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Post-Harvest Handling through Processing Oranges into Wine to Increase the Added Value of Oranges when Fruit is Abundant and the Skills of the Women Farmer Group "Widya Pertiwi" in Belantih Village, Kintamani District, Bangli Regency

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ABSTRACT

The community service activity on aimed at post-harvest handling through processing citrus fruits into wine to increase the added value of citrus fruits when the fruit is abundant. And the skills of the farmer women's group "Widya Pertiwi" in Belantih Village, Kintamani District, Bangli Regency. This service activity is carried out through stages, namely providing material and demonstrations on processing oranges into wine and final evaluation (post-test) through distributing questionnaires. The results of counselling and training showed that through training and hands-on practice, they could easily understand how to process citrus fruit into wine, which could be done when the fruit was excessive in the harvest season, to increase added value and income. The results of this activity showed an overall increase in knowledge where 85% of respondents stated that they understood very well, and the remaining 15% indicated that they understood the extension materials and methods provided, which means that there were no respondents who stated that they did not understand or did not understand. Of the 15 respondents who participated in the counselling, 80% indicated they were very satisfied, and the remaining 20% stated they were satisfied participating in the counselling activities. 95% of the respondents indicated they were very interested, and the remaining 5% stated they were interested in practising turning citrus fruits into wine in their homes. This means that 100% of the participants from the farmer women's group are interested in improving their skills and applying the technology of processing citrus fruits into wine to reduce the occurrence of fruit spoilage when the fruits are abundant in the harvest season.

1. INTRODUCTION

1.1. Research Background

Siamese orange is one of the horticultural commodities and is the flagship fruit of Bangli Regency. Kintamani District is the largest producer of oranges in Bangli Regency with a total production of 131,587 tonnes [1]. Belantih Village is one of the citrus-producing centres in Kintamani District, Bangli so it is not surprising that citrus plants or trees dominate the plantations or moor of local residents with an area of 9.06 km2 and is located at an altitude of 800-900 metres above sea level [2,3]. Ref. [4] states that oranges have health benefits because they contain organic acids consisting of citric acid, tartaric acid, high vitamin C, contain bioflavonoids that function as antioxidants such as limonin and limonen. The other benefits of antioxidants are preventing free radicals to protect body cells from damage and containing folic acid which functions to help improve brain health and beta-carotene to maintain body tissues and metabolism [5].

Agriculture has an important role in both the economic sector and the fulfilment of basic needs or food so that it can improve the economy for farmers. The development of the agricultural sector is directed at increasing the productivity of agricultural products to meet the food needs of the community, and domestic industrial needs, increase exports, increase farmers' income, expand employment opportunities, and encourage business opportunities [6].

The citrus harvest in Belantih Village is not conducted every month. When the citrus harvest occurs, the amount of production increases dramatically and has an impact on the price of citrus fruits which decreases and citrus fruits are not sold in the market [7]. This causes farmers to lose money, so it is necessary to take action to overcome this problem, namely increasing community skills in good and correct cultivation and being able to process citrus fruits into a product with a longer shelf life [8]. By improving the skills of human resources in responding to technological developments in the context of good post-harvest handling of oranges in accordance with the principles of Good Handling Practices (GHP) so that the oranges have a longer shelf life and have added value in sales [9]; [10].

Generally, siamese oranges in Bangli Regency are sold fresh and consumed directly without further processing. The community is also familiar with processed citrus fruit products themselves only to the extent that they are often found in the form of syrups, extracts, cake mixes, puddings, and others. As for the processing of the latest innovative products, it is still unfamiliar and has not been found much [11]; [12]. Citrus fruits can be further processed into a processed product to increase their selling value and also become an alternative business product for farmers. Some processed citrus products that are easy to make include candy, jelly, jam, fruit leather and wine. Wine is a type of alcoholic beverage made from fruit juice with a high sugar content, which is produced from the fermentation process with the help of certain microbes in anaerobic conditions [13].

