5
Total (%)	64.5	3.2	60.3	1.5	71.7	3.5	65.4	2.7

Source: Household survey data

Concerning side occupation, defined as income generating activities additional to the main occupation, about two-fifth of the respondents engage in other activities out side their farm for additional income. The case of Sukaluyu, half of the respondents consider farming as their side occupations. As we can see in the Table 4, two dominance activities are work as farm laborer (17.8%) and trader/merchant (20.5%).

In further detail, to relate those occupation data to the labor force of the household members, it is found that there are 22.2% of the family member belong to working age population who have no occupation. There are no significant different among the three sample villages in the proportion of the jobless family member, ranging between

16.2% and 29.8%, it is much higher than West Java Province (12.3%) and even than national data (9.5%) (BPS, 2003).

Educational attainment is another parameter considered. Statistics of Kecamatan Nanggung indicate that education level is quite low; only 16.5% of the population in the study area attained senior secondary education (SLTA/SMU/SMA). The household survey found that 5.9 % of the respondents were illiterate, lower than national data (9.07%), and most of the respondents (87.6%) never went beyond elementary level. As summarized in Table 5, among the family members, only 6.5% attained higher level of education beyond elementary school, and primary school enrollment rate[7] is also low.

Table 5. Percentage distribution of Respondents and Family members by educational attainment and elementary school enrolment rate

	Parakan Muncang	Curug Bitung	Cisarua	Sample Villages
Respondents (number)	**(62)**	**(63)**	**(60)**	**(185)**
Never goes to school	6%	5%	7%	6%
Elementary school	88.7%	85.7%	88.3%	87.6%
Junior secondary school		3.2%		1.1%
Senior secondary school	1.6%	3.2%	1.7%	2.2%
Academy/University	3.2%	3.2%	3.3%	3.2%
	100%	100%	100%	100%
Family members (number)	**(281)**	**(265)**	**(229)**	**(775)**
Schooling age but not yet enrolled	7.3%	7.0%	10.4%	8.1%
Never goes to school	3.6%	1.5%	3.5%	2.6%
Kindergarten			1.0%	0.3%
Elementary school	66.5%	51.8%	55.7%	58.2%
Junior secondary school	3.8%	9.5%	5.5%	6.3%
Senior secondary school	1.2%	8.2%	3.1%	4.2%
Academy/University	0.3%	2.7%	0.0%	1.0%
	100%	100%	100%	100%
Primary school enrolment rate	**88.6%**	**90.5%**	**83.7%**	**87.8%**

Source: Household survey data

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[7] **Primary school enrolment rate** is primary school enrolment ratio. Data refer to gross enrolment ratio, which is the total enrolment of all ages divided by the population of the specific age groups, corresponding to the primary school age group. The ratio may exceed 100 if the actual age distribution of pupils extends beyond the official school ages. (UNESCAP)

Assets

a) Housing

As seen in Table 6 at the physical attributes of the houses where the surveyed household settle, such as building materials, type of floor, type of roof, floor space and water closet availability in each house, larger part of the household samples settle in reasonably appropriate houses for rural environment. As seen in Table 6, most of the houses are made of concrete with appropriate floor; some houses are even furnished with ceramic tile.

Table 6.   Percentage distribution of respondents' houses by physical attributes.

Physical Attribute	Hambaro	Parakan Muncang	Sukaluyu	Total
	n = 62	n = 63	N = 60	n = 185
1. Building Material				
Full Concrete	64.5%	79.4%	60.0%	68.1%
Wood	1.6%	1.6%	3.3%	2.2%
Bamboo	33.9%	19.0%	36.7%	29.7%
2. Type of Floor				
Ceramic tile	37.1%	36.5%	40.0%	37.8%
Simple tile	17.7%	31.7%	6.7%	18.9%
Simple concrete cement	22.6%	22.2%	35.0%	26.5%
Wood	6.5%	1.6%	3.3%	3.8%
Bamboo	14.5%	6.3%	10.0%	10.3%
Dirt	1.6%	1.6%	5.0%	2.7%
3. Type of Roof				
Roof-tile	98.4%	100%	100%	99.5%
Plant Leafs	1.6%	-	-	-
4. In House Bathroom				
Available	46.8%	57.1%	30.0%	44.9%
Not available	53.2%	42.9%	70.0%	55.1%
5. In House Closet				
Available	40.3%	54.0%	30.0%	41.6%
Not available	59.7%	46.0%	70.0%	58.4%
6. Floor Width				
≤ 19 M²	0%	0%	1.7%	0.5%
20-29 M²	3.2%	3.2%	6.7%	4.3%
30-49 M²	30.6%	15.9%	36.7%	27.6%
50-99 M²	61.3%	77.8%	48.3%	62.7%
100-149 M²	4.8%	3.2%	3.3%	3.8%
≥ 150 M²	0%	0%	3.3%	1.1%
Floor Width Range (M²)	20 - 120	20 - 144	20 - 168	12 - 168
Avg Floor Width (M²)	56	58	56	
Avg Floor Width per person (M²/ps)	10	11	12	11

Source: Household survey data

Besides, all the houses were roof-tiled. Average floor space of the houses were 57.1 m^2, varies between 12 m^2 and 168 m^2; average floor space per person were 11 m^2. Regarding toilet availability, less than half of the households surveyed have inside toilet facilities.

With regard to electricity, almost all houses of the surveyed household are supplied by electricity power from State Owned Electricity Power (PLN). While for telephone line very few houses in all villages surveyed (7.0% of the houses) get connection this public services.

b) Landholdings and plot history

Comparing the three sample villages, Table 7 shows that average landholding per household is 0.33 ha in Hambaro, 0.43 ha in Parakan Muncang and 0.49 in Sukaluyu – averaging 0.42 ha across the study area. Range of landholding per family is 0.33 to 0.49 ha. The larger portion of the surveyed household belong to the lowest strata of land holding classes; hence 52.4% of the surveyed household controlling less than 0.2 ha of land. Hambaro is the highest where the other two villages relatively better off in this regards.

Looking at land tenure issue, not all agricultural land that is controlled by the surveyed household is owned by that household.   The study revealed that 11% of the total agricultural land controlled by the surveyed household belongs to others and is cultivated by means of renting in, sharecropping, or just **numpang**[8].   It needs to note that sharecropping systems mainly applies to wetland rice field

There is unequal distribution of land holdings in the study area. As shown in Figure 3, the bottom 60% of the surveyed household controlled only 15% of total landholding size, while the top 20% controlling about 62% of the total land. Apart from that, regardless the land use type, average landholding size per household is 0.42 ha, with an average of 0.08 ha per family member. Considering the small landholdings controlled by families, it is not surprising that off farm activities are an important elements their livelihood.

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[8] *Numpang* is a colloquial Bahasa Indonesia that is normally used for or means ride-in. It this context, the word of *numpang* means cultivating others land without any financial consequences, or right to use the land. It happens if the land is not used by the owner.

Table 7. Profile of surveyed households according to landholdings by village and land use type

	Hambaro			Parakan Muncang			Sukaluyu			Total		
	n	%	Ha	n	%	Ha	n	%	Ha	n	%	Ha
	n hh =	62		n hh =	63		n hh =	60		n hh =	185	
	n plot =	103		n plot =	102		n plot =	105		n plot =	310	
1. Number of Plot Owned (plot)												
1 plot	62	100%	14.76	63	100%	14.47	60	100%	16.16	185	100%	45.39
2 plots	37	59.7%	5.31	36	57.1%	11.26	36	60.0%	12.67	109	58.9%	29.24
3 plots	4	6.5%	0.52	3	4.8%	0.83	9	15.0%	0.9	16	8.6%	2.26
2. Type of Land Owned (plot)												
Irrigated Paddyfield	37	59.7%	9.85	38	60.3%	10.96	24	40.0%	7.57	99	53.5%	28.38
Rainfed Paddyfield	23	37.1%	4.59	20	31.7%	3.23	21	35.0%	7.21	64	34.6%	15.03
Dry Land	25	40.3%	3.04	23	36.5%	5.36	35	58.3%	8.83	83	44.9%	17.24
Monoculture Garden	7	11.3%	0.76	2	3.2%	0.35	9	15.0%	1.62	18	9.7%	2.73
Simple Agroforest	10	16.1%	1.37	18	28.6%	6.61	15	25.0%	4.48	43	23.2%	12.45
Complex agroforest	1	1.6%	1.00							1	0.5%	1.00
Shrub				1	1.6%	0.04	1	1.7%	0.01	2	1.1%	0.05
3. Land size (m²) by household												
< 0.1	28	45%	1.35	17	27%	0.88	23	38%	1.25	68	37%	3.48
0.11 - 0.3	11	18%	1.73	25	40%	4.88	7	12%	1.36	43	23%	7.97
0.31 - 0.5	9	15%	3.64	4	6%	1.80	10	17%	4.18	23	12%	9.62
0.51 - 0.7	10	16%	5.94	3	5%	1.95	2	3%	1.13	15	8%	9.02
> 0.71	4	6%	7.94	14	22%	17.55	18	30%	21.30	36	19%	46.79
4. Descriptive statistics of landholding size												
Total Land Size Surveyed (Ha)	20.6			27.05			29.22			76.88		
Avg Land Size (Ha/Hh)	0.33			0.43			0.49			0.42		
Land Size Range (Ha)	0.003 - 3			0.002 - 2			0.003 - 1.8			0.002 - 3		
Std. Deviation	0.33			0.30			0.31			0.31		

