

Introduction of People's Rubber Post-Harvest Technology For Improving Bokar Quality and Farmer's Income

Sumihar Hutapea¹, Suswati², Tumpal HS Siregar³, Asmah Indrawaty⁴
Fachru Yuzairi⁵, Ilham Hidayat⁶, Saipul Sihotang⁷

Faculty of Agriculture, Universitas Medan Area, North Sumatra, Indonesia

Co author: sumihutapea@gmail.com

Abstract

Mekar Tani group based in Sari Laba Jahe Village predominantly manages its rubber plantations multiple cropping. PKM activities carried out in the farmer group in 2019 by introducing wiretapping technology succeeded in increasing the production of the farmer group from an average of 0.18 kg / plant / tappap to 0.28 kg / plant / tappap. Another aspect that is a priority is the demands of improving the quality of people's rubber. Based on discussions with members of the farmer group, as well as detailed observations of the handling of bokar in the farmer group, it was formulated the introduction of bokar handling activities described into several parts, namely: clean sap comfort in the container, garden-scale bokar handling technology, and negotiations with the manufacturer, which were carried out by discussion and training methods. The purpose of this activity is to train members of the farmer group in handling clean sap in container containers, garden-scale bokar handling technology, and negotiations with the manufacturer. The result of this activity is the acquisition of increased bokar production and improvement of bokar quality using natural clumping glugur acid extract and nenas fruit extract. In the end, an increase in group income of Rp.300 - Rp.500 / kg of rubber produced.

Keywords: *post-harvest technology; bokar quality; farmer's income*

INTRODUCTION

The Mekar Tani group, which is domiciled in Betala Hamlet, Sari Laba Jahe Village, predominantly manages its rubber plantations in *multiple cropping*, besides that farmers also manage other annual crops such as duku, palm, and durian. In an effort to increase the income of rubber farmers in Betala Hamlet, Sari Laba Jahe Village, in addition to tapping technology, the technology of handling results is also an inseparable part. The success of tapping technology in increasing production must also be accompanied by proper handling of results, so that the selling price of people's rubber processing materials (bokar) has also increased from the aspect of quality. In other words, the increase in production to be integrated also with the improvement of the quality of bokar [3.7].

The management of rubber plantations in the form of wiretapping is carried out 3-4 times a week and almost no other management actions are carried out due to the low price of rubber in the past 10 years. On the other hand, farmer groups have never received technical guidance or training related to the management of their rubber plantations. This condition causes production to stagnate due to tapping that is carried out without a touch of technology. Pkm activities carried out by the proposer [4] in the farmer group in 2019 by introducing eavesdropping

technology succeeded in increasing production by 40–60%. The introduction of tapping technology in farmer groups was able to increase the yield from an average of 0.18 kg / plant / tapping to 0.28 kg / plant / tapping. In other words, the technology of tapping through the correct tapping system and the use of stimulants is able to increase the rubber production of rubber farmers of members of the farmer group. The introduction of the technology, which began with discussions and training, can in fact increase revenues through increased production of bokar sold to rubber agents in the village.

In the context of the overall aspect of production, the introduction of eavesdropping technology must also be accompanied by bokar handling technology. The fact observed in the farmer group is the low technology of handling bokar. Bokar in the form of a lump bowl that is sold once a week (every Tuesday) is rubber sap that is left in the form of frozen chunks in the bowl / holding shell. This condition is so traditional that there are several aspects that reduce the quality of bokar, namely; 1.High level of dirt entering the reservoir. 2.No increase in Dry Rubber Content (KKK), as the main component of bokar.3.Chunks whose size and shape are not uniform.

This condition makes the price factor per unit weight of the bokar produced by rubber farmers cannot be increased. In other words, an increase in income through increased production is not enough to raise the income of rubber farmers. At the price level of Rp.6,500–Rp.7,500 per kg, an increase in income was indeed obtained due to an increase in production in the range of Rp.200,000 – Rp.400,000 per month [5]. Accompanied by an increase in bokar handling, it is projected to increase the selling price in the range of Rp.300 – Rp.500 per kg.

