

Empowering Santri Through Ecoenzyme Waste Management And Traditional Jamu: A Community Service Program At Darul Falah Putri Islamic Boarding School, Barito Kuala

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Abstract.

Environmental sanitation issues and low immunity levels among students remain major challenges in Islamic boarding schools located in rural swamp areas. This community service program, funded by the Ministry of Higher Education, Science, and Technology (Kemdiktisaintek) through the BIMA Grant Scheme, aimed to address these problems at Darul Falah Putri Islamic Boarding School, Barito Kuala. The activities consisted of (1) counseling and training on household waste management through ecoenzyme production, and (2) counseling and training on the utilization of Family Medicinal Plants (TOGA) for traditional jamu preparation as an immune booster. Methods included interactive lectures, group discussions, practical demonstrations, and evaluations through pre-tests and post-tests. The results showed a significant increase in students' knowledge and skills, with average test scores improving from 75 to 90 for ecoenzyme training and from 70 to 85 for jamu preparation. Students successfully produced ecoenzyme fermentation products and ready-to-drink herbal jamu, demonstrating the applicability of local wisdom in promoting health and sustainability. This program not only enhanced students' awareness and competencies but also contributed to fostering a culture of healthy living and environmental responsibility within the pesantren community.

Keywords: Ecoenzyme; Jamu; TOGA; Waste Management; Islamic Boarding School and Community Service.

I. INTRODUCTION

Terantang Village is located in Mandastana District, Barito Kuala Regency, South Kalimantan Province. The village lies on the banks of the Alalak River, approximately 200 kilometers from the river mouth to the sea, with a total area of around 8 km² (800 hectares). Geographically, Terantang Village has a tropical climate, influenced by the rainy season from November to April and the dry season from May to October. The distance between the village and the sub-district capital is about 14 km, accessible by both two-wheeled and four-wheeled vehicles. Most of the area consists of swamp land [1]. Darul Falah Putri Islamic Boarding School is one of the Islamic schools located in Terantang Village, accommodating around 128 female students. To reach the female dormitory building, one must pass through an access road where a garbage disposal site is located at the entrance. Most of this waste comes from household activities within the boarding school, consisting largely of plastic waste and food scraps. This waste problem worsens during both the dry and rainy seasons, as the odor spreads throughout the boarding school and the surrounding community. This situation requires serious attention considering the large number of students, as unmanaged waste is the main factor behind poor sanitation and the spread of various diseases [2]; [3]. As a student residence, an Islamic boarding school should meet proper sanitation standards so that students can carry out their activities comfortably [4]. Students are required to live in dormitories provided by the school. These dormitories are usually equipped with facilities such as bathrooms, kitchens, and trash bins.

If sanitation and hygiene are not properly maintained, they can significantly impact students' health. Common health problems often found in Islamic boarding schools include scabies, itching, allergies, coughs, shortness of breath, and influenza. These health issues are considered to be the result of poor sanitation and hygiene in the boarding school environment [5]; [6]; [7]. This situation is also found at the targeted boarding school in this community service program. The school buildings, made of wood and built above swampy land, combined with the waste problem, increase the risk of disease among students. The large number of students and the inadequate environment often result in illnesses, with only minimal treatment provided due

to the limited healthcare facilities, which are quite far from Darul Falah and not reachable by public transportation. Given the very limited healthcare infrastructure, an alternative form of treatment is needed that can be used daily by students to help maintain their immune system during their studies at Darul Falah. A stronger immune system will make students healthier and less susceptible to disease [8]; [9]. Herbal medicine (jamu) is a mixture of several medicinal plants that can be used to maintain immunity, promote health, and serve as emergency remedies [10].

Various herbs that can be used in jamu are widely available as kitchen spices or cultivated in family medicinal plant gardens (TOGA), and can serve as natural immune boosters [11]; [12]. Examples include turmeric and red ginger, which can be processed into practical and simple herbal drinks with medicinal properties as traditional treatment alternatives. Additional ingredients such as cinnamon, lemongrass, and palm sugar can be used to improve flavor and aroma [13]; [14]. This herbal processing practice is necessary for students so that they can consume jamu daily to strengthen their immunity. At the Darul Falah Putri dormitory, students form groups for daily activities such as cooking and cleaning their rooms as well as the school environment. These activities are carried out in the communal kitchen, which is very limited in terms of facilities and infrastructure. The kitchen, built from wooden planks and covered with aluminum sheets, is not equipped with proper sanitation standards, making it highly prone to food contamination. *Cross-contamination* can easily occur during food preparation because of the unsafe and unhygienic environment [15]; [16]. In addition, a large amount of food waste produced daily is not properly managed, even though it could potentially be processed into ecoenzyme fertilizer. This situation shows the urgency of promoting safer food preparation practices and utilizing food waste more effectively, for example through herbal jamu production and ecoenzyme processing, so that students can maintain both health and environmental sustainability at the same time. The proposed community service program focuses on waste management and health. Waste management is one of the key areas emphasized by the South Kalimantan local government within the framework of community-based total sanitation (STBM).

