

Quality Improvement the Off-Farm and On-Farm of Menoreh Coffee toward Sustainable Agriculture in Sidoharjo Village

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ABSTRACT

Menoreh mountainous region, especially the Samigaluh district, has been long known as a coffee producer in Yogyakarta Special Region. The coffee trees were planted with other kinds of trees, known locally as “Kebun Campur”. The advantages of “Kebun Campur” in those regions were its capability to provide food resilience and sustainability. Meanwhile, “Kebun Campur” usually has low productivity due to poor maintenance and tight competition with other plants in a small area. We introduced high-yield and aroma coffee clones from National Coffee and Cocoa Research Center (Puslitkoka), supervising the local farmer in making good coffee-tree framing to support good harvest and easy picking of coffee beans. To support environmentally good farming practices, we also introduce how to produce Liquid Organic Fertilizers based on local resources. In the Off-farm aspects, we are introducing knowledge on how to process fresh coffee beans and how to operate a mini gas-powered roasting machine so that the farmer could get more value-added on their coffee beans.

Keywords: Coffee bean quality, Menoreh Region, Mixed farming.

1 Introduction

Sidoharjo Village has a huge potential for becoming the new destination for eco-agrotourism due to its local coffee production and beautiful scenery, including Kendil Hills, one of the highest places in Kulon Progo. Geographically Sidoharjo Village is in the center of the Menoreh Mountain Area and consists of 1.352,68 hectares and is between 400-1100 above sea level.

The coffee trees were planted with several other trees, known as “Kebun Campur”. Kebun Campur is the most familiar for a farmer in that region due to its food security and sustainability resiliency. The disadvantage of Kebun Campur is that the production of each plant is relatively low due to internal competition. The farmer usually sells their coffee as green beans in the local market. The Samigaluh region is also known as an area with frequent landslides during the rainy season [1].

Our studies aimed to improve both On-farm and Off-farm aspects. On-farm activities were done by improving the quality of the plantation for maximum production with the introduction of new coffee plant clones. They addressed action to restore the plant frame so that it could produce optimal coffee beans and ease the farmer to harvest it. Off-farm aspect by introducing techniques to process and serve coffee rather than sell it merely as green beans. One set of units for producing liquid organic fertilizer was introduced to support eco and environmental-friendly agriculture. We also introduced techniques to process and dry the green bean and operate the gas-powered roasting machine so that the farmer could produce customized coffee beans according to the market demand.

New Arabica and Robusta coffee clones were introduced to farmers by establishing demonstration plots on the farmer’s land, originally from National Coffee and Cocoa Research Center (Balitkoka, Jember, Indonesia). After one year of introduction, the new Robusta coffee clones developed better than Arabica. It is a new finding to see the productivity of newly introduced coffee clones after five years.



2 Research Methodology

2.1 Community Engagement

This community development activity was based on “Sigap-REDD+” [2], implemented for five years in Berau District, East Kalimantan. Our approach was as explained in Figure 1.

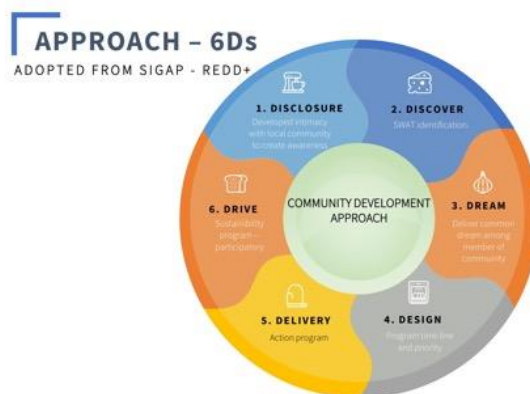


Figure 1: The 6Ds approach for community engagement.

2.2 On-Farm

On-farm activities were done by introducing Robusta BP 930 and Robusta BP 409 200 plants each, Arabica clones of Komaste 200 plants, and Arabica AS2K 400 plants. Each clone was distributed to a local farmer and planted on their land.

2.3 Off-Farm

The off-farm activity consists of two main activities:

2.3.1 Coffee Bean Processing

This includes supervising new bean processing and fermentation, drying, and roasting. According to Hailey and Kang, processing was done by applying wet and honey processes [3]. Roasting is performed by medium and medium-dark, and dark roasting according to the variety used or customer demand.

