The type and distribution of sap preservatives used by farmers in Kebasen District, Banyumas Regency, Indonesia

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Abstract. The purpose of this study was to know the type and distribution sap preservative used by farmer in Kebasen district, and to know the selling price of coconut sugar based on the type of sap preservative used in Kebasen district. Sensus method was used in this research. Total respondents are 794 farmers. The variables studied are the type and distribution of sap preservative used by farmer and the selling price level of coconut sugar. The results showed that the type and distribution of sap preservative used by farmer in Kebasen district are 431 farmers using sodium metabisulfite, 210 farmers using sodium metabisulfit + lime + jackfruit wood, 125 farmers using lime + jackfruit wood, 20 farmers using lime, and 6 farmers using lime + mangosteen peel, respectively. The type of sap preservative used by farmers give affects the selling price of sugar. The highest average selling price is Rp 10,750.00 from sugar using lime + mangosteen peel, while the lowest price is Rp 10,370.00 from sugar using sodium metabisulfite.

1. Introduction

Sugar is a one commodity that is quite strategic and plays an important role in the agricultural sector for national economy. It is a very important product for Indonesia people since it is used both in the daily needs of the household scale and for industrial needs [1]. Coconut sugar is one of the leading commodities in Banyumas regency. The area of coconut palm trees in Banyumas regency reaches 5,126.33 hectares, and is known to contribute to coconut production by 23.3% of the total coconut production in Central Java. This is the largest amount of coconut production among other regions such as Purbalingga, Cilacap, Purworejo and Kebumen regency. Based on the data from the Department of Industry, Trade and Cooperatives of Banyumas Regency, the centers of coconut sugar producer in Banyumas regency include are Cilongok, Ajibarang, Somagede, Pekuncen, Purwojati, Lumbir, Wangon, Kemranjen, Sumpiuh, and Kebasen district, respectively. These are the 10 districts with the large number of coconut sugar production in Banyumas regency. Kebasen district is one of the center coconut sugar producing areas in Banyumas. According to data from [2], there were 965 people working as farmers (coconut sugar craftsmen) with 14,647 trees and the number of sugar production per day reached to 5,272 kg.

The coconut sugar is produced from coconut sap that comes out of tapped coconut flowers. Coconut sap contains sugar at a concentration of 7.5 to 20.0%. It is easily damaged due to microbial contamination such as yeast (*Saccharomyces* sp.) or bacteria (*Acetobacter* sp.). To prevent sap damage, it can be done by adding sap preservative to the sap container before it being used to tap the sap. There are two types of sap preservative which are commonly used by farmers, namely natural and

synthetic sap preservative [3]. Natural sap preservatives that widely used by farmers are lime in combination with mangosteen peel or jackfruit wood. Both of these materials show antimicrobial properties which can inhibit microbial growth [3]. Many farmers are still use synthetic sap preservative called sodium metabisulfite, especially during the rainy season since it can prevent the risk of damage to coconut sap [4]. The use of various sap preservative by farmers will affect the quality of the sugar as well as the selling price of sugar. The type and distribution of sap preservative used by farmer in Kebasen District, Banyumas regency is still unknown. Based on this condition, it is important to know the type and distribution of sap preservative used by farmer and the level of selling price of coconut sugar. The purpose of this study was to determine the type and distribution of sap preservative used by farmer in Kebasen district and to find out the level of selling price of coconut sugar based on the type of sap preservative of their used.

2. Material and methods

This research was carried out in Kebasen district, Banyumas regency on February to May, 2018 using a census method. The subjects of this study were all coconut sugar farmer in Kebasen district. Census method is a sampling technique if all members of the population are used as samples [5]. All coconut sugar farmers in Kebasen district were used as respondents in a total of 794 people. The questionnaire was used to facilitate researchers in collecting quantitative information that is being studied. The parameters studied included the type and distribution of sap preservative used by farmer, number of farmer, number of coconut trees tapped, the amount of sugar products, the time to take coconut sap and the selling price of coconut sugar. The data obtained were then analyzed using descriptive statistical analysis to describe the type and distribution of sap preservative, the number of farmer, the number of coconut trees tapped, the amount of sugar, the time of sap taken and the selling price of coconut sugar.

