



## **IbM Empowerment of Cocoa Farmers (*theobroma cacao* L.) During Pre and Post-Harvest in Effort of Quality Improvement of Cocoa Commodity in Kolaka**

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### Abstract

Kolaka is known as the city that has a cocoa statue or also known as "Kolaka Cocoa City". Cocoa is the main commodity of Kolaka District. Based on data from Agricultural Department of Kolaka in 2013, the area of cocoa in Kolaka reaches 29,166.76 ha with dry bean production in 2013 of 8562.86 kg/ha which is mostly located in Latambaga and Samaturu Sub-districts. Partners in the IbM program are cocoa farmers of Induha Urban Village, Latambaga Sub-district and cocoa farmer in Samaturu Sub-district. Various cooperation programs have been conducted to improve the quality of cocoa commodities in Kolaka District. In its development, various classical problems remain faced by partner farmers both in terms of production and business management. In terms of production, pre-harvest problems faced by farmers are cocoa pests and diseases, which cause the farmers' dependence on pesticides and chemical fungicides as well as the age of plants, therefore, it is important to reduce the use of pesticides and chemical fungicides because in the long term it can have adverse impact on environmental sustainability and health. The problem of post-harvest for partner farmers is a low quality of cocoa production. Most cocoa farmers process cocoa fruits to be dried beans in a rough way so that  $\pm 90\%$  of the cocoa beans produced by farmers have a low quality with the main characteristic is not fermented. The problem faced by farmers in term of business management is the oligopsony tendency market structure, in which farmers are at the lowest position in the marketing chain so that farmers do not have a bargaining position. The objectives of IbM program were to 1) Reduce farmers' dependence on pesticides and chemical fungicides with the utilization of environmentally friendly pesticides 2) Design the fermentor to improve the quality of cocoa beans 3) Enhance the bargaining position of farmers through the active role of Farmer group (*Gapoktan*) in the marketing chain of cocoa.

**Keywords:** Cocoa, empowerment, quality improvement

## A. Introduction

Sulawesi produces nearly 60% of Indonesia's cocoa production (Nielson, 2007). Most of the cocoa production is exported in the form of beans (raw materials) while the export of processed products only reaches 17-20% (Dirjen Bina Produksi Perkebunan, 2012). Kolaka is known as the city that has a cocoa statue and or also known as Kolaka Cocoa City. Based on data from Agricultural Department of Kolaka in 2013, the area of cocoa in Kolaka reaches 29,166,76 ha with dry bean production in 2013 of 8562.86 kg/ha which is mostly located in Lambandia, Ladongi, Latambaga and Samaturu Sub-districts. Partners in the IbM program are cocoa farmers of Induha Urban Village, Latambaga District and cocoa farmers in Puu Lawulo Village, Samaturu Sub-district.

Various activities have been undertaken to improve cocoa productivity in Kolaka District. The low productivity and quality of cocoa are inseparable from the unavailability of superior varieties where farmers commonly use planting material derived from seeds, the presence of pest and disease attack, the age of the older plants and the farmers do not perform post-harvest fermentation stage. Preliminary observations by AIAT Southeast Sulawesi at the end of May 2015 in the cocoa farming owned by farmers in Samaturu Sub-district showed a percentage of PBK attack (*Conopomorpha cramerella*) of 10% and fruit rot by 36% with average fruit per tree of 25 fruit. This condition causes the decrease of cocoa price from Rp. 2,000/ kg to Rp. 2,500/kg. This condition leads to high dependence of farmers on chemical pesticides and fungicides. According to the description of farmers in Induha Village, the use of pesticides in 2015 reached  $\geq 30$  L/Ha.

Management of cocoa beans during post-harvest is still not intensive. Post-harvest cocoa fermentation is carried out by farmers roughly, thus approximately 90% of cocoa beans produced by farmers are low quality because they are not fermented, less dry, very easily attacked by fungi and contain lots of contaminants. In addition to limited processing facilities and knowledge, farmers are not interested in following a good processing method because of the lack of price incentives between properly processed cocoa beans and roughly processed cocoa beans. The fermented cocoa beans are bought by the cooperatives built by the local agricultural department with the price of Rp. 30,000/kg, while nonfermented cocoa beans are bought by merchants for Rp. 25,000- Rp. 27,000/kg..

Related to the post-harvest processing of cocoa beans, quality dried cocoa beans will be achieved through the fermentation process. The fermentation of cocoa beans causes both physical and chemical changes in the inner and outer beans to form distinctive colors and flavor as well as the aroma of chocolate (Doume et al. 2013). In addition, fermentation can kill cocoa beans to prevent germination (Afoakwa et al., 2012).

Cocoa marketing pattern in Kolaka District is by farmers sell their cocoa to merchants at village or sub-district level, then the merchants sell the cocoa to exporters in Makassar, exporters will export abroad. In this case, the cocoa market structure that occurs tends to be oligopsony, in which farmers are in the lowest marketing chain so that farmers do not have a bargaining position. In addition, the quality of cocoa beans produced by farmers is relatively low. Based on research result by Jaya (2003), elasticity analysis of cocoa price transmission in Kolaka obtained the number  $<1$ , which means that the price at the merchant level will affect the price at the producer/farmer level, thus, it indicates that the cocoa marketing in Kolaka takes place in the imperfect competition market which means that the marketing system is inefficient.

