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Coffee plantation characteristics of migrant farmers: a case study in Tanggamus, Lampung, Indonesia

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Abstract. Tanggamus District is the second-largest coffee producer in Lampung Province after West Lampung District. The main production region is located at the highland of the northern side of Tanggamus namely the Sub-district of Air Naningan, Pulau Pangung, and Ulu Belu which border with protected forest area. This research was conducted in the Sumberejo Sub-district of Tanggamus Regency using survey and Focused Group Discussion method, considering that Sumberejo was the population center and the main coffee producer among Talang Padang ex-subdistrict region. The study involved 3 villages that were chosen purposely with 71 respondents of coffee farmers that were determined using a simple random sampling method and 3 series of FGD from April 2019 until September 2020. Data were analyzed using both descriptive and quantitative methods. The results show that 49% of sample farmers grow coffee located at medium (5-19 km) or long distances (≥ 20 km) from home. There are 25-76% of sample farmers who work as a seasonal migrant usually (76.5% farmers) come to the garden once a month or once in two months. About 38% of sample farmers have coffee plantations outside Sumberejo Sub-district mainly at the Sub-district of Air Naningan and Ulu Belu. Long-distance coffee plantations are characterized by larger landholdings (1.5 ha on average), higher coffee stands per hectare (2,456 trees on average), and are dominated by mature coffee trees (41% farmers) and younger coffee trees (29% farmers). The more distance from home the lower shade trees population is. However more divers of MPTS are found in the coffee plantation that is located close to home residency. The yield of coffee plantations that are in a close or medium distance from home ranges 0.75-0.77 tons per hectare per year. Meanwhile, coffee plantations that are located a far distance from home get a yield of 0.94 tons per hectare.

Keywords: Coffee, Characteristics, Farmers

1. Introduction

The provinces of Lampung, South Sumatra, and Bengkulu are known as the triangle of Indonesian coffee producers. According to the Center for Agricultural Data and Information [1] this region contributes 63.21% of Indonesia's Robusta coffee production. Producer districts are located in the Bukit Barisan Selatan Mountain Range, namely Tanggamus, West Lampung, North Lampung, Way Kanan (at Lampung Province), South OKU, OKU, Lahat, Muara Enim, Empat Lawang (at South Sumatra Province), Seluma, Kepahiang, Rejang Lebong, and Lebong (at Bengkulu Province).

The expansion of the coffee plantation area encourages the migration of farmers and seasonal workers to earn a living [2]. Seasonal labor migration occurs especially in the coffee picking season [3] where workers are brought in from outside the region [4]. Migration to coffee production centers in Lampung occurs spontaneously or following the transmigration program. According to the Directorate General of PKPPT [5], the first transmigration program in Indonesia occurred in 1905 with resettlement from Java to Bagelen Village, Gedong Tataan District, Pesawaran Regency, Lampung. Resettlement continued until 1941 to western regions such as Pringsewu and Wonosobo nearby Kota Agung.



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In year 1930 migrants from South Sumatra (including Semendo and Ogan) have been inhabited Northern and Western Lampung including District of Way Kanan (Kasui), West Lampung (Sumberjaya), and Tanggamus (Talang Padang, Air Naningan, Pulau Panggung, Ulu Belu). Meanwhile, newcomers of java migrants are welcome to work at Lampung and Semendo's land tenure as farmers who replant shrub plots for free, as sharecroppers, or as wage-laborer. One day they are eventually able to buy a piece of land of their own, usually through a series of small payments especially at the end of the coffee harvest season [6].

Prijono [7] reported that to earn a living, spontaneous migrant farmers from Java and South Sumatra cleared forests in more remote areas including at the Sub-district of Air Naningan, Pulau Panggung, and Ulu Belu which bordering the KPLH Batu Tegi and KPLH Kota Agung Utara. In Tanggamus, the pioneer period of forest clearing for coffee plantations occurred in the 1950s, followed by a period of acceleration in the 1970s, and a period of reformation in 1999-2000. Since 2017 coffee plantations in forest areas in Tanggamus have received legality with the existence of a community forest utilization business permit (IUP HKm) which today has been received by 40 farmer group associations (Gapoktan).

