

# Training on making kombucha tea from snake fruit peel and butterfly pea flower

Pelatihan membuat teh kombucha dari kulit buah salak dan bunga telang

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## ABSTRACT

Snake fruit peel is an organic waste that is often not utilized, while the flower of the butterfly pea is known as a natural dye for food and beverages. The COVID-19 pandemic causes susceptibility to the human body. Therefore, it is necessary to process health drinks in order to utilize organic waste. This community service program activity aims to introduce fermented food processing to the community, especially the Family Welfare Development (PKK) Group RT 3 RW 3, Ngijo Village, Gunungpati District, Semarang City by utilizing snake fruit peel (*Salacca zalacca*) and butterfly pea flower (*Clitoria ternatea*) as kombucha tea. The method of this program is in the form of delivering material either through posters, videos, demonstrations, and youtube links. A positive response was given by community after conducting a taste test on the product that was socialized in the form of many questions submitted including other alternative raw materials and the volume of kombucha tea served. This program has the potential to foster community motivation in entrepreneurship so that family income will increase.

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## 1. INTRODUCTION

The COVID-19 pandemic in Indonesia began in early March 2020 (Annas et al., 2020; Giatman et al., 2020; Susilawati et al., 2020) causing people's lifestyle to change and impacting the industrial sector where some companies laid off their employees. As a result, people's purchasing power weakens, so that the economy for households is affected. Unfortunately, the amount of assistance from the government to break the chain of spread of the COVID-19 virus is still limited (Pitoyo et al., 2020; Setiati & Azwar, 2020).

Actions taken to reduce the spread of the COVID-19 virus are based on directives from both the Government of Indonesia and the World Health Organization (WHO) by maintaining distance in all sectors

(Kementerian Kesehatan Republik Indonesia, 2020). Some of these actions include not doing activities outside the home, maintaining personal and environmental hygiene, using personal protection when traveling outside the home, and maintaining a diet and/or drink to increase endurance by consuming fermented drinks. The activity of consuming this drink is one of the efforts to minimize the public's lack of awareness of this regulation.

Fermentation is one of the oldest traditional methods for food and beverage preservation (Rawat et al., 2018; Ray et al., 2016) because it uses a low-cost energy conservation system so that biochemical changes that occur during fermentation can affect the nutrition of compounds which result in end product properties such as bioactivity (Villarreal Soto et al., 2018; Hur et al., 2014). One example of a fermented drink is kombucha tea. Kombucha tea is a functional beverage fermented from a symbiotic relationship between bacteria and yeast (SCOBY) to form "tea mushrooms" with a slightly sweet and sour taste, refreshing, and beneficial for health (Antolak et al., 2021; Jayabalan & Waisundara, 2019; Leal et al., 2018; Jayabalan et al., 2014). The fermentation process also leads to the formation and thickening of tea or scoby mushrooms due to the activity of certain acetobacter sp (Villarreal Soto et al., 2018).

Snake fruit (*Salacca zalacca*) is a tropical fruit plant in Indonesia with an ellipsoid shape and brownish scaly skin (Čepková et al., 2021) as much as 10-14% (Surbakti & Barus, 2022). Apparently, the bark of salak has phytochemicals including flavonoids, phenols, alkaloids, and tannins that are beneficial for health such as anti-aging agents (Girsang et al., 2019) and tea drinks (Sholihah & Tarmidhi, 2022). In addition, the results of the antioxidant activity of salak peels were  $229.27 \pm 6.35$  ( $\mu\text{g}/\text{MI}$ ) (Čepková et al., 2021).

Butterfly pea flower (*Clitoria ternatea L.*) is known as a natural colorant in foods and beverages containing flavonoid and anthocyanin compounds (Verma et al., 2013). Butterfly pea flower has a composition of phenolic acids, stilbenes, flavanols, anthocyanins, flavonols, and flavanones (de Morais, et al., 2020) as well as phytochemical compounds in the form of flavonoid glycosides as antioxidants (Cahyaningsih et al., 2019) which are useful for antidiabetic and increase immune system (Choiriyah, 2020). Unfortunately, the use of snake fruit peel and butterfly pea flower as the main raw materials for the manufacture of fermented drinks in the form of kombucha tea has not been developed by the community, especially in the Family Welfare Development Group (PKK) RT 3 RW 3, Ngijo Village, Gunungpati District, Semarang City. This group lives with some of their husbands working as laborers and with this activity the family income can be increased. So that family welfare for community is achieved.

