THIRD YEAR ANNUAL REPORT

POVERTY ALLEVIATION PROGRAMS THROUGH PEOPLE PARTICIPATION IN IMPROVED AGROFORESTRY SYSTEM AT GUNUNG WALAT EDUCATIONAL FOREST, INDONESIA

Submitted by

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EXECUTIVE SUMMARY

AKECOP Phase II in Indonesia has an umbrella title which is "Poverty Alleviation Programs through People Participation in Improved Agroforestry System at Gunung Walat Educational Forest (GWEF), Indonesia". Under this umbrella research title there are five activities which could be categorized as scientific research and development or action research.

Research on the use of dekastar®® fertilizer for improving coffee productivity in agroforestry system in gunung walat education forest showed previous study that the use of anorganic fertilizer of Urea 250 g + TSP 100 g + KCL 180 g significantly increased the coppice growth but not for the coppice number and that the dosage use of 50 g per plant of Dekastar®® fertilizer significantly increased the coffee bean productivity.

Research a planting trial of medicinal plants at Gunung Walat Eduational Forest (GWEF) showed that two species (Kumis Kucing and Temu Lawak) performed better survival rates (more than 90%) than two others (Sambiloto and Mahkota Dewa). In this experiment, Mahkota Dewa showed the lowest survival rate (78.67%-83.67%). Selection of suitable species for increasing biodiversity in agroforestry should consider the adaptability of the target species in the new environment.

The research monitoring and evaluation of Agroforestry farmers shows that are 1) The pressure to GWEF is increased which indicate by the total amount the members of farmers groups has been increased 2) Contribution of agroforestr yincome has 20 % fromo total family income.

Research training effectiveness agroforestry farmers shows that are 1) the training effectiveness can be concluded that the level of acceptance of training participant is limited to the farmer knowledge and yet reach the application in field, 2)Internal and external factor cause the training effectiveness agroforestry farmers

Research Market Potential of Medicinal Plant Cultivation around the Gunung Walat Educational Forest (GWEF) , that are 1) medicinal plants in and around GWEF has not been cultivated at economic scale,2. Cultivation of medicinal plants has Research results showed that (1) production of medicinal plant sourounding GWEF have not seriously cultivated (2 opportunity markets for community in GWEF to develop the medicinal plant business

RESEARCH TITLE

Poverty Alleviation Programs Through People Participation in Improved Agroforestry System at Gunung Walat Educational Forest, Indonesia

OBJECTIVE

The third year AKECOP activity is a continuation of the project activities conducted in the second year. AKECOP regional research in Indonesia has development objective as follows:

> "Strengthening poverty alleviation programs through development of improved agroforestry system in GWEF with people participation"

To achieve the development objective and considering the problems to be addressed in the phase II AKECOP in Indonesia, the specific objectives of the project are as follows:

a. To improve productivity of agroforestry models
b. To improve people participation on AKECOP

To achieve the overall objectives, the third year of Phase II AKECOP in Indonesia was carried out through following strategies: (1). Development of plant crops diversity through introduction of medicinal plants; (2) Intensification of cultural treatment of agroforestry; (3) Improvement of farmer groups's function through extension and training ; (4). Improvement of agroforestry product processing through training on management and post-harvesting medicinal plants; (5).Development of agroforestry product (medicinal plants) marketing

EXPECTED OUTPUT

Table 1: Program, Objective, Expected Output and Activity in the Third Year of Phase AKECOP in Indonesia (2007/2008)

Program and Objective	Expected Output	Detail Activity
1. Development of plant crops diversity in agroforestry models		
a. To introduce prospective medicinal plants in established agroforestry models.	Diversity and productivity of medicinal plants	1. Seedlings procurement, site selection, out planting, and maintenance of medicinal plants. 2. Growth and yield monitoring of medicinal plants
b. To maintain the first and second year plantation of fuelwood and fodder species	Diversity and productivity of fuel wood and fodder species are maintained	1. Seedlings procurement, re-planting, and maintenance of introduced species 2. Growth and yield monitoring of introduced

2. Intensification of agroforestry treatments		
a. To intensify plants tending in Agroforestry models	Plant growth and productivity are increased	1. Application of pruning technique 2. Monitoring on plant growth and productivity.
b. To apply appropriate fertilization technique	Plant growth and productivity are increased	1. Application of appropriate fertilization technique 2. Monitoring on plant growth and productivity.
3. Improvement of farmer group's function		
a. To improve the extension program	Farmer groups are active	1. Regular meeting between farmers with field worker of AKECOP, management of GWEF, and research team
b. To improve the farmer's motivation	Farmer motivation is improved	1. Training of agronomic aspect of medicinal plants
4. Improvement of agroforestry product processing		
a. To increase the value added of medicinal plants as one of main agroforestry products	Farmers skill on post-harvesting of medicinal plants is improved	1. Training and extension on post harvesting of medicinal plants
5. Development of agroforestry product marketing		
a. Strengthening of farmer's capacity on marketing practice	Farmers could market AF products according to existed situation	1. Development of marketing network
b. To improve agroforestry product marketing system	Marketing of AF products is efficient at all marketing channels	1. Research on marketing of medicinal plants

ACTIVITY AND ACHIEVEMENT

PROGRAM 1: Development of plant crops diversity in agroforestry models

A Species trial of medicinal plants is carried out for the following species: i) Kumis Kucing (Orthosiphon aristatus); ii) Sambiloto (Andrographis paniculata); iii) Temulawak (Curcuma xanthorrhiza) and Mahkota Dewa (Phaleria macrocarpa). A trial in randomized completely block design (RCBD) was carried out in two plots inside GWEF, aiming at determining suitable medicinal plant species for agroforestry system. Results showed that two species (Kumis Kucing and Temu Lawak) performed better survival rates (more than 90%) than two others (Sambiloto and Mahkota Dewa). In this experiment, Mahkota Dewa showed the lowest survival rate (78.67%-83.67%). Selection of suitable species for increasing biodiversity in agroforestry should consider the adaptability of the target species in the new environment.

Complete report of this research is presented in **Annex 1.**

PROGRAM 2. Intensification of Agroforestry treatments

Soils in Gunung Walat Educational Forest (GWEF) are generally not fertile and comprise areas with tree and no tree covers.. Coffee plant is one of the popular agroforestry plants raised under the Aghathis loranthifolia in GWEF.. However, the coffee productivity is not yet satisfied due to lack of tending and application of agroinputs. Previous studies showed that the use of anorganic fertilizer of Urea 250 g + TSP 100 g + KCL 180 g significantly increased the coppice growth but not for the coppice number.

Three different dosage levels of Dekastar®® were used, namely : (1) Control, (2) 25 g per plant , (3) 50 g per plant. Results showed that the dosage use of 50 g per plant of Dekastar®® fertilizer significantly increased the coffee bean productivity.

Complete report of this research is presented in **Annex 2.**

PROGRAM 3-4 : Improvement of farmer groups's function and Improvement of agroforestry product processing

The aim of this program is to improve farmer's participation on the AKECOP activities in Gunung Walat Educational Forest. Two activities have been done to achieve the objectives of this program:

1. Updating data of AKECOP farmer participants through survey. The survey is conducted from January until June 2008. Survey results showed that the number of farmer participated in AKECOP activities decreased from 188 farmers to 250 farmers (Table 1). Increase on the Number of AKECOP farmer participants was indicated the pressure to GWEF is increased

   Table 1: Number of AKECOP Farmer Participants in the Year 2004 and 2006

Nu	Location (Forest Block)	Number of AKECOP Farmers Participants	
		Year 2006	Year 2008
1	Cipeureu	75	89
2	Sindang	34	65
3	Citalahab	43	51
4	Sampay	18	27
5	Nanggerang	18	18
	Total	188	250

2. Strengthening farmer group capacity was conducted to improve farmer participation on AKECOP actvities at GWEF. The AKECOP research team have facilitated several farmer activties, i.e. farmer workshop, farmer training, discussion between farmers and experts, farmer group meetings and extension by development worker directly at farmer agroforestry plots or visiting the farmers at home. Training on agronomic and product processing medicinal aspects (Figure 1). Topics were discussed with farmers in the meeting, mainly about problems and constraints on agroforestry farming and marketing of agroforestry products.