Semendo migrants of new coming or new married are supposed to open forests that are usually remote and isolated to plant coffee. It is a tradition called "nyusuk" meaning to work and live in a hut at an isolated farm that is far away from the village [8]. Production of coffee fields achieves the peak yield (called "ngagung") when the plants are 5-6 years old and followed by the years of decreasing yield. When the yield is low, the fields are abandoned and become shrub. Semendo farmers then clear another forest. Sometimes java migrants from nearby districts or sub-districts come to buy the abandoned coffee fields or shrubs to cultivate vegetables and coffee [9]. Migrant Farmers (ethnics of South Sumatera, Java, and Sunda) that are succeeded in coffee farming will go back to their home-based village to stay while regularly coming back to maintain and harvest coffee.

The transformation of swidden fields into the permanent fields of coffee plantations [10] is brought by the increasing amount of labor needed for weeding, pruning, fertilizing and harvesting that pushed the influx of spontaneous migrants. Labor arrangements (daily wages, contracts, and sharecropping) enable the migrants to accumulate savings and to buy their own gardens [6]. Labor is the main component of coffee farming costs. Prasmatiwi [11] reported that labor costs (from outside the family) and transportation costs for harvested produce contributed 72.1% to the total cost of coffee farming. Evizal [9] reported that total labor was 117 – 154 man-days, depending on the intensity of plant maintenance. Nevertheless, Sari [12] reported that harvesting labor reached 53-81% of the total labor man-day. According to Suryana [13] the need for labor in coffee plantations is seasonal, especially during the harvest season in April - June. Furthermore, labor for routine maintenance is needed around August - September and around November – December.

The aims of the study were to characterize coffee farming management as the impact of the distance of farmers' homes to coffee fields especially in Tanggamus District, Lampung Province, Indonesia.

2. Materials and Method

This research was conducted in Sumberejo Sub-district of Tanggamus Regency using survey and Focused Group Discussion method, considering that Sumberejo was the population center and the main coffee producer among Talang Padang ex-subdistrict region (Talang Padang, Sumberejo, and Gisting). Pain [6] classified densities >500 people/km² as settlement centers, usually as the center of rice production. The areas, especially of the piedmont, have fertile soil and high rainfall that can be planted with food crops, coffee vegetables and pepper with good results, which is called a pioneer area. Besides paddy, Sumberejo is the largest producer of coffee among Talang Padang ex-subdistrict region. As the population increases and the land is scarce, farmers move to areas of low populated but the main producer of coffee in the District of Tanggamus (see Figure 1). By motorbike transportation, farmers are able to manage coffee plantations in a location far away crossing sub-districts [7].

The study involved 2 villages that were chosen purposively (Village of Sumbermulyo, Margoyoso, and Argopeni), with 71 respondents of coffee farmers that determined using a simple

random sampling method, and 3 series of FGD on April 2019 until September 2020 involved key persons from farmer groups. Data were analyzed using both descriptive and quantitative methods.