## B. Methodology

In order to solve the problems of pre and post-harvest of Cocoa that faced by partners, it is necessary to carry out empowerment effort using activity implementation method which is divided into 3 main group that is:

### 1. Manual Training of Bio pesticides:

Training on the manufacture of the Bio pesticide will be taught to both partners, started from how to obtain the material, the tools needed, the process of manufacturing, as well as how to apply to the plants, so that in the future the farmers will be able to make Bio pesticides to control of their cocoa pests and no longer depend on chemical pesticides or at least can reduce the cost of production because the materials needed in the manufacture of the Bio pesticides can be obtained easily and available in nature and some others can be purchased at a very low price.

## 2. Cocoa fermentor design and its application:

At this stage, it will be accompanied the use of fermentor to partner farmers to produce cocoa beans produced fermented in a shorter time and produce cocoa beans with good quality so that in the future farmers have bargaining value on their cocoa products on the market. During the advisory phase, it is also provided the education to farmers on good and proper cocoa post-harvest processing techniques because, in order to obtain a high selling price, the harvested cocoa beans must be processed immediately. The proper post-harvest processing of cocoa beans is carried out by stages that are able to keep the cocoa bean quality optimally. The stages are as follow: the fruit sorting stage, to group the cocoa bean based on its physical appearance and bean size. Export quality cocoa beans (AA standards) are separated from medium quality beans (standard A and B) and low quality (C and S standards). These seeds are separated because each standard has different selling prices. During sorting, contaminants must be removed to prevent it from being stored in the storage. The contaminants include pieces of fruit skin, gravel, pieces of wood, metal, and various other foreign objects. Packaging and storage are also important series to obtain a good quality of cocoa.

## 3. Education on business management at gapoktan level

The third stage will be carried out in a team meeting forum with partners and other stakeholders.

## C. Results and Discussion

Cocoa fruit borer attack (PBK) and *Phytophthora palmivora* infections cause a high degree of farmers' dependence on the use of chemical pesticides and fungicides. The older plants need to reduce the use of chemical pesticides because in the long term these chemical pesticides can have an adverse impact on the environment and health. Thus, plant-based pesticides are chosen in controlling cacao pests in this research. Bio pesticides are chosen as a long-term alternative to environmental sustainability. Some bio pesticides that can be used to control PBK are tobacco leaves (Handoko and Sundari 2004), betel leaf, Neem leaves (*Azadirachta indica*), *umbi ganyong* (canna), Sugar-apple seeds, jatropha seeds, suren leaves (*Toona sureni*) and *Tithonia* (*Tithonia diversifolia*). Bio pesticides as control agent of pests in the lbM program was made from the extract of betel leaves plus some other ingredients. Betel leaf is a type of bio pesticide that has the same effect as a synthetic pesticide (deltamethrin).

The pesticide of betel leaf extract was made with a composition of 500 g of smoothed betel leaf, 10 L water, 10 ml alcohol (fermentation) was stirred evenly, and then soaked for several hours. The result of the immersion of the material was filtered by filter cloth. The filtered solution was then added with 50 g detergent and stirred evenly. Betel leaf extract was ready for use as a pesticide.

The process of fermentation of cocoa using fermentor is as follows: the first day fermentation was performed in the first fermentor by laying the fresh cocoa beans that have been sorted. Wall or bottom of the fermentor was made a hole with a diameter of 1.5 cm at every distance of 10 cm. This hole serves as the outlet of oxygen, carbon dioxide, and water resulting from the fermentation process. The fermentation temperature was kept  $\geq 40$ -50 °C, if the temperature is less than that the beans will be black and smelly. The pile of cocoa beans in the fermentor was covered with banana leaves. The cover not only suppresses the heat in the crate, but also prevents the dry beans from losing water content. On the second day, the pile of cocoa beans was stirred by being moved to the second fermentor with the purpose of heat generated from the fermentation process can be evenly distributed. On the next day, the cocoa beans were returned to the third fermentor. Entering the fourth day, cocoa beans can be issued for further drying. Cocoa fermentor was made with the size of 50x50x50 cm and capacity of 40 kg.

Partner education on marketing management was conducted in informal forums, on planning, analyzing, implementing and controlling cocoa farming activities. Providing an understanding that the purpose of framers group (*Gapoktan*) is to study the needs and desires of consumers, set prices to obtain a decent return on investment, manage distribution and check sales, create good marketing communications from framers group (*Gapoktan*) to merchants and exporters. So that the expected output of increasing the bargaining position of farmers through the role of active framers group (*Gapoktan*) in the marketing chain of cocoa can be achieved

**D. Conclusion**

1. There is an increase in understanding and skill of cocoa farmers of Kolaka District.
2. There is the existence of Bio pesticide and cocoa fermentor products produced during the science and technology program for the community (IbM) in Kolaka District.

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