Source: Household survey data

Cumulative Land Distribution
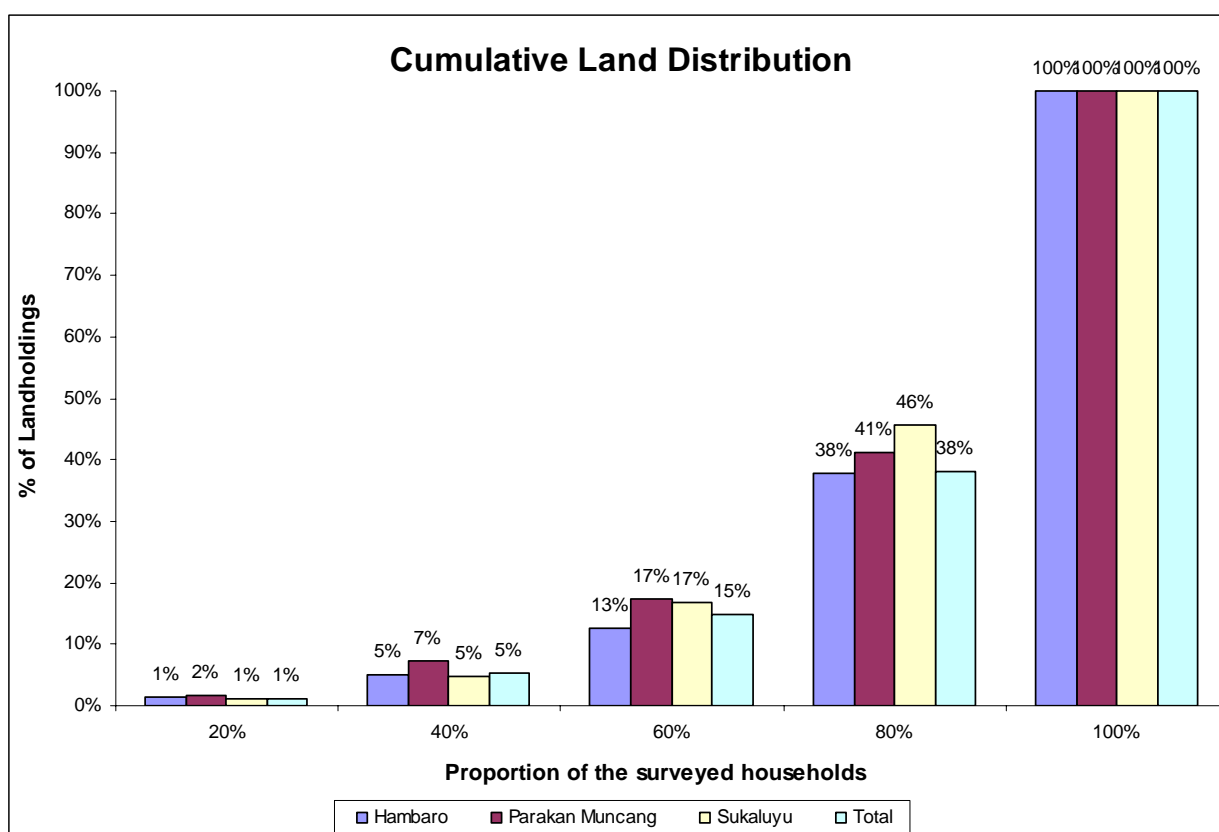
Source: Household survey data

Figure 3. Cumulative distribution of the surveyed household by landholding size

Almost all of plot samples (89%) were privately owned, with more than half (67%) obtained through inherintance. Land was acquired through purchase from other individual in 21% of the cases (See Table 8.). Obtaining land by forest clearance (logged-over forest) occured in 2% of the cases.

Table 8. Ways of obtaining the land by land status

Ways obtaining land	*Privately Owned*			*Perhutani Land*			*National Park*			*Numpang*			**Total**		
	n	%	Ha	n	%	Ha	n	%	Ha	n	%	Ha	n	%	Ha
Opened from Forest				6	2%	3.15							6	2%	3.15
Bought	65	(21%)	25.83										65	21%	25.83
Heritage	203	65%	38.02	5	2%	0.85							208	67%	38.87
Using other persons land	9	3%	3.50	6	2%	1.57	1	0.30%	1.00	15	5%	2.96	31	10%	9.03
	277	89%	67.35	17	5%	5.57	1	0.30%	1.00	15	5%	2.96	310	100%	76.88

Source: Household survey data

Table 8, documents history of land 'ownership'. Years of 'ownership' range from 1 to 61 years, averaging 19.9 years.

Table 9. Number of plot sample according to years of 'ownership'

Length of owned the land (yrs)	Hambaro		Parakan Muncang		Sukaluyu		Total	
	N	%	n	%	n	%	n	%
0 – 5	9	(9%)	15	(15%)	5	(5%)	29	(9%)
6 – 10	22	(21%)	18	(18%)	17	(16%)	57	(18%)
11 – 15	16	(16%)	8	(8%)	17	(16%)	41	(13%)
16 – 20	14	(14%)	10	(11%)	14	(13%)	38	(13%)
21 – 25	9	(9%)	4	(4%)	10	(10%)	23	(7%)
> 25	33	(32%)	47	(45%)	42	(40%)	122	(39%)

Source: Household survey data

The study was able to trace back the land use systems practices of the plot samples before and during the years of ownership by current land holder. As presented in Figure 4., Looking at the graph, the plot number of land use types relatively remain stable. But if we looking in further detail, to relate those land use type before owned to the current land use type (table 10.), it is found that rainfed paddy field, monoculture garden, and complex agroforest, tend to changed by household into other land use type. While irrigated paddy field, dryland, and simple agroforest relatively remain stable.
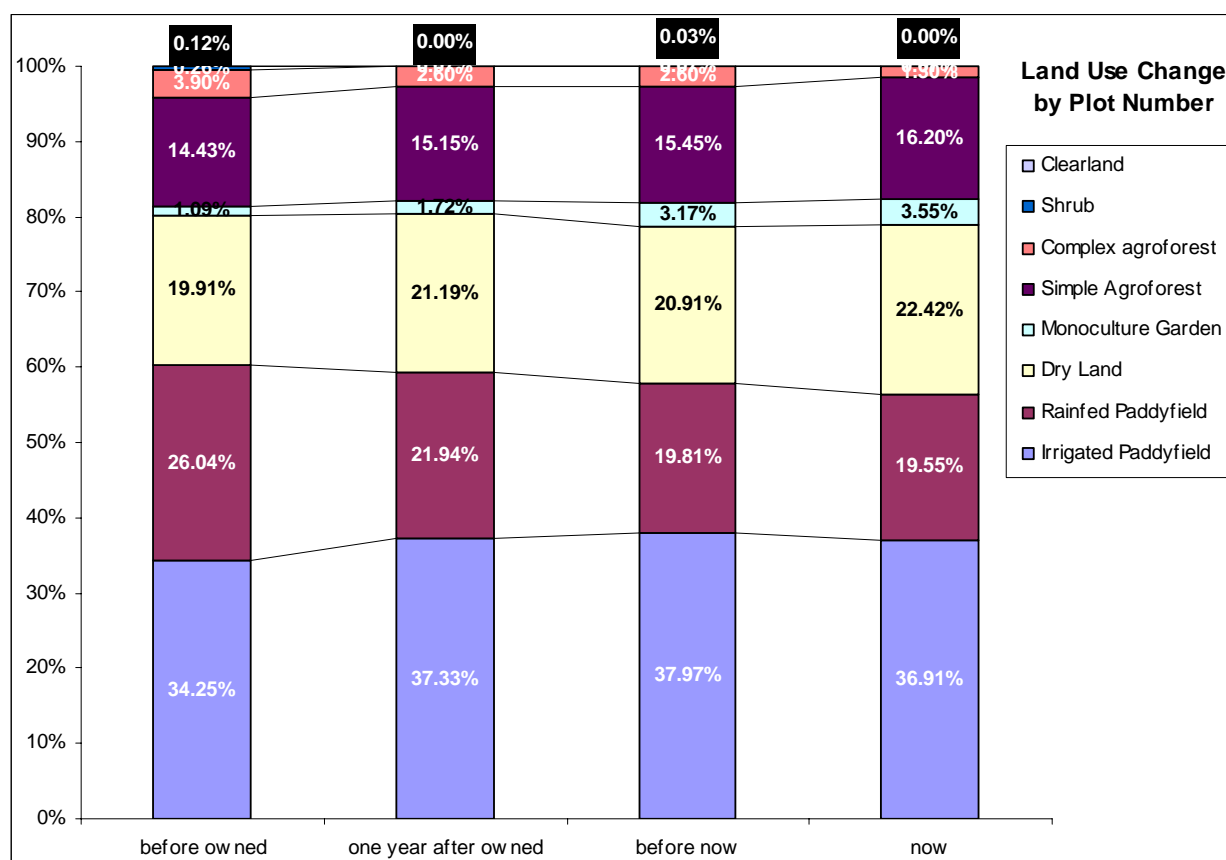
Source: Household survey data

Figure 4. Plot samples utlization Before and during ownership

Table 10. Land use type before owned and recent

		Land Use Type Now								
		Irrigated Paddyfield	*Rainfed Paddyfield*	*Dry Land*	*Monoculture Garden*	*Simple Agroforest*	*Complex agroforest*	*Shrub*	*Clearland*	*Total*
Land use type before owned	*Irrigated Paddyfield*	89.0%	3.3%	2.2%	4.4%	1.1%	0%	0%	0%	100%
	Rainfed Paddyfield	19.1%	66.3%	9.0%	4.5%	1.1%	0%	0%	0%	100%
	Dry Land	1.3%	2.6%	88.5%	6.4%	1.3%	0%	0%	0%	100%
	Monoculture Garden	0%	0%	33.3%	50.0%	16.7%	0%	0%	0%	100%
	Simple Agroforest	0%	0%	2.6%	0%	97.4%	0%	0%	0%	100%
	Complex agroforest	0%	0%	33.3%	0%	33.3%	33.3%	0%	0%	100%
	Shrub	0%	0%	0%	33.3%	0%	0%	66.7%	0%	100%
	Clearland	0%	0%	0%	100%	0%	0%	0%	0%	100%
	Total	31.9%	20.6%	26.8%	5.8%	13.9%	0.3%	0.6%	0.0%	100%

Source: Household survey data

c) Other assets

Information concerning other assets such as farm implements, savings, motor bikes and electronic equipment (TV and Radio) were also collected in this survey as a means of identifying the socio economic conditions of the target population. The data are summarized as follows.