3. Results and discussion

3.1. Profile of coconut sugar farmer

The number of farmers, the number of tapped coconut trees, and the amount of sugar production in each village in Kebasen district are presented in Figure 1. The population of farmer in Kebasen district is 794 people. The number of tapped cococnut trees is 14,941 trees and the amount of sugar produced by farmer in Kebasen district is 4,475 kg / day. Based on Figure 1a, it shows that the village of Kalisalak has the largest number of farmer of 361 people, while Tumiyang village has the lowest number of 2 people. The second largest population is in Kaliwedi village, 144 people. Figure 1b shows that the highest number of tapped trees is found in Kalisalak village with 6,821 trees, while the lowest is found in Tumiyang village with 37 trees. Figure 1c shows the highest amount of sugar production in Kalisalak village is 1,965 kg / day while the lowest sugar yield in Tumiyang village is 12 kg / day.

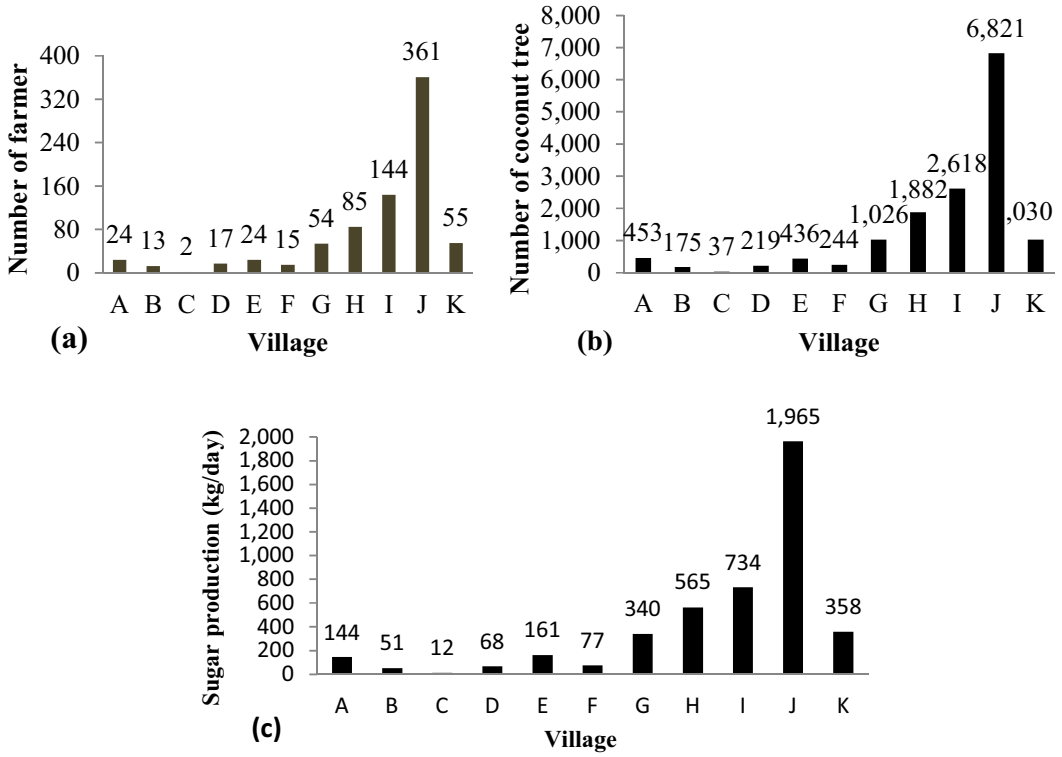

Figure 1. The number of farmer (a), the number of tapped coconut tree (b), and the amount of sugar production (c) of each village in Kebasen district.
(A= Adisana, B= Gambasari, C= Tumiyang, D= Bangsa, E= Randegan, F= Cindaga, G= Sawangan, H= Kebasen, I= Kaliwedi, J= Kalisalak, K= Karangsari).

