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PRACTICAL INNOVATION ON ELEOCHARIS DULCIS WASTE-BASED COMPOST FERTILIZER BY PT PUPUK ISKANDAR MUDA IN GAMPONG BLANG ME

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Abstract

Training on the use of dried and dead Purun plants as compost fertilizer raw material was carried out by PT Pupuk Iskandar Muda. The participants of the conducted training were from small enterprises in Gampong Blang Me, UMKM Beujroh. The practice was aimed to improve the community's knowledge, awareness and action changes towards dead and dried Purun plants. The training was implemented by showing and involving the participants in composting dried Purun plants. After the activity, it was found out that development in knowledge, awareness and action of participants. Training participants' knowledge of composting dried Purun plant with one hundred percent rise. Moreover, their awareness of negative potential from dried Purun plant also increase by ninety percent. Lastly, the community commitment to implement the procedure was also raised from zero to ninety percent of the participants involved. Besides, the training affected the community positively by utilizing dead dried Purun plant into compost with other affirmative aspects such as women empowerment and potential income generation.

Keywords: Compost, Eleocharis dulcis, Training, Waste

INTRODUCTION

Indonesia has a total land area of 1,922,570 km2 of which approximately 30% is used for community activities(Valgunadi 2024). Among the areas located on land, there are marshes. These marshes contain many types of biotas, both flora and fauna, such as fish, algae, shrimp and Eleocharis dulcis or Purun plants(Puspita, Nugroho, and Faisal 2022). The utilization of Purun plants by communities has been carried out. The utilization of Purun plants by the community has been done through adding economic value to the handicraft sector. Based on local wisdom, this practice is carried out from generation to generation and is a household-scaled industry(Rusmaniah et al. 2022). The products that have been produced traditionally through purun-based handicraft activities include plaited items, mats, bags, hats, accessories and more(Adiwijaya and Yovita 2023). The activities of handicrafts are also applied at Gampong Blang Me in Bireun of Aceh Province.

PT Pupuk Iskandar Muda is located in Aceh Utara of Aceh province. It is one of industries that focuses on trading, services of fertilizer, petrochemicals and other chemicals. As its social responsibility to the community, PT Pupuk Iskandar Muda has been appointing and supporting small enterprises such as UMKM Beujroh in Gampong Blang Me. UMKM Beujroh focuses on the use of Purun plants for handicrafts. Blang Me Village in Bireun Regency, which is situated in an area of natural wetland known as the Paya Nie, comprises a vast expanse of swampy terrain spanning several hundred hectares. The Paya Nie area, which is characterized by its peatland habitat, provides an optimal environment for the growth and reproduction of Purun plants.

A substantial portion of the total area, exceeding 250 hectares, is utilized by the community as raw material for handicrafts, including bags, mats, prayer mats, and other products. In particular, the Purun plant is a primary resource utilized by the community, accounting for approximately 80% of the total area(Zufina et al. 2023). Despite its use and benefits, the unused Purun plant has disadvantages to the environment and community in Gampong Blang Me. Purun plants that die and dry and are not utilized can have adverse environmental consequences in the form of fires. The potential for such fires to occur increases with human negligence and the accumulation of environmental heat, especially during the dry season(Lake and Christianson 2020). Figure 1 shows burnt Purun plants caused by firing.

Figure 1. After firing condition of dried Purun plant

Dead Purun plants can be repurposed into a more useful product than simply allowing them to decay, which ultimately results in further environmental degradation. One of the potential applications of the Purun plant is as a raw material for the production of compost fertilizer. The use of compost fertilizer derived from Purun plants has been demonstrated to increase the levels of organic acid, pH, magnesium, and calcium in soil(Asikin and Thamrin 2012). The use of waste from dead Purun plants can prevent land fires, and the use of compost can improve the quality of the soil in the surrounding area and provide a potential source of additional income for the community.