Table 11. Other assets

Asset	Hambaro		Parakan Muncang		Sukaluyu		Total	
	n	62	n	63	n	60	n	185
1. Radio/Tape		50.0%		57.1%		56.7%		54.6%
2. Television		75.8%		76.2%		61.7%		71.4%
3. VCD/DVD		43.5%		47.6%		43%		44.9%
4. Telephone/Cellphone		8.1%		9.5%		3.3%		7.0%
5. Refrigerator		11.3%		12.7%		8.3%		10.8%
6. Bike		6.5%		4.8%		7%		5.9%
7. Motobike		6.5%		15.9%		8.3%		10.3%
9. Car		3.2%		1.6%		0%		1.6%

Source: Household survey data

Televisions are more common as compared to Radios/Tape Cassette Players, as seen in Table 11. Comparing to all assets, Parakan Muncang seems to be better off than the other two villages. The difference in this figures does not seem significant - with possible except of motor bikes in Parakan Muncang.

Income and Expenditure

This section discusses the living standards of the Nanggung population using two socio-economic indicators, i.e. income and expenditure. It describes family income (and per capita income), source of income, family expenditure (and per capita expenditure) and expenditure allocation. It also assesses the level of family income and expenditure of the surveyed household compared to national and provincial poverty line to find out the status of their living standard; hence surveyed households are defined as poor if their income or expenditure is below poverty line.

a) Income

Although most of people in Nanggung are engaged in agriculture (work as farmer), it is unlikely that agricultural income is the greatest contributor to family income. Income data derived from this survey shows that agriculture is not the main contributor to family income. As seen in Table 12., agricultural activities alone contribute only 14% to the total households' income, with average time spent 5.16 hours/day. However, comparing these three villages, it is interesting to note that the share of agricultural income of the surveyed household in Hambaro to the total family income is higher than in Parakan Muncang and Sukaluyu, although the average of landholding size in Hambaro s slightly less than in others two villages. More detail observation reveal that in Parakan Muncang, the most accessible village among the three sample villages, there are 68% of surveyed household engage in trade activities. This activity contributes about 42 % of the total off-farm income in Parakan Muncang (see Annex).

The fact that off-farm incomes contribute the most to the total family income, it explains that most of the surveyed household can't rely mainly on agricultural activities with relatively narrow landholding size for their livelihood. It also indicates that large portion of people, must engage in other income generating activities to meet their family livelihood needs.

For those households that have other sources of income (usually remittance from a son/daughter), although these sources are irregular and relatively small as a portion of total family income, this additional income is meaningful for their livelihood. In this regards, Sukaluyu is the 'best', meaning amount of income receiving this kind of income is highest.

Table 12. Households' Income and average time spent by source of income and by village sample

	Hambaro			Parakan Muncang			Sukaluyu			Total		
	n	Rp 000	%	n	Rp 000	%	n	Rp 000	%	n	Rp 000	%
Agriculture												
Agriculture	44	6,239	11	43	6,541	7	50	10,688	14	137	23,468	10
Livestock & Fishery	13	6,498	11	14	1,463	2	12	382	0.5	39	8,344	4
Total Agriculture Income	**46**	**12,737**	**22**	**46**	**8,004**	9	**52**	**11,070**	14	144	**31,812**	14
Average time spent in agriculture activities (hours/day)		5.10			5.31			5.11			5.16	
Off Farm Income	**58**	**37,554**	**63**	**60**	**73,529**	**83**	**57**	**36,866**	**47**	**175**	**147,948**	**65**
Average time spent in off-farm activities (hours/day)		5.54			5.83			5.34			5.59	
Non-fixed Income	**23**	**8,937**	**15**	**24**	**7,525**	**8**	**21**	**30,523**	**39**	**68**	**46,985**	**21**
Total Household Income	**62**	**59,228**	**100**	**63**	**89,058**	**100**	**60**	**78,459**	**100**	**185**	**226,745**	**100**

Source: Household survey data

From living standard point of view, it is necessary to question whether the surveyed households can fulfill their needs. To answer such questions, the study applies the poverty line of BPS – Statistics of Indonesia that refers to the daily minimum requirement of 2,100 kilo-calories per capita plus the non-food minimum requirement, such as for living, clothing, schooling, transportation, household necessities and other individual needs. The value of expenditure (in rupiahs) needed for fulfilling the basic minimum requirement including food and nonfood (that is called as poverty line) Indonesia in 2005 were Rp. 150,000 capita^{-1} month^{-1} respectively or in annual basis were Rp 1,800,000. capita^{-1} year^{-1} (BPS, 2005).

Using average per capita income of the surveyed household in three sample villages, the study reveals the average person/family in Nanggung is still above the poverty line. As seen in Table 13, average per capita incomes of the three sample villages are still higher than the poverty line of Indonesia. But, because of skewed distribution of income (see Figure 5), it needs to be treated with cautions, especially if number of people below poverty line is counted. The study found that more than half (52 %) of the surveyed household are below poverty line, mean that those households cannot afford the basic requirements, and thus are categorized as poor. Comparing the sample villages, Hambaro is the worst among the three sample villages; hence, about 67.7% of the people below poverty line.

Table 13. Descriptive statistics of family income of the surveyed households and people under poverty line

	Hambaro	Parakan Muncang	Sukaluyu	Sample Villages
Number of surveyed household	62	63	60	185
Number of family member	281	265	229	960
Total family income (Rp 000/month)	59,228	89,058	78,459	226,745
Range (Rp 000/month)				
Minimum	28	8	20	8
Maximum	9,306	12,967	3,950	12,967
Average family income per household (Rp 000/month)	955	1,414	1,308	1,226
Income per capita (Rp 000/month)	173	272	271	236
Proportion of people below poverty line				
~ of Indonesia (Rp 150,000 capita^{-1} month $^{-1}$)	67.7%	38.1%	51.7%	52.4%

Source: Household survey data
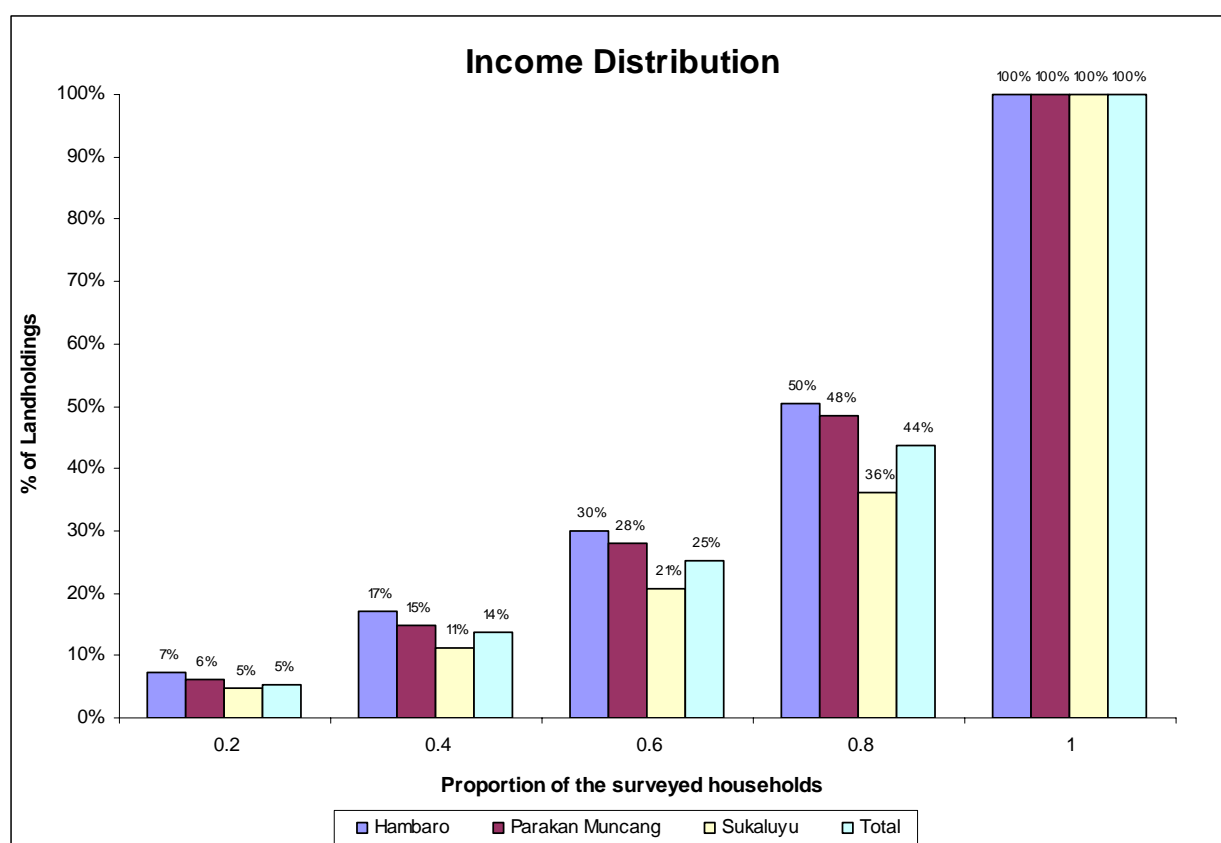
Source: Household survey data

Figure 5. Cumulative distribution of the surveyed household by Income

b) Expenditure

Table 14 describes expenditures of the surveyed households in the three sample villages.   The data are monthly expenditure derive from the survey.