Figure 1: Training on agronomic and product processing medicinal aspects .

Strengthening AKECOP farmer groups was conducted through regular informal meetings between researchers and farmer groups. Until June 2008, five times meetings with two farmer groups have been conducted. Topics discussed with farmers in the meeting were mainly about problems and constrains on agroforestry farming and marketing of agroforestry products.

Complete report of this research is presented in **Annex 3 and 4.**

PROGRAM 5: Development of agroforestry product marketing

There are two activities will be conducted to meet the objectives of the third year program, i.e. development of agroforestry product marketing. The first activity is to conduct a business gathering to develop a marketing network of agroforestry products in GWEF and the second activity is to conduct marketing research, especially on medicinal

plants originated from non-timber forest products and other products related with GWEF such as alley cropping and community forestry.

Research Market Potential of Medicinal Plant Cultivation around the Gunung Walat Educational Forest (GWEF) , that are 1) medicinal plants in and around GWEF has not been cultivated at economic scale,2. Cultivation of medicinal plants has Research results showed that (1) production of medicinal plant sourounding GWEF have not seriously cultivated (2 opportunity markets for community in GWEF to develop the medicinal plant business

Complete report of this research is presented in **Annex 5.**

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Annex 1

Increasing Medicinal Plant Diversity in Agroforestry Models at Gunung Walat Educational Forest (GWEF) Sukabumi, West Java

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ABSTRACT

This paper presents a planting trial of medicinal plants at Gunung Walat Eduational Forest (GWEF). A trial in randomized completely block design (RCBD) was carried out in two plots inside GWEF, aiming at determining suitable medicinal plant species for agroforestry system. Results showed that two species (Kumis Kucing and Temu Lawak) performed better survival rates (more than 90%) than two others (Sambiloto and Mahkota Dewa). In this experiment, Mahkota Dewa showed the lowest survival rate (78.67%-83.67%). Selection of suitable species for increasing biodiversity in agroforestry should consider the adaptability of the target species in the new environment.

Keywords: Medicinal plants, agroforestry, species trials, biodiversity.

INTRODUCTION

Maintaining multiple functions of agroforests is now being extended through increasing plant diversity. As a determining factor of on-site productivity, existing biodiversity in agroforests needs to be managed adaptively especially with respect to the local needs. Lessons learned from the first phase of agroforestry development in Gunung Walat Educational Forest (GWEF) showed that existing agroforestry models in this forest needs to be enriched among otherby medicinal plant species.

People in the world still depend to some extent on medicinal plants for their daily health care. This condition shows that function and strategically advantages of medicinal plant species was extremely high to efforts of healing people from diseases. Benefits of using medicinal plants for raw material of modern medicine, traditional medicine ("jamu" or herbal products) and traditional cosmetics have become more popular than before. This situation made difficult condition to find out sufficient quantity of medicinal plants as raw materials. Heyne (1950) *in* Latumahina (2008) recorded more than 1000 species of

medicinal plants in Indonesia. This situation opens up opportunity to society, especially people near the forests, to develop their own sources of medicinal plants through incorporation in the locally available agroforestry models. Benefits of developing medicinal plants especially for people near the forest were income, increasing prosperity, natural resources conservation, informal education, sustainable daily work and employment as well as social security.

Introduction of medicinal plant species in agoforestry models has not been really carried out due to lack of information on the species suitability and therefore a planting trial of selected medicinal plant species to be carried out. Planting trials were conducted with aims at determining suitable medicinal plant species. In the long run, planting medicinal plant species in agroforests will encourage local people to do a replication and is perhaps as an alternative future source of adapted planting stocks.

METHODOLOGY

Two plots inside GWEF were selected for the trial. Four medicinal plant species of different therapheutic uses propagated from seedling (Table 1 and Figure 1), namely i) Kumis Kucing (*Orthoshipon aristatus*), ii) Sambiloto *(Andrographis paniculata Ness*), iii) Temu Lawak (*Curcuma xanthorhiza* L.) and iv) Mahkota Dewa *(Phaleria macrocarpa*) were planted in three blocks inside Gunung Walat Educational Forest (GWEF).

Tabel 1. Kind of medicinal plants used in the trial and their specific uses

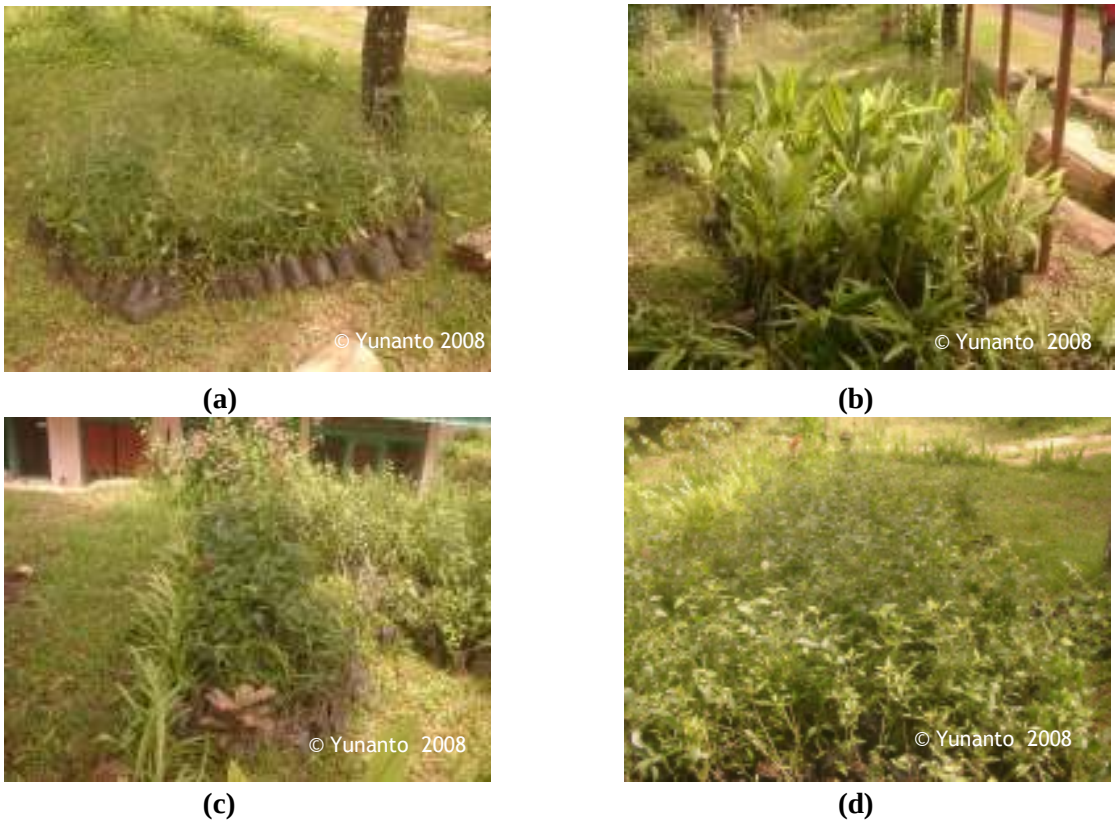
No	Local name	Latin name	Used plant parts	Propagation Technique	Therapeutic uses
1	Kumis Kucing	*Orthoshipon aristatus*	Leaf	Seedling	Diuretic, Rheumatic
2.	Temu Lawak	*Curcuma xanthorhiza* L.	Rhizome	Seedling	Herbal, antiacne
3.	Sambiloto	*Andrographis paniculata Ness*	All parts	Seedling	Antibody
4.	Mahkota Dewa	*Phaleria macrocarpa*	Fruit	Seedling	Antioxidant

