USE OF KETAPANG (*TERMINALIA CATAPPA L.*) LEAVES AS ANTI-BACTERIAL INGREDIENTS OF *CUPANG* (*BETTA SPLENDENS*) ORNAMENTAL FISH IN SUB-DISTRICT CIBOGOR, BOGOR CITY

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ABSTRACT

The purpose of this Community Service (PkM) program activity is to increase awareness and understanding of ornamental fish business actors as PkM partners, namely residents of Cibogor district, Bogor city. The problems faced by partners, among others, are related to the knowledge of residents about anticipating attacks of various bacteria and diseases on ornamental fish (*Cupang / Betta splendens*) with organic matter which is still rare. Another thing, related to the provision of anti-bacterial drugs is considered as an additional operational cost becomes expensive. The mentoring activities carried out were emphasized on optimizing the use of dried *Ketapang* (*Terminalia catappa L.*) leaves as antibiotics and creating healthier and more productive ornamental fish. In this activity the materials taught are carrying out socialization activities to residents, carry out training/assistance on the use of dried *Ketapang* leaves, and evaluate the understanding of the residents before and after the mentoring.

Keywords: anti-bacterial, *Betta splendens*, Ketapang leaves, ornamental fish

1. INTRODUCTION

Fish that are immune to disease have a strong body defense system related to the immune system that comes from the fish's body. The immune system depends on the effectiveness of white blood cells that can protect the fish's body from secondary infections caused by disease. In intensive fish farming, fish are kept under stress conditions due to high-density levels, which weakens the immune system (Sukamdani & Sukwika, 2022). It increases the chances of pathogens attacking and causing disease. This infectious disease contributes to economic losses and constrains the intensive cultivation process. One of the natural ingredients that are quite promising for controlling fish diseases is natural ingredients derived from medicinal plants (herbal ingredients).

Currently, the prevention treatment of sick fish is highly recommended to use herbal or natural ingredients because utilizing herbal ingredients for the prevention and treatment of sick fish can reduce the costs incurred even if we can do environmentally friendly fish farming. The use of herbal ingredients is said to be environmentally friendly because the herbal ingredients used will easily decompose in nature compared to artificial chemicals, so the use of herbal or natural ingredients does not pollute the environment, and the fish produced is safe for consumption (Rahmaningsih, 2012; Tantu et al., 2013). This material contains an active substance that can function on par with antibiotics, whose use is currently very limited. By utilizing the content of natural active substances (natural antibiotics) in herbal ingredients, it is expected to be able to replace the function of synthetic antibiotics but not leave residues that have implications for the decline in the sustainability of fish farming activities in general.

Phytopharmaceuticals or herbal medicines are natural medicines whose raw materials are extracted from plants for use in medicine. Approximately 250,000 species of higher plants are found in tropical forests, and about 54% of them are. However, only about 0.3% of these plants have been investigated by researchers for their benefits. As a country with a tropical climate, Indonesia's tropical forests have the potential to be developed as a source of herbal medicines (Inayah & Ernayenti, 2007 *in* Lusiastuti, 2021). Phytopharmaca has advantages because it is cheap, easy to obtain, safe and effective, so it has long been used as human medicine but has yet to be widely used in managing fish health. Some types of plants that fish farmers can use in maintaining the health of the fish that are kept include (Lusiastuti, 2021): Ketapang (Temmalia cattapa), Betel (Piper betle L.), Garlic (Allium sativum), Aloe Vera (Aloe vera), Temulawak (Curcuma Xanthorrhiza ROXB), Ciplukan (Physalis angulata L), Water hyacinth (Eichornia crassipes), Gamal Liridiyah (Glyriceridia sephium), Guava (Psidium guajava), Moringa (Moringa oleifera Lamk.), Turmeric, Turmeric Turmeric (Curcuma longa), Noni (Orinda citrifolia L.), Meniran (Phyllanthus niruri L., Phyllanthus urinariaLinn.) , Pineapple (Ananas comusus Merr), Orang-aring (Eclipta alba), Gotu kola (Centela asiatica), Papaya (Carica papaya L.) fam. Caricaceae, Chinese Petai, Kemlandingan, Lamtoro (Fam.mimesacea), Banana (Musa paradisiaca), Sente (Alocasia macrorrhiza schott), Sweet Potato (Ipomoea batatas poir).