2.3.2 Land Conservation

Landslides and erosion are common phenomena in Sidoharjo, especially during the rainy season. Here we are introducing a small water catchment pond system to mitigate the flow of rainwater. Every hectare of at least there are 4 small catchment ponds of 2 x 4 m², distributed evenly, and the case for Sidoharjo Village already has an enormous catchment pond called “Embung Canggal”.

3 Results and Discussion

3.1 Community Engagement

With the 6D approach (Disclosure, Discover, Dream, Design, Delivery, Drive), we could create programs or activity that matches the community’s needs, and they have the capability and enough resources to execute the programs. This condition will guarantee the continuity and sustainability of the programs even if our project is already finished.

This approach focused mainly on small-group farmers or participants. In the case of Sidoharjo Village, we could have a group of 15-20 farmers, which could be separated into two main groups. Young farmers are usually interested in Off-farm activities, like preparing coffee, roasting, and fermentation. The senior farmer focuses on how to maintain the coffee plantation, make fertilizer, controlling pests and diseases.

3.2 On-farm

After one year, the newly introduced coffee clones showed differences in growth and development. The Robusta looked better than the Arabica ones. The result shown in Table 1 is as follows.

Table 1: *The growth and development of Robusta and Arabica clones planted in Sidoharjo Village after one year.*

3.2.1 No.	3.2.2 N	3.2.2 Type of clone	3.2.3 Number of plants	3.2.4 Number of dead plants	3.2.5 Number of good plants	3.2.6 Number of retarded plants
3.2.7	1	3.2.8 Robusta	3.2.9 4000	3.2.10 0	3.2.11 2800	3.2.12 1200
3.2.13	2	3.2.14 Arabika	3.2.15 6000	3.2.16 600	3.2.17 1620	3.2.18 3780

Table 1 shows that the Robusta performed better than Arabica one. One of our explanations is that the Arabica clones need more support for nutrients during early development than the Robusta clone. The other is that there was a possibility that the Arabica clone needed a higher altitude compared to Robusta. The growth and development of newly introduced Robusta and Arabica are illustrated in Figure 2.

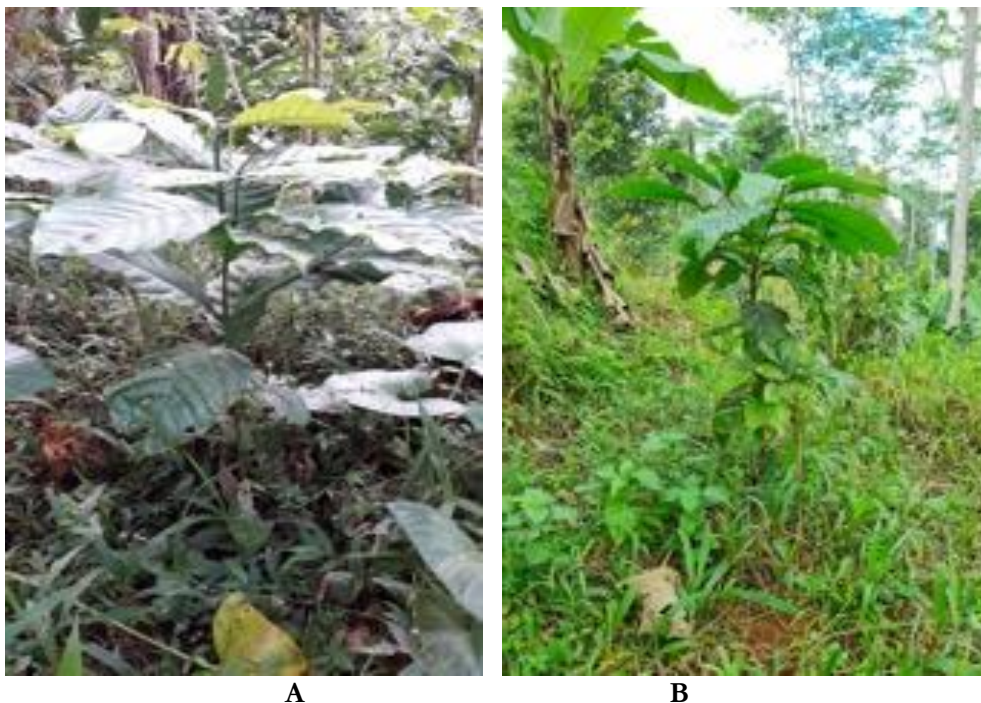


Figure 2: *Robusta (A) looked better in growth and development compared to Arabica (B)*