Table 14. Households' expenditure by items (per month)

	Hambaro			Parakan Muncang			Sukaluyu			Total		
	n	Rp000	%	N	Rp000	%	n	Rp000	%	n	Rp 000	%
1. Food	62	21,730	66%	63	24,075	64%	60	18,733	56%	185	64,538	62%
2. Education	42	3,190	10%	33	2,983	8%	39	2,801	8%	114	8,974	9%
3. Electricity	56	2,032	6.1%	57	2,487	-	46	1,875	6%	159	6,394	6%
4. Telphone	3	340	1%	3	170	0%	1	100	0%	7	610	1%
5. Health	28	1,084	3%	33	1,225	3%	38	1,455	4%	99	3,764	4%
6. Transportation	23	1,727		29	1,854		36	3,069		88	6,650	6%
7. Cigarette		-	-	1	50	0.1%		-	-	1	50	0.0%
8. Others	1	1	0%	3	2,385	6%	6	1,323	4%	10	3,710	4%
9. Farm Inputs	60	3,059	9%	59	2,154	6%	53	4,084	12%	172	9,297	9%
Total Household Expenditure	**62**	**33,163**	**100%**	**63**	**37,383**	**100%**	**60**	**33,440**	**100%**	**185**	**103,986**	**100%**
Family Expenditure per household		**535**			**593**			**557**			**562**	
Average Family Income		**955**			**1,414**			**1,308**			**1,226**	

Source: Household survey data

Survey data on household expenditures shows that all expenditures are lower than family income, and average expenditure per households is also lower than average family income (see also Table 12 and Table 13).   This demostrates that almost all income is spent on consumption. Having a close look at the expenditure items, the largest proportion is spent on food (62%) and other non-food consumption that is categorized as basic needs for the family livelihood, such housing, cloth, education, transportation, and others.

Table 15. Households' expenditure by items (per month)

Percentage of Expenditure to Income	Hambaro		Parakan Muncang		Sukaluyu		Total	
	N	%	n	%	n	%	n	%
≤ 50%	14	22.6%	25	39.7%	16	26.7%	55	29.7%
50% - 75%	19	30.6%	14	22.2%	14	23.3%	47	25.4%
76 - 100%	18	29.0%	20	31.7%	17	28.3%	55	29.7%
100%<	11	17.7%	4	6.3%	13	21.7%	28	15.1%

Source: Household survey data

The also study revealed that about 15% of surveyed household had negative income, it's mean their expenditure higher than income. As seen in Table 15, Sukaluyu is the worst among the three sample villages; about 22% of the people had negative income.

Farming System Characteristics

This section presents the profile of farming practices of the surveyed household based on the information gathered by interviewing the respondents. It describes how farmers manage their agricultural land and the productions with special emphasis on vegetables farming management.

a) Physical Characteristics

As mention earlier, agricultural land controlled by the surveyed household is comprise of rice fields, dryland agriculture, monoculture gardens (ex. Cassava, *timun*), and traditional multispecies tree gardens. As seen in Table 16, of 310 plots, there are 163 plots (43.4 ha) of rice field, 83 plots (17.2 ha) of dryland agriculture (*Tegal/ladang*) and 18 plots (2.7 ha) of monoculture gardens and 43 plots (12.4 ha) of multi-species tree garden controlled by the surveyed households.

Table 16. Physical Characteristics of plot controlled by household by land use type

	Irrigated Paddyfield	Rainfed Paddyfield	Dry Land	Monoculture Garden	Simple Agroforest
Number of Plot	99	64	83	18	43
Total Area (Ha)	28.38	15.03	17.24	2.73	12.45
1. Distance from Village (M²)					
≤ 500 m	82%	83%	95%	78%	77%
500 - 1,000 m	5%	6%	0%	22%	19%
1,000m <	13%	11%	5%	0%	5%
2. Time Needed to go to the plot (Minutes)					
1 – 15	80%	84%	89%	83%	63%
16 – 30	16%	13%	10%	11%	35%
31 – 60	4%	3%	1%	6%	2%
> 60					
3. Plot Fertility					
Quite Fertile to Very Fertile	87%	53%	87%	83%	67%
Less Fertile	13%	47%	12%	17%	33%
Not Fertile			1%		
4. Plot Slope					
Flat to Slightly Slope	88%	64%	93%	89%	47%
Gently Slope	12%	36%	5%	11%	40%
Slightly Step to Step Slope	0%	0%	2%	0%	14%
5. Water Source for Irrigation					
Technical Drainage	14%				
Simple Drainage	9%	2%	2%		
Direct from River	17%	5%	4%	11%	2%
Water Spring	53%	8%	14%	6%	7%
Rain Fed	6%	86%	80%	78%	91%
Others	1%			6%	

Source: Household survey data

Intensive agriculture (paddy field, dryland and monoculture garden) mostly takes place in the relatively flat area, more than 80% of the plots are considered by the respondents as gently to slightly steep area. Regarding to soil fertility, most of

respondents consider their land quite fertile to very fertile. With the exception of the irrigated paddy fields, all other plots depend on rain as source of water to support crop production.

Table 17. Physical Characteristics of plot controlled by household by Village

	Hambaro	Parakan Muncang	Sukaluyu	Total
Number of Plot	103	102	105	310
Total Area (Ha)	20.60	27.0537	29.2241	76.8793
1. Distance from Village (M²)				
≤ 500 m	79.6%	75.5%	80.0%	78.4%
500 - 1,000 m	9.7%	20.6%	11.4%	13.9%
1,000m <	10.7%	3.9%	8.6%	7.7%
2. Time Needed to go to the plot (Minutes)				
1 – 15	83.5%	88.2%	72.4%	81.3%
16 – 30	15.5%	10.8%	21.0%	15.8%
31 – 60	1.0%	1.0%	6.7%	2.9%
> 60				
3. Plot Fertility				
Quite Fertile to Very Fertile	70.9%	76.5%	81.9%	76.5%
Less Fertile	28.2%	23.5%	18.1%	23.2%
Not Fertile	1.0%			0.3%
4. Plot Slope				
Flat to Slightly Slope	71.8%	79.4%	82.9%	78.1%
Gently Slope	25.2%	20.6%	12.4%	19.4%
Slightly Step to Step Slope	2.9%		4.8%	2.6%
5. Water Source for Irrigation				
Technical Drainage	9.7%	2.0%	1.9%	4.5%
Simple Drainage	3.9%	4.9%	2.9%	3.9%
Direct from River	11.7%	2.0%	11.4%	8.4%
Water Spring	12.6%	36.3%	21.9%	23.5%
Rain Fed	62.1%	53.9%	61.0%	59.0%
Others		1.0%	1.0%	0.6%

Source: Household survey data

Using village as basis for plot characteristics in three villages, as seen in Table 17, the agricultural land mostly situated in undulating area, from gently to steep slope. In soil fertility, most of the land is quite fertile; only 0.3% of the plots are considered by the respondents as not fertile.

From the interview with the respondent, we founds 23 vegetables species and two staple crop species (paddy and cassava). The top five vegetables species found in of plots samples were : Pisang (*Musa* sp.), Kacang panjang (*Vigna sinensis*), Timun (*Trichosanthes cucumeroides maxim*), Kucai (*Allium tuberosum*) and Buncis (*Phaseolus vulgaris*). This species are mostly cultivated by farmer in dryland and simple agroforest plots.

Table 18. Vegetables Species Cultivated by surveyed household (by landuse types)

No	Commodity	Irrigated Paddyfield (% of n=99)	Rainfed Paddyfield (% of n=64)	Dry Land (% of n=83)	Monoculture Garden (% of n=18)	Simple Agroforest (% of n=43)	Total (% of n=307)
1	Bayam (*Alternanthera amoena voss*)			1.2%			0.3%
2	Buncis (*Phaseolus vulgaris*)		1.6%	4.8%		7.0%	2.6%
3	Cabe (*Capsicum frutescens*)			7.2%	5.6%	2.3%	2.6%
4	Caesin (*Brassica rapa L.*)	1.0%		3.6%			1.3%
5	Jagung (*Zea mays L.*)			4.8%		4.7%	2.0%
6	Jahe (*Zingiber offcinale*)	1.0%	1.6%	3.6%	5.6%		2.0%
7	Kacang kedelai (*Soya max piper*)		1.6%				0.3%
8	Kacang panjang (*Vigna sinensis*)	2.0%		12.0%		7.0%	4.9%
9	Kacang tanah (*Arachis hypogaea*)	1.0%	1.6%	2.4%	5.6%		1.6%
10	Kangkung (*Ipomoea aquatica forsk*)			1.2%			0.3%
11	Katuk (*Sauropus androgynus merr*)			1.2%			0.3%
12	Kucai (*Allium tuberosum*)			3.6%		16.3%	3.3%
13	Kunyit (*Curcuma longa*)	1.0%		3.6%		2.3%	1.6%
14	Lengkuas (*Alpinia galangal*)			7.2%		4.7%	2.6%
15	Padi (*Oryza sativa L.*)	99.0%	95.3%	2.4%			52.4%
16	Pepaya (*Carica papaya L.*)			2.4%			0.7%
17	Pisang (*Musa sp.*)	2.0%	1.6%	26.5%	16.7%	18.6%	11.7%
18	Sawi (*Brassica juncea (L.) chern*)			1.2%			0.3%
19	Sereh (*Andropogon citratus dc*)			2.4%		4.7%	1.3%
20	Singkong (*Manihot esculenta*)	1.0%	7.8%	47.0%		20.9%	17.6%
21	Talas (*Colocasia esculenta*)			3.6%		2.3%	1.3%
22	Terong (*Solanum melongena L.*)			2.4%			0.7%
23	Timun (*Trichosanthes cucumeroides maxim*)	3.0%		9.6%		7.0%	4.6%
24	Tomat (*Solanum lycopersicum*)			3.6%			1.0%
25	Ubi Jalar (*Ipomoea batatas*)				5.6%		0.3%

Source: Household survey data

Simple agroforest or ***Dudukuhan*** are traditional tree farming system commonly found in West Java, farmers realized that ***Dudukuhan*** are underproductive and hold great untapped potential for meeting the raising demand for tree and annual crop products in West Java. Farmers are interested in intensifying the management of their dudukuhans, but hesitate because they do not know where to focus their efforts (Manurung, 2005).

