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## **Eucalyptus in Rural Livelihood Safety Net Strategy in Coffee Growing Area: Case Study Around Jimma, Southwestern Ethiopia**

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**Abstract:** Eucalyptus is becoming one of the most important land uses in coffee growing area in Ethiopia. Information on the consequences of discouraging growing eucalyptus on farm is insufficient. The study aims at investigating the effect of growing eucalyptus in the livelihood of smallholder farmers to attain food security. The study was conducted close to Jimma, Southwestern Ethiopia. Information on household characteristics and growing eucalyptus were collected through interview. Two kinds of analysis were used for data analysis. Independent t testing for differences between households and paired t testing for differences within households. The survey result showed about 54.8% of the household owned a land less than 1ha. Only about 87.6% households were capable to feed family up to eleven months from what they produce. About 44.9% of the households owned eucalyptus. The frequency distribution result showed that the annual income of the majority of both coffee and eucalyptus grower households were more than 4000. Could there have not been income from eucalyptus, this frequency distribution had been shifted to annual income between 2000 and 3000 Ethiopian birr. An independent t testing result showed the average annual income of coffee and eucalyptus grower household was significantly different from only coffee grower household, ( $p = 0.003$ ). The paired t testing result shows that there could be significant difference in annual income within coffee and eucalyptus grower households ( $t = 7.441$ ,  $df = 34$ ,  $p = 0.000$ ). Growing eucalyptus is the most important livelihood part of poor and medium households. Discouraging eucalyptus may increase vulnerability to food insecurity at household level.

**Key words:** Farm forestry, food security, livelihood, woodlot, household, income

### **INTRODUCTION**

The intention of growing eucalyptus under community and farm forestry programme before three decades (Bishaw, 2001), to solve wood demand shortage in response to loss of natural forest has been changed to market oriented growing practices over period of time (Mekonnen, 2000). This is due to the fact that growing eucalyptus has significant economic benefit to the land user (Wirtu and Gong, 2000; Liu and Li, 2010). The cash obtained from eucalyptus sale assist smallholder farmers to bridge the food shortage gap at household level. As a result, growing eucalyptus at a farm level in a form of woodlot has become very common practice among smallholder farmers in rural parts Ethiopia (Jagger and Pender, 2003).

Agriculture is the means of livelihood for 85% of the population living in rural area of Ethiopia (Bishaw, 2001; Tadessa, 2001). The contribution of smallholder farmers' account for 90 and 95% of the total grain and coffee produced in the country respectively (Nicolas, 2007). Most of these agricultural productions are subsistence based to attain food security. Productivity per unit area is also low due to land degradation (Bishaw, 2001; Alam *et al.*, 2002; Jagger and Pender, 2003). The decision makers have worried much about the expansion of eucalyptus in fear of jeopardizing agricultural production in rural parts of Ethiopia (Jagger and Pender, 2003). Non-foresters seriously complain the partly or completely conversion of cultivated land to eucalyptus. The ecological dilemma of eucalyptus (Liu and Li, 2010), getting the discussion point in many forums. As a result, the use of extension to promote growing eucalyptus for farm forestry development has never been policy objective in Ethiopia (EFAP, 1994; Jagger and Pender, 2003). At the end, the Oromia regional government has put rules and regulations in place not to plant eucalyptus on agricultural land in Oromia rural land use administration proclamation number 56/2002.

Southwestern part of Ethiopia is coffee growing area, which is the most important cash crop. However, smallholder farmers grow eucalyptus as farm diversification to livelihood coping strategy to attain food security. There is insufficient information on the extent of eucalyptus on smallholder farmers' livelihood coping strategy to food security. Discouraging eucalyptus may aggravate the food insecurity at smallholder farmers' level. Therefore, the study aim at investigating to what extent growing eucalyptus brings a difference in livelihood of smallholder farmers to attain food security. The hypothesis is that the area is coffee growing area and growing eucalyptus doesn't bring any change in livelihood strategy of smallholder farmers.

## **MATERIALS AND METHODS**

### **The Study Site Description**

The study was conducted at *Gube Mulata* 14 km from Jimma town. Geographically, the study site is located between 36°00' and 37°00' N and 7°00' and 8°00' E. The area receives annual rainfall between 1200 and 2800 mm. The temperature ranges between 28.8 and 11.8°C. The altitude of the area is about 2000 m.a.s.l. The total population of the area is about 5440. The total household number is 888 of which 714 and 74 male and female headed household, respectively. Agriculture is the means of livelihood of the people (Kiflu *et al.*, 2009). The area is one of the major coffee growing areas. Maize, teff, sorghum, pulses and root crops are the major crops grown in the area. Coffee is the most important cash crop in the area.