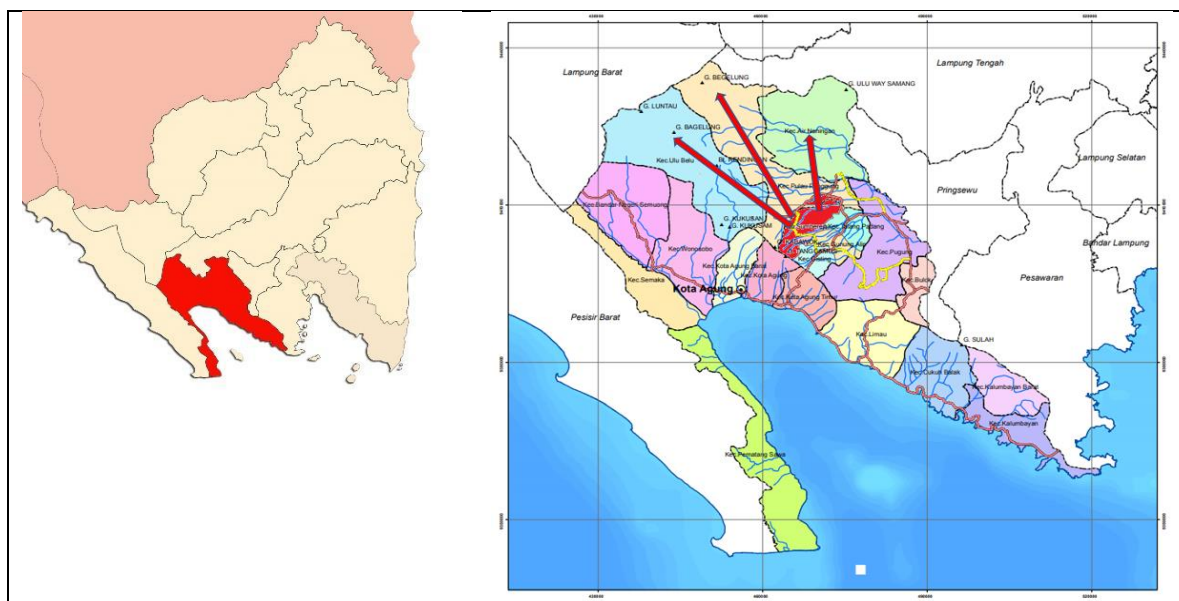


Figure 1. Location study site of Sumberejo Sub-district of Tanggamus District, Lampung Province (right in red color) with red arrows showing the direction of migration of long-distance coffee farming

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3. Results and discussion

3.1. Coffee farm characteristics

Based on the distance of the coffee field from the home of permanent residence (domicile), coffee field management is categorized into (1) close to home (<5 km), (2) medium distance from home (5-19 km), and (3) long-distance from home (>20 km). As many as 94% of the sample of coffee farmers in Sumberejo Sub-district are Javanese. Almost half of the farmers grow coffee quite far from home (23.9%) and even very far from home (25.4%). Farmer goes to work in the coffee plantation by motorbike (82-100%) (Table 1).

If the location of the garden is far enough, 75% of farmers can still return home in the afternoon, 25% of farmers usually stay overnight. If the location of the plantation is very far away, 100% of the farmers must stay on-site until the work is completed. It can be concluded that if the distance of the coffee plantation is very far (≥ 20 km from home) the farmers do seasonal migration. When farmers come to work, they are on-site primarily for weed control, pruning, fertilizing, and coffee harvesting. After the work is done, they stay at home. They generally (76.5%) come to the garden once a month or in two months. Meanwhile, farmers who plant coffee close to their homes, come to the garden almost every day (4-7 days a week).

Farmers who have coffee plantations near their homes generally (59%) get it from their parents' inheritance. Meanwhile, 62% of farmers who have coffee plantations with medium distance from their homes obtained it from buying shrubland to plant coffee or buying existing coffee plantations to be rehabilitated. On the other hand, for coffee plantations far away from home, 59% of farmers get it from buying an existing coffee plantation and 35% of farmers get it from buying shrubs to grow their own coffee starting from seed transplanting.

Table 1. Characteristics of farm occupancy

No	Characteristic	Distance of coffee field from home		
		Close (<5 km)	Medium distance (5-19 km)	Long-distance (≥ 20 km)
1.	Farmers number (%)	50.7	23.9	25.4
2.	Ethnic (%)			
	Jawa	94.1	93.7	94.1
	Semendo	5.9	6.3	0
	Lampung	0	0	5.9
	Sum	100	100	100
3.	Transportation to coffee farm (%)			
	On foot	17.6	6.3	0
	Motorcycle	82.4	93.7	100
	Sum	100	100	100
4.	Migration (%)			
	Daily migrant	100	75	23.5
	Seasonal migrant	0	25	76.5
	Sum	100	100	100
5.	Coffee farm occupancy (%)			
	Buy shrub to plant coffee	5.9	31.2	35.3
	Buy existing coffee	35.3	31.2	58.8
	Parents' inheritance	58.8	37.6	5.9
	Sum	100	100	100
6.	Frequency of working on the farm (%)			
	4-7 times per week	91.2	75.0	17.6
	1-3 times per week	8.8	12.5	5.9
	1-2 times per month	0	12.5	41.2
	1 time per 2 months or more	0	0	35.3
	Sum	100	100	100

Table 2. Characteristics of coffee fields

No	Characteristic	Distance of coffee field from home		
		Close (<5 km)	Medium Distance (5-19 km)	Long-distance (≥ 20 km)
1.	Coffee land area (ha)	0.83	1.0	1.5
2.	Coffee age (year)	28.6	26.1	19.8
3.	Coffee plant category (%)			
	Pre-yielding (<4 years)	0	0	5.9
	Young (4-10 years)	11.7	12.5	23.5
	Mature (11-25 years)	26.5	12.5	41.2
	Old (>25 years)	61.8	75.0	29.4
	Sum	100	100	100
4.	Amount of plant per field	1610	1937	3555
5.	Coffee population (ha ⁻¹)	2053	2083	2456
6.	Number of clones per field	2.1	1.9	2.1
7.	Amount of grafting tree (%)	72.5	67.2	62.1