The Dudukuhan process starts with fallow systems, which are cleared by farmer to establish 'huma or tegalan' upland systems of banana and annual crops for 3 to 4 years. During that period, farmer enriched the huma by planting seedlings or wildlings of the priority tree species (Manurung, 2005).

In Table 19., the tree species used to plant in Dudukuhan are Alpukat (***Persea Americana***), Melinjo (*Gnetum gnemon*), Nangka (***Artocarpus heterophyllus***), Jengkol (***Pithecellobium jiringa***), Durian (***Durio zibethinus***), Kecapi (***Sandoricum koetjape***), Sengon (Paraserianthes *falkataria*), Mangga (***Mangifera indica***), Petai (***Parkia speciosa***), and Pinus (*Pinus* sp). Kacang panjang (***Vigna sinensis***), Timun (***Trichosanthes cucumeroides maxim***), Kucai (***Allium tuberosum***) and Buncis (***Phaseolus vulgaris***), are the most common annual crops cultivated by farmer under Dudukuhan system.

Table 19. Trees and Annual Crops Species combination found in household survey

Tree Species	Annual Crop Species
Alpukat (*Persea Americana*), Nangka (*Artocarpus heterophyllus*)	Kucai (*Allium tuberosum*)
Jengkol (*Pithecellobium jiringa*), Durian (*Durio zibethinus*)	Kucai (*Allium tuberosum*)
Jengkol (*Pithecellobium jiringa*), Petai (*Parkia speciosa*)	Kacang panjang (*Vigna sinensis*)
Kecapi (*Sandoricum koetjape*), Sengon (*Paraserianthes falkataria*), Mangga (*Mangifera indica*)	Buncis (*Phaseolus vulgaris*), Kacang panjang (*Vigna sinensis*)
Mahoni (*Swietenia macrophylla King*), Sengon (*Paraserianthes falkataria*) Melinjo (*Gnetum gnemon*)	Buncis (*Phaseolus vulgaris*), Kacang panjang (*Vigna sinensis*)
Melinjo (*Gnetum gnemon*)	Buncis (*Phaseolus vulgaris*), Kacang panjang (*Vigna sinensis*)
Nangka (*Artocarpus heterophyllus*), Rambutan (*Nephelium lappaceum*)	Buncis (*Phaseolus vulgaris*), Kacang panjang (*Vigna sinensis*)
Petai (*Parkia speciosa*)	Kacang panjang (*Vigna sinensis*), Timun (*Trichosanthes cucumeroides maxim*)
Pinus (*Pinus* sp)	Timun (*Trichosanthes cucumeroides maxim*), Kucai (*Allium tuberosum*), Buncis (*Phaseolus vulgaris*), Kacang panjang (*Vigna sinensis*)
Sengon (*Paraserianthes falkataria*)	Kucai (*Allium tuberosum*), ,Kacang panjang (*Vigna sinensis,*)Timun (*Trichosanthes cucumeroides maxim*)
Melinjo (*Gnetum gnemon*), Nangka (*Artocarpus heterophyllus*)	Buncis (*Phaseolus vulgaris*), Kacang panjang (*Vigna sinensis*)

Source: Household survey data

As seen in Table 20., household who experienced with tree-annual crop farming system only 10.3% to the total households. Comparing these three villages, it is interesting to note that in Sukaluyu, about 25% of surveyed household experienced with tree-annual crop farming system.

Table 20. Number of Household experienced with Tree-annual crop Farming System

	Hambaro		Parakan Muncang		Sukaluyu		Total	
	n	%	n	%	n	%	n	%
Household experienced	1	1.6%	3	4.8%	15	25.0%	19	10.3%
Household not experienced	61	98.4%	60	95.2%	45	75.0%	166	89.7%

Source: Household survey data

b) Labour and External Inputs

This part of the report presents the level of inputs (external inputs application and labor inputs) allocated to farm management by the surveyed household.

With regard to labor inputs, based on activities implemented, the data shows that land preparation is the activity most commonly conducted in the farm. Harvesting, maintaining and planting, respectively are the activities that require the most labor. As seen in the Table 21, the number of person-days involve in land preparation is much higher than the number of person-days involved in other activities. Number of

person-days involved in nursery activities and fertilizing activities is the lowest compare with the others activities.

Table 21. Level of Labour Input by land use type

	Irrigated Paddyfield	Rainfed Paddyfield	Dry Land	Monoculture Garden	Simple Agroforest
No of Plot	99	64	83	18	43
Total Area (ha)	28.38	15.03	17.24	2.73	12.45
Labor inputs					
1.1 Land Preparation					
~ Plot with land prep. Activity (%)	100%	100%	84%	89%	44%
~ Average Labor (ps-day/ha)	121.5	117.2	160.3	78.6	57.2
1.2 Nursery					
~ Plot with land prep. Activity (%)	95%	92%	12%	6%	2%
~ Average Labor (ps-day/ha)	10.9	10.6	1.7	0.1	0.3
1.3 Planting					
~ Plot with planting activity (%)	99%	98%	83%	89%	44%
~ Average Labor (ps-day/ha)	57.0	50.8	80.9	24.1	33.8
1.4. Maintaining					
~ Plot with Crop care activity (%)	98%	97%	70%	89%	33%
~ Average Labor (ps-day/ha)	64.5	52.4	107.7	33.1	27.5
1.5. Fertilizing					
~ Plot with Fertilizer. activity (%)	95%	86%	48%	72%	33%
~ Average Labor (ps-day/ha)	13.5	14.9	20.8	10.1	6.7
1.6. Harvesting					
~ Plot with harvesting activity (%)	98%	97%	75%	72%	42%
~ Average Labor (ps-day/ha)	66.6	56.0	49.1	19.1	16.0

Source: Household survey data

Labor inputs, as presented in Table 22., shows that the larger area of plot samples the less labor input will be. It can be understood that farmers who have small parcel of tends to intensify their land for their livelihood. It does also relate to the availability of labor. Farmers who have larger area of agricultural land, without a sufficient amount of labor tend to practice less labor intensive agricultural systems, such tree-based systems.

Table 22. Labor inputs by land holding size and land use type

Land size (ha) by household	Irrigated Paddyfield	Rainfed Paddyfield	Dry Land	Monoculture Garden	Simple Agroforest
	Average Labor Input (ps-day/ha)				
< 0.1	483	433	580	274	185
0.11 - 0.3	234	215	261	93	118
0.31 - 0.5	128	59	160	19	124
0.51 - 0.7	113	45	30		
> 0.71	254	45	73		21

Source: Household survey data

The use fertilizer, both chemical and green manure, was quite common in all sample plots in the study site, except for complex agroforests and fallow lands. Table 23.

presents the fertilizer rate of every land use category. In general, the rate of fertilizer varies according to land use category and varies among plot within the land use category. It reflects the variation of land use practices and agricultural undertaking. As can be seen external agricultural inputs used by the surveyed household is quite high.

Table 23. Level of External Input by type of land use type

	Irrigated Paddyfield	Rainfed Paddyfield	Dry Land	Monoculture Garden	Simple Agroforest
No of Plot	99	64	83	18	43
Total Area (ha)	28.38	15.03	17.24	2.73	12.45
External Inputs					
Chemical Fertilizer					
Urea					
~ Plot applying (%)	100%	97%	39%	44%	23%
~ Average Rate (kg ha^{-1})	426.5	691.7	179.5	180.6	28.7
SP-36					
~ Plot applying (%)	91%	94%	54%	56%	35%
~ Average Rate (kg ha^{-1})	160.0	228.8	105.0	117.8	17.7
KCL					
~ Plot applying (%)	24%	16%	20%	39%	16%
~ Average Rate (kg ha^{-1})	30.6	22.1	72.0	48.7	4.3
NPK					
~ Plot applying (%)			2%	22%	
~ Average Rate (kg ha^{-1})			1.5	11.9	
Other					
~ Plot applying (%)	5%	2%	5%	0%	5%
~ Average Rate (kg ha^{-1})	5.1	2.3	91.4	-	7.0
Organic Fertilizer					
~ Plot applying (%)	21%	16%	52%	78%	30%
~ Average Rate (kg ha^{-1})	348.9	721.1	3,836.0	4,049.7	972.0
Pesticide					
~ Plot applying (%)	88%	91%	33%	44%	16%
~ Average Rate (ml ha^{-1})	6,368.6	2,402.5	10,214.1	1,087.5	364.0

Source: Household survey data

The study found that chemical fertilizer was applied in all paddyfields and organic fertilizer mostly was applied in monoculture garden and dryland plots. The rate of fertilizer application, for chemical fertilizer was also quite high, ranging between 2 and 7,500 kg ha^{-1}, whereas for organic fertilizer, some plots, especially monoculture garden applies reasonably high, up to 34 ton ha^{-1}.

Same as fertilizer applications, rate of pesticide application and type of pesticide used varies according to land use category. As seen on Table 23.above, all types of pesticide applied for all land use category. While paddy field in the study cite mostly applied herbicide to reduce labor cost for weedings. The rate of pesticide application for dryland was the highest among the other land use category.

c) Farm Outputs

Regarding to the farm outputs, Table 24 presents the vegetable commodities produced in the plot. It was found that almost all commodities harvested in the plot were sold by the surveyed households. Most of the harvested yields (89% or more) are sold for 22 annual commodities. Only 76.5% of corn yields are sold and 29.6% of rice. All (100%) of the sawi produced is consumed by households.