Wine is usually made from fermented grape juice. It turns out that with the development of food technology today, wine is also used on citrus fruits, which can be fermented without the addition of sugar, acids, enzymes, or other nutrients. Wine is made by fermenting citrus fruit juice using a certain type of yeast. The yeast will consume the sugar content in the citrus fruit and convert it into alcohol. In addition to using citrus fruits, other fruits such as apples, berries, longan, and pineapple contain a lot of sugar. Making orange wine starter [14].

Besides grapes, other fruits can be made into alcoholic beverages, such as citrus fruits. Alcoholic fermentation is the process of anaerobic alteration of a substrate that converts sugar into ethanol and carbon dioxide. In the process of fermenting a substrate using microorganisms. The microorganisms used in the fermentation process of this drink use khamri group microorganisms [15]. The length of fermentation time can affect alcohol content. The longer the fermentation time, the lower the sugar content. This is because microorganisms break down sugar to produce metabolite compounds in the form of organic acids [16.17].

Although it has great agro-tourism potential, this potential has not been well utilised so the benefits have not been felt by the people of Belantih Village. In the on-farm aspect, farmers and communities have not been able to package the various potentials they have [18]. The community needs to be given an in-depth understanding of the benefits and properties of citrus fruits and their business opportunities. In addition, it is also to put forward the mindset of the community regarding the potential of citrus fruit as an innovative product that can be competitive [19].

1.2. Literature Review

The main problem faced by orange farmers in Belantih Village is that even though the village is one of the orange producing centres, orange cultivation and agribusiness have not been able to alleviate poverty and provide good welfare. The strategic issue of citrus agribusiness in Belantih Village has been declining since the last decade. Based on data from the [1], Siamese orange production in Bangli Regency fluctuates from year to year. Production in 2019 (168,476 tons); in 2020 (131,587 tons) and 2021 (104,528 tons). Siamese oranges are a fruit that has the potential to be developed as an effort to fulfil consumer demand. Siamese oranges have a sweet and fresh taste so they are in great demand by consumers [20]. The fruit produced cannot compete with imported fruit, the fruit harvest is seasonal. Where during the main harvest the fruit produced is abundant, and conversely, outside the main harvest, little or no fruit is produced, so the availability of fruit is not continuous, and the quality of the fruit produced is low so the selling price is also low. This condition causes many farmers during the main harvest season to leave their fruit unharvested (rotting on the tree) because the selling price is low (1,000 - 1,500 per kg) [9]. Post-harvest handling is also poor and there is no skill in processing orange fruit into various culinary product variants made from orange raw materials such as cakes, sweets, tea from orange peel, jam, and orange wine) which should be done when fruit is abundant. peak harvest season to increase added value.

1.3. Research Objective

Based on the above, the education provided aims to inspire people to be creative and utilize citrus fruit intensively.

2. MATERIALS AND METHODS

The service activity of processing and utilizing citrus fruits into processed products that can be stored for a long time was carried out at Belantih Village Hall, Kintamani District, Bangli Regency on Sunday, 8 June 2024. The training was held at 09.00 WITA until completion by involving the Widya Pertiwi Women Farmers Group. KWT Widya Pertiwi was chosen as the service subject because it is expected to receive the knowledge provided to further develop the diversity of Micro, Small and Medium Enterprises (MSMEs) in Belantih Village.

The dedication programme carried out is exploratory qualitative in nature by going through stages in the form of :

1) **Observation** which aims to find out the condition and potential of the Belantih Village Orange Grove, Kintamani, Bangli and identify existing problems.
2) **Socialisation** of the Benefits and Processing Programs and Utilisation of Citrus Fruit by providing an understanding of the benefits and properties of citrus fruits and their skins as well as business opportunities for processed citrus fruit products; and activities to be

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carried out including the types and objectives of activities.

3) **Introduction to Processing Innovations** with the introduction of innovative processed orange jam products; ingredients used and needed; and production process procedures and packaging.
4) **Training in Making Processed Citrus Fruit** so that trainees can carry out and make processed wine products by established procedures.
5) **Evaluation** by showing the results of wine products that have been bottled so that they can be stored longer and tasting to find the advantages and disadvantages of the processed products. In addition, to find solutions to the shortcomings of the processed products so that they become ready-made products. Evaluation of activities is carried out through distributing questionnaires and the results are tabulated to be used for follow-up improvements to the next service.