Long-distance coffee plantations are characterized by larger landholdings (1.5 ha on average), higher coffee stands per hectare (2,456 trees on average), and are dominated by mature coffee trees (41%) and younger coffee trees (29%). In contrast, close and medium-distance coffee plantations are characterized by smaller landholdings (1 ha or less), lower coffee stands per hectare (about 2,000 trees per ha), and are dominated by old coffee trees (62-75%) (Table 2). These findings show that there are almost no new plantings of coffee plantations. There are few new plantings on coffee plantations that

are a far distance from home which land is still available. Javanese migrants rarely buy shrubland or old coffee land to establish young coffee plantations as reported by Kusworo [8].

Generally, instead of new-planting or replanting, farmers prefer rehabilitating coffee plantations by pruning and grafting using local superior coffee clones [14] including intra and inter-specific grafting systems [15]. Data shows that on average 62-73% of coffee trees owned by farmers have been improved by grafting and cloning. Farmers apply methods of coffee grafting both using water shoots or using fruit branches [16].

3.2. Coffee fields maintenance and conservation

The data also shows that the practice of maintaining coffee plantations that are far from home is almost the same as plantations that are close to home. The application of organic and inorganic fertilizers is still in low doses. However, coffee plantations that are far away from home are more frequently sprayed with herbicides and yet have more manual weeding (Table 3).

Table 3. Chemicals, weeding, and manure

No	Characteristic	Distance of coffee field from home		
		Close (<5 km)	Medium Distance (5-19 km)	Long-distance (≥ 20 km)
1.	Not apply fertilizer (% farmers)	23.5	25.0	17.6
2.	Dose of Fertilizer			
	Dose of Urea (kg ha ⁻¹)	125.6	85.4	69.5
	Dose NPK Phonska (kg ha ⁻¹)	64.6	79.2	82.7
	Dose ZA (kg ha ⁻¹)	13.2	34.4	23.5
	Dose of NPK Mutiara (kg ha ⁻¹)	9.5	7.8	7.7
	Dose of KCl (kg ha ⁻¹)	3.9	3.1	5.9
	The total dose of fertilizer (kg ha ⁻¹)	216.9	209.9	189.3
3.	Dose of herbicide (l ha ⁻¹)	4.9	5.5	6.6
4.	Frequency applying herbicide			
	Not apply herbicide (% farmers)	20.6	6.3	5.9
	1-2 times per year (%)	50.0	43.8	35.3
	3-4 times per year (%)	23.5	31.3	52.9
	>4 times per year (%)	5.9	18.8	5.9
	Sum (%)	100	100	100
5.	Frequency of manual weeding			
	No manual weeding (%)	5.9	12.5	11.7
	1 time per year (%)	2.9	6.2	0
	2 times per year (%)	58.8	68.8	41.2
	3-4 times per year (%)	32.4	12.5	47.1
	Sum (%)	100	100	100
6.	Dose of manure (kg ha ⁻¹)	691	225	294
7.	Dose of coffee skin (kg ha ⁻¹)	85	1017	123
8.	Dose of fungicide (l ha ⁻¹)	0	0	0
9.	Dose of insecticide (l ha ⁻¹)	0.4	0.1	0.004

Coffee plantations that are a far distance from home are not supported by soil pits and terraces for soil conservation (Table 4), but all of the coffee fields are conserved by shade trees. The more distance from home the lower shade trees population (335, 286, 167 trees ha⁻¹ respectively for close, medium, and long-distance from home). More divers of MPTS are found in the coffee plantations that is located close to home residency. Besides banana, black pepper is the most preferred of MPTS. In Lampung Province black pepper is commonly planted on shade trees of coffee plantation and become a coffee – black pepper multiple cropping [17][18].

As many as 53% of long-distance coffee plantations have no legume trees for shading. These practices need to be improved. However, legume shade trees are of very important for N fixation [19]

and for enhancing soil nutrients especially under organic cultivation [20]. Planting legume shade trees is a key variable of coffee plantation yield [21][22] and a pillar of sustainable coffee agroecosystems [23]. It is a contrast to what farmers practice in Sumberjaya Sub-district of West Lampung District (bordering with the Ulu Belu Sub-district) where legume tree species were the most preferred coffee shade trees mainly of *Gliricidia sepium* and *Erythrina sububrams* [24].