3.2. The type and distribution of sap preservative

The type and distribution of sap preservatives used by farmer in Kebasen district are presented in Figure 2. Based on Figure 2, it is known that sodium metabisulfite is the highest sap preservative used by farmers 54% (431 people). The farmers use sodium metabisulfite as sap preservative because it is very effective on inhibiting microbial contamination and the prices are quite affordable for farmers (Rp. 2,500.00 to 4,000.00), practical in used, and easy access to obtain in the market. In addition, the sugar that produced using sodium metabilsufite show hard in texture and brighter of sugar color. [5] states that synthetic preservatives are still widely used by farmer among others, since it is effective to inhibit microbial growth, easily available on the market, affordable prices, and many of farmer still lack of understanding and awareness of farmers about the risk of synthetic preservatives.

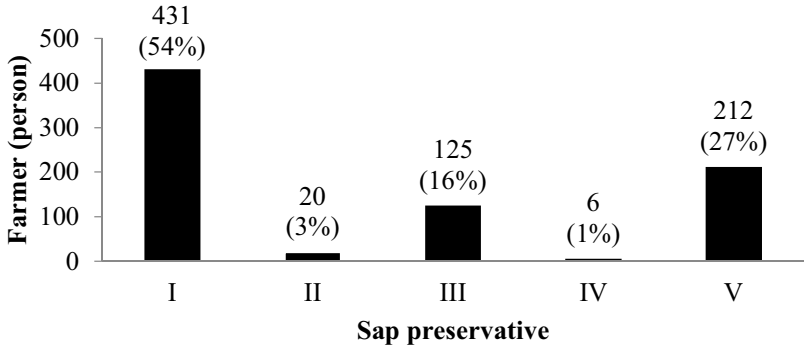

Figure 2. The type of sap preservative used by farmer in Kebasen district.
(I= natrium metabisulfit, II= lime, III= lime+ jackfruit wood, IV= lime+ mangosteen peel, V= natrium metabisulfit + lime+ jackfruit wood).

According to [7] and [8], sulfite will interact with carbonyl groups and the reaction results in binding to melanoidin, thus preventing the appearance of brown color of sugar. However, the use of sulfite as a sap preservative is not recommended since it has an adverse effect on consumer health. [7] explained that sulfite can disrupt the human respiratory tract (especially people with asthma) and can cause death. Therefore, the use of sulfite needs to be reduced and even replaced with other sap preservatives to avoid the danger of sulfite.

The second largest number of sap preservative used by farmer is sodium metabisulfite + lime + jackfruit wood was 27% (212 people). Then subsequently 16% (125 people) of farmer use lime + jackfruit wood, 3% (20 people) use lime only and 1% of farmers use lime + mangosteen peel as a sap preservative. Jackfruit wood which is often used by farmer also has a chemical content including flavones, flavonoid tannins which are proven to be antibacterial and antiviral [9].