Dry Ketapang leaves that fall from the tree often pollute the house's road or yard. However, behind the dry leaves of Ketapang as waste, there is another value that can be taken if you know the benefits of the dry leaves of Ketapang (Sukamdani et al., 2022). Through handling using a simple treatment, dry leaf waste from Ketapang can be used as an

ingredient to make anti-bacterial medicine for betta fish (Sukamdani & Sukwika, 2021). Ketapang leaves contain tannins, which can reduce the pH of the water, making it comfortable for fish. Ketapang leaves are also antibacterial and kill fungi, so it helps the development of betta fish to live better. Betta fish, given vitamin water from Ketapang leaves, will have bright colours and healthy growth (Raharjo, 2011; Rahmaningsih, 2012).

Partners of this community service program are residents of Cibogor Village, Central Bogor District, Bogor City. The determination of this partner is because this location has breeding and rearing activities for ornamental fish, especially betta fish (Betta splendens). The problem most often found in ornamental fish beginners is the loss caused by the death of fish in vain (Sukamdani & Sukwika, 2022). In the water, Aeromonas hydrophila bacteria commonly infect fish (Rahmaningsih, 2012; Tantu et at., 2013). These bacteria can spread rapidly in dense populations with high stocking rates, which can cause seed death by up to 90% (Purwani, 2015). It makes ornamental fish novice business people know little about anticipating attacks of various bacteria and diseases on ornamental fish. Therefore, the availability of anti-bacterial drugs is important.

Having an anti-bacterial course can be inexpensive. The use of organic materials around the environment can be done. One of them is by using dried Ketapang leaves which are processed with simple treatments. Ketapang leaves are one of the plants that have the potential as anti-bacterial because they contain secondary metabolites, namely tannins, flavonoids, and saponins (Yulvizar et al., 2014; Purwani, 2015). Raharjo's research (2011) showed that Ketapang leaf extract could treat infections in catfish. Experience in several places has shown results that obtaining natural medicinal ingredients for anti-bacterial.

Assistance in using dried Ketapang leaves for ornamental fish breeders as a beginner step towards creating a healthy and productive ornamental fish business. For this reason, it is necessary to provide knowledge on how to process the leaves of these plants so that residents understand how to make an easy anti-bacterial by utilizing the plants available around the residents' homes.

2. METHOD

Approach Method

Based on the problems that have been described previously and the agreement between the proposing team and partners, the solutions offered to overcome the existing problems can be done using the following approach methods:

a. The process of building human resource motivation (capacity building). This process is intended so that the empowered resources have a desire in terms of environmental health of ornamental fish.
b. The use of dried Ketapang leaves is carried out to provide a very simple understanding of how organic matter can be used as an anti-bacterial.
c. The mentoring process is carried out to maintain the commitment, sustainability of ornamental fish, then a mentoring process will be carried out.

Stages of activity

The empowerment method uses the stages of empowerment activities. The steps are as follows:

a. The first stage is to find and collect data, facts, and information related to the problems of community service partners.
b. The second stage is to develop a joint plan through a focused discussion approach. In this process, all stakeholders are involved. The purpose of the discussion is to get support and agree on solutions to problems together.
c. The third stage is to develop a work plan. The results of the focused discussion are included in the strategic plan matrix tables. The matrix will describe the objectives of the activity, location, scope, role of related parties, required cost plans, indicators of success, and post-mentoring sustainability processes.
d. The fourth stage, the technical implementation plan, contains a detailed timetable in a large table. It is hoped that all interested parties know the plan to be carried out. This way, all resources are involved in the management process, including planning, organizing, reporting, and monitoring.
e. The fifth stage is the implementation of activities that have been planned and agreed upon with partners.
f. The sixth stage is monitoring evaluation and report generation. At this stage, the implementation results are disseminated so that a thorough evaluation can be carried out, discussing sustainability and development efforts. Dissemination is also intended to provide a learning process for other activities. All subsequent activities are published in the form of scientific articles at the national level so that they will indirectly promote what is being done by partners.