Table 4. Shade trees and conservation

No	Characteristic	Distance of coffee field from home		
		Close (<5 km)	Medium distance (5-19 km)	Long-distance (≥ 20 km)
1.	No legume trees (%)	29.4	37.5	52.9
2.	Legume trees 1 species (%)	44.1	50.0	35.3
3.	Legume trees 2-3 species (%)	26.5	12.5	11.8
	Sum	100	100	100
4.	Amount of legume trees (ha ⁻¹)	188.0	93.8	53.5
5.	No MPTS* (%)	2.9	6.2	17.6
6.	MPTS 1 species (%)	26.5	56.3	58.8
7.	MPTS ≥ 2 species (%)	70.6	37.5	23.6
	Sum	100	100	100
8.	Amount of MPTS (ha ⁻¹)	120.7	117.9	99.5
9.	No wood trees (%)	41.2	50.0	47.1
10.	Wood trees 1 species (%)	20.6	25.0	17.6
11.	Wood trees ≥ 2 species (%)	38.2	25.0	35.3
	Sum	100	100	100
12.	Amount of wood trees (ha ⁻¹)	25.9	74.3	15.3
13.	Not built soil pit (% farmer)	44.1	31.2	100
14.	Not built terrace (% farmer)	97.1	100	100

Note: * Multipurpose Tree Species

3.3. Coffee Yield

In the last 4 years the coffee yield achieved by the sample farmers was about 0.7-0.9 tons per hectare. The closer distance from home the lower the coffee yield. Coffee plantations which are far away from home are situated at highland where its soil is still relatively fertile so that the yield achieves 0.8-1.0 tons per hectare. This high yield seems to encourage farmers to plant coffee even though it is very far away, namely across sub-districts and even across districts. The yield of coffee plantations that are close (44% farmers) or medium distance from home (44% of farmers) ranges 0.4-0.7 tons per hectare per year. Meanwhile, coffee plantations that are located very far away generally (41% of farmers) get a yield of >1 ton per hectare (Table 5). The lower yield of coffee fields at Air Naningan Sub-district has been reported by Fitriani [25] that attained less than 0.4 (ton ha⁻¹) coffee bean, but the yield of MPTS has significantly increased land productivity.

Table 5. Coffee yield in 2016-2019

No	Characteristic	Distance of coffee field from home		
		Close (<5 km)	Medium Distance (5-19 km)	Long-distance (≥ 20 km)
1.	Yield in the last 4 years (kg ha ⁻¹)	757.1	772.9	941.0
2.	Yield category			
	< 400 (kg ha ⁻¹)	8.8	6.2	23.6
	400-700 (kg ha ⁻¹)	44.2	43.8	17.6
	800-1000 (kg ha ⁻¹)	23.5	25.0	17.6
	>1000 (kg ha ⁻¹)	23.5	25.0	41.2
	Sum (% farmers)	100	100	100
3.	Yield in 2016 (kg ha ⁻¹)	770.5	739.6	1025.9

4.	Yield in 2017 (kg ha ⁻¹)	770.5	739.6	1025.9
5.	Yield in 2018 (kg ha ⁻¹)	702.1	730.2	849.0
6.	Yield in 2019 (kg ha ⁻¹)	775.6	839.6	934.7

3.4. Long-distance coffee farming

As many as 38% of the sample farmers have coffee plantations outside the Sumberejo Sub-district (Figure 2). From FGD it concluded that in year 1999-2000 many farmers migrated to the areas, including to Datar Lebuay Village, Air Naningan District as workers in coffee plantations. Migrants came from more densely populated areas such as Pringsewu (Pringsewu Regency), Talang Padang, Sumberejo, Gisting (Tanggamus Regency), from the south side and Gedung Surian (West Lampung Regency) from the west side.