Different agroforestry and variety will have different pest infestation levels. Robusta coffees produce a more complex fruit and thus are not as susceptible to pesky insects. On the other hand, Arabica is more fragile and can be damaged by bugs. And we found in our demonstration plot that around the rhizosphere of Arabica coffee, there were many bugs and ants compared to the Robusta ones [4].

3.3 Off-farm

Fresh coffee beans that has been processed by honey and wet process method is shown in Figure 3.



Figure 3: *The Robusta bean has been processed by honey process (A) and wet process (B).*

This shows a significant difference in bean condition between these two methods. Usually, farmers prefer the wet process, resulting in the bean's good color and aroma. However, the task is that the climate condition in Sidoharjo Village tends to be cloudy and rainy afternoons, so getting a good level of dryness (10-11%) could take 1-2 months.

3.4 Branding product

The farmer in Sidoharjo, especially in Nglambur Hamlet, are used to keeping their coffee bean as a deposit and selling their bean as it is in the local market when they have a cash necessity. Here we have introduced the gas-powered roaster machine so that the farmer can further process their dry coffee bean in more niche markets nearby. By roasting their bean according to customer demand, they can get higher prices than selling them to the local market or local medium man. The coffee roasting and tasting activity are illustrated in Figure 4 as follows.



Figure 4: *Roasting activity (A) and end-product of Sidoharjo coffee sold at the promotion event.*

Figure 4 shows that the farmer could sell their product in several promotional events around Yogyakarta and Jakarta with the existing roaster machine. They could have several product variations with only two clones, Arabica and Robusta. The “wine aroma Arabica” from Nglambur, Sidoharjo, was the most expensive product, up to IDR 300,000 per kg.

3.5 Land Conservation Program

Samigaluh and its surrounding mountain are known for their landslide occurrence during the rainy season. In this project, we are also providing an activity supporting coffee production's sustainability. The farmer planted coffee plants within a mixed farming model consisting of wide varieties of plants in a small area.

We introduced and urged farmers to create small catchment ponds for land and water conservation to support this model. The catchment pond could provide a multifunction according to the climate condition. The rainy season could provide for the fish breeding site to improve the nutrition available for the community. During the long dry season, it could provide water irrigation to the coffee plantation for at least 2-3 months before the rainy season comes again. The established catchment rainwater pond illustrated in Figure 5 is as follows.



Figure 5: Rainwater catchment pond during the rainy season with Tilapia in it

Figure 5 shows that during the rainy season, this pond could serve as a rainwater catchment and provide additional nutrition for farmers when they harvest the fish in the pond.

4 Conclusions

The On-farm program should be closely observed in the next 2-3 years due to the variation in growth and development of the Arabica clone. The management of the coffee plantation must be applied at a certain level to achieve optimal production and conservation. Most coffee plantations in Sidoharjo Village are planted mixed with other plants so that the place arrangement of each plant should be in the correct position. The social and cultural event should include a coffee drink to build collective awareness of Nglambur Coffee as a unique coffee. One of the solutions is to create an atmosphere of coffee enthusiasts in Nglambur by establishing a cafe-like. It could be open during the weekend and or by special request.

The other is to develop a simple drier system for coffee beans so that the drying time can be shortened and independent of the weather. Usually, farmers take 1-2 months to dry the coffee bean, and during the rainy season could take as long as 3 months.

5 Declarations

5.1 Acknowledgments

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5.3 Informed Consent

Arman Wijonarko was the PIC of this project and wrote the original manuscript. Eka Tarwaca Susila Putra contributed to the whole program in Sidoharjo. Taufan Alam is responsible for the community engagement activity. Priyono Suryanto contributed to the land-water conservation aspect of the program.

5.4 Publisher's Note

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