Therefore, this community service program aims to increase awareness of the importance of maintaining the immune system of the PKK Group in RT 3 RW 3, Ngijo Village, Gunungpati District, Semarang City through training in making kombucha tea from snake fruit peel and butterfly pea flower. In addition, community can use organic waste into goods that can have added value as well as fruit waste other than durian and rambutan seeds into chips (Damayanti et al. 2020) and cherry leaves into jelly candy and brewed tea (Damayanti et al. 2019). Even through this program, it can be a home-based business opportunity for community.

## 2. METHODS

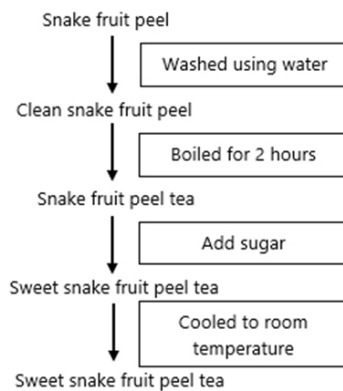
Based on the problems faced by partners, training is needed in applying the technology of making kombucha tea from snake fruit peel and butterfly pea flower as a medium for training and practice for the PKK Group RT 3 RW 3, Ngijo Village, Gunungpati District, Semarang City. This service program was carried out on June 18, 2022, which consisted of the field survey and analysis stages, re-trials, and socialization as well as demonstrations. The field survey stage is carried out in coordination with the

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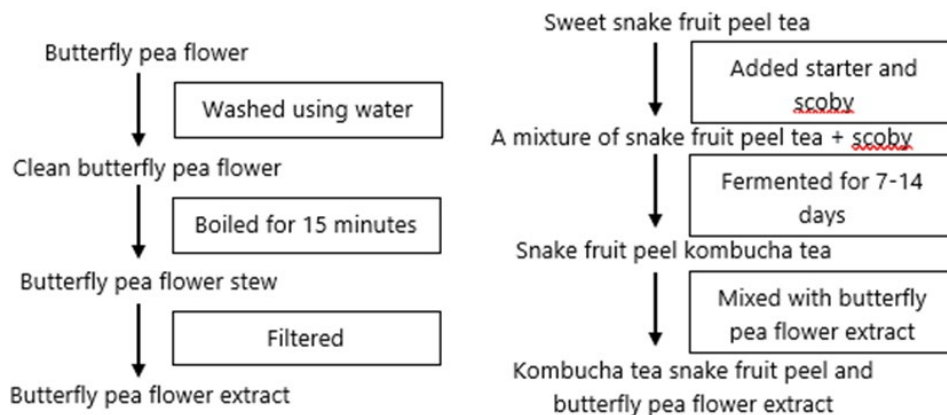
PKK Chair regarding service activities. Meanwhile, socialization as well as demonstrations were carried out by the Community Service Team so that community became clearer about the purpose of these activities. Based on the results of the survey and field analysis, it was continued with re-trials so that they succeeded in making kombucha tea from snake fruit peel and butterfly pea flower.

Then a demonstration was held to the PKK Group RT 3 RW 3, Ngijo Village, Gunungpati District, Semarang City, preceded by the distribution of a flow diagram of the stages of making kombucha tea from snake fruit peel and butterfly pea flower. The flow chart is as shown in Figure 1, Figure 2, and Figure 3.



**Figure 1.** Flowchart of making snake fruit peel tea

Before the processing demonstration is carried out, first explain the steps in product processing as follows: (1) Processing of bark tea. The initial stage is selecting the bark of the bark, the washing process, boiling for 2 hours, filtering the snake fruit peel tea, adding sugar, and cooling the sweet tea of the snake fruit peel; (2) Pea flower extract processing. In the initial stage were selected of the butterfly pea flower, washed, boiled for 15 minutes, filtered the extract of the butterfly pea flower, and was cooled; (3) Kombucha tea processing. The initial stages of the process were added of a starter and scoby to snake fruit peel, fermented process, and added of the extract of butterfly pea flower.



**Figure 2.** Flowchart of making butterfly pea flower extract

**Figure 3.** Flowchart of making kombucha tea snake fruit peel and butterfly pea flower

The socialization of service (Table 1) was carried out in front of the community by explaining the equipment and raw materials that would be used for kombucha tea from the snake fruit peel and butterfly pea flower.