Procedures

The PkM method to overcome problems in betta fish micro business actors in Bogor City is related to using organic materials made as anti-bacterial betta fish. Based on the results of identifying the issues above, the approach method designed is to educate the use of organic materials from Ketapang leaves to serve as anti-bacterial betta fish. The participation of betta fish micro business actors includes some activities, namely: presenting the phenomena and problems of betta fish care and attending education about literacy in the use of organic materials for anti-bacterial drugs for betta fish.

Implementing the community service program (PkM) is carried out twice. The first meeting was held one week before the PkM activity. The implementation starts, namely site survey and problem identification correspondence. The PkM activity method uses several stages. The following is a detailed explanation of the working procedure of using dried Ketapang leaves as an anti-bacterial agent in betta fish: (1) Conducting a socialization meeting for residents of micro-enterprises for ornamental betta fish. (2) Carry out training/assistance on dried Ketapang leaves. (3) Carrying out activities for arranging dried Ketapang leaves as an anti-bacterial material for ornamental betta fish and evaluating the understanding of residents before and after mentoring.

Figure 1. Photo of the Assistance Activity Process

Ketapang Leaf Processing Technique

Simply putting Ketapang leaves into a betta fish container or aquarium can speed up the mutation of betta fish. However, in practice here, it is not using leaves picked directly from the tree but using dry leaves that have gone through the processing stages first.

The following are the stages of making dried Ketapang leaves into an anti-bacterial herbal medicine. First, select the brown, dry Ketapang leaves that have fallen to the ground, then clean the dirt that sticks. Make sure that there is no dust and grit on the front and back of the leaves. Soak the Ketapang leaves in water for 30 minutes, drain the Ketapang leaves, and then continue soaking in fish salt water or table salt for 24 hours. One teaspoon is enough for one bucket. The purpose of settling with salt is to remove the oil and sap in it. After 24 hours of soaking, drain again, then dry in the sun for 2-3 days, according to weather conditions. Make sure the Ketapang leaves are completely dry. Ketapan leaves that have been processed can be used by placing a few leaves of Ketapang in the aquarium. Slowly the colour of the aquarium water will be brown, like tea. Alternatively, put a few leaves in a bucket containing 5-6 litres of water after the leaves dry. Allow 1-2 days until the water turns yellow. The results of the Ketapang soak are put in the pool. For each Ketapang leaf, 5-6 litres of water is used. Figure 1 shows how Ketapang leaves are processed into anti-bacterial herbal medicine for betta fish.

3. RESULT AND DISCUSSION

The implementation of the community service program or PkM is designed in the form of literacy education and the practice of using organic materials for anti-bacterial medicine for betta fish using dried Ketapang leaves. Before the mentoring activity, the PkM team conveyed the socialization of using dried Ketapang leaves as anti-bacterial medicine for betta fish. Furthermore, the PkM team shared the following points regarding dried Ketapang leaves and introduced types of Ketapang leaves. Finally, an explanation of the user starts from sorting and processing to using simple Ketapang leaves. Participants followed attentively, the material was well received, and interactive questions and answers took place. At the end of the session, participants understood more about the benefits and functions of using dried Ketapang leaves for anti-bacterial betta fish. Figure 2 shows a group photo session with PkM partners.