The experimental trial in Randomized Completely Block Design (RCBD) was established to monitor mainly the survival rate of the planted species. All of the planting materials of medicinal plant species were prepared through seedling propagation methods. Initial

numbers of planting materials for each species were presented in Table 2. They were planted in 36 square tree plots with planting distances of 1 m x 1 m in February 2008 (Figure 2) and subsequently maintained, i.e. fertilization, before being assessed in terms of survival (%S) in May 2008. Data were transformed into arcsine √%S and then subjected to analysis of variance (ANOVA) using Minitab Release 14 (Mattjik and Sumertajaya, 2006).

Table 2. Initial number of individuals from each species planted in two agroforestry plots

No.	Species	Plot 1 (inside GWEF)			Plot 2 (inside GWEF)		
		Block 1	Block 2	Block 3	Block 1	Block 2	Block 3
1	Kumis Kucing (*Orthoshipon aristatus*)	36	36	36	36	36	36
2	Sambiloto *(Andrographis paniculata Ness*)	36	36	36	36	36	36
3	Temu Lawak (*Curcuma xanthorhiza* L.)	36	36	36	36	36	36
4	Mahkota Dewa *(Phaleria macrocarpa*)	36	36	36	36	36	36



(a) **(b)**

(c) **(d)**

Figure 1. Planting stock materials: a). Sambiloto, b). Temu Lawak, c). Mahkota Dewa and d). Kumis Kucing

Figure 2. Planting activity of medicinal plants inside Gunung Walat Education Forest (GWEF)

RESULTS AND DISCUSSION

Average survival data (Table 3) from 4 species (Kumis Kucing, Sambiloto, Temu Lawak and Mahkota Dewa) were calculated and analysed by ANOVA and then tabulated into histogram (Figure 3). Table 4 presents summary of ANOVA analysed based on only one variable (% survival) which was assessed three months after planting. Significant effect of plant species and no effect of block ($p<0.05$) were observed in Plot 1, while no significant effects at all were found in the Plot 2.

Table 3. Average survival (%) of plant species in two plot trials

No.	Species	Plot 1	Plot 2
1	Kumis Kucing (*Orthoshipon aristatus*)	100.00	99.00
2	Sambiloto *(Andrographis paniculata Ness*)	79.67	92.67
3	Temu Lawak (*Curcuma xanthorhiza* L.)	92.33	94.67
4	Mahkota Dewa *(Phaleria macrocarpa*)	78.67	83.67

Table 4. Summary of ANOVA in two plots (P values)

No.	Source of Variation	Plot 1	Plot 2
1	Plant species	0.004**	0.180ns
2	Block	0.078ns	0.270ns

Note: ** = significant at 5% level of confidence; ns = not significant at 5% level of confidence

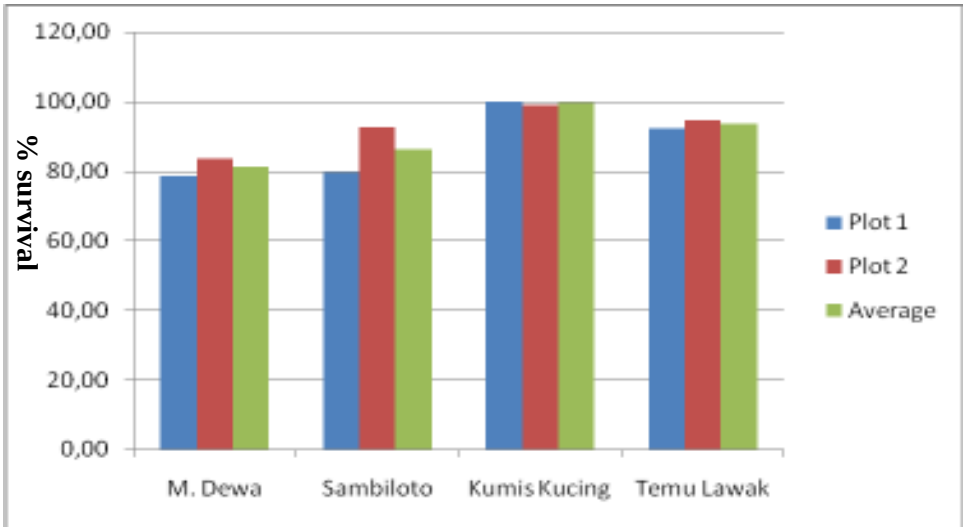


Figure 3. Average survival rates (%) of medicinal plant species in Plot 1 and Plot 2

In general, survival rates of medicinal plants in Plot 2 were better than that of those of Plot 1 (Figure 3). It is clear that initial conditions of sites may influence the plant survivals in which the light intensity of Plot 1 was less than that of Plot 2.

Two plant species (Kumis Kucing and Temu Lawak) performed better survival rates (more than 90% at both blocks) than two other species (Sambiloto and Mahkota Dewa). Mahkota dewa had the lowest survival, 78.67% and 83.67%, in Plot 1 and Plot 2, respectively, while Sambiloto showed actually much better than Mahkota Dewa that is around 79.67-92.67% survival. Examples of field performance of plant species are presented in Figure 4.

Figure 4. Performances of Kumis Kucing and Mahkota Dewa inside GWEF (Up) and Temu Lawak and Sambiloto (Below) three months after planting.

In this experiment, the good growth performance of Kumis Kucing is interesting to be noted. Growth conditions for Kumis Kucing were determinated by full sun light and medium to high air temperature. Shading will decrease leaf extraction level (Anonym, 2008a). The most simple propagation technique for Kumis Kucing is through vegetative propagation such as stem cutting or branch cutting. On the other hand, Temu Lawak can naturally grow both on tree covered lands and open areas. This medicinal plant has a high adaptation to different types of weather in tropical climate (Anonym, 2008b). A possible propagation technique for Temu Lawak is practiced by rhizome.

With regards to agroforestry development in GWEF and its surrounding areas, there are a great potential for extended cultivation and development of some medicinal plant species. This situation gives opportunities for development of medicinal plants in form of small and medium enterprises near the forests. However, the prices of medicinal plants in the market seem unstable. These conditions cause some farmers to be unwilling for planting medicinal plants. In addition, lack of skills and knowledge on the cultivation techniques of medicinal plants have contributed to the development progress of this potential sub-sectors.

CONCLUSION

Kumis Kucing and Temu Lawak showed better survival rates compared to Sambiloto and Mahkota Dewa. In particular, there is still a need to further develop and improve cultivation techniques for medicinal plant species in order to increase quantity and quality of medicinal plants.

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Annex 2.