## Implementation Stages

### Presentation

The presentation stage is carried out to explain the materials needed, including the products to be processed. This is done so that community understand in advance the details of all the materials needed to become a useful product. The service team also showed all the ingredients used for kombucha tea from snake fruit peel and butterfly pea flower.

### Material selection

At this stage, it is intended that community can find out the ingredients that can be used to make kombucha tea products. This is carried out to increase the knowledge and abilities of the community regarding basic ingredients and in particular products made from snake fruit peel and butterfly pea flower. The specifications of all materials are also explained in detail so that community can treat them properly and correctly.

**Table 1.** The socialization of service

Stages of Socialization	Activities	Purpose
1	- Introduction of ingredients	- To introduce raw materials and equipment in the manufacture of kombucha tea from the snake fruit peel and butterfly pea flower
2	- Material processing	- To provide knowledge about the processing of snake fruit peel and butterfly pea flower into kombucha tea products
3	- Demonstration/training of making kombucha tea	- To provide knowledge about the process of making kombucha tea by utilizing snake fruit peel and butterfly pea flower. - The practice of making kombucha tea products from the snake fruit peel and butterfly pea flower, which begins with washing the snake fruit peel until the fermentation process
4	- Taste test by community	- Share the results of the training or experimental results with community to taste. - Get feedback from community in the form of an assessment of the kombucha tea products that have been made
5	- Packaging and labeling	- Providing packaging for kombucha tea products from the snake fruit peel and butterfly pea flower in order to display maximum results,

### Material processing

At this stage of processing raw materials, it is intended that community can process the raw materials used in the manufacture of kombucha tea products. In this stage, various methods are used so that at the time of manufacture it can provide good and desired results. The service team also showed semi-finished products, so that community could understand.

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### Review

The final stage is the execution of community service programs which are realized in the form of training. The hope is that community can also make their own with the same results as the Service Team. In addition, the confidence of each citizen can also be increased.

### Closing

This part is in the form of distributing products that have been successfully made to community by preparing small glasses. Furthermore, the products that have been prepared are drunk to get comments from community. Positive testimonials from community are expected to be information for community who are not present.

## 3. RESULTS AND DISCUSSION

The implementation of community service program activities is carried out in two ways, namely exposure and practice. The presentation was carried out to explain and introduce the ingredients needed, the steps for making kombucha tea to the benefits of the tea. After a detailed explanation, proceed with manufacturing practices, starting with preparing the materials needed until the process is carried out and providing examples of kombucha tea products made from the snake fruit peel and butterfly pea flower that are finished and packaged ready to be sold.

### Activity Material

In this community service program, the materials used in the implementation have been adapted from various literature searches by the implementing team. The product is made based on a simple experiment because innovation with snake fruit peel and butterfly pea flower raw materials has never been done by others. SCOBY ingredients and dried butterfly pea are presented in Figure 4.

Apart from that, the service team also provided examples of failed and successful products as a reference for manufacture. The next process is the selection of raw materials in the form of snake fruit peel and butterfly pea flower because the ingredients are easy to find and are included in household waste. Then the process of explaining the product and the process of making kombucha tea from the snake fruit peel and butterfly pea flower was carried out.

After the fermentation process is carried out, the process of adding butterfly pea flower extract is carried out so that it becomes kombucha tea ready for consumption. Packaging and labeling are done to make it more attractive to present or sell (Figure 5).



**Figure 4.** SCOBY and dried butterfly pea

**Figure 5.** Kombucha tea products from snake fruit peel and butterfly pea flower

Community service activities that have been carried out regarding the use of snake fruit peel and butterfly pea flower to make kombucha tea have a significant positive effect and greater entrepreneurial motivation. It is based on raw materials around each residence, it is very easy and a lot so that it can be directly practiced. The kombucha tea product tested by the team was presented with bottled samples, snake fruit peel and butterfly pea flower kombucha tea as an effort to foster the entrepreneurial spirit of the PKK group RT03/RW03, Ngjijo Village, Gunungpati District, Semarang City. Service socialization is presented in Figure 6.

The PKK group RT 3 RW 3, Kelurahan Ngjijo, Kelurahan Ngjijo has filled the interior of the house to listen to the socialization of community service (Figure 6).



**Figure 6.** Socialization of kombucha tea from snake fruit peel-butterfly pea flower

The activity began with an opening ceremony accompanied by the delivery of kombucha tea products from snake fruit peel and butterfly pea flowers to the Chair of the PKK. The event continued with an explanation of the bark of kombucha tea and its preparation by the Team Leader and students presented in Figure 7.