Before the activity begins, there is a pre-test for the participants. This test determines the extent of the participants' initial understanding of the questions about household lamps and the manufacturing process. At the end of the activity, there is a post-test. Here, participants will know the changes in their abilities according to the material that has been obtained. Evaluation of activity achievement against Specific Instructional Objectives (SIO) is based on measurement parameters: (1) Participants' general knowledge about dried Ketapang leaves as anti-bacterial. (2) Participants' knowledge of dried Ketapang leaves. (3) Participants' knowledge of how to optimize Ketapang leaves as an anti-bacterial. (4) Participants' knowledge about the experience of how to process dried Ketapang leaves. (5) Participants' knowledge of organic anti-bacterial manufacture.

Figure 2. Photos of Assistance Activities Results.

The questions on the pre-test are the same as the questions on the post-test. The test is used to compare the results of training activities by compiling questions according to the Specific Instructional Objectives (SIO) to be achieved in this service activity. Information on the composition of SIO in the pre-test and post-test is presented in Table 1.

Table 1. The composition of SIO in the pre-test and post-test

No	*Specific Instructional Objectives (SIO)*	*Question points.*	*Number of questions*	*Proportion*
1	Knowing the general understanding of dried Ketapang leaves as anti-bacterial.	1, 2, 3	3	30
2	Increase knowledge about the benefits of dried Ketapang leaves.	4,5	2	20
3	Increase knowledge about how to optimize Ketapang leaves as an anti-bacterial.	6, 7	2	30
4	Increase knowledge about the experience of how to process dried Ketapang leaves.	8	1	10
5	Increase knowledge about organic anti-bacterial manufacture.	9, 10	2	20

The results of Table 1 and Table 2 are compared to determine the change in the percentage increase in SIO achievement, namely before service activities and after service activities.

Table 2. Comparison of SIO achievements before and after service.

No.	*SIO*	*Achievement SIO (%)*		
		Before	*After*	*Progress*
1	Knowing the general understanding of dried Ketapang leaves as anti-bacterial.	43,16	86,76	43,60
2	Increase knowledge about the benefits of dried Ketapang leaves.	49,02	90,25	41,23
3	Increase knowledge about how to optimize Ketapang leaves as an anti-bacterial.	38,94	90,01	51,07
4	Increase knowledge about the experience of how to process dried Ketapang leaves.	40,83	91,45	50,62
5	Increase knowledge about organic anti-bacterial manufacture Average.	39,03	89,36	50,33
	Average	42,20	89,57	47,37

Table 2 and Figure 3 show that the achievement of SIO before the service activities were held was 42.20%. Then, after the service activities were held, it changed to 89.57%. Therefore, it can be said that each SIO increased by an average of 47.37%. It shows that the community's knowledge about using Ketapang (Terminalia catappa L.) leaves as anti-bacterial has increased significantly. Overall, the initial objectives of this service activity have been achieved satisfactorily. This increase in citizen knowledge is expected to be transmitted to other residents, in general, to synergize in improving community welfare (Fahrudin, 2012; Sukwika, 2021).