This will make rubber farmers experience an increase in income from two aspects, namely through increasing production and improving the quality of the bokar they produce. Another aspect that is a priority is the demand for improving the quality of people's rubber, as has been done in several rubber plantation centers [3]. The "clean rubber movement" launched in many people's rubber producing centers has an impact on improving the quality of bokar so that it is no longer in the SIR 20 qualification, the lowest rubber standard in the industrial industry. The introduction of bokar handling is in accordance with the Regulation of the Minister of Agriculture Number 38 / Permentan / Ot.140 / 8/2008 concerning Guidelines for Processing and Marketing of Rubber Processing Materials (Bokar) so that on a national scale, Indonesia avoids the qualification of natural rubber producers with the lowest quality, which refers to SNI [9]. In other words, the introduction of bokar handling through its handling technology, on a micro scale in North Sumatra, began in the Mekar Tani Group, Sari Laba Jahe Village, Biru biru District, Deli Serdang Regency.

SITUATIONAL ANALYSIS

The area of rubber plants in Biru-biru sub-district is 240.10 ha with a production of 130.20 tons which is managed in the form of community plantations

[2]. Sari Laba Jahe Village is one of the 17 villages/kelurahan in Biru-biru District whose residents grow rubber plants as the third commodity in their farming business after oil palm and cocoa plants. This village is located at 3°35' North Latitude - 9°866' East Longitude Sari Laba Jahe Village with an area of 8.88 km² or about 9.90% of the total area of the Biru-biru district and is at an altitude of 28 meters above sea level with a land contour in the form of a stretch (Figure 1).

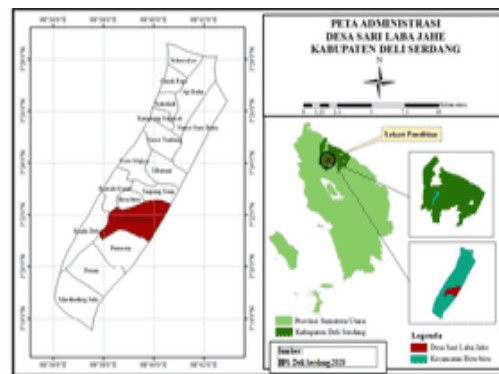


Figure 1. Location of community service activities. Source: BPS Deli Serdang, 2020

The Mekar Tani group is one of the farmer groups in Sari Laba Jahe Village, which is located in Betala Hamlet, which predominantly manages its rubber plantations *in multiple cropping*. In general, rubber land ownership of group members ranges from 1-2 ha. According to [4.5] that 70% of rubber farmer groups manage rubber plantations with an area of under 1 ha, of which 13.33% of farmers manage rubber plantations with an area of more than 2 ha and 6.66% of farmers manage rubber plantations with an area of 1.5-2 ha and 10% manage rubber plantations with an area of 1-1.5 ha.

The production of sap produced per ha is still relatively low. According to [2], as many as 26.67% of farmers only obtained production of less than 25 g per tree per bushel with an average rubber production of 0.045 tons/Ha (assuming a plant population of 450/Ha and 4 tapping times per week) and 20% of farmers obtained more than 55 g per tree per tapping equivalent to rubber production of 0.07 tons/ha. This amount only reaches 30% of the National rubber production which can reach 2 tons / Ha.

Through the service activities carried out by the team in 2019 concerning tapping technology, it was obtained that there was an increase in rubber production of mekar Tani group members from an average of 0.18 kg / plant / tapping to 0.28 kg / plant / tapping. Increased production can still be done by applying clean rubber tapping technology and the use of natural clumping compounds.

The main problems faced by farmer groups are: 1. The maximum handling of sap has not been carried out, farmers still use simple container containers in the

form of coconut shells / shells that are small in size. Very often part of the sap that is accommodated comes out beyond the container of the shell. The flow of sap drops is not flowed through the gutters of latex jetting. In addition, the problem found is that there has not been a finding of a compound / clotting agent that can maintain the quality of bokar and the price of bokar is still priced low by the agents of the bokar group buyers.

METHOD OF IMPLEMENTATION

This community service was carried out at the Mekar Farmer Group, Sari Laba Jahe Village, Biru-Biru District, Deli Serdang Regency, North Sumatra Province. This village is 35 km from the city of Medan, can be reached by two-wheeled and four-wheeled vehicles for 1 hour 30 minutes from campus 1 of Medan Area University.

The number of members of farmer groups who participated in this activity was 20 people (66%) especially members who had rubber plants as the main commodity they managed. The problems of partners and the activities carried out can be seen in Table 1.