STUDY ON THE USE OF DEKASTAR®® FERTILIZER FOR IMPROVING COFFEE PRODUCTIVITY IN AGROFORESTRY SYSTEM IN GUNUNG WALAT EDUCATION FOREST

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ABSTRACT

Soils in Gunung Walat Educational Forest (GWEF) are generally not fertile and comprise areas with tree and no tree covers.. Coffee plant is one of the popular agroforestry plants raised under the Aghathis loranthifolia in GWEF.. However, the coffee productivity is not yet satisfied due to lack of tending and application of agroinputs. Previous studies showed that the use of anorganic fertilizer of Urea 250 g + TSP 100 g + KCL 180 g significantly increased the coppice growth but not for the coppice number.

The objective of this study was to determine the effectiveness of Dekastar® fertilizer in promoting the productivity of coffee bean after pruning in Gunung Walat. Three different dosage levels of Dekastar®® were used, namely : (1) Control, (2) 25 g per plant , (3) 50 g per plant. Results showed that the dosage use of 50 g per plant of Dekastar®® fertilizer significantly increased the coffee bean productivity.

INTRODUCTION

Since ten years ago agroforestry system was developed in Gunung Walat Educational Forest (GWEF) with aim at maximizing forest land productivity. Various plant species were selected as main agroforestry components, including medicinal plant, foarage plant, horticultural plant as well as woody plant for timber and non timber production. One of the plant species that has been selected and planted under the *Aghatis loranthifolia* trees is *Coffea robusta*. The reason for this choice was due to its tolerance to shade while economically important for increasing farmer income.

The soil properties in GWEF has been identified to be of low fertility, causing low plant productivity as shown in the recent harvest of coffee beans. Previous study showed that the application of an organic fertilizer of urea 250 g + TSP 100 g + KCL 180 g after pruning significantly increased the coppice growth but not for coppice number. In order to stimulate initial flowering and fruiting after pruning and to increase the bean productivity, an experiment was carried out in which Dekastar® fertilizer was used for

improving fruit productivity. Dekastar® 6-13-25 is a trade mark of fertilizer designated for stimulating initial flowering and fruiting of the plant. This is a complex fertilizer containing Nitrogen 6%, Phospate 13% and Potassium 25%.

The objective of this study was to determine the effectiveness of Dekastar® fertilizer application in increasing coffee bean yield after pruning in GWEF.

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METHODOLOGY

Study site

Gunung Walat Educational Forests lies geographically between South latitudes of 6^{o} 53' 35" and 6^{o}55' 10", and between East longitudes of 106^{o} 67' 50" and 106^{o}51' 30", with an annual mean temperature range of 22^{0}C – 30^{0}C and annual rain fall range of 1600 – 4400 mm. The soils are Latosol red yellow, followed by Latosol brown and Podsolic red yellow which are low in organic matter content and nutrient availability.

The existing *coffee* plants were 9 year old grown under the *Aghatis loranthifolia* trees of 40 year old and 25 m height in average. The coffee plant has been pruned at the age of 7 years in order to stimulate growth of coppices (new branches).

Experimental site preparation

The ground forest floor areas of 0.3 ha were cleared by removing grasses and shrubs. Coffee plants (*Coffea robusta*) with approximately 1.5 m height that have been planted and pruned under the *Aghatis loranthifolia* stands were fertilized with three different dosages of Dekastar® fertilizer. The experimental site was then divided into three blocks, each of 1000 m^2 (0.1 ha) containing about 40 coffee plants. Fifteen out of 40 relatively uniform coffee plants in term of height, number of coppices and the plant size were selected from each block for receiving the treatments.

Experimental design

A trial in randomized complete block design (RCBD) was used for this experiment. The plants were then fertilized by *Dekastar*® fertilizer at different dosage levels, as follows: (1) Control, (2) dosage of 25 g and (3) dosage of 50 g per plant. Fresh bean weight was recorded at the end of fruiting seasons. Data were then subjected to Analysis of Variance and Duncan multiple range range test (DMRT).

RESULTS AND DISCUSSION

Results

Number of fruiting coffee plant

The number of fruiting coffee plant was affected by the application of fertilizer dosage levels as shown in Figure 1. There was a tendency that the coffee fruiting increased along with the increase of fertilizers dosage application. The beans were observed in all of the plants (100%) fertilized with a Dekastar® dosage of 50 g, while the lower numbers of plants bearing beans were observed at dosage of 25 g (98%) and control (88%).

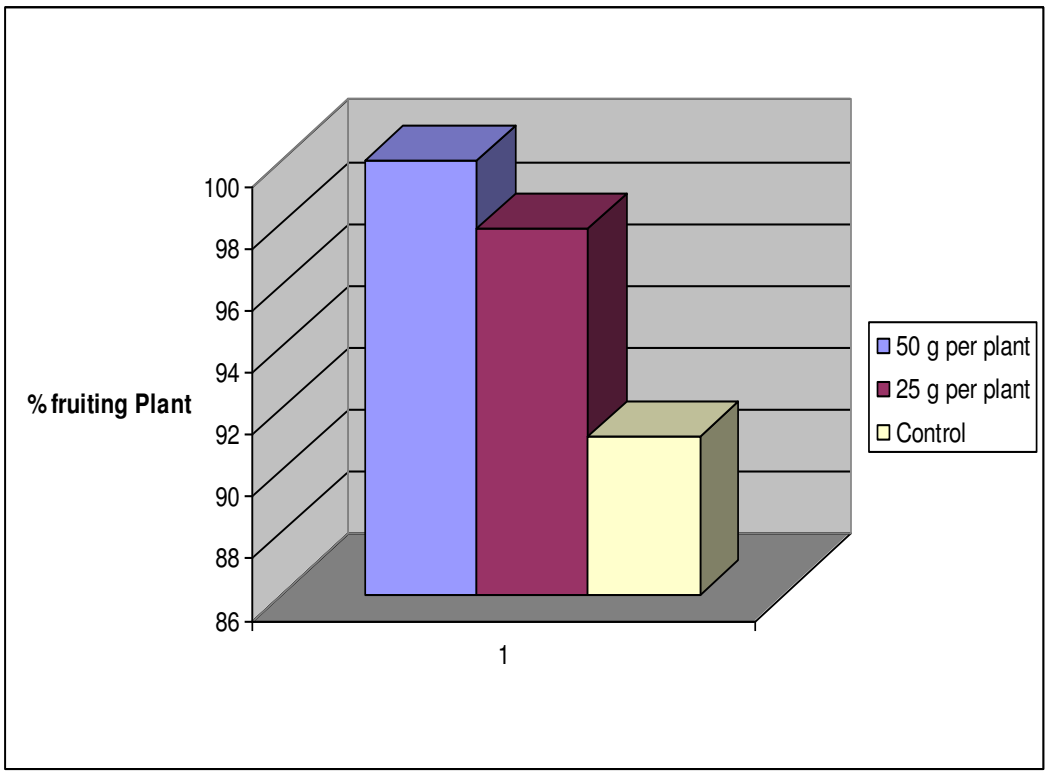

Figure 1. Effects of Dekastar® fertilizer dosages on the fruiting of coffee plants

Fresh coffee bean yield

The results of ANOVA, based on only one variable (% fresh bean yield) that was recorded five months after treatments, is presented in Table 1. There were no effects of

blocks and the significant effects of coffee fresh bean weight was clearly observed ($p<0.05$).