### **Methods**

A household survey was conducted between March to July 2010. Information on household characteristics and growing eucalyptus were collected through interview. Semi structured and structured type of questionnaire was used for interview. The total number of the households in the study area was 888. From which 98 (11%) households were randomly selected for interview.

Annual income from eucalyptus and coffee was collected particularly from those farmers who have the experience. Eucalyptus growers obtain income from eucalyptus every three to four years. Annual income was assumed diving to three to four without strictly considering the time value of money. The SPSS version 16 was employed for data analysis. Two kinds of analysis were used for data analysis. Independent t testing was used to see a difference

between households and paired t testing was used to see a difference within households. Square root data transformation was done to fulfill the assumption of normality and homogeneity of variance for independent testing. Moreover, data was analyzed using descriptive statistics.

## RESULTS AND DISCUSSION

### Household Characteristics

Table 1 shows the summary of household characteristics in the study area. The family size of the household was quite vary (Min. = 2, Max. = 12, Mean = 6). Overall, the members per household were very large for the households. Of the total households (n = 98), 29 households support family members between 3 and 5 (29.8%), 39 households support family members between 5 and 7 (39.8%), 9 households support family members between 7 and 9 (9.1%), 5 households support family members between 9 and 12 (5.1%). In total 83.8% of the total interviewed households support family members more than 3.

The survey result analysis also showed that about 50.6 and 42.6% of the total sampled population (n = 98) was reported poor and medium, respectively. The landholding size of the household varied from 0.1 to 7 ha. However, about 54.8% of the household owned a land less than 1 ha. Smallholder farmers allocate important enterprises for their livelihood across this small unit of land (Barrett *et al.*, 2001). Tekalign and Ayele (2003) reported that farmers having below a hectare of land and with no access to diversification are susceptible to food insecurity even with optimum use of the available technology.

### Eucalyptus to Livelihood of Smallholder Farmers

Table 2 shows that large number of households engaged in growing eucalyptus. From the total households interviewed (n = 98), 44 (44.9%) owned eucalyptus. Eighty seven (90.6%) of the respondent claimed self-sufficient to support their family throughout the year, of which 41 (47.12%) were eucalyptus grower. From 97 households, only 12 households (12.4%) were capable to feed the family throughout the year. The rest 85 households (87.6%) were capable to feed up to eleven months from what they produce. As a result, smallholder farmers need cash to bridge the gap to the minimum of a month to half years to be self-sufficient in supporting family. Adekoya (2009) reported that households engaged in one or more income generating activities aside from primary occupation to meet food needs.

Table 1: Summary of household characteristics

Characteristics	N	Min.	Max.	Mean	Valid percent
Family size	98	2	12	~6	
Less or equal 3	16				16.3
Between 3 and 5	29				29.6
Between 5 and 7	39				39.8
Between 7 and 9	9				9.1
Between 9 and 12	5				5.1
Wealth status	98				
Rich	6				6.7
Medium	38				42.7
Poor	45				50.6
Land holding size (ha)	98	0.1	7	~1.09	
Less or equal to 1	51				54.8
Between 1 and 2	35				37.7
Between 2 and 3	6				6.4
Greater than 3	1				1.1

Table 2: Proportion of self-sufficient households in study area

	N	Valid percent
Self-sufficient	87	90.6
Self-sufficient own eucalyptus	41	47.12
Production to support family	97	
Up to half year	12	12.5
Up to nine months	59	60.8
Up to ten months	82	84.5
Up to eleven months	85	87.6
All the year	12	12.4
Total household number	98	
Own eucalyptus	44	44.9
Not own eucalyptus	54	55.1

Table 3: Frequency distribution of households categories based on annual income (ETB)

Source of Income	N	Percentage
Coffee only <sup>1</sup>	53	100.0
Annual income categories (ETB/year)		
Less than 1000	10	18.9
Between 1000 and 2000	14	26.4
Between 2000 and 3000	12	22.6
Between 3000 and 4000	13	24.5
More than 4000	4	7.5
Coffee and Eucalyptus <sup>2</sup>	35	100.0
Annual income categories (ETB/year)		
Less than 1000	3	8.6
Between 1000 and 2000	4	11.4
Between 2000 and 3000	8	22.9
Between 3000 and 4000	9	25.7
More than 4000	11	31.4
Coffee <sup>2</sup>	35	100.0
Annual income categories (ETB/year)		
Less than 1000	8	22.9
Between 1000 and 2000	5	14.3
Between 2000 and 3000	11	31.4
Between 3000 and 4000	6	17.1
More than 4000	5	14.3

\*ETB: Ethiopian birr <sup>1</sup>= only coffee grower households, <sup>2</sup> = Coffee and eucalyptus grower households

Ahmed *et al.* (2004) also reported that tree in homestead generate income to the farmers. Schreckenber *et al.* (2006) described the important gap-filling role of income from indigenous fruit trees at the start of the agricultural season in Benin.