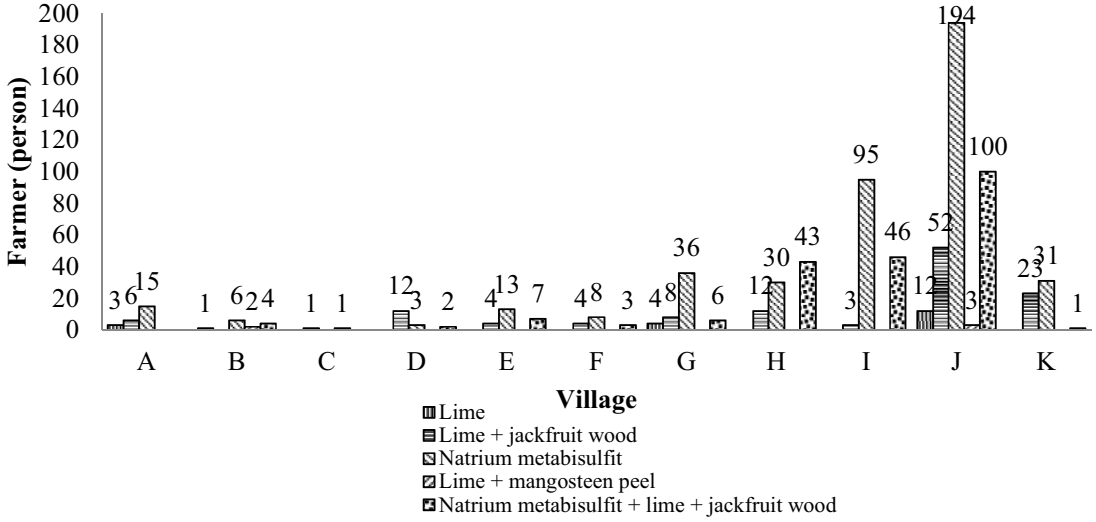

Figure 3. The type and distribution of sap preservative used by farmer on each village in Kebasen district.
(A= Adisana, B= Gambasari, C= Tumiyang, D= Bangsa, E= Randegan, F= Cindaga, G= Sawangan, H= Kebasen, I= Kaliwedi, J= Kalisalak, K= Karangsari).

3.3. The time sap collection

There are two time of farmer taking sap in a day including twice a day (morning, evening) or once a day (morning). The time sap collection of farmer in Kebasen district was presented in figure 4. The number of farmer who taking sap once a day (in the morning) are 438 people (55%) more than the farmer who taking sap twice a day (morning, evening) are 356 people (45%). The reason why farmers more prefer taking sap once a day because it is more practical in processing sugar and less time consuming and fuel cost.

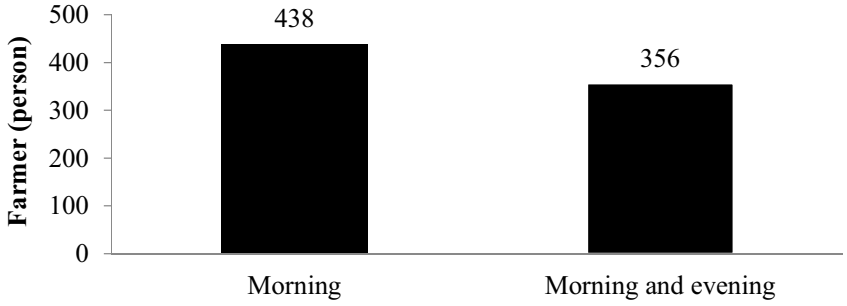

Figure 4. The time sap collection of farmer in Kebasen district

The time sap collection in each village are varied. Figure 5 shows the time of sap collection on each village in Kebasen district. The time sap collection in Sawangan, Kebasen, Kaliwedi, and Kalisalak villages are once a day (in the morning) more compared to taking twice a day. Meanwhile in the villages of Adisana, Gambasari, Tumyang, Bangsa, Randegan, Cindaga, Karangsari, the majority of farmers took the sap twice a day.

