

Quality and market chain of Aceh Cocoa Beans

Irfan, I Sulaiman, CN Ikhsan, N.Faizun

Agricultural Faculty of Syiah Kuala University, Banda Aceh, Indonesia
Aceh Food Security Agency, Banda Aceh, Indonesia

E-mail: ismail.sulaiman@unsyiah.ac.id

Abstract. After long-lasting conflict and tsunami on December 26, 2004, some international donors/NGOs supported Aceh on cocoa development. Aceh cocoa sector has experienced tremendous growth in Indonesia. This study aims to investigate quality and market chain of Aceh cocoa beans. The survey was conducted in Pidie District. A number of 21 farmers and 1 exporter were interviewed; the beans from farmer's warehouses were analyzed and compared to Indonesia National Standard (INS). The result showed that the beans were generally produced from 6 Sub-Districts: Keumala, Titeue, Glumpang Tiga, Padang Tiji, and Tangse. They were not fermented; most were exported to the USA. Based on bean count, quality was mainly included in I/A and II/B. The main quality problem was high moisture content. Presumably, the beans were bought by wholesalers with lower price although not been sufficiently dried. Other quality parameters were good: no moldy bean and contaminant, very low insect damage/hollow-/germinated beans, and tiny broken beans (quality I)

1. Introduction

Indonesia is one of the main cocoa suppliers, after Ivory Coast, and Ghana. The cocoa plant is easy to be integrated or intercropped with other plants as bananas, nuts, etc. and can be developed within the scope of organic farming.

In Aceh, cocoa was rapidly developed after the tsunami of 26 December 2004, supported by international NGOs and donors [1]. Cocoa played a special role in the economic rebuilding of the community after conflict since many potential cocoa cultivation areas located at areas where people most severely by conflict and capital requirement for cocoa plantation is relatively low compared to oil palm and rubber, making it affordable by the community. In addition the global market of cocoa in the future is expected to remain strong.

Now, cocoa is one of Aceh superior commodities. Production increases continuously, with the centers in East Aceh, East South Aceh, North Aceh, Bireuen, Pidie Jaya and Pidie Districts. A big warehouse, managed by an exporter, was established in Pidie District [5].

Unfortunately, Aceh cocoa export has not given much-added value to farmers. The quality variation affected the acceptance of consumers and long marketing chain reduced the profits of farmers. Therefore, the study of cocoa quality and marketing chain is important in order to provide greater profits for farmers. Efforts to increase the added value of cocoa plantations also can be done with the utilization of cocoa pod waste to be processed into organic fertilizer or extracted to get pectin [3].



2. Quality Standard

The quality standard can be used to produce quality classes[8]. Cocoa beans' quality based on Indonesian National Standard (INS 01-2323-2003) is presented in Table 1.

Table 1. INS of cocoa beans

Characteristic	I	II	III
Bean count/ 100 grams	AA: max.85 A: max.100	B: max.110 C: max.120	> 120
Moisture content, % max	7.5	7.5	7.5
Moldy, % max	3	4	4
Unfermented, % max	3	8	8
Insect damage, hollow-, germi-nated, % max	3	6	6
Broken, % max	3	3	3
Contaminants, % max	0	0	0

3. Research Method

The survey was conducted in Pidie District. A number of 21 respondents which consisted of 20 farmers and 1 exporter[5] were interviewed. The respondent was determined by purposive sampling technique.

Samples of cocoa beans were taken from the farmers' warehouses and analyzed in the laboratory of Agricultural Faculty of Syiah Kuala University. Quality analysis consisted of bean count, moisture content, moldy beans, fermented/not fermented beans, insect damage/hollow beans/germinated beans, broken beans, and contaminants. The results of this analysis were compared to the quality requirements of INS, so that it could be known the quality class of each sample.

In addition to the analysis of cacao beans quality parameters, it was also observed the market chain of cocoa beans in the field. The market chain here is the stages which through by the sale of cocoa beans from the producers or farmers to the exporter.

4. Results and discussion

The results of the quality analysis of Aceh cocoa beans from this research are presented in table 2.

Table 2. Quality of Aceh cocoa beans

Sub-District	Bean count	Moisture (%)	IHG (%) ^b	Broken (%)
Tiro	108	15	1.17	1
Glumpang Tiga	85	21	3.89	1
Keumala	88	12	1.28	0.47
Tangse	105	9	1.69	0
Titeue	88	12	2.58	0
Padang Tiji	102	9	1.63	0

- a. Unfermented, moldy beans 0%, contaminants 0%
- b. Insect damage/hollow-/germinated beans

4.1. Bean count

Bean count is a determination of cocoa beans quality based on the calculation of the number of beans per 100 grams of sample. The larger the bean size, the fewer the bean count, so the better the bean

quality class. However, the comparison of the cocoa quality based on bean count must be done in the same moisture content, namely the moisture content of 7.5% (INS).