Table 1. Summary of ANOVA (p values)

No.	Source of Variation	p < 0.05
1	Coffee fresh bean weight	0.000**
2	Blocks	0.041ns

*Numbers followed by the same letter are not significantly different

The coffee bean yields treated by dosages of 25 g and 50 g per plant were higher than that of the control and was significantly different (Figure 2 and 3)

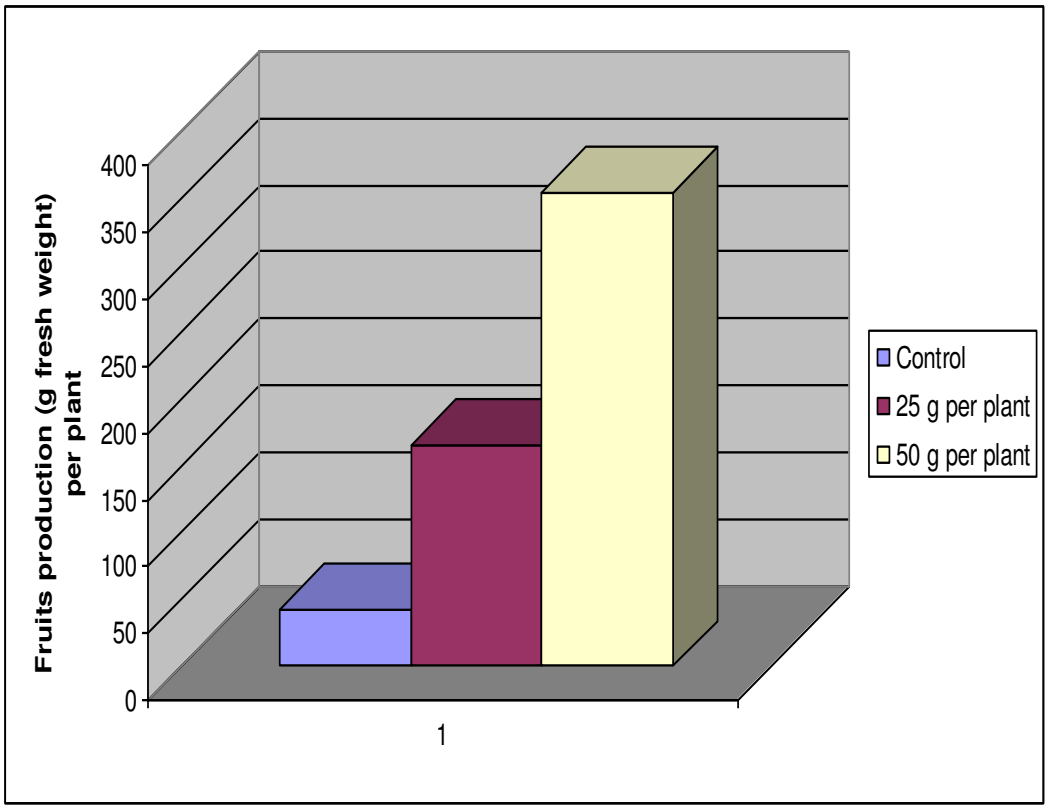

Figure 2. . Fresh coffee bean weight as influenced by fertilizer dosage

Figure 3. Coffee bean yields (Control (*left*) , 25 g (*middle*) and 50 g (*right*) Dekastar®)

Discussion

The initiation of flower primordial is a major event in the life cycle of a plant in that it involves a shift in the pattern of growth and development from vegetative to reproductive processes. Before floral primordial can be initiated, the plant must complete a period of vegetative growth or attain some minimal leaf number (Nogle and Fritz, 1983). Ripeness to flower is not recognizable by any external characteristics, but it can be determined empirically by subjecting plants of varying age to environmental conditions known to induce flowering. Both temperature and light are involved and the availability of some essential elements in the soil is also considered to contribute to the flower initiation and fruit production.

Figure 1 shows that the fertilizer dosages influenced the number of fruit (bean) producing plant, indicating fertilizer dosages as critical level for flower stimulation in the plant. The fruit production was also affected by fertilizer dosages as shown in Figure 2 and 3. The dosage of 25 g and 50 g of Dekastar® fertilizer significantly increased fruit production by 297% and 730%, respectively as compared to the control treatment.

Dekastar® 6-13-25 contains Nitrogen (N) 6%, Phosphate (P) 13% and Potassium (K) 25%. N is an essential element for plant growth and development. The role of this

element in the plant is through its presence in the structure of the protein molecules. In addition, N is found in such important molecules as pirin, pyrimidines, prophyrines and coenzymes. P is found in plants as a constituent of nucleic acid, phospholipids, the coenzymes NAD and NADP, and most important, as a constituent of ATP. The coenzymes NAD and NADP are important in oxidation-reduction reaction in which hydrogen transfer takes place. Such important plant processes as photosynthesis, glycolisis, respiration and fatty acid synthesis are depend on the action of theses enzymes. The Potassium is essential as an activator for enzymes involved in the synthesis of certain peptide bond and also can act as an activator for several enzymes involved in carbohydrate metabolisme (Devlin and Whitam, 1983). All of those processes were required as prerequisite for reproductive growth of the plant including flower initiation and fruit production. In some instances, critical levels of either single element of N, P, K or its combination seem necessary and the interaction between those element with light or temperature is highly contribute to the flower stimulation and fruit production.

CONCLUSION

Fertilizer dosages significantly increased coffee bean yields with different efficacies. Dosages of 25 g and 50 g of Dekastar® fertilizer stimulated coffee bean yields by 297% and 730%, respectively over the control.

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Annex 3.

MONITORING AND EVALUATION OF AGROFORESTRY FARMERS

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ABSTRACT

Study on Monitoring and Evaluation of Agroforestry farmers in Gunung Walat Educational Forest (GWEF) was very important to enhance the community participation.Objective of this study was to identify the activity of farmers and farmers groups..The research found two main results, that are 1) The pressure to GWEF is increased which indicate by the total amount the members of farmers groups has been increased 2) Contribution of agroforestr yincome has 20 % fromo total family income.

Key words: farmer, monitoring, evaluation

INTRODUCTION

Monitoring and Evaluation (monev) is a phase in activity. The purpose of monev in an activity is to measure how far the implementation is and if it is appropriate with or has deviation from the guidelines or to know the gap between implementation and the ideal condition.

Frutchey (1973) wrote that evaluation consist of observation, comparing between observation results by guidelines and decision making or assessment of the observed object. While Soumelis (1983) define evaluation as decision making process by comparing observation results of the object.

The main idea of monitoring and evaluation is the observation to collect data or fact, use of the guideline, measuring or comparing observation result with guideline and assessment.

METHODOLOGY

The research took place in the village around Bogor Agricultural University Gunung Walat Educational Forest in Hegarmanah Village, Cicayantan Subdistrict, Sukabumi

District, West Java Province. The research conducted in January – March 2008. The sample and population for this research are the farmers which participate in GWEF agroforestry cooperation. The respondent of this research are farmers which actively involved in forest rehabilitation activity through agroforestry cooperation in the research area.

RESULT AND DISCUSSION

Strengthening farmer group capacity was conducted to improve farmer participation on AKECOP activities at GWEF. The AKECOP research team has facilitated several farmer activities, i.e. farmer workshop, farmer training, discussion between farmers and experts, farmer group meetings and extension by development worker directly at farmer agroforestry plots or visiting the farmers at home. Focus Group Discussion (FGD) was employed in the regular meeting between AKECOP research team with 22 farmer groups (Figure 1). Topics were discussed with farmers in the meeting, mainly about problems and constraints on agroforestry farming and marketing of agroforestry products.

Figure1. Informal meeting with AKECOP farmers at the agroforestry sites

Based on the development data of agroforestry farmers, until May 2008 there is increase in active agroforestry farmers from 188 in 2006 to 250 in 2008. Based on field result, this increase is caused by several condition i.e. there are some non active farmer but there are also farmers from year 2001 data who is again active. This also proves that the pressure on forest resources is occurs as the effect the increase in goods price as the consequence of oil rise. The following is information of forest block distribution, the number of working farmers in Gunung Walat Educational Forest.

