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Utilization of Butterfly Pea Flowers for Food Applications with Antioxidant Content in Ciparigi Village, North Bogor District, Bogor City

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Abstract: Ciparigi Village is one of the Villages in the North Bogor District, Bogor City, West Java, with an area of 160.72 Ha. The population of Ciparigi Village is 18,324 people consisting of 9,092 men (49.62) and 9,232 women (50.38) with a total of 4,909 Family Heads. The population density in this Village in 2008 was 11,401 people per km2. When viewed from the activities of each working group in Ciparigi Village, it is still very small, this is probably due to the lack of delivery of various information or development of its members' skills in the form of counseling and training to the community. The solution offered by the University in this case the Chemistry Study Program, FMIPA, Pakuan University, is to provide counseling on the use of butterfly pea flowers to be applied to several food preparations. The lack of public knowledge, especially the family empowerment and welfare group in Ciparigi Village, in processing and optimizing the potential of butterfly pea flowers needs to be improved through socialization and training. The output targets to be achieved include publication in the LPPM Journal of Pakuan University, publication in the mass media, and increasing skills in making food products with butterfly pea flowers. The bright blue color of butterfly pea flowers is very attractive and easy to consume, mothers can produce butterfly pea flower syrup, butterfly pea flower tea and butterfly pea flower pudding. Butterfly pea flowers contain various active compounds that are beneficial for health, such as: anthocyanins - natural pigments that function as antioxidants to protect body cells from damage caused by free radicals, flavonoids-compounds that can help reduce inflammation and boost the immune system, cyclic peptides-Known to have antimicrobial and anticancer properties, phenolic acids-play a role in maintaining heart health and reducing the risk of chronic diseases.

Keywords: antioxidant; Butterfly pea flower; food product

1.INTRODUCTION

The development of technology and information has also encouraged the increased use of various local food commodities. Local food can be used as an ingredient in the processing of food products. Various sources of food ingredients continue to be identified to provide benefits in the development and application of the food industry. One of the local food ingredients that is starting to be widely studied is the butterfly pea flower.

Indonesia has a wealth of plants that have properties as medicines and health supplements, one of which is the butterfly pea flower. Butterfly Pea Flower is a member of the Fabaceae family, has a small stem and

grows creeping, small leaves with a leaf shape of 2 to 4 pairs of leaves per sheet. This plant is native to tropical areas in Asia, currently its distribution includes Africa, Australia, North America, South America and the Pacific region. In Indonesia, butterfly pea flowers are widely found in the Ternate area, North Maluku.. The parts of the butterfly pea flower that are used by the community are the flowers, leaves and roots. The limited insight and knowledge of the community has caused the butterfly pea flower to not be utilized optimally, especially in the field of processed food.

The limited public insight into the benefits of butterfly pea flowers is the reason for us lecturers at Pakuan University to provide socialization, counseling and practice in making processed foods by utilizing butterfly pea flowers to carry out community service activities, especially for housewives or family empowerment and welfare group, especially in the Ciparigi sub-district who need knowledge and skills in processing and utilizing butterfly pea flowers to be used as supplements in food products such as tea tubruk, syrup and pudding. This training is one of the proofs of the efforts of the Chemistry Study Program, Faculty of Mathematics and Natural Sciences, Pakuan University in realizing the tridharma of higher education, namely community service by supporting the healthy Indonesia program through socialization, counseling and training activities. It is hoped that the community can better understand the importance of maintaining health naturally in order to increase public love for products made from local ingredients while improving public health in general. In this case, as academics we will provide training in making food products using butterfly pea flowers as supplements. In the end, it is hoped that the community can cultivate and utilize butterfly pea flowers for health purposes and also have economic value.

Butterfly pea flowers have blue, light purple, and white colors, hidden stamens and pistils. Butterfly pea flowers are native to tropical Asia including areas in the Indian subcontinent and Southeast Asia (Indonesia, Bangladesh, Malaysia, and Thailand) which are currently also spread in the United States, Australia and Africa and are known as butterfly pea. Butterfly pea flower (*Clitoria ternatea*) is a purplish-blue flowering plant that has long been used as a natural ingredient in traditional medicine. In addition to having a beautiful color, this flower is also rich in health benefits. In recent years, butterfly pea flowers have become increasingly popular because of their high antioxidant content and their benefits for the body.

Butterfly pea flowers contain various active compounds that are beneficial for health, such as: anthocyanins - natural pigments that function as antioxidants to protect body cells from damage caused by free radicals, flavonoids - compounds that can help reduce inflammation and boost the immune system, cyclic peptides - Known to have antimicrobial and anticancer properties, phenolic acids - play a role in maintaining heart health and reducing the risk of chronic diseases. Antioxidants are substances or compounds that have a primary function in preventing or eliminating free radicals, especially in body cells. One example of free

Figure 1. Butterfly pea flowers

radicals that can be produced by body cells in oxidative stress conditions, The anthocyanin content in butterfly pea flowers can be obtained by extraction. A cheaper, easier and simpler anthocyanin extraction method is maceration or dissolving butterfly pea flowers in water. Butterfly pea flower extraction can be done using water or aquadest solvents heated to a temperature of 100° C. Anthocyanins are a subclass of water-soluble flavonoids that are responsible for the red, purple and blue colors in fruits, vegetables, cereals, flowers. So that anthocyanins can be natural food colorings, in addition, anthocyanins are also believed to be antioxidants. Therefore, a study was conducted with the aim of identifying the potential of butterfly pea flower extract as a local natural antioxidant in food products.