The team leader briefly explained the background and workings of making kombucha tea from the snake fruit peel and butterfly pea flower, while the students explained in detail including the failure factors (Figure 7).



**Figure 7.** Team leader and students briefly describe the community service program

The explanation of the mechanism for making kombucha tea to community through posters and demonstrations with a video background is presented in Figure 8. The video tutorial has also been published via the youtube link [https://youtu.be/cH\\_A4mtDJO4](https://youtu.be/cH_A4mtDJO4). Then the community service members consisting of the PKK group were directed to taste the kombucha tea products that had been prepared

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from the snake fruit peel and butterfly pea flower. Question and answer session were also held while community tasted the products presented in Figure 9.



**Figure 8.** Explanation of the mechanism of making kombucha tea through posters and demonstration media

Figure 9 shows that community tasted fermented tea drinks, resulting in a moment of question and answer between community and servants. A clear and detailed explanation of the service made the community understand and satisfied. The closing of the socialization was carried out with a group photo session after the question and answer was completed which is presented in Figure 10.



**Gambar 9.** Community taste kombucha tea and ask questions  
**Figure 10.** Closing service outreach

The service team has also conducted a simple experiment on the snake fruit peel tea recipe by Anjani et al. (2014) and kombucha tea by Villarreal Soto et al. (2018). The experiment was carried out three times because it was the result of a combination of two different studies so that the results were suitable for consumption. Fermenter made of glass with experimental results are presented in Table 2.

**Table 2.** Experiment of snake fruit peel and butterfly pea flower of kombucha tea

Experiments	Variables	Methods	Results
I	Fermented salak bark tea with butterfly pea flower	The fermenter is tightly closed	- Fungus was formed
II	Fermentation of snake fruit peel tea without butterfly pea flower	The tissue is placed in the mouth of the fermenter then covered with a napkin and finally closed tightly	- Sour taste - Aroma: pungent, typical fermentation - Gas content: not too much - No fungus formed
III	Fermented tea obtained from the market	The tissue is placed in the mouth of the fermenter then covered with a napkin and finally closed tightly	- Taste: more sour - Aroma: pungent, typical fermentation - Gas content: more than snake fruit peel of kombucha tea - No fungus formed

The appearance of a sour taste due to the kombucha fermentation process is suspected to be a variant of the resulting acid (Table 2). Acetic acid is the most prominent with a slightly sharp and hard sour aroma and taste. In addition, gluconic acid is also found in kombucha tea with a refreshing, soft, and light taste (Laureys et al., 2020). Meanwhile, fungal contamination (Table 2) produces mycotoxins that are hazardous to health, presumably due to unsterilized equipment and/or the presence of air entering the fermenter (Jarrell et al., 2022).

There are visible changes from the PKK Group RT 3 RW 3, Ngijo Village, Ngijo Village, Gunungpati District, Semarang City. This service program was carried out including: (1) Public understanding of kombucha tea bark- butterfly pea flower as a beverage product that is useful for increasing endurance the body is also refreshing; (2) Interest in developing this product business is expected to become a bigger home industry; (3) Improve skills in making kombucha tea by utilizing snake fruit peel and butterfly pea flower.

#### 4. CONCLUSION AND RECOMMENDATIONS

The PKK group RT 3 RW 3, Ngijo Village, Gunungpati District, Semarang City was able to know the processing and requirements for the success of making snake fruit and butterfly pea flower into kombucha tea. His understanding from the preparation of materials to his interest in developing as an entrepreneur is getting bigger. This snake fruit peel and butterfly pea flower kombucha tea can be used as an alternative for making butterfly pea flower bark kombucha tea which has a characteristic taste and aroma so that it can increase sales potential with a broad target market.

Community assistance needs to be taken seriously and directly involved in entrepreneurship training, especially for the PKK Group RT 3 RW 3, Ngijo Village, Gunungpati District, Semarang City. Monitoring the results of sustainable activities also needs to be done to observe and find out developments, progress, and obstacles that occur in order to maintain the business. Cooperation with partners should be followed up so that the implementation of community service programs that have been carried out is responded to more quickly and widely. The success of the implementation of this activity has been achieved, but there are inhibiting factors. First, the start of the new norm order phase (new normal). So hopefully there are community who still have activities in other places. Second, new knowledge for community is about kombucha.



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