The field data presented in Table 2, for example, showed that the beans from Glumpang Tiga had the fewest bean count (85) but the highest water content (21%), while the beans of Keumala and Titeu had more bean count (88) but lower water content (12%). As the cocoa moisture contents were reduced or set up to 7.5% based on INS, the bean count of Glumpang Tiga was equivalent to 98 or higher than that of Keumala and Titeu (92). However, since these bean counts were below 100, based on INS, they met into quality IA. The bean count of Padang Tiji was equivalent to 103 (IIB), Tangse 106 (IIB), Tiro 116 (IIC), and no sample was included in quality III of INS.

4.2. Moisture content

The moisture content affects the durability of the beans during storage [10]. To prevent the growth of micro-organisms, the moisture content of cocoa beans must be reduced by drying the cocoa beans to the limit of the maximum moisture content of 7.5%. However, if the cocoa beans dried for too long under the sun, the moisture content could be extremely low. Too dried beans could stimulate outer skin damage, so that the beans became brittle and easily broken [9].

The moisture content of the beans in this research was above INS (Table 2). It allegedly due to bad post-harvest handling, for example, the sap was not removed before the beans dried (sugar beans). On drying process, the outer skin of sugar beans will remain wet even though the inside of the beans has been dried. The cocoa beans with relatively high moisture content were also 21% due to the insufficient drying process. Supposedly the beans must be dried up to 4-5 days, however sometimes the collectors directly buy it with cheaper prices despite the drying process was still 1-2 days.

Generally, the moisture content of cocoa beans in the field was measured by using a digital tool called Aqua-Boy. The measurement was quite simply by plugging the tool into jute or sack containing cocoa beans, and then the tool automatically determines the amount of water content of the cocoa beans. The tool was also quite accurate, since there was no much difference as the result of this tool compared to that of the laboratory using the oven method.

4.3. Moldy beans

Mold can not only damage the taste and aroma of chocolate, but also has potential to produce toxic compounds that are harmful to health. The beans with high moisture are susceptible to mold attack and mold attack is considered serious if the growth has entered into pieces of beans.

However, as shown in Table 2, the moldy beans in this research were 0%. Although the moisture content did not meet the INS, allegedly the storage process in average had not lasted longer (just 5-6 days), so that the condition of the beans were still good.

4.4. Unfermented beans

Fermented cocoa beans have a brighter appearance, sharp scent, not slimy, and higher value. The unfermented beans have relatively lower quality since they have the more opaque appearance, less pungent aroma, slimy, and lower prices[10].

As shown in Table 2, the cocoa beans in this research were not fermented. These beans were exported to the American market, which based on farmer opinion did not require fermentation process. In addition, farmers generally did not understand how to do cocoa fermentation. It was also found in the field that there was no price difference which was gained by farmer between fermented and unfermented beans. The previous ones however required a longer processing time and a more intensive work compared to the last ones, so that there was so far no stimulate motivation for the farmer in order to conduct fermentation process.

4.5. Insect damage

Insect damage beans are beans those found inside the content of insects or insect body parts, or show damage due to insects that can be seen by the eye. The presence of insects could be caused by bad

storage condition or by too long storage time. While the hollow beans are beans those have been empty inside, and will deflate when pressed with a finger.

As shown in Table 2, insect damage, hollow-, germinated beans (IHG) in this research ranged between 1.17%-3.89%. These met the quality I of SNI (max.3%), except Glumpang Tiga (II). Interestingly, the only contribution of IHG came from hollow beans. No insect damage and germinated beans were found. Germinated beans usually occur when the fruits are harvested too ripe.

The hollow beans occurred allegedly due to the lack of farmer's knowledge on cocoa cultivation technique. Farmers expected a lot of fruits from one cocoa plant. They did not understand that branched cocoa fruits could later cause hollow beans. Therefore the cocoa farmers still required counseling and training.