Table 1. Taxonomy of Butterfly Pea Flower (*Clitoria ternatea* L.):

Kingdom	Plantae
Sub kingdom	Tracheobionta
Super Division	Spermatophyta
Division Class	Magnoliophyta
Sub class	Magnoliopsida
Order	Rosidae
Family	Fabaceae
Genus	Clitoria
Species	*Clitoria ternatea* L.

(Source: Hartono et al., 2012)

The main primary metabolite components in butterfly pea flowers are fat, which is 32.9%/dry weight, carbohydrates (29.3%) and crude fiber (27.6%). Meanwhile, the protein contained in butterfly pea flowers is found in relatively small amounts (4.2%) (Neda et al., 2013). Bioactive components in butterfly pea flowers that are estimated to have functional benefits come from various groups of phytochemical compounds, namely phenols (flavonoids, phenolic acids, tannins, and anthraquinones), terpenoids (triterpenoids, saponins tocopherols, phytosterols), and alkaloids. Other components also found in butterfly pea flowers are palmitic, stearic, petroselinic, linoleic, arachidic, behenic and phytanic fatty acids (Shen et al., 2016), mome-inositol and pentanal (Neda et al., 2013).

2. METHOD

The method of implementing community service consists of counseling, training, monitoring and evaluation, including:

1. Providing counseling on butterfly pea flowers and the benefits of butterfly pea flowers in the health sector. Counseling is carried out using lecture and discussion methods which will be delivered by food experts and chemical experts who are qualified in the use of natural materials as medicinal plants (back to nature).
2. Providing an explanation of making tubruk tea, syrup and pudding using butterfly pea flowers.
3. Practice making tubruk tea:

   Prepare Butterfly Pea Flowers,you can use fresh or dried butterfly pea flowers. If using fresh flowers, make sure they are washed clean. If using dried flowers, make sure they are dried well to avoid mold Boil Water: Heat the water until it boils. Brew Butterfly Pea Flowers:put the butterfly pea flowers in hot water. Use about 3-5 dried butterfly pea flowers or a handful of fresh butterfly pea flowers for one glass of water, let it sit for a while until the water turns blue. The time needed can be around 5-10 minutes.
4. Practice making syrup:

Boil water & butterfly pea flowers until blue. Strain, add sugar, lemongrass, cinnamon, stir until sugar dissolves, cool. Serve with ice cubes, fresh & healthy

5. Practice making pudding:

   In a small saucepan, combine sugar and *agar-agar*, stir well. Add milk, stir well until *agar-agar* blends with milk before turning on the heat, Turn on the heat to medium low. Add the butterfly pea flowers, then stir slowly and continuously so that the milk does not boil too much and overflow. Once boiling, turn off the heat. Strain butterfly pea flowers. Store at room temperature before going into chiller.

3. RESULT AND DISCUSSION

Efforts to make food products using butterfly pea flowers are intended to broaden insight and skills in making food products with antioxidant content that will ultimately improve health. The implementation of this activity uses a method of direction and guidance by means of counseling about butterfly pea flowers and their benefits as well as by means of demonstrations and demonstrations of making tubruk tea, syrup and butterfly pea flower pudding. The activity was carried out for family empowerment and welfare group in Ciparigi Village, North Bogor District, Bogor City with lecture and discussion methods and demonstrations that will be delivered by chemists and food experts. on February 15, 2025. This activity was attended by around 15 participants from family empowerment and welfare group with the lecture as a resource person. Results of the activities that have been carried out in the form of tea, pudding and butterfly pea flower syrup have been handed over by the chairperson to the family empowerment and welfare chairwoman in Ciparigi Village, North Bogor District, Bogor City.

The complement of this community service activity is that it has been published through the Jabar Online Media with the link https://www.jabaronline.com/program-studi-kimia-fmipa-unpak-lakukan-sosialisasi-dan-pelatihan-pemanfaatan-bunga-telang-untuk-aplikasi-pangan-dengan-kandungan-antioksi-dan-di-desa-ciparigi-kecamatan-bogor-utara-kota-bogor and Youtube with the link https://youtube.com/shorts/rfS4BNsxt7c?feature=share, with the aim that this activity can be known by the general.

a b c

Figure 2. Product images include butterfly pea flower tea (a), butterfly pea flower pudding (b), and butterfly pea flower pudding(c)

The PKM activity on making food products (tea, pudding and syrup) from butterfly pea flowers that has been carried out has received a positive response from the participants. This can be seen from the enthusiasm of the participants during the discussion and the input given provides a sufficient picture that the participants are satisfied and have gained additional insight from the activities that have been carried out. The indicators for achieving the objectives of this activity are increasing the insight of family empowerment and welfare group about the benefits of butterfly pea flowers for health and increasing the skills of family empowerment and welfare group in making food products from butterfly pea flowers, especially loose tea, syrup and pudding. It is expected that this community service activity will be able to empower natural resources and human resources as an effort to improve the economy and skills of the community so that it will improve the socio-economy of the community and in the end it is hoped that it can form sustainable business partners in addition to being able to realize the IKU of Pakuan University, namely students gain experience outside the campus in the form of interaction with the community and lecturers can also do activities outside the campus. Students involved in this activity can be converted into food chemistry courses.

4. CONCLUSION

The community service activity on making food products (tea, pudding and syrup) from butterfly pea flowers that has been carried out has received a positive response from the participants. This can be seen from the enthusiasm of the participants during the discussion and the input given provides a sufficient picture that the participants feel satisfied and have gained additional insight from the activities that have been carried out.

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CONFLICT OF INTERESTS

Limited funds available and the presence of partners that are not yet optimal are obstacles to the implementation of this PKM program, it is hoped that in the future it can be implemented better with different topics.

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