3. RESULT AND DISCUSSION

The output achieved from this service is that the Women Farmers Group is very interested and very enthusiastic about training and direct practice in making culinary ingredients made from citrus into orange wine, through education and assistance so that later there will be an increase in added value and income from citrus cultivation. Education and training are carried out through 2 things, namely counselling on citrus fruit processing technology into processed wine product variants and hands-on practice.

The implementation of the service is carried out following the predetermined activity method, namely: 1) Observation and identification, 2) Socialisation of the benefits and processing programs and the use of citrus fruits, 3) Introduction of citrus fruit processing innovations and explanations, 4) Training on making processed citrus fruit into orange wine and 5) Evaluation.

The first phase of activities began with observation and identification carried out in March 2024, at the beginning of the service, namely observing and seeking information about the potential of the village and orange groves. In addition, it also explores the problems and innovations needed to further develop the potential of the village. Based on the results of the observation, some information was obtained about the problems that are often found by the community.

The information obtained is: 1) Citrus harvest is seasonal, where during the harvest season the fruit is abundant and the price is cheap, so many farmers let the citrus fruit turn yellow on the tree not picked and a lot of fruit is wasted due to decay; 2) The citrus harvest is sold directly or in the form of fresh fruit. 3) The harvested citrus fruits are prone to spoilage if the visitors are quiet; 4) The public is familiar with citrus fruit preparations in general, such as orange ice and direct consumption of fresh fruit, 5) Low public knowledge about the benefits, properties and variety of processed fruits in depth.

Through the observations that have been made, it can be concluded that the problem found is the lack of development and innovation in processing citrus fruit-based products into renewable product forms. In addition, there is a lack of education about citrus fruits and market opportunities for innovative products. Where this results in citrus fruit lacking a high selling value. So processed products are only limited to a variety of general products. The results of the observation of the citrus garden of Belantih Village, Kintamani District, Bangli are presented in Figure 2.

Figure 2. Observation of citrus orchards in Belantih Village, Kintamani District, Bangli

Based on the observation and identification of the problem, the preparation of the solution provided is in the form of: 1) Providing education on the processing and utilisation of citrus fruits and explaining the benefits of citrus fruits as a whole; 2) Providing training on how to process diversified products made from citrus fruits into high-value innovative products such as orange wine; 3) Providing knowledge on how to label and package products.

The second stage was in the form of socialisation of training on processing and utilising citrus fruits as orange wine which was conducted on 8 June 2023. This socialisation activity was attended by 15 participants of the Widya Pertiwi Women Farmers Group in Belantih Village. This stage was the first step in providing a good understanding of post-harvest processing and product innovation. The material presented discussed briefly citrus fruit, the benefits and properties of fruit and explained the potential of Belantih village in the form of a citrus garden located in Banjar Luahan Belantih Village, an explanation of the product diversification system in citrus fruit. The material was delivered by the Service Team assisted by 2 students. Socialisation activities are carried out to provide education about understanding the benefits and properties of citrus fruit and its business opportunities, to put forward the community's mindset regarding the potential of citrus fruit as an innovative product that can be competitive and can inspire the community to be creative and make intensive use of citrus fruit. The socialisation of citrus fruit processing and utilisation as well as the donation of tools and materials are presented in Figure 3.

Figure 3. Socialisation on the processing and utilisation of citrus fruits as jam products and donation of processing tools and materials

The socialisation was carried out, followed by the third stage, namely the introduction of materials and tools needed in the process of processing citrus fruits into wine, citrus fruit processing innovations, processing procedures and production processes to packaging to empower the community by providing knowledge about processing materials into an innovative product that has economic selling value. The materials needed to make orange wine consist of several types of oranges, namely Kintamani siam oranges and squeezed oranges and tangerines as the main raw material, sugar as a thickener, instant yeast, gallons for fermentation, wine storage bottles, pans for boiling sugar, blenders to crush orange grains, filter cloth to filter the orange solution after blending.

