

Making Organic Fertilizer Based on JADAM Natural Farming with Local Adaptation

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Abstract

JADAM is an organic farming method that has been proven to empower farmers, not only allowing farmers to make their own fertilizers and pesticides, but also returning farmers to become experts in agriculture and their own land because of the experiments and introduction of biological potential in the environment they observe. The purpose of this article is to develop a JADAM model that is adjusted to the availability of materials in the surrounding environment. It is done under the concept of organic farming, and community empowerment. This article is developed from the results of a community service activities. The findings of the research show that there are three ways of making organic fertilizer from materials found the surrounding, namely household organic waste, leaf shoots, and a combination of waste to make organic NPK. Another interesting development of the JADAM method is an organic fertilizer that can be drunk, made from fruits and vegetables. It proves that organic fertilizer is more than safe so that it can be drunk.

Keywords

farmer independence, homemade natural fertilizer, jadam, organic farming

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INTRODUCTION

The scarcity of fertilizer, and the increasing price of fertilizer, makes agriculture even more challenging for farmers. Moreover, along with the war between Russia and Ukraine, fertilizer is becoming increasingly scarce and more expensive. The increase in fertilizer prices has reached 50%. This is because most fertilizers come from Russia. For example, NPK fertilizer which used to cost 12,000 per kilogram is now 20,000 per kilogram (Kompas, March 20, 2022). The increasing price of fertilizer makes farmers' incomes, which are already small, even smaller because of the increasing expenditure on fertilizer. Therefore, efforts are needed so that farmers can be independent and make their own fertilizer, which is no less effective than chemical fertilizers, so that expenses can be reduced, income can be greater, and most importantly, farmers can be independent, not dependent on the fertilizer industry.

In addition to the urgency to make our own fertilizer, dependence on chemical fertilizers must be reduced because in the long term the use of chemical fertilizers can reduce the quality and even damage the soil (1,2,3). Pane (1) stated that the use of chemical fertilizers such as urea, ZA, in the long term can kill biological agents in the soil and change soil biology. As a result, the soil becomes infertile, agricultural productivity decreases and farmers become increasingly dependent on chemical fertilizers for the plants to grow. The use of natural fertilizers can revive biological agents in the soil and restore fertility and soil damage caused by chemical fertilizers (4).

JADAM Ultra Low-Cost Organic Farming is an organic farming model that is able to provide answers to these problems in a comprehensive, practical, concrete and easy way while also being able to return farmers to become agricultural experts who understand soil biology, microorganisms, pests and local biodiversity. As agricultural actors, the researchers find the JADAM method to be an enlightening and enjoyable method. We have implemented organic farming methods, we find this JADAM met-

hod to be the most enlightening, the most practical. Organic farming methods are generally expensive because they have to buy organic fertilizer products, and farmers are not trained to become agricultural experts themselves. Jadam does not sell its products. Not only our own experience, but also many researchers admit it, for example Vivek (2), Nam (3), Nam & Moon (4). Even because of its enjoyable nature because of the experiment of making your own fertilizer and pesticides like a scientist, young people are also happy with Jadam, so that with Jadam millennial youth can be made interested in agriculture (5).

JADAM Organic Farming is an organic farming model developed by Youngsang Cho from Korea in 1991. Youngsang Cho continued the struggle that had been carried out by his father, a farmer and humanitarian fighter who was very concerned with the fate of farmers. Jadam itself is short for Jayonul Damun Saramdul, which means a person who returns to nature. The principle of JADAM is to imitate nature's method in making soil fertility (6). For example, JADAM learned from the forest how the forest became a fertile place even though it was never given chemical fertilizer. The forest is fertile because the natural process of the forest makes fertilizer for itself by dropping its leaves, as well as from animal waste and carcasses of dead animals, which lasts a long time so that the soil is fertile and rich in biological agents. By Cho, the concept and method of making cheap fertilizer from the surrounding environment is written in the book JADAM Organic Farming: The way to Ultra Low-Cost agriculture, JADAM., while for the recipe for pest control he wrote in JADAM Organic Farming: ULTRA Powerful Pest and Disease Control Solution, Make all-Natural Pesticide, The way to Ultra-Low-Cost Agriculture. Although summarized from experience in Korea, JADAM trains to utilize local resources and other innovative findings available. JADAM provides its perspective and knowledge.

If organic farming generally suggests buying microbes (e.g. EM4) for the fermentation process in making fertilizer, the Ja-

dam method is to make your own fermenter microbes. If conventional farming, pesticides are bought, Jadam also trains how to make your own pesticides. Although developed in Korea, the Jadam method is very flexible to be adjusted to the biodiversity in the surrounding environment. The typical JADAM fertilizer products are JMS (Jadam Microbiological Solutions) and JLF (Jadam Liquid Fertilizers) for fertilizer (6). While for pesticides, JADAM products are JWA (Jadam Wet Agent), JS (Jadam Sulfur), and JNP (Jadam Natural Pesticide) (7). Research has proven that both Jadam's natural fertilizers and pesticides are no less functional than chemical fertilizers and pesticides (8,9,10).