Table 1. Agroforestry Working Farmer in Gunung

No	Forest Block	Working Farmer (Household)	
		2006	2008
1	Cipeureu	81	89
2	Sindang	42	65
3	Citalahab	50	51
4	Sampay	20	27
5	Nanggerang	20	18
	Total	188	250

Survey shows that agroforestry products commonly consist of coffee, kapulaga, cassava, taro and banana. The average income of agroforestry working farmer is Rp. 284.750 per hectare per year which is a significant decrease compare to the income in 2004. This is understood because during that time range, the farmer did not cut the albizzia tree. If compare to the income from outside the agroforestry land (owned garden), the income will reach Rp. 1.181.000. By total, the income from agroforestry land is 20 % from family total income. The income from owned garden came from several commodities such as Africa wood, bamboo, lanseh, durian, kapol, coconut, mango, mangosteen, banana, rambutan, albizzia tree (sengon) and cassava. The income distribution of agroforestry land and owned garden based on commodities is showed in Figure 2 and Figure 3.

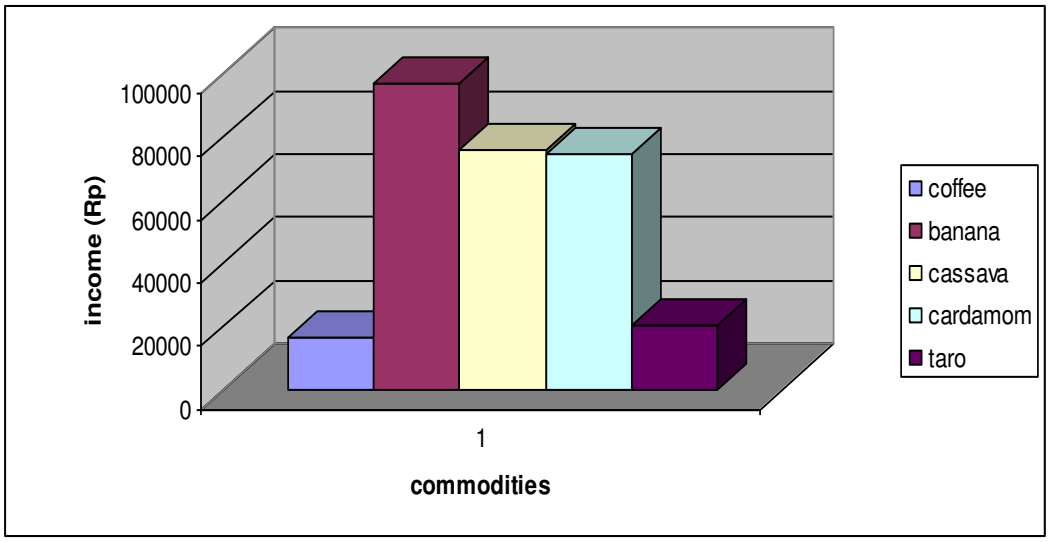

Figure 2. Income Distribution from Agroforestry Land based on Commodities

Figure 2 shows that banana has the highest percentage income that reach Rp. 97.000 per hectare per year, followed by cassava Rp. 76.000 per hectare per year, kapulaga Rp. 74.000 per hectare per year, talas Rp. 20.000 per hectare per year and coffee with only Rp. 16.000 per hectare per year.

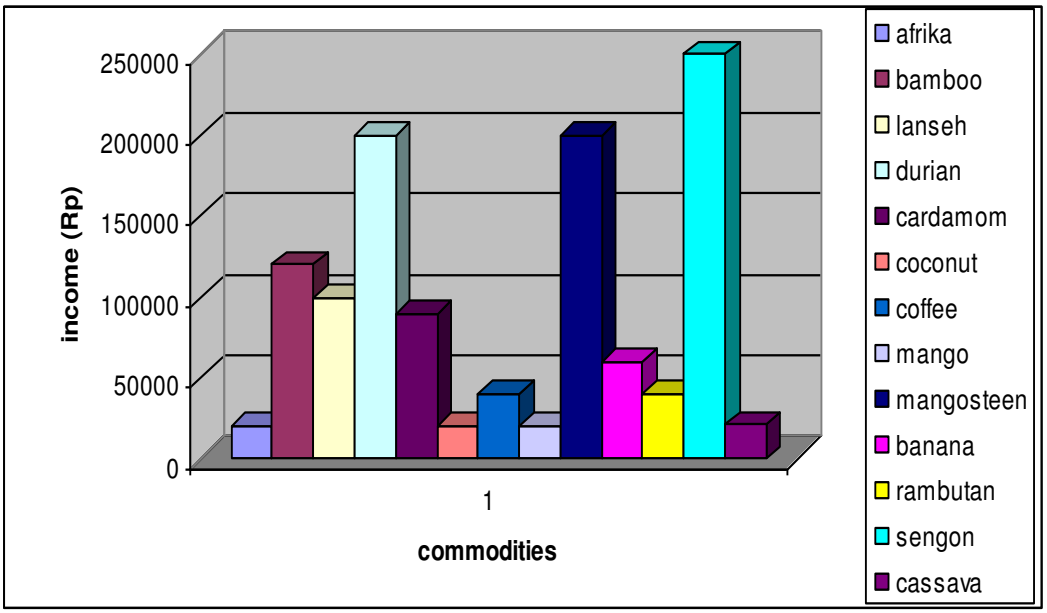

Figure 3. Income Distribution from Owned Garden Based on Commodities

Figure 3 shows that income distribution from owned garden based on commodities has the highest result from albizzia tree with Rp. 250.000 per hectare per year, mangosteen and durian Rp. 200.000 per hectare per year, bamboo Rp. 120.000 per hectare per year and other commodity below Rp. 100.000 per hectare per year comprise

of Africa wood, kapulaga, coconut, coffee, mango, banana, rambutan and the least valued is cassava with Rp. 21.000 per hectare per year.

CONCLUSION

The pressure to GWEF is increased which indicate by the increase of encroachment toward agroforestry area. This worsens by the hard situation of state social and economy condition. The income percentage of agroforestry area is 20% from total family income, it is decrease due to zero income from wood from agroforestry cooperation.

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Annex 4.

TRAINING EFFECTIVENESS AGROFORESTRY FARMER IN GUNUNG WALAT EDUCATIONAL FOREST, SUKABUMI

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ABSTRACT

Study on training effectiveness agroforerstry farmers in the Gunung Walat Educational Forest (GWEF) was influenced by two aspects of marketing mix i.e. realization of adoption stage of agroforestry farmer and factor that influenced adoption. The research found two main results, that are 1) the training effectiveness can be concluded that the level of acceptance of training participant is limited to the farmer knowledge and yet reach the application in field, 2)Internal and external factor cause the training effectiveness agroforestry farmers.

Key words: farmer, training, effectiveness

INTRODUCTION

In forestry extension, the desired goal is the changes in community behavior in order to increase the wealth level of the community surround the forest. According to Mosher that adoption of innovation is a process when farmer observe, consider, and reject or practice an innovation.

In the implementation, extension process needs acceptance. The meaning of acceptance is the execution from understanding the delivered message. One of the extension activities is training. In order to know the adoption level toward the training, therefore needed instrument to know the development of the farmer's acceptance level.

LITERATURE STUDY

There are many definition of training suggested by experts. In the book Helping People Learn: *A Module for Trainers,* training is a learning process designed to change the performance of officer in conducting their jobs.

From the above explanation, there are four basic words in training which are Learning, Performance, People and Jobs. Training is designed to change someone habit to increase their performance and achievements.

