# Community empowerment with the making of liquid organic fertilizer from banana slim stem

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ABSTRACT

Banana is a plant that is not foreign to the community. Banana (Musa Pradisianca) comes from Asia and spreads in Spain, Italy, Indonesia and America. Banana plants can be used in liquid organic fertilizers, fertilizers are materials that are added to the soil to provide essential elements for plant growth. When viewed based on the source of the material used, fertilizers are divided into inorganic fertilizers and organic fertilizers. The banana plant is a plant that only bears fruit once in its lifetime and after that the banana tree will not bear fruit again. After that the tree will be left to die and even just left alone. In the stem of the banana midrib there are important elements needed by plants, the content of nutrients contained in the banana midrib, namely N (nitrogen), P (phosphorus), and K (potassium). The results of the implementation of the Banana Stem Liquid Organic Fertilizer Manufacturing program in Guyangan Village, Loano, Purworejo, Central Java, went smoothly. This program is considered very useful for the people of Guyangan Village in order to reduce environmental problems in the form of banana stem waste and improve the people's economy by utilizing useless banana stem waste into something that can be reused.

KEYWORDS
Pisan Plants;
Organic Fertilizer;
Liquid;
Content of banana plants;
Benefits of banana stems



## 1. Introduction

Fertilizer is a substance added to the soil to provide the essential elements for plant growth. Fertilizers have been studied by researchers before. Human waste as a resource in agriculture – Evaluating the fertilizer potential of various products derived from composting and fermentation was investigated by Kelova [1]. Assessment of physicochemical properties and heavy metal concentrations in agricultural soil fertilized with chemical fertilizers was investigated by Salem [2]. Deficit irrigation combined with reduced N fertilizer levels can reduce high nitric oxide emissions from drip fertilized maize fields in China studied by Ning [3]. Data on heavy metals in soil and groundwater in the Kiwi Amlash orchard in Guilan Province, Iran were investigated by Naghipour [4]. Soil mineral nitrogen and yield-scale soil N2O emissions were reduced by reducing nitrogen application and intercropping with soybeans for sweet corn production in southern China studied by TANG [5]. The response of maize (Zea mays L.) yield to the effect of mixed fertilizers and varieties under additional irrigation in Hadero Zuria Kebele, southern Ethiopia was investigated by Orebo [6]. Data on the vegetative response of cowpea to fertilizer application on three selected reference soils in the Upper West region of Ghana were investigated by Emmanuel [7]. Stimulus of nitrogen fertilizers and soil characteristics on maize yield and nitric oxide emissions from Ferric Luvisol in the agro-ecological zone of Guinea Savanna, Ghana was investigated by Atakora [8]. The yield response of cassava Huay Bong 80 variety grown in Paleustult Oxyaquic to cassava starch waste and nitrogen fertilizer was investigated by Phun-iam [9]. The response of the N2O reductase (nosZ)-denitrifier gene community to long-term fertilization following the depth pattern in purplish-calcareous rice fields studied by WANG [10].

The effect of various types of slow-release and controlled-release fertilizers on rice yield was investigated by WU [11]. The impact of tillage, fertilizer and residue management on soil properties and wheat

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production in the semi-arid region of Iran was investigated by Houshyar [12]. Brief data on inter-row rainwater harvesting and application of fertilizers on yields of maize and gude bean cropping systems in the sub-humid tropics were studied by Saidia [13]. Incorporation of white clover (Trifolium repens L.) into perennial ryegrass (Lolium perenne L.) that received varying degrees of nitrogen fertilizer: Effects on milk and herb production studied by Egan [14]. Electrodialytic removal of fluoride and calcium ions to recover phosphate from fertilizer industry wastewater was investigated by Bagastyo [15]. The calibration of the EU-Rotate_N model with measured C and N mineralization of potential fertilizers and the predictive evaluation of plant and soil data from vegetable field trials were investigated by Vsthus [16]. Science-based decision support for formulating crop fertilizer recommendations in sub-Saharan Africa was investigated by Rurinda [17]. Leaf mineral content regulates the structure of microbial communities in the phyllosphere of spinach (Spinacia oleracea) and rocket (Diplotaxis tenuifolia) studied by Darlison [18]. Nitric oxide flux (N2O) responds exponentially to nitrogen fertilizers on irrigated wheat in the Yaqui Valley, Mexico studied by Millar [19]. Examining the impact of increased maize production on groundwater quality using a paired modeling system was investigated by [20].