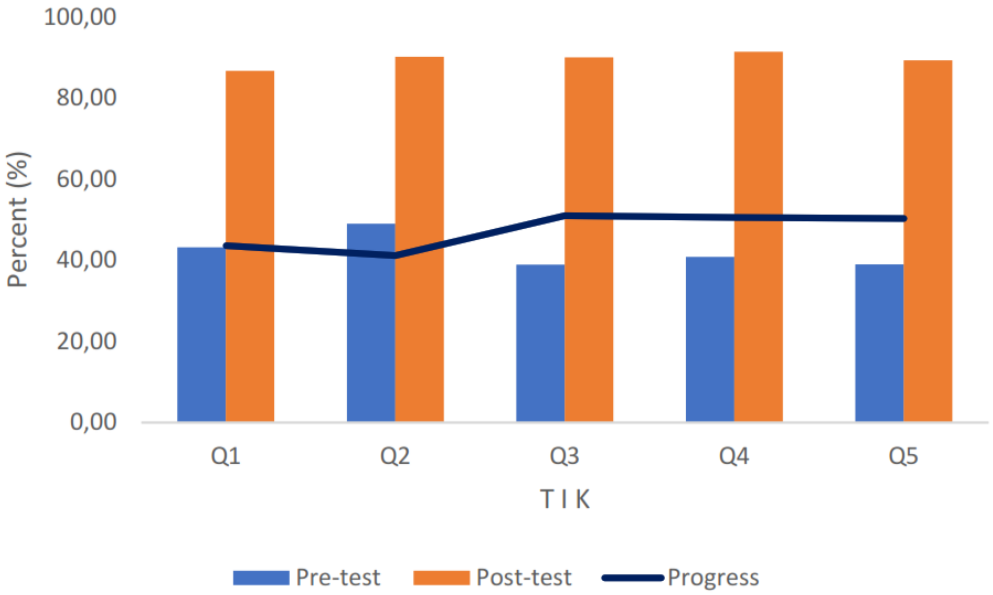

Figure 3. Comparison of SIO achievements before and after service activities.

4. CONCLUSION

Implementing community service using Ketapang (Terminalia catappa L.) leaves as anti-bacterial. This mentoring method is useful for introducing and practicing and is easily applied at the community level. Technical assistance is based on residents' preferences in creating anti-bacterial by Ketapang (Terminalia catappa L.) leaves. Efforts to optimize space along the alley have created beauty and cleanliness in the alley environment.

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REFERENCES

Fahrudin, A. (2012). *Pemberdayaan, partisipasi dan penguatan kapasitas masyarakat*. Bandung: Humaniora.

Lusiastuti, A. M. (2021). *Direktori Herbal untuk Pengelolaan Kesehatan Ikan Air Tawar*. Bogor: PT Penerbit IPB Press.

Purwani, I. (2015). In vitro potential test of Ketapang (Terminaliacatappa) leave extract against Aeromonas salmonicida. *Journal of Applied Environmental and Biological Sciences*. 5 (7): 1-2.

Raharjo, S. B. (2011). Efektivitas ekstrak daun Ketapang (Terminalia cattapa l.) untuk meningkatkan imunitas ikan patin (Pangasioniodon hypophthalmus) terhadap infeksi bakteri Aeromonas salmonicida. *Jurnal Sain Veteriner*. 31 (1): 126-421.

Rahmaningsih, S. (2012). Pengaruh ekstrak sidawayah dengan konsentrasi yang berbeda untuk mengatasi infeksi bakteri *aeromonas hydrophila* pada ikan nila *(Oreochromis niloticus)*. *Jurnal Ilmu Perikanan dan Sumberdaya Perairan.* 1 (1).

Sukamdani, N. B., Sukwika, T. and Eddyono, F. (2022). Edukasi manajemen sampah untuk peningkatan kapasitas sdm pada pengurus kelompok disabilitas kota Bogor. *RESWARA: Jurnal Pengabdian Kepada Masyarakat*, *3*(2), 826-833.

Sukamdani, N. B. and Sukwika, T. (2022). Scenario of key factors development in betta fish micro-business: Leverage and ISM approach. *Enrichment: Journal of Management*, 12(4): 2536-2542.

Sukwika, T. (2021). Utilization of Space to realize a green alley in Cibogor village, Bogor City. *In ICCD*, 3 (1), 262-264.

Tantu, W., Reiny, A. T. and Sammy, N. L. (2013). Deteksi keberadaan bakteri aeromonas sp pada ikan nila yang dibudidayakan di karamba jarring apung danau Tondano. *Budidaya Perairan.* 1 (3): 74-80.

Yulvizar, C. I., Dewiyanti, C. and Nanda, D. (2014). Seleksi bakteri berpotensi probiotik dari ikan mas *(Cyprinus Carpio L)* indegenous jantho berdasarkan aktivitas antibakteri secara in vitro. *Jurnal Teknologi dan Industri Pertanian Indonesia*. 6 (2): 20-24.