The problem in Gampong Blang Me is that the community has little awareness of peatland conservation. Dried Purun is simply left unattended. The activity of carelessly throwing or intentionally burning cigarette butts burns dried Purun, releasing carbon. In addition, there are problems related to unbalanced fertilization activities carried out by people who work as farmers. This community service involved training on how to use dead Purun waste as the main ingredient of compost fertilizer. The training that was conducted by PT Pupuk Iskandar Muda was to educate and share knowledge of know-how the use of dried and dead Purun plants as compost fertilizer raw material to Gampong Blang Me community.. Besides, people's awareness about the risk of unused dried and dead Purun plants was aimed to be achieved. Later, the community's willingness to apply into action the practice of compost from Purun plants was also intended to be accomplished.

LITERATURE REVIEW

Purun Plant

Purun plant (Eleocharis dulcis) is a kind of a shrub that grows in swamps. It can thrive in watery land with a pH range of 6.9–7.3 and on merely acidic soil(Suprapto and Yudha 2019). Purun plants grow in locations with an altitude of 0–1,350 meters above sea level and temperatures of 30–35°C(Taslim et al. 2018; Suprapto and Yudha 2019). According to these conditions, Purun plants thrive in Indonesia, including in Aceh Province, where they can be found in lowland areas. Purun plants are characterized by upright, unbranched stems measuring between 50 and 200 cm in length. They contain over 90% water, and in a dry state they contain significant quantities of

cellulose and lignin, at 32% and 26% respectively(Sunardi 2021). Moreover, other nutrients found in Purun plants are nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, aluminum and iron(Asikin and Thamrin 2012). Moreover, it was found that Purun plant has capability of absorbing metals to the maximum extent of 1% of its dried mass(Napisah and Annisa 2019).

Compost Fertilizer

Compost is one of the organic fertilizers made up from plants. The use of compost is simply by applying it on the soil and it is useful in tackling the effect of erosion, which leads to fertility loss of soil(Ayilara et al. 2020). Compost fertilizer is used to assist in upgrading soil fertility and the growing plant yield(Brempong and Addo-Danso 2022). Moreover, it enhances soil structure, soil's ability to stabilize aggregates and holding water capacity(Gonawala and Jardosh 2018). The main components that must be present in compost are Nitrogen, Phosphorus and Potassium. Nitrogen is critical in plant growth, Phosphorus is important for generating new tissue and transforming complex energy of the plant(Zenda et al. 2021). Besides, Potassium enhances the plant's growth. chlorophyll and carotene content(Barzegar, Mohammadi, and Ghahremani 2020).

There are some methods in producing compost fertilizer. Out of eight methods, Vessel Composting is one of the methods that uses container, in which the composting process takes place(Gonawala and Jardosh 2018). This methods is suitable for maximizing other parties or people participation in producing compost fertilizer. During the composting process, a decomposer is added to the raw material of fertilizer. This is aimed to add microorganisms that convert materials into useful chemicals as fertilizer(Jalaluddin, Nasrul, and Syafrina 2017). In addition to that, composting process requires time to accommodate the microorganisms synthesizing useful chemicals. In general, the longer duration of composting, the more useful chemicals synthesized in the compost fertilizer(Jalaluddin, Nasrul, and Syafrina 2017).

S-O-R Theory

One theory that paves the explanation of individual behavior change is the S-O-R or Stimulus-Organism-Response theory. "Stimulus" refers to external or internal surroundings that motivate personnel or individuals to react; "Organisms" are the parties that are involved and being subjected to the applied stimulus; on the other hand, "Response" is the replying action or change from the organism or party who is being stimulated(Huang et al. 2022).

METHOD

The training of Gampong Blang Me community by PT. Pupuk Iskandar Muda was conducted to group of UMKM Beujroh, which has twenty-seven members from women and men. Before conducting the training, the raw materials and other materials and tools were prepared, such as dried Purun, container, straw-based bio decomposer and others. On the top of that, a questionnaire was given to the participants as the instrument of evaluation of the program. In general, the training was divided into three main parts, which are preparation, execution and evaluation. The main process of this training is shown in Figure 2.