Table 1. Problems and activities of the Service Program for Rubber Farmers Sari Laba Jahe

No.	Partner Issues	Solution
1	Still low technology for handling clean sap	Clean sap handling training
2	Still not obtained garden-scale bokar handling technology	Training on improving the quality of sap with various types of clumping compounds
3	The low selling price of farmers' bokar after the improvement of bokar management technology.	Comparative studies and negotiations of rubber prices to PT. Nusira <i>Crumb Rubber</i>

III. RESULTS AND DISCUSSION

3.1. Profile of the Blooming Farmers Group of Sarilaba Jahe Village

The Mekar Sari Farmer Group is a farmer group located in Betala Hamlet, Sarilaba Jahe Village, STM Hulu District, Deli Serdang Regency. This group has as many as 30 members who generally plant plantation crops including rubber and oil palm plants, besides that they also grow various fruit crops such as Durian, Duku, Salak, Mangosteen and other perennial plants such as Glugur acid, Petai and Jengkol which are superimposed with rubber plants (Figure 2).

Farmer's age (th)	Percent	Education	Percent
30-40 years	50.00	Sd	12.50
41-50 years	37.50	Junior	12.50
51-60 years	25.00	High School	75.00



Figure 2. Rubber Plantation of Mekar Tani Farmer Group, Betala Hamlet, Sarilaba Jahe Village, STM Hulu District, Deli Serdang Regency.

Members of the farmer group are generally between 30-40 years old as much as 50%, aged 41-50 years as much as 37.50% and aged 51-60 years as much as 25%. Members of farmer groups generally have a high school education of 75%, elementary and junior high schools 12.5% each (Table 2).

Table 2. Age and Education Level of Mekar Tani Farmer Group

This group has been growing rubber plants since 1998, rubber planting is still growing until 2022, meaning that the life of rubber plants in the farmer group ranges from 10-24 years. The average rubber land ownership of the group ranges from 0.5 ha-2 ha. As many as 75% of rubber farmers have a rubber planting area of 1 Ha, 12.5% have an area of 2 Ha and 12.5% have an area of 0.5%.

Rubber plants are planted using *the rubber agroforestry systems (RAS)* method which aims to improve the rubber plantation management system by using superior rubber and other non-rubber intermediate plants. The planting distance used is generally 3 m x 5 m using superior clone rubber seeds obtained from the Sei Putih Rubber Plant Research Center (the result of interviews with members of the farmer group).

3.2. The Latest Condition of Rubber Plants of the Mekar Tani Farmer Group

The lifespan of rubber plants of members of the peasant group ranges from 10-23 years. At the time of the interview and observation activities carried out, information was obtained that the old rubber plant that was 24 years old would be logging in replanting with a new superior rubber plant.

The low productivity of people's rubber in general is caused by the management of community rubber plantations still not following the correct cultivation instructions. The awareness of farmer groups to carry out plant maintenance by fertilizing and controlling pests and diseases of rubber plants is still low. Group rubber planting has never been fertilized with inorganic fertilizers such as Urea, TSP and KCl. Sources of plant nutrition only rely on decomposition of

rubber decomposition which requires a long decomposition time.

The high infestation of termite pests and diseases on group rubber plants resulted in low latex production. According to [4] the percentage of termite pest attacks on rubber plantations of the Mekar Tani farmer group reached 10%, the percentage of white root fungus attacks caused by *Rigidiporus microporus* or *Rigidiporus lignosus* reached 46% and bark dryness was 50%. Rubber plant termite pests are caused by *Coptotermes curvignathus*.

Another disorder that attacks many rubber plants of members of the Mekar Tani farmer group is dry groove tapping (KAS) which is known as *bark dryness*. Dry groove tapping (KAS) is a physiological disorder that results in a rubber plant (*Hevea brasiliensis* Muell. Arg) is unable to remove the latex at the time of tapping. Dead bark is known to be a strong indication of unsustainable tapping so that the tree does not drain the latex [1].

3.3. Training on Improving the Quality of Clean Sap

The practice of improving the quality of bokar using plastic container containers, clean and the use of natural coagulators was held directly in the rubber plantation owned by Mr. Tarigan which was followed by all members of the farmer group (Figure 3). This activity was guided directly by Mrs. Dr.Ir.Sumihar Hutapea, MS and the PKM UMA team.



Figure 3. The practice of improving the quantity of bokar with the innovation of clean container containers and the use of natural clumps. Source : Documentation Fachru Yuzairi U.S, 2021.