Table 24. Farm outputs by land use type (per plot)

No	Commodity	Unit	n = plot	Yield Total	Yield Avg (per plot)	Yield Consump (%)	Yield Sold (%)
1	Bayam (*Alternanthera amoena voss*)	ikat	1	900	900		100%
2	Buncis (*Phaseolus vulgaris*)	*kg*	8	2,020	253	1.3%	98.7%
3	Cabe (*Capsicum frutescens*)	*kg*	8	754	94	4.5%	95.5%
4	Caesin (*Brassica rapa L.*)	kg	4	410	103		100%
5	Jagung (*Zea mays L.*)	kg	6	1,500	250	23.5%	76.5%
6	Jahe (*Zingiber offcinale*)	*kg*	6	400	67		100%
7	Kacang kedelai (*Soya max piper*)	kg	1	50	50	10.0%	90.0%
8	Kacang panjang (*Vigna sinensis*)	*kg*	15	8,925	595	0.6%	99.4%
9	Kacang tanah (*Arachis hypogaea L*)	kg	5	580	116	1.7%	98.3%
10	Kangkung (*Ipomoea aquatica forsk*)	ikat	1	120	120		100%
11	Katuk (*Sauropus androgynus merr*)	ikat	1	600	600		100%
12	Kucai (*Allium tuberosum*)	ikat	10	9,100	910		100%
13	Kunyit (*Curcuma longa*)	*kg*	5	7,100	1,420		100%
14	Lengkuas (*Alpinia galangal*)	*kg*	7	2,640	377	0.8%	99.2%
15	Padi (*Oryza sativa L.*)	kg	161	100,805	626	70.4%	29.6%
16	Pepaya (*Carica papaya L.*)	kg	2	1,200	600		100%
17	Pisang (*Musa sp.*)	*tandan*	36	859	24	10.2%	89.8%
18	Sawi (*Brassica juncea (L.) chern*)	kg	1	10	10	100%	
19	Sereh (*Andropogon citratus dc*)	kg	4	1,050	263		100%
20	Singkong (*Manihot esculenta*)	*kg*	54	26,680	494	6.3%	93.7%
21	Talas (*Colocasia esculenta*)	*kg*	4	565	141	7.1%	92.9%
22	Terong (*Solanum melongena L.*)	kg	2	150	75		100%
23	Timun (*Trichosanthes cucumeroides maxim*)	kg	14	13,045	932	0.3%	99.7%
24	Tomat (*Solanum lycopersicum*)	kg	3	496	165	0.2%	99.8%
25	Ubi Jalar (*Ipomoea batatas*)	*kg*	1	450	450	11.1%	88.9%

Source: Household survey data

Paying attention to the returns gain from kebuns, data derived from respondents shows that among the commodities produced in the plot (excluded Paddy), *Timun, Cabe, Caesin, Jagung, Kacang kedelai, and Ubi Jalar* are the most valuable species, provided above five million rupiah per hectare.

Table 25. Farm income by land use type (per ha)

No	Commodity	Unit	n = plot	Price (Rp/unit)	Average Yield (per ha)	Income (Rp000/ha)
1	Bayam (*Alternanthera amoena voss*)	ikat	1	500	9,000	4,500
2	Buncis (*Phaseolus vulgaris*)	*kg*	8	1,650	677	1,116
3	Cabe (*Capsicum frutescens*)	*kg*	8	7,500	1,007	7,549
4	Caesin (*Brassica rapa L.*)	kg	4	1,500	3,400	5,100
5	Jagung (*Zea mays L.*)	kg	6	3,000	1,904	5,713
6	Jahe (*Zingiber offcinale*)	*kg*	6	2,167	1,735	3,759
7	Kacang kedelai (*Soya max piper*)	kg	1	2,000	2,500	5,000
8	Kacang panjang (*Vigna sinensis*)	*kg*	15	1,321	2,008	2,653
9	Kacang tanah (*Arachis hypogaea L*)	kg	5	2,200	1,680	3,696
10	Kangkung (*Ipomoea aquatica forsk*)	ikat	1	500	1,200	600
11	Katuk (*Sauropus androgynus merr*)	ikat	1	500	2,000	1,000
12	Kucai (*Allium tuberosum*)	ikat	10	405	4,242	1,718
13	Kunyit (*Curcuma longa*)	*kg*	5	833	3,824	3,187
14	Lengkuas (*Alpinia galangal*)	*kg*	7	686	1,831	1,256
15	Padi (*Oryza sativa L.*)	kg	161	2,369	4,151	9,834
16	Pepaya (*Carica papaya L.*)	kg	2	650	2,625	1,706
17	Pisang (*Musa sp.*)	*tandan*	36	7,741	428	3,315
18	Sawi (*Brassica juncea (L.) chern*)	kg	1		40	-
19	Sereh (*Andropogon citratus dc*)	kg	4	475	1,421	675
20	Singkong (*Manihot esculenta*)	*kg*	54	510	6,924	3,531
21	Talas (*Colocasia esculenta*)	*kg*	4	500	1,831	916
22	Terong (*Solanum melongena L.*)	kg	2	1,025	300	308
23	Timun (*Trichosanthes cucumeroides maxim*)	kg	14	975	8,999	8,774
24	Tomat (*Solanum lycopersicum*)	kg	3	1,750	1,754	3,070
25	Ubi Jalar (*Ipomoea batatas*)	*kg*	1	1,000	5,000	5,000

Source: Household survey data

The study found that most of the yields of the species planted in the plot were sold. Data recorded from the surveyed household shows that high value species (*Cabe, Caesin, Kacang kedelai*) mosly sold directly through consumer, this show that farmers lack adequate market information and market access, while others species (*Jagung, Timun, Ubi jalar*) mostly sold through collector.

Table 26. Marketable commodities and the marketing chain used (in percentage by commodities)

No	Commodity	Market	Collector	Consumer	Wholeseller
1	Bayam (*Alternanthera amoena voss*)			100%	
2	Buncis (*Phaseolus vulgaris*)	12.5%	87.5%		
3	Cabe (*Capsicum frutescens*)	33.3%	33.3%	33.3%	
4	Caesin (*Brassica rapa L.*)		25.0%	75.0%	
5	Jagung (*Zea mays L.*)		100%		
6	Jahe (*Zingiber offcinale*)	75.0%	25.0%		
7	Kacang kedelai (*Soya max piper*)			100%	
8	Kacang panjang (*Vigna sinensis*)	14.3%	78.6%	7.1%	
9	Kacang tanah (*Arachis hypogaea L*)		100%		
10	Kangkung (*Ipomoea aquatica forsk*)			100%	
11	Katuk (*Sauropus androgynus merr*)	100%			
12	Kucai (*Allium tuberosum*)		100%		
13	Kunyit (*Curcuma longa*)	66.7%	33.3%		
14	Lengkuas (*Alpinia galangal*)	16.7%	83.3%		
15	Padi (*Oryza sativa L.*)		57.1%	28.6%	14.3%
16	Pepaya (*Carica papaya L.*)		100%		
17	Pisang (*Musa sp.*)		84.6%	15.4%	
18	Sawi (*Brassica juncea (L.) chern*)				
19	Sereh (*Andropogon citratus dc*)		100%		
20	Singkong (*Manihot esculenta*)		84.4%	15.6%	
21	Talas (*Colocasia esculenta*)		100%		
22	Terong (*Solanum melongena L.*)	50.0%	0.0%	50.0%	
23	Timun (*Trichosanthes cucumeroides maxim*)	7.1%	92.9%		
24	Tomat (*Solanum lycopersicum*)			100%	
25	Ubi Jalar (*Ipomoea batatas*)		100%		

Source: Household survey data

Fruit and vegetable products from Nanggung are market through four channels:

> Channel 1: Farmer → local household or local market
> Channel 2: Farmer → local collector → local trader → local customer or local market
> Channel 3: Farmer → local collector → regional trader or retailer → urban customer (Bogor or Jakarta)
> Channel 4: Farmer → local collector → local trader → regional trader → regional retailer → urban customer (Bogor or Jakarta)

The main types of market agents are farmers, collectors, local and regional traders and regional retailers. The role of farmers is largely restricted to production. Collectors, traders and retailers, to different degrees, all are engage in sorting, grading, storage and transportation (Tukan, 2005).

d) Gender Roles in Agricultural Undertaking

The purpose of this section is to contribute to a better understanding of the roles women and men play in the different stages of agriculture as well as other production and income-generating activities. This study looks at what different women and men are doing especially in agricultural activities. As seen in Table 27., women involved in agriculture is limited to certain activities, in paddy field, women had proportion more than 15% of labor input only in nursery, maintaining, fertilizing, and harvesting activities. But for others land use, proportion of women labor very small. Involvement in agriculture may therefore partly depend on whether the household can afford to hire in labour or not. Gender roles in Nanggung are probably restricted by socio-cultural factors.

