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Empowering Kalianyar Village by utilizing Clay to Produce Hydroton as an Alternative Planting Medium

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Abstract

Kalianyar Village, Tamanan Subdistrict, Bondowoso Regency has long had potential clay soil that has been used by the community to produce roof tiles. However, the high number of similar businesses has led to increasingly fierce market competition, requiring new innovations in the use of clay. The community service program implemented by the PPK Ormawa Team aims to empower the community through innovation in the production of hydroton as an environmentally friendly and economically valuable planting medium. The activities were carried out in four stages, namely socialization, training and production of hydroton, application of hydroton, and evaluation through guidance and supervision. The results of the activities show that the community is able to produce high-quality hydroton that is very effective in supporting plant growth, while also opening up new business opportunities based on local potential. This program not only improves the technical skills of the community, but also introduces modern agricultural innovations to the younger generation through the Children's Smart Corner. This activity can also contribute to encouraging independence, innovation, and economic sustainability in the Kalianyar Village community

***Key words**: community empowerment, growing medium, hydroton*

INTRODUCTION

Kalianyar Village is located in Tamanan Subdistrict, Bondowoso Regency. This village also has clay potential. This is because the village is located on very fertile land. From the past until now, the people of Kalianyar Village have utilized this potential to produce roof tiles. The production of roof tiles continues to grow every year, to the extent that almost 70% of the local community has a roof tile business in their homes. This same business has made the market more competitive. This situation is necessary to create new innovations from clay that can generate new economic value. However, the community still lacks new innovations to create products other than roof tiles

Figure 1. Roof Tile MSME in Kalianyar Village

Expanded clay, often known as hydroton, is a type of growing medium that is often used in hydroponics (Linda *et al.*, 2021). Hydroton first entered the Indonesian market in 1990 (Alwi *et al*., 2022). Hydroton has a small, round shape. This is so that the corners of the hydroton can support the bottom of the plant. Hydroton is made by burning, which is a characteristic of the manufacturing process. Hydroton can be used repeatedly. Maintenance only requires rinsing the edges of the object to remove dirt around it (Baihaqi *et al.*, 2022: 35).

Hydroton has many beneficial advantages in various aspects. Hidroton can maximally absorb and store minerals for the plants around it, making it easier for plant owners to avoid watering their plants. Its porous structure supports air circulation, which is useful for oxygen. This is beneficial for the inner roots of plants. Hidroton can be mixed with other planting media to support or even improve quality. Hidroton is often mixed with planting media such as charcoal, husks, and the like. Mixing these growing media can improve the quality and effectiveness of the growing media. Hydroton is lightweight, simple, and clean, which are its advantages over other types of growing media (Habibie, 2021).

METHODE

Community empowerment activities carried out in Kalianyar Village in the production of hydroton based on clay potential were implemented through several stages, including: socialization, training and production, application, guidance, and supervision (Agustina *et al*., 2025). The first stage was

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socialization, where the community was introduced to the concept and objectives of hydroton, as well as the creative economic opportunities that could be developed. The second stage was training and production of hydroton, where participants received technical guidance starting from the process of selecting clay potential in Kalianyar Village, production, molding, drying, and firing to produce good quality hydroton.

The third stage was the application of hydroton, which was carried out directly to the target community through planting using hydroton media so that the community could see the effectiveness of hydroton in supporting plant growth. The final stage involves mentoring and supervision through continuous accompaniment, monitoring product quality, and ensuring sustainability in creative efforts to develop hydroton products. At each stage of the community service implementation, the focus is not only on knowledge transfer but also on fostering community independence and sustainable village economic

RESULT AND DISCUSSION

The community service program was carried out in the children's corner, targeting the community with children in Kalianyar Village, Tamanan District, Bondowoso Regency. This activity aimed to educate the community about the importance of utilizing local resources in the village, especially the abundance of clay in Kalianyar Village. Through this activity, the community was introduced to the importance of preserving resources in utilizing local potential. This activity consists of four stages, including:

A. Socialization: Education About Discussion

In the initial stage, an awareness campaign was conducted on the importance of utilizing the abundant clay resources in Kalianyar Village to produce value-added products such as hydroton. This campaign aimed to provide insight to the community, and the materials presented included:

1. Introduction to the community service program to be implemented in Kalianyar Village, emphasizing the importance of utilizing the clay potential in roof tile production found in Kalianyar Village.
2. Explanation of the function of hydroton in supporting plant growth, namely its ability to maintain moisture, provide aeration for roots, and be reused multiple times.
3. Presentation of the advantages of hydroton compared to other growing media, such as its light weight, environmental friendliness, affordability, and high market value.
4. Education about the creative economic potential that can be developed from hydroton production, so that the community not only gains technical benefits for agriculture, but also new business opportunities based on local resources.
5. The community was shown firsthand how clay is processed into hydroton granules and fired at high temperatures to produce a hard, porous product that is ready for use.