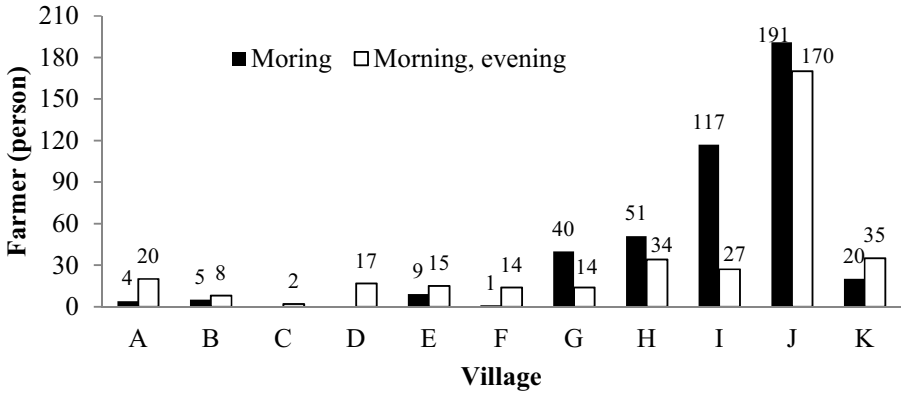

Figure 5. Time sap collected by farmer on each village in Kebasen district.
(A= Adisana, B= Gambasari, C= Tumiyang, D= Bangsa, E= Randegan, F= Cindaga, G= Sawangan, H= Kebasen, I= Kaliwedi, J= Kalisalak, K= Karangsari).

In the Figure 6, it shows that the number of farmer use sodium metabisulfite and takes the sap once a day is 390 people (61%), more than the farmer who take the sap twice a day is 253 people (39%). Based on these data, sodium metabisulfite is still widely used by farmers. Most of farmer beliave that sodium metabisulfite to be able to preserve the sap longer. [10] stated that farmers use sodium metabisulfite because this preservatives are able to prevent the shelf life of sap longer.

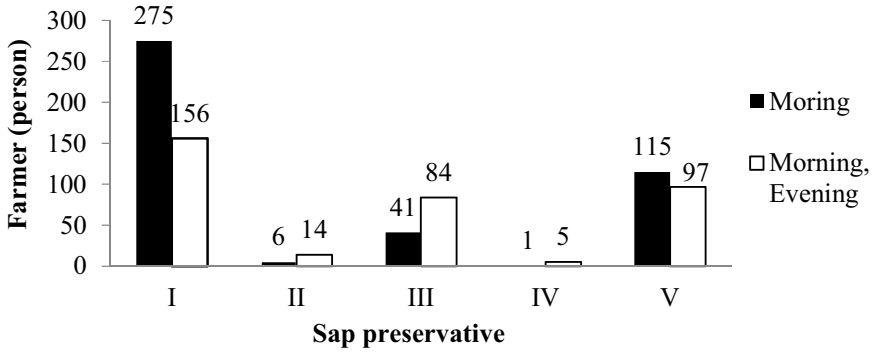

Figure 6. The time sap collection and the type sap preservative used by farmer in Kebasen district. (I= natrium metabisulfit, II= lime, III= lime+ jackfruit wood, IV= lime+ mangosteen peel, V= natrium metabisulfit + lime+ jackfruit wood).

Farmers who use natural preservatives such as lime, jackfruit wood and mangosteen peel that took a sap twice a day was 103 people (68%) more than natural preservative who take-up a sap once a day, 48 people (32%).

3.4. The sugar price

The selling price is the cost determined by the producer to get profits and cover expenses in producing goods or services. [11] states that the right selling price is the price that matches the product quality of an item and that price gives satisfaction to consumers. Figure 7 shows the average price of sugar in each village in the Kebasen district. Based on these data, the price of sugar is varies. The highest selling price of coconut is found in Tumiyang Village, which is Rp 11,250.00 while the lowest sugar price is found in Karangsari village Rp 10,209.00. The price of coconut sugar produced from each village in Kebasen district tends to fluctuate. This is because the prices of coconut sugar that set by collectors are different from one another so there is a variation in the price of sugar.