Table 27. Average Level of Labour Input by land use type (per plot)

	Irrigated Paddyfield	Rainfed Paddyfield	Dry Land	Monoculture Garden	Simple Agroforest	Total
No of Plot	99	64	83	18	43	307
Total Area (ha)	28.38	15.03	17.24	2.73	12.45	75.83
Labor inputs						
Land Preparation						
~ Proportion of male (%)	99.7%	99.2%	99.2%	100%	99.6%	99.4%
~ Proportion of female (%)	0.3%	0.8%	0.8%	0%	0.4%	0.6%
Nursery						
~ Proportion of male (%)	73.4%	92.7%	100%	100%	100%	82.4%
~ Proportion of female (%)	26.6%	7.3%	0%	0%	0%	17.6%
Planting						
~ Proportion of male (%)	59.6%	54.7%	83.3%	84.9%	94.1%	71.1%
~ Proportion of female (%)	40.4%	45.3%	16.7%	15.1%	5.9%	28.9%
Maintaining						
~ Proportion of male (%)	56.1%	52.1%	78.2%	78.7%	88.3%	67.9%
~ Proportion of female (%)	43.9%	47.9%	21.8%	21.3%	11.7%	32.1%
Fertilizing						
~ Proportion of male (%)	75.1%	98.0%	89.8%	70.5%	99.5%	87.1%
~ Proportion of female (%)	24.9%	2.0%	10.2%	29.5%	0.5%	12.9%
Harvesting						
~ Proportion of male (%)	66.5%	70.4%	78.9%	88.3%	98.3%	72.5%
~ Proportion of female (%)	33.5%	29.6%	21.1%	11.7%	1.7%	27.5%
Total Labor Input						
~ Proportion of male (%)	76.0%	77.9%	87.9%	90.4%	95.9%	82.4%
~ Proportion of female (%)	24.0%	22.1%	12.1%	9.6%	4.1%	17.6%

Source: Household survey data

The Gender role in cultivating vegetables depend on father, mother, and children's skills. Certain perennial vegetable tree crop (Melinjo, Petai, etc) needed special skill in harvesting, such as climbing skill. Gender role in selling product depends on the quantity. If the harvest product comes in a great number, then father will be the one who sell it through wholeseller or directly to the market, but if there's only small

amount, then mother will sell it retally to local store in the neighborhood (Setiawan, 2006).

Table 28. Who control the expenditure for Agricultural inputs

	Hambaro		Parakan Muncang		Sukaluyu		Total	
	n	62	n	63	N	60	n	185
Family Head	49	79.0%	54	85.7%	49	81.7%	152	82.2%
Wife	11	17.7%	3	4.8%	4	6.7%	18	9.7%
No agricultural expenditure	2	3.2%	6	9.5%	7	11.7%	15	8.1%

Source: Household survey data

Looking at Table 28., the expenditure for agricultural inputs are mostly the domain of men. This means that it may be difficult for women to make decisions over how money is spent.

Concluding remarks

1. The project site, Kecamatan Nanggung, includes 7,022.3 (63.8%) hectare of arable land comprised of paddy field (1,740.7 ha.), ladang/kebun (1,836.5 ha.), community forest (144 ha.), and Perhutani/State Forest Corporation (SFC) land (2,050 ha.). The remaining area is housing and other infrastructures and other uses . All paddy fields, ladang/kebun lands and community forests are privately owned. In total these privately held (farmer owned) lands compose 3,721.3 ha (52.3%). The rest (47.7%) are officially under the management of SFC and other large scale plantations. However, discussion with farmers/government officials and observation found that there are patches of government land that is being cultivated by farmers, however detailed data is not available to quantify this situation.

2. Population growth during the last three years (since 2003) was 0.40% per year, lower than West Java Province and even than national growth.   Population density of the area is 683 persons per square kilometers (ps.km^{-2}), lower than for West Java, varies from 155 ps.km^{-2} in Malasari (the upper most village) to 2,347 ps.km^{-2} in Kalong Liud. Agricultural density of Kecamatan Nanggung is 11 ps/ha, while at village level the ratio varies from 6 ps ha^{-1} (Malasari) to 33 ps ha^{-1} in Sukaluyu. Seven out of 10 villages are above the kecamatan average. It's indicated that agriculture intensification is necessary in many villages of Kecamatan Nanggung.

3. Agriculture is an economic mainstay of Nanggung population, where 63.4% of working population (economically active population) engages in agriculture, higher than national data (46.3%).   The survey clear demonstrated that problems stem not merely from the natural capital available for the people, but also inform limitations of human capital and financial capital that are not easy to resolve. The evidence of low level education attainment, such as 5.9 % of the respondents were illiterate, and most of the respondents (87.6%) never went through beyond elementary level and primary school enrollment rate is also low (87.8%), is an example.

4. The assessment of income and expenditure of the surveyed households found that the largest proportion of family income were spent on food (62%) and other non-food consumption that is categorized as basic needs for the family livelihood. Although most of people in Nanggung engage in agriculture (work as farmer), agricultural does not contribute the most to family income.   Agricultural income

contributed 14% to the total households' income. From a living standard point of view, applying the poverty line of BPS (2005), the study found that 52% of the surveyed households are below poverty line, and thus are categorized as poor. Hambaro was the worst among the three sample villages; hence, about 68% of the people were below poverty line.

5. There are 310 plots within 163 plots (43.4 ha) of rice field, 83 plots (17.2 ha) of dryland agriculture (*Tegal/ladang*) and 18 plots (2.7 ha) of monoculture gardens and 43 plots (12.4 ha) of multi-species tree garden controlled by the surveyed households. The study revealed that 11% of the total agricultural land controlled by the surveyed household belongs to others and is cultivated by means of renting in, sharecropping, or just *numpang*. Unequal land distribution is a characteristic of the study site, where the bottom 60% of the surveyed household controlled only 15% of total landholding size, while the top 20% controlling about 62% of the total landholding size. Land use systems practices of the plot samples before and during the years of ownership by current land holder, the plot number of land use types relatively remain stable. In further detail, to relate those land use type before owned to the current land use type, it is found that rainfed paddy field, monoculture garden, and complex agroforest, tend to changed by household into other land use type. While irrigated paddy field, dryland, and simple agroforest relatively remain stable.

6. Intensive agriculture (paddy field, dryland and monoculture garden) mostly takes place in the relatively flat area, more than 80% of the plots are considered by the respondents as gently to slightly steep area. Regarding to soil fertility, most of respondents consider their land quite fertile to very fertile. With the exception of the irrigated paddy fields, all other plots depend on rain as source of water to support crop production.

7. We founds 23 vegetables species and two staple crop species (paddy and cassava). The top five vegetables species found in of plots samples were : Pisang (*Musa* sp.), Kacang panjang (*Vigna sinensis*), Timun (*Trichosanthes cucumeroides maxim*), Kucai (*Allium tuberosum*) and Buncis (*Phaseolus vulgaris*). This species are mostly cultivated in dryland and simple agroforest plots.   The tree species used to plant in *Dudukuhan* are Alpukat (*Persea Americana*), Melinjo (*Gnetum gnemon*), Nangka (*Artocarpus heterophyllus*), Jengkol (*Pithecellobium jiringa*), Durian (*Durio zibethinus*), Kecapi (*Sandoricum koetjape*), Sengon (Paraserianthes *falkataria*), Mangga (*Mangifera indica*), Petai (*Parkia speciosa*), and Pinus (*Pinus* sp). Kacang panjang (*Vigna sinensis*), Timun (*Trichosanthes cucumeroides maxim*), Kucai (*Allium*

tuberosum) and Buncis (*Phaseolus vulgaris*), are the most common annual crops cultivated by farmer under Dudukuhan system.

8. Land preparation is the activity most commonly conducted in the farm. Harvesting, maintaining and planting, respectively are the activities that require the most labor. The number of person-days involve in land preparation is much higher than the number of person-days involved in other activities. Number of person-days involved in nursery activities and fertilizing activities is the lowest compare with the others activities. Labor inputs, shows that the larger area of plot samples the less labor input will be. It can be understood that farmers who have small parcel of tends to intensify their land for their livelihood. It does also relate to the availability of labor. Farmers who have larger area of agricultural land, without a sufficient amount of labor tend to practice less labor intensive agricultural systems, such tree-based systems.

9. The use fertilizer, both chemical and green manure, was quite common in all sample plots in the study site, except for complex agroforests and fallow lands. The fertilizer rate of every land use category varies according to land use category and varies among plot within the land use category. It reflects the variation of land use practices and agricultural undertaking. The study found that chemical fertilizer was applied in all paddyfields and organic fertilizer mostly was applied in monoculture garden and dryland plots. The rate of fertilizer application, for chemical fertilizer was also quite high, ranging between 2 and 7,500 kg ha^{-1}, whereas for organic fertilizer, some plots, especially monoculture garden applies reasonably high, up to 34 ton ha^{-1}. Same as fertilizer applications, rate of pesticide application and type of pesticide used varies according to land use category. All types of pesticide applied for all land use category. While paddy field mostly applied herbicide to reduce labor cost for weedings. The rate of pesticide application for dryland was the highest among the other land use category.

10. Regarding returns from kebuns, the study found that almost all commodities harvested in the plot were sold by the surveyed households. Most of the harvested yields (89% or more) are sold for 22 annual commodities. Only 76.5% of corn yields are sold and 29.6% of rice. All (100%) of the sawi produced is consumed by households..

11. The marketing aspect of the study found most of the yields of the species planted in the plot were sold. Data recorded from the surveyed household shows that high value species (*Cabe, Caesin, Kacang kedelai*) mosly sold directly through consumer, this show that farmers lack adequate market information and market

access, while others species (*Jagung, Timun, Ubi jalar*) mostly sold through collector. Other evidence of poor marketing ability of farmers in Nanggung was also found. None of the surveyed households process the commodities harvested. This is a huge missed opportunity to gain additional market margin through value added processing.

12. Women involved in agriculture is limited to certain activities, in paddy field, women had proportion more than 15% of labor input only in nursery, maintaining, fertilizing, and harvesting activities. But for others land use, proportion of women labor very small. Involvement in agriculture may therefore partly depend on whether the household can afford to hire in labour or not. Gender roles in Nanggung are probably restricted by socio-cultural factors. The Gender role in cultivating vegetables depend on father, mother, and children's skills. Gender role in selling product depends on the quantity. The expenditure for agricultural inputs are mostly the domain of men, it may be difficult for women to make decisions over how money is spent.