Environmental sanitation and public health are also included in the medium-term development plan (RPJM) of Terantang Village. The health aspect of this program is reflected in the production of jamu from kitchen herbs (TOGA), which aligns with the Key Performance Indicators (KPI) of Uniska Banjarmasin University. These two areas of focus can serve as indicators of lecturers' performance through community engagement activities. Research and teaching outcomes can be directly applied in society, while the linkage with university performance indicators (KPI) also lies in providing opportunities for students to interact with and analyze community problems, as well as to gain hands-on learning experiences outside the classroom.

II. METHODS

The implementation of the Community Service Program at Darul Falah Putri Islamic Boarding School employed two primary methods: counseling and practical training. The counseling sessions were designed to enhance participants' theoretical understanding of ecoenzyme and herbal jamu. These sessions were delivered through structured lectures combined with interactive two-way discussions between facilitators and students. To optimize the learning process, participants were divided into small groups and guided by qualified speakers in each respective topic. The materials emphasized household waste management for ecoenzyme production and the utilization of kitchen spices and family medicinal plants (TOGA) for jamu preparation. Pre-tests and post-tests were administered to assess knowledge acquisition, and incentives were awarded to the most active participants as well as those achieving the highest scores. The practical training component aimed to translate theoretical knowledge into technical competence. Demonstrations, interactive discussions, and direct practice were conducted in small groups. Students were systematically trained to convert household waste into ecoenzyme and to process herbal jamu from readily available natural ingredients.

Following the demonstrations, each group independently executed the production steps under supervision. Their performance was evaluated based on both the production process and the quality of the final products. Rewards were provided to the groups that demonstrated outstanding participation and results in order to strengthen motivation and engagement. Program evaluation was conducted on a monthly basis

following the initial implementation to monitor progress and identify areas for improvement. Long-term sustainability was supported through annual follow-up evaluations at Darul Falah Putri Islamic Boarding School. The evaluation specifically measured participants' ability to produce ecoenzyme from household waste and to prepare herbal jamu using kitchen spices and TOGA. Moreover, sustainability was further assessed by observing the extent to which students disseminated their acquired knowledge and skills to junior peers. This continuous cycle of knowledge transfer is considered crucial in ensuring that similar community health and environmental challenges can be addressed effectively and sustainably by future generations of students.

III. RESULT AND DISCUSSION

The first priority problem faced by the partner community was the accumulation of household waste at Darul Falah Putri Islamic Boarding School, most of which consisted of organic waste from students' leftover food. The dormitory buildings, which are located on swampy land, accelerated the decomposition process, resulting in foul odors, environmental pollution, and an increased risk of disease transmission. This problem not only disrupted students' comfort but also threatened their health and reduced their learning productivity. The solution implemented was a combination of counseling sessions on waste management and practical training in producing ecoenzyme from organic household waste. This approach was chosen because: (1) waste management education increases students' awareness of the health impacts of unmanaged waste; (2) ecoenzyme production provides practical skills to transform organic waste into useful products such as natural liquid fertilizer, supporting local greening and food security; and (3) the process is relatively simple, inexpensive, and sustainable, making it suitable for the boarding school context. The activity began with socialization and counseling on types of waste, the health impacts of waste accumulation, and the benefits of ecoenzyme. The sessions were delivered through interactive lectures, two-way discussions, and direct demonstrations of ecoenzyme preparation. As can be seen in Figure 1, the counseling session was conducted interactively with all students and facilitators present.



Fig 1. Counseling and education session on waste management and ecoenzyme at Darul Falah Putri Islamic Boarding School.

Female students were divided into small groups to make the learning process more effective and participatory. As can be seen in Figure 2, the training process encouraged students' active involvement and collaboration in handling waste.