Figure 2. Socialization of the Hydroton Innovation Program

B. Hydroton Training and Production

Hydrotone is a type of growing medium made from clay that has been heated to a temperature of over 1000 degrees Celsius (Nugroho, 2024: 13). Through this process, hydrotone becomes lightweight and porous, and is able to retain and drain water, which greatly supports root system development. This medium is also pH-neutral, does not easily decompose, and is sterile from pests and pathogenic microorganisms. Additionally, hydroton can be reused after cleaning, making it more practical and environmentally friendly.

Hydroton production training in Kalianyar Village was conducted as a form of knowledge and skills transfer to the community. This activity was facilitated by the PPK ORMAWA team with the aim of teaching techniques for processing clay into a planting medium that has economic value. The training began with a presentation on the characteristics of clay that is suitable for use as a raw material for hydroton, such as its smooth texture, plasticity, and resistance to cracking when fired at high temperatures. The manufacturing process began after the theoretical explanation, accompanied by the team to carry out the practice directly. It started with the selection and cleaning of clay, followed by mixing it with water and kneading it until it reached a certain consistency. The prepared clay was then shaped into small grains of uniform size to produce consistent products. Next, the grains were dried to reduce the water content before being put into the kiln.

Figure 3. Hydroton Manufacturing Process

The firing process was carried out using a traditional kiln at high temperatures until the clay particles turned into hard, light, and porous hydroton. During the activity, the PPK ORMAWA team provided guidance on the characteristics of a successful product, including color, texture, and water absorption. This emphasis was given so that participants understood that firing is a crucial stage that greatly determines the quality of hydroton. The results of the activity show that most of the community is able to produce good quality hydroton. The products produced are intact, not easily broken, and meet the requirements as a hydroponic growing medium. The high level of community involvement is evident from

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their active participation in the entire series of activities, from processing the materials, shaping, to firing

C. Application of Hydroton

Trials using hydroton as a growing medium were conducted to assess the quality of products produced by the Kalianyar Village community. The trials were conducted using a simple hydroponic system with leafy vegetables, including lettuce. The results showed that plants grown in hydroton grew more stably, with better root development compared to conventional soil media. In addition, water requirements were relatively lower because the pore structure of hydroton was able to store water while providing sufficient aeration for the roots.

The use of hydroton is not only beneficial in terms of technical aspects of plant cultivation, but also has the potential to be an environmentally friendly alternative growing medium. The community, which was previously unfamiliar with hydroton, gained a new understanding that this product is not only effective, but also has economic value. This direct application provides clear evidence that locally produced hydroton can be used as a substitute for commercial growing media.

From a social perspective, community involvement in the application stage provides new experiences and increases motivation to independently develop hydroton production. Assistance from the PPK ORMAWA team also strengthens the community's understanding of the benefits of hydroton, both for modern agriculture and for creative business opportunities. Thus, this application activity is not only a technical trial, but also a means of empowerment that encourages community independence.

D. Evaluation: Guidance and Supervision

The evaluation stage of the activity was carried out through continuous guidance and supervision by the PPK ORMAWA team for the Kalianyar Village community. This guidance not only focused on the technical aspects of hydroton production, but also aimed to strengthen the capacity of the community through the Pojok Cerdas Anak (Smart Kids Corner) forum. Through this program, children and young people in the village are introduced early on to modern agricultural innovations, particularly the use of hydroton as an environmentally friendly planting medium. The PPK ORMAWA team supervises the hydroton production process carried out by the community, from the selection of clay to the firing stage, to ensure that product quality is maintained. In addition, assistance is also provided in simple management, such as recording production results, calculating costs, and marketing strategies for hydroton as a creative economic product. Thus, the community is not only technically skilled, but also has the ability to independently manage small businesses. The coaching activities through the Children's Smart Corner are also designed as a means of intergenerational knowledge transfer. Children are invited to learn about the simple process of making hydroton, so that they are motivated to continue innovation based on local potential in the future. The evaluation results show an increase in community participation and the emergence of small groups committed to developing sustainable hydroton production

Figure 4. Evaluation

CONCLUSION

The community service program carried out by the PPK Ormawa Team in Kalianyar Village, Tamanan District, Bondowoso Regency, has succeeded in making a real contribution to the utilization of local potential in the form of clay through the innovation of hydroton production. The activity was carried out in four stages to manage village resources creatively and sustainably. Socialization provided an understanding of the importance of managing local potential and hydroton innovation as an environmentally friendly planting medium with economic value. Training equipped the community with technical skills, while trials tested the effectiveness of hydroton in supporting plant growth, and evaluations ensured the sustainability of production in introducing innovation to the younger generation. This initiative not only enhances community capacity in modern agriculture but also opens opportunities for creative economic ventures based on local potential. The program serves as a strategic step in empowering rural communities to become more self-reliant, innovative, and competitive in sustainably managing natural resources.

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