Coffee and eucalyptus were the main source of cash for the households. Table 3 shows annual income of household from coffee and eucalyptus. From the total households considered for interview, 92 households grow coffee, of which 44 households also have eucalyptus. From coffee growers, only 88 households were willing to respond to the question regarding their annual income from coffee and eucalyptus, of which 35 households were own both coffee and eucalyptus. The frequency distribution result showed that the annual income of the majority of only coffee grower households were between 1000 and 2000 Ethiopian birr (26.4%). For households who grow both coffee and eucalyptus the largest proportions were more than 4000 Ethiopian birr (31.4%). Could there have not been income from eucalyptus, this frequency distribution had been shifted to annual income between 2000 and 3000 Ethiopian birr. This implies that eucalyptus growers tend to be more financially secured in ensuring food security (Adekoya, 2009). Eucalyptus can save farmer from poverty in such a way that it will provide them some supporting returns after harvesting the trees (Ahmed *et al.*, 2007).

#### Effect of Eucalyptus on Livelihood of Smallholder Farmers

Table 4 shows two categories of households; only coffee grower and coffee and eucalyptus grower. The result showed that there was a difference in annual income between

Table 4: Summary of household income from coffee and eucalyptus (ETB/year)

Source of income	N	Min.	Max.	Mean
Total number of households	98			
Missing	10			
Coffee grower households only	53			
Income from Coffee		200	16000	2405.47
Coffee and eucalyptus grower households only	35			
Income from both coffee and Eucalyptus	300	7400	3278.34	
Income from coffee only*		0	4800	2260.63

\*Mean for transformed data

Table 5: Comparison between households (n = 52 coffee and 34 both coffee and eucalyptus)

Variables	M	SD	t	df	p
Coffee	44.34*	13.47	-3.076	84	.003
Both coffee and eucalyptus	54.05*	15.55			

\* = Reducing the cash obtained from eucalyptus, ETB: Ethiopian Birr

eucalyptus and non-eucalyptus grower households. The annual income within eucalyptus grower households changes with eucalyptus land use option. The average annual incomes of coffee and eucalyptus grower households were greater than only coffee grower households. Within coffee and eucalyptus grower households again the average annual income was better when eucalyptus maintained in land use.

Table 5 shows mean annual income comparison between only coffee grower households and coffee and eucalyptus grower households. An independent t testing result showed the average annual income of coffee and eucalyptus grower household was significantly different from only coffee grower households ( $p = 0.003$ ). The average annual income of coffee and eucalyptus grower household was significantly higher than the average annual income of only coffee grower households.

The paired t testing result shows that there could be significant difference in annual income within coffee and eucalyptus grower households ( $t = 7.441$ ,  $df = 34$ ,  $p = 0.000$ ). The average annual income of household was significantly higher when eucalyptus opted for land use (Mean = 3278.34 and 2260.63 with and without eucalyptus, respectively). Ahmed *et al.* (2007) reported that eucalyptus was raised with the objective of getting more economic return. Adekoya (2009) mentioned that households engaged in various forms of agricultural activities to meet food security. Tekalign and Ayele (2003) reported that eucalyptus serves as a cash crop. The sale of eucalyptus has the potential to raise farm incomes, reduce poverty, increase food security and diversify smallholder farming systems in less favored areas (Jagger and Pender, 2003). Alam *et al.* (2005) reported that the income from tree species was significantly different within the farm categories. The medium farmers were reported to intensive cultivate the homegarden to get monetary benefits. Experiences from northern Ethiopia showed that eucalyptus woodlots with an average planting density of 4,500 trees/ha and survival rate of 64% worth more than 80,000 Ethiopian birr/ha.

It can be concluded from the aforementioned statement that smallholder farmers claimed self-sufficient based on the production they produce and cash they can get for access to food. Eucalyptus has significant benefit as a cash crop to smallholder farmers. Growing eucalyptus is the most important livelihood part of poor and medium households. Discouraging eucalyptus may increase vulnerability to food insecurity at household level.

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