Fig 2. Students practicing ecoenzyme preparation by sorting and processing organic household waste.

To evaluate knowledge improvement, a pretest and post-test were conducted. The results showed that the average pretest score was 75, indicating that students already had a fairly good basic knowledge, but only at a general level. After the training, the average post-test score increased to 90, showing a significant improvement in students' understanding of waste management and ecoenzyme production. This finding is

consistent with previous studies that highlighted the effectiveness of interactive and practice-based approaches in improving environmental sanitation awareness in school communities [17]; [18]. In addition to cognitive evaluation, students' practical skills were also assessed through their ability to follow the ecoenzyme preparation steps. Almost all groups successfully completed the procedures, starting from separating organic waste, mixing it with palm sugar and water, to initiating the fermentation process. The initial ecoenzyme products already showed good fermentation signs and will continue to be monitored until ready for use. Figure 3 shows the fermentation containers of ecoenzyme that will be monitored for several weeks.



Fig 3. Fermentation containers of ecoenzyme produced during the training session.

The tangible impacts observed after this activity included: (1) the availability of waste management facilities such as waste separation bins and designated ecoenzyme fermentation containers within the school; (2) increased student awareness and discipline in separating organic and non-organic waste; and (3) the production of ecoenzyme as a direct result of waste management, which could later be used for fertilizing plants around the boarding school. With a significant improvement in test scores, this activity was effective in enhancing knowledge, attitudes, and skills regarding ecoenzyme-based waste management, while simultaneously strengthening the culture of healthy living at Darul Falah Putri Islamic Boarding School. The second priority problem identified was the decreased immune system of students, caused by inadequate environmental conditions, intensive learning activities, and limited access to formal healthcare services.

These conditions made students more vulnerable to minor illnesses such as influenza, coughs, and fatigue, which frequently interfered with their comfort and concentration in learning. As a solution, the PKM team carried out counseling and practical training on the preparation of traditional herbal medicine (jamu) made from *Family Medicinal Plants* (TOGA) that are easily available in the local environment, such as turmeric, ginger, pandan leaves, and *Piper betle*. These plants have been empirically proven to possess immunomodulatory properties and can be used as safe, affordable, and sustainable immune boosters [19]; [20]; [21]. The activity began with an interactive lecture on types of traditional herbal, their medicinal benefits, and the basic principles of jamu preparation. This was followed by a two-way discussion session where students could ask questions about the use of medicinal plants. The program then continued with practical demonstrations, where students, organized in small groups, directly processed the herbs into ready-to-drink jamu. As illustrated in Figure 4, the practice session enhanced students' hands-on skills in preparing traditional herbal drinks.



Fig 4. Practical session of jamu preparation by students.

Pre-test and post-test evaluations were also conducted to assess knowledge improvement. The average pretest score was 70, showing that students' prior knowledge was limited to general information about jamu. After the training, the average post-test score increased to 85, indicating a significant improvement in their understanding of TOGA types, their health benefits, and the basic skills needed to

prepare them into jamu. This is consistent with earlier findings that traditional herbal education effectively increases health literacy and encourages preventive health practices in boarding schools [22]; [23].



Fig 5. Final jamu products (ready-to-drink herbal beverages) produced by students.

Students' practical skills were also observed through their ability to prepare jamu according to the correct procedures, including washing, grinding, boiling, and serving. Most groups successfully produced herbal drinks with acceptable taste and aroma that could be directly consumed. The direct impacts of this activity included: (1) students gained practical skills in processing TOGA into ready-to-drink jamu, enabling them to prepare herbal remedies independently when needed; (2) students became more aware of the importance of maintaining health through natural and preventive approaches; and (3) the production of simple jamu served as tangible evidence of their acquired skills, which could later be developed into a routine program at the boarding school. With the increase in average test scores from 70 to 85, this activity proved effective in enhancing students' knowledge and skills in the utilization of TOGA, while also supporting locally based, sustainable health practices.

IV. CONCLUSION

The community service program at Darul Falah Putri Islamic Boarding School effectively addressed environmental sanitation and health issues by introducing coenzyme production for household waste management and traditional jamu processing from TOGA as natural immune boosters. Both activities significantly improved students' knowledge and practical skills, as reflected in increased test scores and the successful production of coenzyme and ready-to-drink jamu. These outcomes demonstrate that integrating local wisdom into health and environmental education can enhance students' awareness, promote sustainable practices, and foster a healthier boarding school environment.

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