Figure 2. General Process in Training Program

In the preparation part, the already dead Purun was collected. Besides, other materials and tools were prepared such as bio decomposer, water, container and chopping machine. In the execution process, an education to the community regarding risk potential of dead and dried Purun was conducted. After that the community was trained by PT Pupuk Iskandar Muda TJSL team, which focuses on sustainable development of social, economic, environmental, law and governance, to make compost fertilizer from dead and dried Purun. The produced compost was ready to be used on the seventh day after the composting process started. Details of steps and mechanisms in the composting process are shown in Figure 3. Towards the end of training, a questionnaire was given to the participants. The questionnaire was given to gain information from the community and analyzed for evaluation of training that had been conducted.

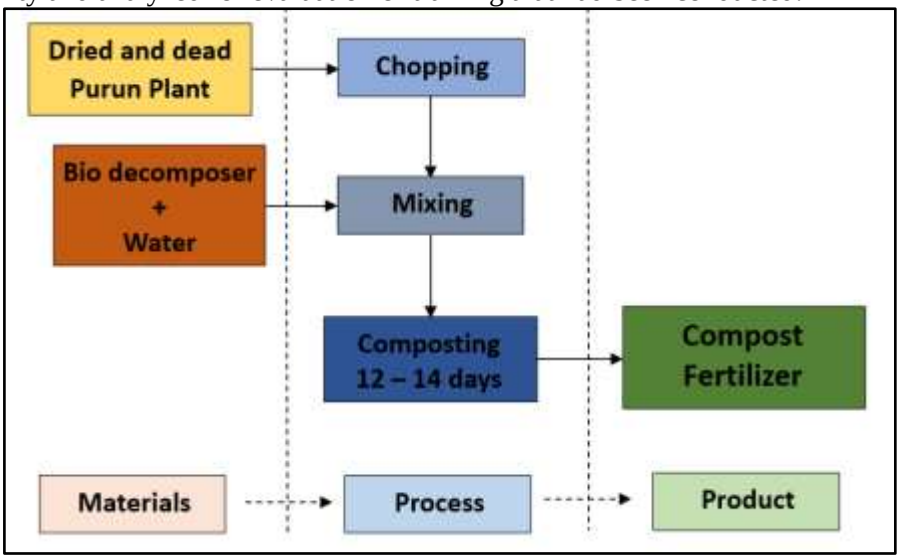

Figure 3. Detailed Mechanism of Composting Process

RESULTS AND DISCUSSION

Results

On Monday 18 March 2024, the training on compost production from dried Purun plants was conducted for the group of UMKM Beujroh. In total there were twenty participants, sixteen women and four men. The participants joined the whole training, including practicing how to process dried Purun plants into compost fertilizer. Figure 4 shows the conducted training activities.

Figure 4. Training Activities on Composting Dried Purun Plant

In order to observe the effectiveness of training conducted by PT Pupuk Iskandar Muda to the group of UMKM Beujroh around Paya Nie in Gampong Blang Me, a questionnaire was distributed to the participants. It was observed that there was some alteration in the behavior of the community who participated in the whole training program. The change of behavior of participants was observed to cover several aspects namely knowledge, awareness and action. It was observed that the participants' awareness about the negative effects of dead and dried Purun plants was changed. Besides, the knowledge of people who participated in the training changed regarding the risk of dried and dead Purun plants being left unattended.

Moreover, participants' knowledge also improved by knowing the process of composting with Purun plants as its raw material. On the top of that, the community's willingness to do some actions about the issue of dead and dried Purun plants also progressed. Figure 5 shows how the number of participants who were aware before and after training about the negative effects of dried Purun plants left unprocessed. The percentage significantly increased from only ten percent of all participants became one hundred percent aware about adverse effects of unattended dried Purun plants after the training.