Low IHG beans were also suspected due to a relatively short storage time (5-6 days). It was a time as farmers dried or stored the cocoa beans while waiting for the collectors. The beans were then further dried by the collectors and after dry enough were stored for no longer than 1 month, while waiting for being sold to big trader or exporter. The trader kept the cocoa beans for no longer than 3 months prior to export. Before storage, the warehouse was cleaned and fumigated in order to avoid pests. As the cocoa beans were being to be exported, the analysis was carried out again in order to ensure the quality.

4.6. Broken beans

There are several causes of broken beans, such as using of sharp tools to issue the beans from the pod, as well as a too long drying process. Using of sharp tools can hurt the beans, while too dried beans are easy to be broken [9]. Fortunately, as shown in Table 2, the broken beans in this research were less than 1% (quality I).

4.7. Contaminants

The presence of contaminants or foreign objects in cocoa beans can reduce the quality of cocoa beans. Usually, foreign objects such as gravel, twigs, and cigarette butts can contaminate the cocoa beans by the drying process, as the beans are dried without any mats or plastic layers under the sun next to the roadside.

INS has absolutely no tolerant to contaminants (0% of contaminants). As shown in Table 2, there were no contaminants or foreign objects found in the samples. This showed a full awareness of cocoa farmers on this quality parameter.

4.8. Market chain

The results showed that there were two types of market chain used by cocoa farmers: farmers-collectors-exporter (type I) and farmers-exporter (type II). About 70-75% of farmers sold their cocoa beans to collectors who came to their homes or who stayed in the market, the collectors sold further the beans to the exporter. Only 25-30% of farmers sold their cocoa beans directly to the exporter (Armajaro). This company has a market share of 40 percent of cocoa beans produced in Pidie.

According to Azzaino [2], the longer the market chain, the higher the marketing costs and therefore the lower profit margins gained by the farmers. The high marketing cost will also increase the prices at the consumer level or decrease the prices at the producer level.

Thus short marketing chain (type II) should be implemented in order to achieve higher marketing margin. However, cocoa farmers in the field were generally less educated or just graduated from primary school, so that they were inexperienced to deal directly with the exporter. Only a small part of the farmers had better education, ranged from junior high school to senior high school. Other reasons associated with the scale or cocoa land owned by farmers. Many cocoa plantations are still managed by the community on a small scale. Most farmers of respondents had less than 2 hectares of land, only a few farmers who own the land area of 3-4 hectare. Therefore, although inefficient, they prefer to implement Type I in the marketing chain.

5. Conclusion

Generally cocoa beans in Aceh (Pidie) were produced without fermentation process and exported to the USA. Based on bean count, quality was mainly included in I/A and II/B. The main quality problem was high moisture content. Presumably, the beans were bought with a lower price by collectors although not been sufficiently dried. The collectors or exporter had to reduce moisture content before export. Other quality parameters generally meet INS. Although less efficient, farmers with lower education level prefer to implement type I of marketing chain (farmers-collectors-exporter).

Recommendation

It needs to outreach to farmers, especially regarding of post-harvest handling, including drying and storage techniques, as well as marketing.

Reference

- [1] Irfan, Syahril H and Rusli F 2009 Support of Aceh Green livelihood program through cacao training (Banda Aceh: ESP)
- [2] Azzaino Z 1981 Introduction to Agricultural trading system (Bogor: Social Sciences Department of Agricultural Economics, IPB)
- [3] Irfan, Asmawati, Fahrizal, Erika, C. 2013. Physicochemical properties of pectin from cocoa pod husk extracted with Ammonium Oxalate through different extraction time and pH 7th *Inter. Conf. Chemical Eng. Sci. Appl.*
- [4] Jano P and Denise Mainville 2007 The Cacao Marketing Chain in Ecuador: Analysis of chain constraints to the development of markets for high-quality Cacao *IAMA Submission Conference Parma, Italy*
- [5] Ngu D 2011 PT.Armajaro *Proceeding of Aceh cocoa conference* (Banda Aceh: PEKA)
- [6] NSI No. 01-2323-2003 National Indonesian Standard *Quality of cocoa beans* (National Standard Authority, Jakarta)
- [7] Roldan M B, Ingrid Fromm and Aido R 2013 From Producers to Export Markets: The Case of the Cocoa Value Chain in Ghana *J. Africak Development* **15** 121-38
- [8] Soekarto T S 1990 *Basics of food quality control and standardization* (Bogor: IPB)
- [9] Susanto F X 2011 *Cokoa: Cultivation and processing* (Yogyakarta: Kanisius)
- [10] Wahyudi T, Penggabean T R and Pujiyanto. 2008 *Cocoa agribusiness management, upstream to downstream* (Jakarta: Penebar Swadaya)