In an effort to improve the quality of sap of farmer groups, sap storage is carried out using containers / reservoirs made of black plastic with a capacity of up to 1 liter, besides that sap storage with pieces of bamboo segments is also carried out (Figure 4a,b, c).

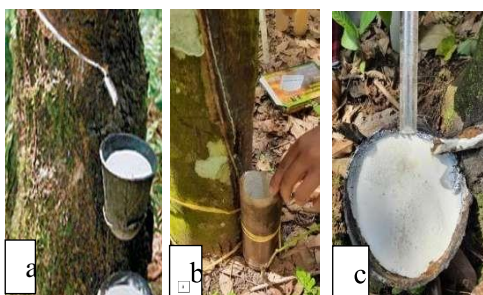


Figure 4. Clean sap container made of plastic and bamboo. Description: a. plastic container container, B. bamboo internode container, c. coconut shell. Source : Documentation Fachru Yuzairi U.S, 2021.

According to [6] there are differences in the volume of lumps that can be accommodated from 3 types of reservoirs (plastic/ standard containers, bamboo segments and coconut shells). The reservoir using coconut shells produces the lowest weight lump compared to the other 2 types of reservoirs (standard and bamboo internodes). Meanwhile, according to [7] the bamboo internode reservoir produced a lump that was lower than the 3 containers tested.

To improve the quality of the lumps produced, the sap collection container is washed periodically to avoid contamination of the old scrap (threads or lumps of sap that are not separated). On the other hand, scrap is cited and classified as a separate section of economic value. In this section, it is projected that rubber farmers have *standardized standards of procedure* (SOP) when handling clean sap from the beginning of production, namely in crops and production equipment in the garden.

At this stage, the technology of cleaning the latex jetting grooves from all non-sap materials is also introduced, and the guarantee of latex dropping into a clean and unhindered container of droppers using zinc gutters as a direction for the flow of sap from the tapping groove plane (Figure 5a,b,c,d,e).



Figure 5. Introduction of clean container container (a), zinc gutter (b) and cleaning of tapping grooves (c). (d). The results of the group bokar mixed with the rest of the rubber skin and (e). Bokar team PKM UMA. Source : Documentation Fachru Yuzairi U.S, 2021.

3.4. Improved Sap Quality Using Natural Coagulators

To improve the quality of sap, sap thickening techniques were introduced using natural coagulators made from Glugur acid extract and pineapple fruit extract which was compared to TSP p upuk coagulators(which farmers use. Both types of plants are very much found in Betala Hamlet, Sarilaba Ginger Village.Glugur acid extract is made by blending 1 kg of Glugur acid or 1 kg of pineapple, then the results are mixed with 5 liters of water and then stirred and

filtered. Each of the filter results is stored in a plastic jerry can container and tightly closed before use. The clumping material is dripped on the latex reservoir at a dosage of 10 – 20 cc per bowl [8]. In its application, rubber sap is mixed with 10-20 cc of glugur acid extract / pineapple fruit extract, stirred evenly, within 5 minutes the sap has undergone a clumping process (Figure 6a,b,c,d)

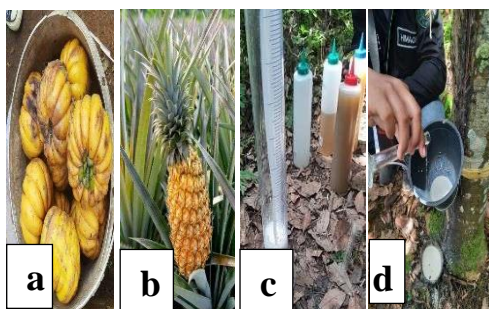


Figure 6. Introduction of natural clumping utilization of Glugur acid fruit extract and Nenas fruit (b) natural clumping extract (c) and (d) administration of natural coagulator to rubber sap in a clean container. Source : Documentation Fachru Yuzairi U.S, 2021.

The bokar results obtained are white, clean from other objects in the form of soil, leaves, wooden branches, sand, stones and others and smell fresh (Figure 7). These results are in accordance with the quality standards of garden latex as referred to in Article 6 paragraph (3) of the Regulation of the Minister of Agriculture Number 38 / Permentan / Ot.140 / 8/2008 concerning Guidelines for Processing and Marketing of Rubber Processing Materials (Bokar). The bokar results introduced by the PKM UMA team are better than the quality of farmers' bokar. Bokars that use TSP fertilizer coagulators are blackish brown, have a pungent smell and are contaminated with impurities such as leaves, pieces of rubber peel and soil.