The effect of fertilizer subsidies on household-level cereal production in Ghana was investigated by Tsiboe [21]. The application of biochar and inorganic phosphorus fertilizers affects the characteristics of the soil rhizosphere, nodule formation and phytoconstituents of cowpea grown in tropical soils. investigated by Phares [22]. Cadmium governance in European phosphate fertilizers: Not so fast? investigated by Ulrich [23]. Molecular characterization of proteolytic bacteria in Panchagavya : Organic fertilizer mixture was studied by Sayi [24]. Nanotechnology: A new perspective in precision agriculture researched by Duhan [25]. When viewed by previous fertilizer researchers based on the source of the materials used, fertilizers are divided into inorganic fertilizers and organic fertilizers. Based on the form, organic fertilizers are divided into two, namely liquid fertilizers and solid fertilizers. Liquid fertilizer is a soluble solution containing one or more carrier elements needed by plants. The advantage of liquid fertilizer is that it can provide nutrients according to plant needs.

The continuous use of chemical fertilizers [26]–[30] can increase the productivity of agricultural products and has a negative impact, namely soil hardening because there is a buildup of fertilizer residues which can make it difficult for plants to absorb nutrients and roots do not function optimally which will disrupt the aeration process. The solution to overcome the problems caused by the use of chemical fertilizers is to use organic fertilizers [31]–[35] which are more environmentally friendly. Liquid fertilizer made from banana stem waste and coconut water can be an alternative and can be of economic value and useful in tackling environmental damage only. Banana stems and coconut water are waste that can be used as liquid fertilizer. Banana midrib contains the elements nitrogen, phosphorus, and potassium that plants need to grow. Coconut water contains potassium, calcium, sodium, magnesium, sulfur, cuprum, ferum, and protein and contains the hormones auxin and cytokinin. Banana is a plant that is not foreign to the community. Banana (Musa Pradisianca) comes from Asia and spreads in Spain, Italy, Indonesia and America. Banana is a tropical fruit that has high economic value, its availability does not know the season and the price is affordable. Banana plants are monocarp, meaning they only bear fruit once and then die. Banana plants will produce well if the growth is also fertile. Bananas can generally grow in fiber (cellulose), in addition to the mineral ingredients potassium, calcium, phosphorus, iron.

The results of observations and interviews in the village of Guyangan show that there are abundant natural resources, one of which is bananas. This paper contributes to teaching the public knowledge in the manufacture of organic fertilizers using materials from banana stems. The banana plant is a plant that only bears fruit once in its lifetime and after that the banana tree will not bear fruit again. After that the tree will be left to die and even just left alone. In the stem of the banana midrib there are important elements needed by plants, the content of nutrients contained in the banana midrib, namely N (nitrogen),

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P (phosphorus), and K (potassium). The highest N, P, K content and absorption of banana midrib compost were 18,056 mg nitrogen, 2,562 mg phosphorus, and 15,860 mg potassium.

## 2. Method

The implementation method used in the door-to-door socialization program is the manufacture of liquid organic fertilizer for banana stems. The pre-implementation activity is an observation stage which aims to obtain initial data and information about the socio-cultural conditions of the community and their existing potential. Observations were carried out by means of interviews and direct discussions with the village community, both community leaders. At this stage, students must be able to collect comprehensive data that will provide an overview of the problems faced by the community to determine the design of activity programs. The program of activities that will be carried out is expected to be useful and applied continuously by the community as well as being a solution to existing problems.