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ANNEX

Table A1. Land Uses in Kecamatan Nanggung (ha)

	Malasari	Bantar Karet	Cisarua	Curug Bitung	Nanggung	Pangkal Jaya	Sukaluyu	Hambaro	Kalong Liud	Parakan Muncang	Jumlah
Total Area	4,756.40	841.04	1,411.00	1,397.00	697.40	398.92	**207.30**	**355.78**	329.00	**605.20**	10,999.05
Total Agricultural Land (*Available Land Excluded TNGH*)	2,801.00	434.68	635.00	1,268.07	374.44	319.30	**142.75**	**270.00**	260.55	**516.79**	7,022.58
Paddy fields	240.00	117.18	275.00	150.50	100.44	227.00	**7.75**	**225.00**	129.10	**268.76**	1,740.73
Ladang/Kebun	-	162.18	325.00	767.57	14.00	56.30	**87.00**	**45.00**	131.45	**248.03**	1,836.53
Large Scale Plantation	971.00	-	30.00	50.00	200.00	-	**-**	**-**	-	**-**	1,251.00
Perhutani Land	1,590.00	155.32	5.00	300.00	-	-	**-**	**-**	-	**-**	2,050.32
Community Forest	-	-	-	-	60.00	36.00	**48.00**	**-**	-	**-**	144.00
TNGH	1,787.00	-	-	50.50	-	-	**-**	**-**	-	**-**	1,837.50
Fishpond	-	5.00	3.00	3.50	3.00	3.64	**0.75**	**1.05**	-	**4.50**	24.44
Housing	43.00	62.50	68.00	60.00	35.00	32.00	**60.00**	**45.05**	24.27	**25.50**	455.32

Source: Household survey data, processed

Table A2. Physical Infrastructure and Public Utilities of Kecamatan Nanggung

Physical infrastructures and Public utilities	Unit	Ratio to the related significance unit.
Road network		
- Paved/asphalted	70 km	636 m km^{-2},
- Gravelled	110.5 km	1,004 m km^{-2}
- Dirt road	116.4 km	1,058 m km^{-2}
Irrigation facilities		
- Dam (public work)	3	
- Dam (self-reliance)		
Domestic water		
- Sallow well		
- Community domestic water network		
Electricity supply (PLN)	7,619 houses in nine villages	43.40%
Telephone line	1.010 households	5.22%
Education Facility		
- Kindergarten : 1	1	
- Elementary school (SD/MI)	44 / 16	
- Junior secondary school (SLTP/MT)	1/3	
- Senior secondary school (SMU)	0	
Health Facility		
- *Puskesmas* - Public health centre	2	
- *Puskesmas Pembantu*	2	
- *Posyandu* - Integrated health services for mother and kids (settlement based)	92	9 village^{-1}
- Family planning post	1	
Marketing facilities		
- Market	2	
- Kiosk /*warung*	587	
- *Toko*	39	
- others	295	

Source: Household survey data, processed

Table A3. Household Income by Source of Income

Source of Income	Hambaro				Parakan Muncang				Sukaluyu				Total			
	n	Hh	Total Income		n	Hh	Total Income		n	Hh	Total Income		n	Hh	Total Income	
Agriculture																
Agriculture	44	71%	6,239,068	11%	43	68%	6,541,074	7%	50	83%	10,687,905	14%	137	74%	23,468,047	10%
Livestock & Fishery	13	21%	6,498,246	11%	14	22%	1,463,249	2%	12	20%	382,080	0%	39	21%	8,343,575	4%
Total Agriculture Income	**46**	**74%**	**12,737,313**	**22%**	**46**	**73%**	**8,004,323**	**9%**	**52**	**87%**	**11,069,985**	**14%**	**144**	**78%**	**31,811,622**	**14%**
Off Farm																
Civil Servant	6	10%	2,450,000	4%	20	32%	12,750,000	14%	11	18%	2,555,666	3%	37	20%	17,755,666	8%
Farm Laborer	33	53%	7,462,833	13%	25	40%	8,767,500	10%	28	47%	6,731,000	9%	86	46%	22,961,333	10%
Gold Extraction	1	2%	150,000	0.3%	-	-	-	-	3	5%	950,000	1%	4	2%	1,100,000	0%
Home Industry	-	-	-	-	1	2%	3,000,000	3%	4	7%	650,000	1%	5	3%	3,650,000	2%
Off Farm Laborer	22	35%	8,320,750	14%	12	19%	5,000,000	6%	11	18%	4,000,000	5%	45	24%	17,320,750	8%
Private company employee	3	5%	650,000	1%	1	2%	300,000	0%	6	10%	2,010,000	3%	10	5%	2,960,000	1%
Services																
Transport	1	2%	1,500,000	3%	4	6%	2,450,000	3%	4	7%	1,650,000	2%	9	5%	5,600,000	2%
Others	-	-	-	-	3	5%	4,100,000	5%	3	5%	3,760,000	5%	6	3%	7,860,000	3%
Trader/Merchant	40	65%	17,020,000	29%	43	68%	37,161,498	42%	26	43%	14,559,166	19%	109	59%	68,740,664	30%
Total Off Farm	**58**	**94%**	**37,553,583**	**63%**	**60**	**95%**	**73,528,998**	**83%**	**57**	**95%**	**36,865,832**	**47%**	**175**	**95%**	**147,948,413**	**65%**
Non-fixed Income																
Given from son/daughter	20	32%	5,336,667	9%	23	37%	5,525,000	6%	17	28%	7,898,334	10%	60	32%	18,760,001	8%
Others	3	5%	3,600,000	6%	1	2%	2,000,000	2%	4	7%	22,625,000	29%	8	4%	28,225,000	12%
Total Non-fixed Income	**23**	**37%**	**8,936,667**	**15%**	**24**	**38%**	**7,525,000**	**8%**	**21**	**35%**	**30,523,334**	**39%**	**68**	**37%**	**46,985,001**	**21%**
Total Household Income	**62**	**100%**	**59,227,564**	**100%**	**63**	**100%**	**89,058,321**	**100%**	**60**	**100%**	**78,459,151**	**100%**	**185**	**100%**	**226,745,036**	**100%**

Source: Household survey data

Table A4. Vegetables Species Cultivated by surveyed household (by landuse types and Hectare)

No	Commodity	Irrigated Paddyfield		Rainfed Paddyfield		Dry Land		Monoculture Garden		Simple Agroforest		Total	
		(% of n=99)	Area (ha)	(% of n=99)	Area (ha)	(% of n=99)	Area (ha)	(% of n=99)	Area (ha)	(% of n=99)	Area (ha)	(% of n=99)	Area (ha)
1	Bayam (*Alternanthera amoena voss*)					1.2%	0.10					0.3%	0.10
2	Buncis (*Phaseolus vulgaris*)			1.6%	0.25	4.8%	2.15			7.0%	1.10	2.6%	3.50
3	Cabe (*Capsicum frutescens*)					7.2%	1.18	5.6%	0.15	2.3%	0.10	2.6%	1.43
4	Caesin (*Brassica rapa L.*)	1.0%	0.05			3.6%	0.21					1.3%	0.26
5	Jagung (*Zea mays L.*)					4.8%	1.85			4.7%	0.28	2.0%	2.13
6	Jahe (*Zingiber offcinale*)	1.0%	0.60	1.6%	0.02	3.6%	0.51	5.6%	0.02			2.0%	1.15
7	Kacang kedelai (*Soya max piper*)			1.6%	0.02							0.3%	0.02
8	Kacang panjang (*Vigna sinensis*)	2.0%	0.16			12.0%	4.27			7.0%	0.98	4.9%	5.41
9	Kacang tanah (*Arachis hypogaea L*)	1.0%	0.10	1.6%	0.03	2.4%	0.60	5.6%	0.10			1.6%	0.83
10	Kangkung (*Ipomoea aquatica forsk*)					1.2%	0.10					0.3%	0.10
11	Katuk (*Sauropus androgynus merr*)					1.2%	0.30					0.3%	0.30
12	Kucai (*Allium tuberosum*)					3.6%	1.55			16.3%	2.55	3.3%	4.10
13	Kunyit (*Curcuma longa*)	1.0%	0.60			3.6%	1.01			2.3%	0.50	1.6%	2.11
14	Lengkuas (*Alpinia galangal*)					7.2%	2.46			4.7%	0.60	2.6%	3.06
15	Padi (*Oryza sativa L.*)	99.0%	28.28	95.3%	14.55	2.4%	0.19					52.4%	43.02
16	Pepaya (*Carica papaya L.*)					2.4%	0.50					0.7%	0.50
17	Pisang (*Musa sp.*)	2.0%	1.10	1.6%	0.05	26.5%	3.15	16.7%	0.53	18.6%	1.32	11.7%	6.15
18	Sawi (*Brassica juncea (L.) chern*)					1.2%	0.25					0.3%	0.25
19	Sereh (*Andropogon citratus dc*)					2.4%	0.70			4.7%	1.05	1.3%	1.75
20	Singkong (*Manihot esculenta*)	1.0%	0.10	7.8%	0.71	47.0%	7.56			20.9%	2.65	17.6%	11.01
21	Talas (*Colocasia esculenta*)					3.6%	0.25			2.3%	0.10	1.3%	0.35
22	Terong (*Solanum melongena L.*)					2.4%	1.10					0.7%	1.10
23	Timun (*Trichosanthes cucumeroides maxim*)	3.0%	0.61			9.6%	2.70			7.0%	0.68	4.6%	3.99
24	Tomat (*Solanum lycopersicum*)					3.6%	0.20					1.0%	0.20
25	Ubi Jalar (*Ipomoea batatas*)							5.6%	0.02			0.3%	0.02

Source: Household survey data