The stages of the process of making wine from oranges are as follows: 1) Fruit Harvesting and Selection. Select oranges that are fully ripe and free from defects or diseases. 2) Cleaning and Peeling. Wash oranges with clean water to remove dirt. Peel the oranges and remove the seeds, then weigh 3 kg. 3) Fruit Crushing. Crush the orange pulp that has been separated from the skin and seeds using a blender or fruit crusher until it becomes pulp. 4) Fermentation. Add 1 small packet of instant yeast (11 g) to the citrus pulp and sugar solution (500 g sugar and water makes 3 litres of solution). Store in a tightly closed container in a dark, cool place for 1-2 weeks for the initial fermentation process. 5) Filtering and Bottling. Filter the wine to remove any remaining solids. Bottle the wine and store in a cool place for a few months before consumption. 6) Maturation. Allow the wine to mature for several months until it reaches the desired flavour. An introduction to citrus fruit processing innovations and an explanation of the tools and materials required as well as the processing procedures are presented in Figure 4. The results of processed products from several types of citrus, and how to package in fermentation bottles and storage bottles are presented in Figure 5.

The KWT Widya Pertiwi conducted the training following the procedures that had been previously exemplified. Although the implementation is quite good, the service team on duty always directs and fosters continuously. This is done so that the processing process follows product requirements so that the resulting product has good stability. Because this training aims to enable participants to process with a diversification system under predetermined stages or procedures.

The products that have been produced through this training activity programme can be used as innovative product development that can later be practised by each community. Where in the future it can be used as a typical Belantih Village product that can be sold and marketed by the community. This is supported because most of the community has been able to understand and carry out every procedure for processing and utilising citrus fruits into typically processed products properly. In addition, processed orange wine products, if developed and become a business, can become a distinctive feature for Belantih Village MSMEs. So that later the community will be able to develop and increase the Micro, Small and Medium Enterprises (MSMEs) of Belantih Village to become diverse.

Figure 4. Introduction to citrus fruit processing innovations, explanation of processing procedures and tools and materials required

Figure 5. Results of processed products from several types of citrus, packaging methods in fermentation bottles and in storage bottles.

The results of the evaluation of the success of the mentoring implementation when viewed from the enthusiasm of the participants were very satisfying and encouraging. Descriptively, this was reflected in their enthusiasm and hard work during the hands-on sessions. While practising, they were very enthusiastic about discussing various matters related to the problems they faced. To determine the success of the counselling implementation, an evaluation was conducted through the distribution of questionnaires. The results of this activity showed an increase in overall knowledge where, 85% of respondents stated that they understood and the remaining 15% stated that they understood the material and methods of counselling provided on how to process citrus fruits into processed products that had added value after the service activities were carried out, which meant that there were no respondents who stated that they did not understand or did not understand. Of the 15 respondents who participated in the extension, 80% stated that they were very

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satisfied and the remaining 20% stated that they were satisfied in participating in the extension activities. 95% of respondents stated that they were very interested and the remaining 5% stated that they were interested in practising making citrus-based culinary variants in their own homes. This means that 100% of the participants from the Women Farmers group are interested in improving their skills and applying citrus fruit processing technology to processed wine products to reduce the occurrence of fruit spoilage when the fruit is abundant in the harvest season.

4. CONCLUSION

Based on the PM-UPUD service activities that have been carried out, it can be concluded that the activities that have been successfully carried out are:

1. Education and training on the utilisation of citrus fruits as processed products (culinary variants made from citrus raw materials such as orange wine went well as planned.
2. The results of the tabulation of questionnaires filled out by the Widya Pertiwi farm women's group, showed an increase in overall knowledge where, 85% of respondents stated that they understood very well and the remaining 15% stated that they understood the material and methods of the extension provided, which meant that there were no respondents who stated that they did not understand or understood less. Of the 15 respondents who participated in the counselling, 80% stated that they were very satisfied and the remaining 20% stated that they were satisfied in participating in the counselling activities. 95% of the respondents stated that they were very interested and the remaining 5% stated that they were interested in practicing the processing of citrus fruits into wine in their own homes. This means that 100% of the participants from the farmer women's group are interested in improving their skills and applying the technology of processing citrus fruits into wine products to reduce the occurrence of fruit spoilage when the fruit is abundant in the harvest season.

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