The tools needed in making liquid organic fertilizer from banana stems are buckets with lids, knife, crackle, stirrer, and used sacks. The ingredients needed in making liquid organic fertilizer from banana stems are Kg granulated sugar, 2 kg banana stems, 3 liters of water, and if necessary EM4.

The working steps of making liquid organic fertilizer from banana midrib are as follows:

- Chop the banana stems into small pieces. Then put it in a used sack
- Mix the sugar water in a bucket or barrel until the sugar is dissolved
- Then enter the sack of banana stems that have been chopped/cut into pieces and the chopped banana stems are put into the sack, then the sack is put into the bucket containing the sugar solution until the sack is submerged. If necessary, give EM4
- Close the barrel / bucket tightly. And then put it in a place that is not exposed to direct sunlight
- Allow about 7-10 days. Don't forget to open the bucket/barrel every day to remove the gases that form from the process
- Within 7-10 days, the liquid fertilizer is ready and ready to be used organically. The signs if the liquid fertilizer is successful is the presence of a smell like the aroma of tape in the container. And if the stench that smells like the smell of sewerage, it means that the process of making our organic liquid fertilizer has failed
- Lift the sack containing the chopped banana stem earlier. And the former chopped banana stems can be used as compost. Meanwhile, the water in the bucket is the liquid organic fertilizer

## 3. Results and Discussion

The implementation of the Banana Stem Liquid Organic Fertilizer Production program in Guyangan Village, Loano, Purworejo, Central Java went smoothly. This program is considered very useful for the people of Guyangan Village in order to reduce environmental problems in the form of banana stem waste and improve the people's economy by utilizing useless banana stem waste into something that can be reused. This of course also reduces the use of synthetic fertilizers which are generally quite expensive. The program for making liquid organic fertilizer from banana stems is held for 16 days. As for the details of the implementation of the program for making liquid organic fertilizer from banana stems, Ibu Sri's house and door too door socialization of liquid organic fertilizer from banana stems in Kragilan Hamlet. The one jar of organic fertilizer shown in Fig. 1 is the result of community service in the Kragilan hamlet. The picture shows that the organic fertilizer that is put into the jar is the result of making organic fertilizer from banana stems.

**Fig. 1.** Organic fertilizer in a jar

Organic liquid fertilizer as a result of community service can be seen in Fig. 2. The picture shows that there are two bottles of organic fertilizer.

**Fig. 2.** The results of liquid fertilizer that have been made and socialized

How to use it as follows: 1:15, meaning that one part of liquid organic fertilizer is dissolved with 15 parts of ground water. Use this banana stem organic liquid fertilizer twice a week and sprinkle it on the soil around your plants. The results of the creation were carried out door to door socialization to residents' houses which were planned in the activity matrix on August 10 - 24 2018 with targets for residents of the hamlets of kragilan and krajan and the number of success targets was 12 people in the hamlets of Kragilan and Krajan, Guyangan Village. However, in reality this door to door socialization took place on August 24-25 2018 with a total of 12 visits to the houses of residents. The implementation time is adjusted or conditional. The program of activities that will be implemented is something new for the community. So that in its implementation, the community needs to be given basic knowledge about each of these programs through a door-to-door socialization. The implementation of door to door can be seen in Fig. 3.

**Fig. 3.** Door to door implementation in kragi hamlet

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## 4. Conclusion

The Liquid Organic Fertilizer activity program carried out in Kragilan Hamlet can be implemented well. The people of this village use chemical fertilizers every day and now they know the dangers of these fertilizers. The manufacture of organic fertilizer can be applied on a small scale as an education for the community about processing banana midrib as a raw material for liquid organic fertilizer and can be used in everyday life, especially for farmers.

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## Author Contribution

The contributor of this community empowerment is to create and implement the Banana Stem Liquid Organic Fertilizer Production program in Guyangan Village, Loano, Purworejo, Central Java went smoothly. The implementation method used in the door-to-door socialization program is the manufacture of liquid organic fertilizer for banana stems.

## Funding

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## Conflict of Interest

The authors declare no conflict of interest.

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