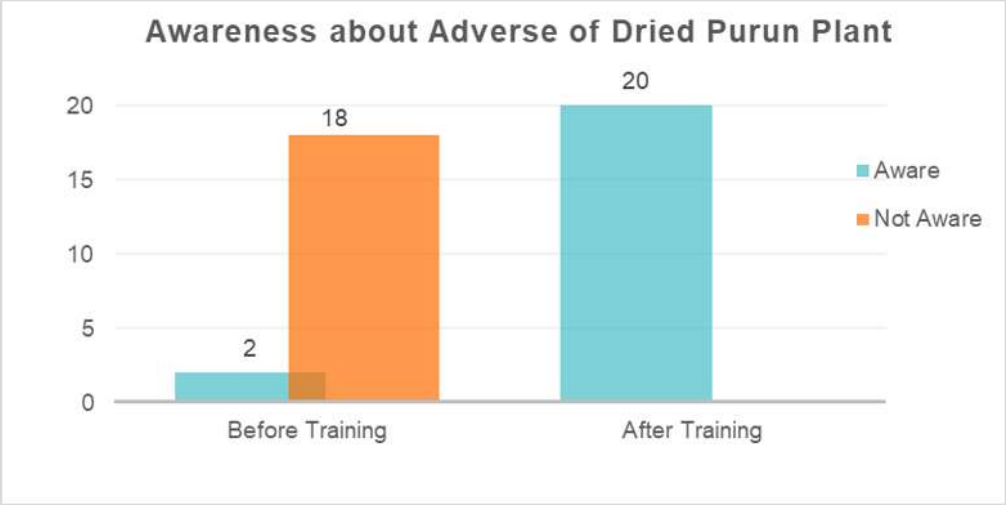

Figure 5. Change in Peoples' Awareness of Unfavorable Effect of Dried Purun Plants

The knowledge of participants on processing dried and dead Purun plants into compost was found to be also improved from nobody who had known the procedure, to be one hundred percent knowing and understanding the techniques and know-how knowledge. More importantly, the willingness of all participants in putting the knowledge and awareness into action was substantially discovered to be elevated as well. After the training, eighteen participants with a ninety percent increase committed to applying the knowledge and skills they achieved and implementing the composting dried Purun plant into compost fertilizer. This rise was acknowledged by the findings that is shown in Figure 6.

Figure 6. Rise in the Number of People Who Decided to Execute Knowledge from Training

Discussion

Reflecting on the results of the evaluation conducted on the training program, an analysis and discussion is to be made. This training focused on the change of participants from Gampong Blang Me towards dried Purun plants in their awareness, knowledge and action. The evaluation of changes in the participants was made according to S-O-R Theory.

The stimulus on the participants was the conditions of their surroundings. Namely, the dried Purun plants are not functioning properly, potentially having several negative effects on them. The adverse effects were informed before the training was conducted of which was firing. The causes of the firing were identified as hot and dried weather and some peoples' careless habits such as throwing cigarettes. Organisms involved in the training were the members of UMKM Beujroh from Gampong Blang Me with total of twenty participants who joined the training. Eighty percent of the participants were women, and the rest were men. Hence, this training was also an activity that focused on empowering women as the dominant participants were women(Ahmed and Yusuf 2020).

The last party in the theory is Response of the organism. The focussing discussion is on the change of participants' knowledge, awareness and action. The participants' knowledge was discovered to be altered from zero to be one hundred percent knowing the procedure and process of compost fertilizer from unused dried Purun plants. This change of knowledge is considered to reflect a positive habit by knowing a new skills and knowledge for participants' better and more positive life(Burns 2020). Moreover, the new skills and knowledge can potentially be impactful in positive way in their economic aspect as potential additional income generation.

Another focus is on the awareness of participants. From Figure 5, it can be stated that an escalation of people towards the unfavorable effects of dried Purun plants. This leads to positive habits in a way of preventing bad or negative behavior and better future conditions(Shiota et al. 2021). Lastly, the commitment of participants of applying and practicing the training on composting dead dried Purun plants was examined. It was observed that the same trend was applied to the action commitment from participants. ninety percent increase of willingness and commitment from participants to apply actions from what they had learnt from training. Thus, this training positively impacted the participants as the change of their willingness and action to implement the knowledge and skills from training(Little, Tarbox, and Alzaabi 2020).

CLOSING

Conclusion

The training on dried Purun plants into compost conducted by PT Pupuk Iskandar Muda to UMKM Beujroh in Gampong Blang Me had positive impact on the participants. The development of the community was determined from their knowledge, awareness and action commitment that shifted to a better and more positive state. On the top of that, other positive aspects were also recognized, such as women's empowerment and the identification of potential additional income for the community.

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