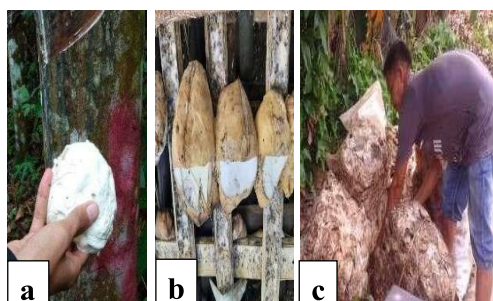


Figure 7. Bokar results using natural coagulators of pineapple extract and glugur acid extract (a) and (b) and bokar with tsp fertilizer coagulator (c). Source : Documentation Fachru Yuzairi U.S, 2021

The quality of the bokar produced using natural clumps is better than the TSP fertilizer coagulators used by farmer groups based on the dry content parameters of rubber (KKK). The results of the KKK analysis conducted in the laboratory of the Sungai Putih Research Center found that the highest bokar KKK was given in the administration of natural coagulators (Glugur acid and pineapple extract) with a shelf life of 6 days, namely 78.34% and 78.81%. Meanwhile, the TSP fertilizer coagulator produces bokar with a lower KKK of 61.70% > of KKK> of 49.14% (Table 3) [5].

Table 3. Dry Rubber Content (%) bokar based on clumping material and shelf life*

Clumping material	Shelf life (days)	Dry Rubber Content (%)
Glugur acid extraction	6	78,34
	4	60,93
	3	53,94
Nenas extract	6	78,81
	4	53,94
	2	47,43
TSP fertilizer	6	56,34
	4	61,70
	2	49,14

*Source : extracted from the certificate of analysis np.01 / LPU / KKK / X / 2021 White Sungei Research

3.3. Sap Quality Improvement Using Sap Pressing Tool

The dry rubber content is one of the determinants of the quality of rubber products, so to improve the KKK, an innovation in pressing bokar is carried out using a simple press made of bamboo slats (Figure 8), so that the KKK is obtained not exceeding 20%. To obtain data on the quality of bokar of the PKM team with the introduction of innovations in clean container shelters, the addition of natural clumps and the pressing of bokar, the bokar results were further analyzed to the Medan rubber quality laboratory. The quality of the bokar produced using natural clumps is better than the TSP fertilizer coagulators used by farmer groups based on the dry content parameters of rubber (KKK).



Figure 8. Improving the quality of bokar with the innovation of press tools (a) and (b); bokar quality testing in the North Sumatra Trade Office Lab (c). Source: Fachru Yuzairi U.S Documentation, 2021.

3.4. Comparative Studies to PT. Nusira *Crumb Rubber* Medan

As a follow-up to the quality improvement activities of the Mekar Tani group, a comparative study activity has been carried out to PT. Mekar Tani. Nusira *Crumb Rubber* Medan was followed by representatives of the rubber farmer group of Sari Laba Jahe Village. At the time of the comparative study, a visit was made to the factory site to observe the quality of rubber produced from rubber farmer groups from other locations in North Sumatra Province (Figure 9). The results of negotiations with the manufacturer agreed that the farmer group could sell the proceeds directly to the PT. Nusira *Crumb Rubber* Medan at a price that matches the quality of bokar that meets the standard requirements.



Figure 9. Comparative Study Activities to PT. Nusira *Crumb Rubber* Medan. Description: a. Presentation and discussion activities. b. A visit to the site of the plant.

CONCLUSION

1. Improving the quality of group bokar can be improved through the application of clean sap technology including the use of latex containment containers made of plastic materials, the use of latex flow flow cleaning technology from all non-sap materials, and the guarantee of latex dropper to clean container using zinc gutters as a direction for sap flow from the tapping groove plane.
2. The natural clumping ingredients of Glugur acid extract and pineapple fruit extract can increase the level of dried rubber (KKK) bokar. The results of the analysis of the highest bokar KKK were found in the administration of natural coagulators (Glugur acid and pineapple extract) with a shelf life of 6 days, namely 78.34% and 78.81%. Meanwhile, the TSP fertilizer lump produced

bokar with a lower KKK of 61.70% >KKK>49.14%.

3. Mekar farmer groups can sell bokar directly to PT. Nusira *Crumb Rubber* Medan at a price that matches the quality of bokar that meets the standard requirements.

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