Training is not the same with education or communication, though there is some confusion to differ those three. Communication and education has more extent meaning than training. Training is the implementation of communication and education principal. Self training is a form of education and communication which in general both has different understanding. Training in fact is application of education and communication. Margono Slamet (1978) says that there are several factors that influence decision making in adoption process as follows:

1. Awareness stage when the target is getting aware of the innovation.
   The awareness stage is influenced by several factors:
   a. Information sources outside the community.
   b. Contact with individual and group within the community
   c. Availability of communication media
   d. Location and Culture
2. Interest stage, the interest growth indicates by the willing to ask.
   The interest stage is influenced by:
   a. Level of need
   b. Contact with information sources
   c. The activity level in searching for information sources
   d. The availability of detail information sources
   e. Encourage from local community
3. Assessment stage or assessment toward the good and the bad of innovation which influenced by:
   a. The knowledge about relative advantage of innovation practice.
   b. The purpose of agriculture
   c. Experience from other farmer.
4. Attempt to do trial in small scale, which influence by:
   a. Special skill that the farmer has
   b. Satisfaction to old ways
   c. The willingness to take risks
   d. Information about special practices
   e. Natural factors, price, etc.

5. Adoption stage, which is the final stage that determine whether or not someone accept or reject an innovation. The influencing factors is:
    a. Satisfaction of the first experience
    b. Farmers ability in managing their agriculture business
    c. Fund and facilities availability
    d. Analysis of success and failure
    e. Family interest and goal

PURPOSE

The purpose of this research is to know the adoption level of farmer in the training they followed. This research conducted through interview and observation to 60 farmers by questionnaire. Data analysis conduct by descriptive to see the factors that influence the decision making process in each adoption level.

RESULT AND DISCUSSION

The research result shows that the form of agroforestry farmer adoption stage after joining the training conducted by Gunung Walat Educational Forest management is realize into three things which are self knowledge, practice on field or agriculture land and spread it to other farmers. Based on questionnaire result, 100% of the farmer feel the benefit of the trainings due to increase in knowledge, 40% of the farmers has practice it in their garden or agriculture land and 60% farmers has spread the knowledge to other farmers. The detail of adoption stage of respondent farmer is in Table 1.

Table 1. Realization of adoption stage of agroforestry farmer in GWEF

Realization of Farmer Adoption	Number of Respondent	Percentage
Knowledge	60	100 %
Practice in garden/agriculture land	24	40 %
Spread out to other farmers	36	60 %

From Table 1 can be seen that respondent farmer in general has not yet doing many practice, just as far as knowledge.

Observing the effective form after training, the identification factor that influence farmer decision in awareness level shows that the factor of information sources within the

community has the biggest influence. The highest interest stage most influenced by the level of need factor. The assessment stage is influenced mostly by knowledge factor on relative advantage of innovation practice. The trial stage is influences most by the special skill factor of which the farmer has and the implementation stage is most influenced by the ability of farmer in managing their agriculture business. The detail is showed by Table 2.

Table 2. Factor that influenced adoption stage

No	Adoption Stage	Influencing Factor	Percentage
1	Awareness	Information sources outside community	80
		Contact with individual and groups within community	75
		The availability of communication media	45
		Location and Culture	45
2	Interest	Level of need	75
		Contact with information sources	55
		Active in seeking sources of information	40
		Information sources for detail	45
		Encourage from local community	45
3	Assessment	Knowledge about the relative advantages of innovation practices.	60
		Purpose of agricultural effort	45
		Experience from other farmers.	40
4	Trial	Special skills that already has by the farmer	60
		Satisfaction to the old ways/methods	40
		The courage to take risks	40
		Information on special practices	35
		Factors of nature, price, etc	35
5	Implementation	Satisfaction from the first experience	45
		Farmers ability in managing their agriculture business	60
		Availability of fund and facilities	35
		Analysis of success and failure	35
		Family purpose and interest	35

Considering the target characteristic, Rogers (1971) proposes that target group within the community divide into 5 (five) groups of innovator, early adopter, early

mayority, late majority and laggard. Concerning the Table 2 above, the majority of farmer can be put into early majority and late majority. The factors being studied consist of agriculture business, income level, age, participation level and cosmopolitan. The following Table 3 will show in detail.

Table 3. Relation between Internal Factor and the Level of Training Adoption

Internal Factor	Spearman Rank Value
Age	-0,241
Size of Agricultural Business	0,082
Participation Level	-0,135
Cosmopolitan	0,133
Income	0,094

Table 3 shows that cosmopolitan factor has the highest value but not significant, which means that farmer in GWEF has relation level with outer world but not significant. Especially for age factor, it shows that the older the age the participation level is lower, vice versa. The farmer with younger age has the tendency to has high participation level.

CONCLUSION

Looking at the training effectiveness can be concluded that the level of acceptance of training participant is limited to the farmer knowledge and yet reach the application in field. This was caused by other internal or external factors which not support the condition. In order to increase the current adoption level, it is needed to improve the influencing factor from inside or outside through assistance consist of communication channel, approach method and types of information to be delivered, as well as increasing the internal factor which are farmer education and motivation.

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Annex 5.

STUDY ON MARKET POTENTIAL OF MEDICINAL PLANT CULTIVATION AROUND GUNUNG WALAT EDUCATIONAL FOREST, SUKABUMI

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ABSTRACT

Study on Market Potential of Medicinal Plant Cultivation around the Gunung Walat Educational Forest (GWEF) was influenced by four aspects of marketing mix i.e. product planning, pricing, distribution and promotion. Five main medicinal plant (Kumis Kucing (Orthosiphon aristatus); Jati Belanda (Guazuma ulmifolia); Sambiloto (Andrographis paniculata); Pegagan/Antanan (Centella asiatica); and Temulawak (Curcuma xanthorrhiza)) were identified.The research found two main results, that are 1) medicinal plants in and around GWEF has not been cultivated at economic scale,2. Cultivation of medicinal plants has Research results showed that (1) production of medicinal plant sourounding GWEF have not seriously cultivated (2 opportunity markets for community in GWEF to develop the medicinal plant business.

Key words: farmer, medicinal plant, market potential

INTRODUCTION

Indonesia has a lot of local community lived in and around forest, these people has traditional knowledge of plants to cure illness (Zuhud, 1999). Indonesia also has potential for medicinal plants, no less than 7.000 species of plants has medicinal use which comprise of 90% medicinal plant species in Asia (Badan POM, 2001). Yet the richness of traditional knowledge and medicinal plants diversity has not been protected and well managed. Both local knowledge and biological diversity have high economic value.

The development of medicinal plants marketing channel is a very complex issue, which basically related with adjustment of production result (supply) to the market demand, supply, time and condition of shipment/delivery, payment system, etc. Various

kinds of medicinal plants commodities have been managed by the people surrounding Gunung Walat Educational Forest (GWEF) since quite a long time. They run it in their land and send it to the market with various kinds of marketing channel. They marketed it to the buyers according to the marketing network and to the commodity. The marketing network was formed long time ago and it is still running until present with a range of benefit levels acquired based on the type of commodity and the existing network. Marketing channel is one of the factors that will influence the benefit the farmers will achieve. Thus far, the farmers have received a number of varieties of benefits from various commodities marketed. For that reason, a study about the existing marketing network is required. The result of the study will then be used as a consideration in the effort of increasing the benefit received by the farmers. The study will be conducted on the supply side (the farmers) and on the demand side (marketing process). The result of the study is expected to find key factors that influence the quality of marketing network.

As early step in developing medicinal plant in encroached area, the marketing aspect of cultivation medicinal plants, i.e. Temulawak, Jati Belanda, Sambiloto, Kumis Kucing and Pegagan is important due to market competition.