By saving the wage and selling livestock at their home village, they were able to buy 1 ha of coffee plantations from local farmers of ethnic Ogan or Semendo. Savings from coffee yields plus wages as farm labor, migrant farmers then could buy and increase the plantation area to 2-3 ha. Coffee yields depend on the intensity of maintenance and the weather conditions. The yield of 1-2 tons per ha was achieved in 2012 with the condition of the plantation has been rehabilitated in 2008 by pruning and grafting. The money earned from the coffee harvest was used to build houses and buy land to grow vegetables around Sumberejo Sub-district. As migrant workers, they stay 2 weeks or even 2 months at the location. During the harvest season, there are many jobs available, namely coffee harvesting services including picking coffee, transporting motorcycle taxis (loading coffee berries and beans), and pulping plus hulling. Coffee harvesting attracts waged migrants to come and work.

If all use commercial services, harvesting requires high costs. The man-power to pick coffee is IDR 50,000 per large sack which can produce 22-25 kg of dry coffee beans (equivalent to 10 kg of dry beans per 100 kg of the coffee bean production). Motorcycle transportation to bring fruit from the garden to the hut is IDR 5,000 per sack (equivalent to 1 kg of dry beans per 100 kg of coffee bean). Pulping and hulling costs are 4 kg of coffee beans per 100 kg of the coffee production. Motorcycle transportation to bring coffee beans from the hut to the market is IDR 1,000 per kg of coffee (equivalent to 5 kg of coffee per 100 kg of the coffee bean). The total cost of harvesting is 20% of the kg of the coffee bean production.

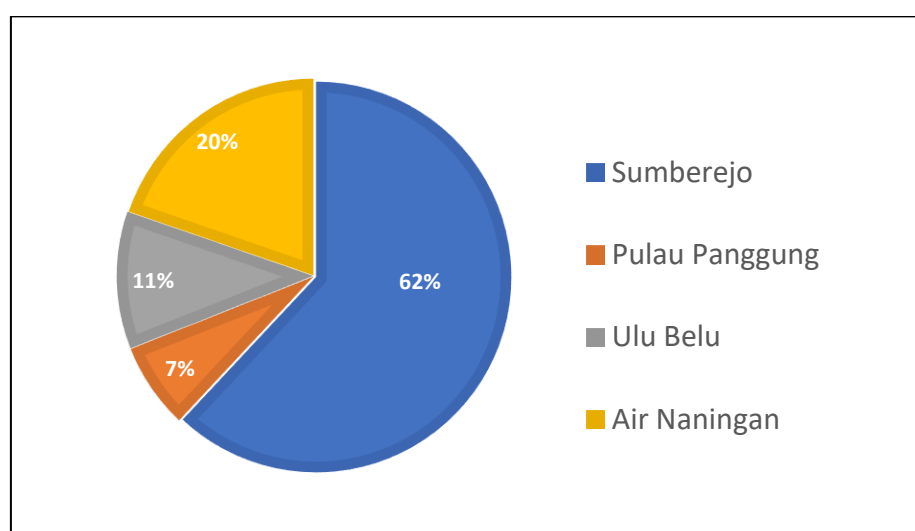


Figure 2. Percentage of farmers migrate outside Sumberejo Sub-district

4. Conclusion

As many as 49% of sample farmers grow coffee located at a medium or long distance from home. They go to work in the coffee plantations by motorbike and usually (25-76%) as a seasonal migrant. Migrant farmers stayed on-site primarily for weed control, pruning, fertilizing, and coffee harvesting.

They generally (76.5%) came to the garden once a month or in two months. Meanwhile, farmers who plant coffee close to their homes come to the garden almost every day (4-7 days a week). As many as 38% of the sample farmers have coffee plantations outside the Sumberejo Sub-district mainly at the Air Naningan and Ulu Belu Sub-district.

Long-distance coffee plantations are characterized by larger landholdings (1.5 ha on average), higher coffee stands per hectare (2,456 trees on average), and are dominated by mature coffee trees (41%) and younger coffee trees (29%). In contrast, close and medium-distance coffee plantations are characterized by smaller landholdings (1 ha or less), lower coffee stands per hectare (about 2,000 trees per ha), and are dominated by old coffee trees (62-75%). The more distance from home the lower shade trees population. However, more divers of MPTS are found in the coffee plantation located close to the home residency.

The yield of coffee plantations that are a close or medium distance from home ranges 0.75-0.77 tons per hectare per year. Meanwhile, coffee plantations that are located a far distance from home get a yield of 0.94 tons per hectare. The total cost of harvesting is 20% of the kg of coffee harvested. Coffee harvesting attracts waged migrants to come for jobs.

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