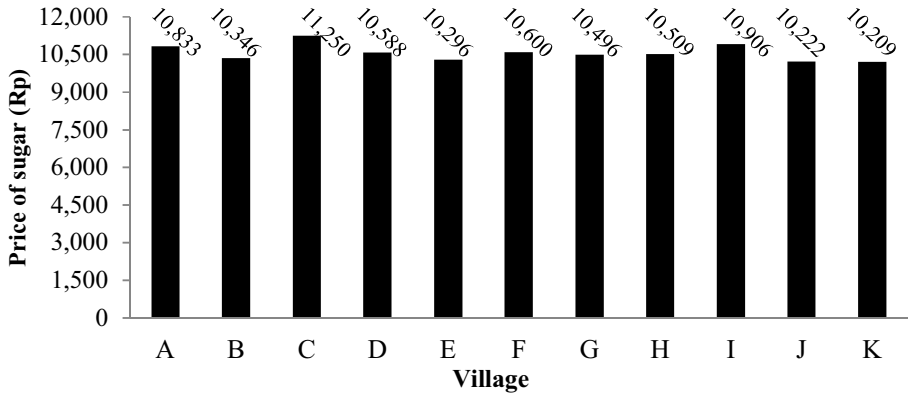

Figure 7. The sugar price from each village in Kebasen district. (A= Adisana, B= Gambasari, C= Tumiyang, D= Bangsa, E= Randegan, F= Cindaga, G= Sawangan, H= Kebasen, I= Kaliwedi, J= Kalisalak, K= Karangsari).

The average price of sugar based on the type of sap preservative used in Kebasen district is presented in Figure 8.

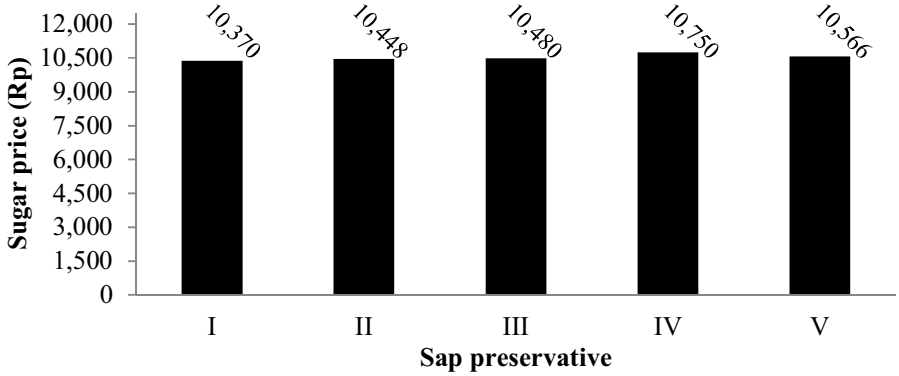

Figure 8. Sugar price and type sap preservative in Kebasen district
(I= natrium metabisulfit, II= lime, III= lime+ jackfruit wood, IV= lime+ mangosteen peel, V= natrium metabisulfit + lime+ jackfruit wood).

It is interesting that coconut sugar that produced from the sap that uses natural preservative was higher than sugar that produced from sap use sodium metabisulfit. The sugar produced from sap use lime + mangosteen peel has the highest selling price of sugar was Rp 10,750.00. The price of coconut sugar that uses natural sap preservatives are almost similar, and it is more expensive than the sugar price which uses sap preservative of sodium metabisulfite. It is because sugar that produced using natural preservative is respected by consumers. The price of coconut sugar block sold by farmers will be more expensive if it has a hard texture and attractive colors according to market demand.

4. Conclusion

The type and distribution of sap preservatives used by farmer in Kebasen district from high to low were sodium metabisulfite (54%), sodium metabisulfite + lime + jackfruit wood (27%), lime + jackfruit wood (16%), lime (3%) and lime + mangosteen peel (1%). Sodium metabisulfite almost used in all village, except for Tumiyang village. The level of selling price of sugar in Kebasen district ranges from Rp 10,209.00 - Rp 11,250.00. The selling price of coconut sugar using natural sap preservatives (Rp 10,750.00) is higher than the price of coconut sugar using sinthetic sap preservative of sodium metabisulfite (Rp 10,370.00).

Acknowledgments

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