LITERATURE STUDY

Limbong and Sitorus (1985) wrote that marketing institution is a institution in marketing field, distributing goods from producer to consumer through trading process. The distance between producer and consumer makes the process of product distribution involved intermediary actors. Distribution process always involved several actors which involvement could be bias in terms of individual or institution, alliance or corporate. Producer has the main role in producing goods and often conducts trading activities. While trader distribute commodity in time, place, and shape which consumer wants.

This marketing institution occurs because of consumer demand to get the goods that they want. The duty of this marketing institution is marketing functions and to fulfill the consumer demand in maximum, as return the consumer will give margin service to the trader institution. Each agricultural product has different channel. The marketing channel of an agriculture product can be differ and changes regarding the area, time and technology. Often times all the channels take attention to relatives units of the goods which channeled through each intermediary institution within marketing channel.

Marketing channel is a series of organization that rely each other and involved in the process to make a product or service ready to be use or to be consumed. A marketing

channel duty is to move the goods from producer to consumer due to gap in time, place and ownership which separate those goods from people who needs or wants it (Kotler, 1987).

Marketing channel characterized by the number level of marketing channel. Each intermediary actor which delivers the product to the final buyer can be named as channel level. Because the producer and final consumer conduct cooperation, both are part of the marketing channel.

OBJECTIVES

This research objective is to identify the marketing pattern of Temulawak, Jati Belanda, Sambilot, Kumis Kucing and Pegagan. The result of this research expected to be recommendation in medicinal plant agroforestry development as the model of community forest co-management.

METHOD

This research conduct by investigate the data from farmer, middleman, retailer to consumer for many commodities. Data is collected with structured interview by questionnaire and deep interview.

RESULT AND DISCUSSION

1. Production aspect

Production aspect to identify potential markets medicinal plant cultivation is very important. There are three factors of production that are very important in determining marketing plan as well as marketing strategy (Azzaino, 1981; Dahl and Hammond, 1977), that are:

- Quantity of products
- Quality of products
- Continuity of supply

The research shows that production aspect of five medicinal plants (i) Kumis Kucing (*Orthosiphon aristatus*); ii) Jati Belanda (*Guazuma ulmifolia*); iii) Sambiloto

(*Andrographis paniculata*); iv) Pegagan/Antanan (*Centella asiatica*); and v) Temulawak (*Curcuma xanthorrhiza*) is varies. Two medicinal plants (Kumis kucing and temulawak) have data production. The following Table 1 describes the quantity of products.

Table 1: Production of cultivation medicinal plants in and around GWEF

Medicinal Plants Products	**Average Production Volume from GWEF***	**Average Production Volume outside GWEF (own farmer land)***	**Processing by GWEF's farmers****
1.Kumis Kucing	5,320 kg/ha/year	subsisten	Raw, Chips
2.Jati Belanda	No data	No data	-
3. Sambiloto	No data	No data	-
4. Pegagan	No data	No data	-
5. Temulawak	No data	subsisten	-

The above Table 1 shows that production volume of kumis kucing are higer than the other medicinal plants (the other no data). The quality of products varies, since there are differences on site condition and lack of farmer's experiences and the supply of those medicinal plants products in and around GWEF fluctuates from time to time. Survey at the agroforestry area shows there are two farmers trying to cultivate kumis kucing (Figure 1)

Figure 1. Agroforestry area to cultivated kumis kucing

2. Pricing

The prices of medicinal plants products is varies, the local market and international markets (exportir). Kumis kucing could be sold in export market, but the other the local market and for own consumption. The following Tabel 2 describes the prices of medicinal plants.

Table 2: Prices of Medicinal Plants Products from in and around GWEF

Agroforestry Products	Farmer's Price	Trader's Price	Exporter's Price
1.Kumis Kucing	Rp. 1,500/kg/wet	Rp. 9,000/kg/dried	Rp. 22,500/kg/dryer
2.Jati Belanda	No data	No data	No data
3. Sambiloto	Rp. 1,000/kg/wet	Rp. 8,500/kg/dried	No data
4. Pegagan	Rp. 1,000/kg/wet	Rp. 12,000/kg/dried	No data
5. Temulawak	Rp. 5,00/kg/wet	Rp. 2,500/kg/dried	No data

Table 2 shows that the price of kumis kucing is about Rp 1,500/kg/wet at the farmer's level. Ten kilos of wet kumis kucing produced 1.2 kg of dried commodity. Usually, the collector of kumis kucing takes gross margin Rp 7,500/kg, so that the price of cassava at the trader's level is about Rp 9,000/kg/dried

The price of sambiloto at the farmer's level is about Rp 1,000/kg/wet, then the trader's sell them is about Rp 8,500/kg/dried.

The price of peagan is Rp 1,000 at the farmer's level and Rp 12,000/kg at the trader's level after processing dried and fine

The price of temulawak at the farmer's level is only Rp 5,00/kg wet. Usually further processing, i.e. drying and selecting quality, is conducted by the trader's.and the price of a high quality of dried temulawak is about Rp 2,500/kg.

3. Distribution

Distribution of medicinal plants are marketed in the local market in Sukabumi district or to be sold in the regional market around Sukabumi, e.g. Bogor and Jakarta. The potential markets of medicinal plants have more opportunity to improved the quantity of supply. The distribution of medicinal plants products from in and around GWEF are described in the following Table 3.

Table 3: Distribution and potential markets of medicinal plants Products from in and around the GWEF

Medicinal Plants Products	Distribution of markets	
	Actual Markets	**Potential Markets***
	Demand	**Demand**
1.Kumis Kucing	France Exporter 28 ton/month	1. PT. Martina Beto 2. PT Sinde Budi Sentosa 3. PT Dewa Honey 4. Cap Singa Banteng, PJ (total demand : simplisia 8,817.290 kg/year)
2.Jati Belanda	No data	1. PT. Martina Beto (14,086.730 kg /year)
3. Sambiloto	No data	1. PT Winis Cap Bijing 2. Mitro Rahajoe Podosalametee, PJ 3. Dami Sariwana, PT 4. Putri Sejati, PJ (Total demand simplisia : 232,798.250 kg/year)
4. Pegagan	No data	1. Herba Khasiat, PT 2. Dami Sariwana, PT 3. Nyonya A Sam, PJ (Total demand simplisia :31,949.66 kg/year)
5. Temulawak	No data	1. Deltomed Laboratories (Total demand simplisia : 406,500 kg/year)

Note : * Data from Badan Pengawasan Obat dan Makanan

Above Tabel 3 show that kumis kucing is sold in the local and international market. The middleman in Karang Tengah Market says that the demand of kumis kucing in France is 28 tons/month while the supply only about 7 tons/month. This shows a potential market for business opportunity to increase kumis kucing productivity. Beside that above data from BPOM, there are some medicinal company to need kumis kucing 8,817.290 kg/year. This shows a potential market for business opportunity to increase kumis kucing productivity.

The demand for Temulawak is relatively high. People consume Temulawak as for traditional drink. Total demand of Temulawak from medicinal company 406,500 kg/year.

Besides Temulawak, medicinal company to need some simplisia from sambiloto (Total demand simplisia : 232,798.250 kg/year) , jati belanda (14,086.730 kg /year) dan pegagan (Total demand simplisia :31,949.66 kg/year).

CONCLUSION

In general, GWEF and the surrounding area have not seriously cultivated medicinal plant even though there are potential markets for those products. This is an opportunity for community in GWEF to develop the business and make it source of promising income in order to develop prospective agroforesty in the coming future.

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