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Training on the production of humic acid from water hyacinth for farmers in Tambakrejo Village, Sumbergempol District, Tulungagung

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ABSTRACT

Farmers in Tambakrejo Village, Sumbergempol District, and Tulungagung Regency are currently facing challenges due to the scarcity of subsidized fertilizer. The government provides fertilizer quotas based on the recommended dosage for each region, but the reduced availability has impacted crop production because of low soil fertility. One way to enhance soil fertility and provide nutrients for plants is by using humic acid. This community service project aims to train farmers to produce humic acid from water hyacinth, a plant often considered an aquatic weed. Utilizing water hyacinth for this purpose helps control the spread of these weeds while improving soil health. The methods involved include raising awareness, conducting practical sessions on making humic acid from water hyacinth, monitoring the maturation process of the humic acid, and applying it in rice fields. The community service activities were well-executed and successful. Humic acid was successfully produced from water hyacinth and can now be applied directly to farmers' fields.

Keywords: Humid acid, soil fertility improvement, Tambakrejo village

Introduction

The application of high doses of inorganic fertilizers in agricultural cultivation practices continuously or for years can cause land degradation. This is what farmers in Tambakrejo Village, Sumbergempol District, Tulungagung Regency do, who apply inorganic fertilizers to rice and corn plants for years with only a little addition of organic fertilizer. The results of soil analysis show that the nitrogen content is relatively low. To improve the land in Tambakrejo Village, land conservation is needed by providing soil conditioners. Soil conditioners are synthetic or natural organic materials that can improve the physical, chemical, or biological properties of the soil. What distinguishes soil conditioners from organic fertilizers is that the nutrient content of soil conditioners is higher than that of organic fertilizers. There are 3 (three) types of soil conditioners currently known, namely soil conditioners, soil ameliorants, and soil decomposers. Soil conditioners are used to improve the physical properties of the soil; soil ameliorants function to improve the chemical properties and chemical reactions of the soil, while soil decomposers are used to improve the biological properties of the soil (Ministry of Agriculture, 2021). One type of soil conditioner is humic acid, which is one of the components that form humus derived from the weathering of organic materials such as leaves and tree trunks. Humic acid is a type of ameliorant soil conditioner because humic acid functions to improve the physical, chemical, and biological properties of the soil and increase the availability of nutrients for plants (Mindari et al., 2022). Humic acid is blackish brown containing 40-80% C, 2-4% N, 1-2% S, and 0-0.3% P, and can reduce the solubility of Fe in the soil so that it can increase the availability of P in the soil (Lestari & Syukri,

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2020). Humic acid can be applied as much as 20 kg/Ha to supplement fertilizer for cultivated plants (Hermanto et al., 2013).

Water hyacinth is an aquatic plant that occupies many rivers, lakes, and reservoirs, disrupting the aquatic ecosystem. The research results of Rupiasih et al. (2013) showed that water hyacinth can take up humic acid in waters, therefore water hyacinth can be used as a source of humic acid while preventing water hyacinth from becoming an aerial weed in rivers.

The purpose of this community service is to introduce the benefits of humic acid for plants to farmers in Tambakrejo Village, Sumbergempol District, Tulungagung, and to teach them how to produce humic acid from water hyacinth.

Material and Methods

This study is structured using normative legal study methods, is a study performed by examining the sources of library materials (secondary data) which are used as the basis for the study, in the form of legislation and associated study reports and the issues raised. The primary source of the constitution used is the 1945 Constitution of the Republic of Indonesia, Constitution no. 1 of 1946 regarding the Criminal.

Method of implementation

This community service was carried out in Tambakrejo Village, Sumbergempol District, Tulungagung Regency in June-August 2024 with Farmer Group participants who planted rice and corn.

Materials and tools

The main materials used are water hyacinth, molasses or sugar, EM-4, water, bucket or closed container.

Activity implementation method

Identification of farmers problems at the location

The community service team conducted a survey in Tambakrejo village, Tulungagung Regency to find out the problems faced by farmers, especially soil fertility and plant fertilization. The team also took soil samples and analyzed the nutrient content.

Socialization of program and counseling on soil fertility and humic acid

The community service team from UPN "Veteran" East Java conducted socialization in the form of counseling on humic acid and its benefits for soil fertility to farmers in Tambakrejo village, Sumbergempol District, Tulungagung Regency, as well as a question and answer discussion on soil fertility and plant fertilization.

Humic acid making practice

Farmers were taught to make humic acid from water hyacinth with a composition of 5 water hyacinth plants, 10 liters of water, 200 ml of EM4, and 100 grams of sugar or molasses. Water hyacinth is chopped and put into a lidded bucket. Sugar and water are mixed, put into the bucket and covered for the fermentation process for approximately 4 weeks. Every day the bucket lid is opened and the ingredients are stirred. After 1 month, humic acid begins to form with a black liquid with sediment indicating that the humic acid is ready and ready to be applied to plants.

Application of humic acid to cultivated plants

Humic acid is applied when giving basic fertilizer and follow-up fertilizer with a dose of 10 ml of humic acid liquid diluted with 1 L of water and then poured onto the soil.

Results and Discussion

Program socialization and counseling on soil fertility and humic acid

Socialization of community service activities and counseling were carried out by providing an explanation of the condition of soil fertility in Tambakrejo village according to the results of the community service team's soil analysis (Figure 1).

Figure 1. Socialization of community service to farmers in Tambakrejo Village, Sumbergempol District, Tulungagung Regency

Before carrying out the activities, a soil analysis was carried out and the results showed that the condition of the rice fields in Tambakrejo village had medium N, high P and low K content. Efforts to increase soil fertility through improving physical, chemical and biological properties are by providing soil amendments.

The practice of producing humic acid from water hyacinth

Water hyacinth grows easily and is found in abundance in rivers and lakes, filling rivers and causing shallowing of rivers and lakes.

Figure 2. Making humic acid from water hyacinth

Making humic acid from water hyacinth is relatively easy and cheap to be practiced by the community. Within 1-2 months, humic acid from water hyacinth is ready to use.

Demoplot of application of humic acid from water hyacinth

The finished humic acid from the water hyacinth is ready to be applied to the land. One day before planting corn, the land is watered with a solution of water hyacinth humic acid. The dosage of water hyacinth humic acid is 10 ml of humic acid diluted in 1 liter of water. After stirring, the humic acid is watered onto the rice fields (Figure 3). The application of humic acid was repeated during the second and third fertilization.

Figure 3. Application of water hyacinth in rice fields is given one day before the first fertilization

Humic acid functions to increase the pH of acidic soil, as a soil buffer because it keeps ions present, increases the soil's capacity to hold water so that evaporation can be reduced and prevents erosion (Rahmandhias and Rachmawati, 2020).

Monitoring and evaluation of community service activities

After one month of applying water hyacinth humic acid, monitoring and evaluation of community service activities were carried out. The application of inorganic fertilizer is accompanied by the application of humic acid. Plants grow better and healthier. Farmers are interested in using humic acid to fertilize the soil and plants can grow and develop well (Figure 4).

Figure 4. Monitoring of paddy fields that have been applied with water hyacinth humic acid

Conclusion

Humic Acid from water hyancinth was succeed had made by farmers in Tambakrejo village and it was applied as a soil amandment in paddy field.

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