The JADAM method has the following main advantages: (i) Eco-Friendly: The inputs are made from natural materials, protecting the crops from harmful chemicals. In livestock farming, the method is Zero emission. All waste water is treated and waste is recycled and converted into resources. (ii) Higher Yield: Strictly follows the Nutrient Cycle Theory, using the right amount of substances at the right time, nourishing the soil with the right amount of nutrients when the plants or animals need them. (iii) High Quality: It allows to produce better quality crops and livestock as a result of the natural farming principles adopted and the absence of chemicals. (iv) Low Cost: It helps to reduce the financial burden of the farmer by the use of home-made materials and by utilizing resources from the fields. Almost all the inputs that actually provide nutrients to the crops and animals are made by the farmer himself saving costs and increasing income. (v) Farmer Friendly: Natural farming methods are free from toxins and toxic chemicals, which are harmful to the health of the farmer, as well as to the consumers, plants and animals (8).

The most important thing about Jadam is that it is able to return farmers to being agricultural experts again. In conventional agriculture, farmers are only passive users of fertilizers made by large industries, and farmers follow the rules of the industry such as fertilizers must not smell and so on. Farmers also do not know about biology and

how the soil works to be fertile. In Jadam, farmers become researchers and observers of their land about plants and biodiversity in the surrounding environment that can be used as fertilizer. According to Jadam, fertilizers do not have to be fragrant, because such concepts are only introduced by factories so that farmers never make their own fertilizers because to get to that stage farmers will definitely fail. "In fact, for thousands of years our ancestors have used fertilizers that are not all fragrant. Don't be allergic to smelly fertilizers" (5).

Jadam provides a solution that is both practical and cognitively satisfying. Practically satisfying because Jadam fertilizer is very easy to make, the ingredients can be obtained from the surrounding environment. Cognitively satisfying because farmers become aware of soil biology and conduct their own experiments in making fertilizer. The Jadam solution as mentioned above is to make JMS (Jadam Microbiological Solutions) and JLF (Jadam Liquid Fertilizer). The researchers have practiced this method for our avocado garden, and we use it as the main method in managing avocado farming, and the results are very satisfying. We are also supported by Jadam farmer activists, who are members of the Jadam Organic Farming group, where members in Indonesia exchange ideas and experiences about using the JADAM method (5).

Jadam's main fertilizers are JMS and JLF. JMS (Jadam Microbiological Solutions) is a method used by Jadam to fertilize the soil by increasing soil microbes into our agricultural land. The method is to take a humus sample from fertile land or forest soil or bamboo subsoil that is very fertile and rich in biological agents, then multiply the biological agents and how to take humus in the surrounding environment. Each place has its own characteristics and diversity of biological agents, so that with the diversity and locality of these biological agents, the soil will become fertile and plants will grow well and produce optimally. Soil or agricultural land with the JMS method can be made like fertile forest soil or bamboo subsoil. With routine JMS application, dry and barren

land can become fertile and loose soil like forest soil. The method of making JMS takes 48 hours or two days (11, 12).

JLF (Jadam Liquid Fertilizer) is a natural fertilizer that utilizes organic materials from the surrounding environment. JLF is made by collecting unused leaves, grass, or fruits, and putting them in a tub, then soaking them in water for approximately three months, then the soaking water will become water rich in nutrients that are very good for plants (13, 14,15). JLF for growth and fertilization can be made to adjust the input used. For growth, leaves and grass will produce fertilizer rich in nitrogen. While for fertilization, fallen or rotten fruit can be used. Farmers are trained to make fertilizer from bamboo stems, grass leaves, leftover rice washing water, now all can be used for soil fertility fertilizer.

For pesticides, the products are Jadam Sulfur, Jadam Wet Agent and Jadam Herbal Pesticide, all of which can be obtained by farmers from their environment. Farmers are also introduced to photosynthetic fertilizer or PSB and nitrobacter fertilizer which are very good for plants but are made at very cheap prices.

METHOD

This study was developed from community service activities whose results were further analyzed to be able to more widely contribute to the academic world. The findings and the evaluation on the implementation of the program raises some important facts, and suggestions to conduct future researches. The study was conducted in a qualitative descriptive manner using a case study method. The research subject is Farmer Groups in Mijen District, Semarang City. The data were collected through participatory observation, interview, and documentation. The study was started with the researchers' doing need analysis on research target. The results of need analysis of the research location were then concluded to formulate a suitable and effective program. After that, the program was implemented. From the implementation of the program,

there were some important facts earned, and some evaluation on the implementation of the program. The findings were then analyzed involving the concept of community empowerment.

RESULTS AND DISCUSSION

The findings of the research show that farmer groups in the research location make use of JADAM farming in their cultivating land. The JADAM farming was implemented by considering local wisdom, and local natural resource. It even makes use of waste. It can be seen from some local JADAM adaptation model fertilizers developed by the farmers, that is, JLF based on household waste, leaf shoots, organic NPK; and drinking water that can be drunk by humans. The discussion of each one will be explained in the following:

Household Waste Drum

It is named household waste drum since the household waste is collected in a drum and left to rot until it becomes fertilizer. It is an organic fertilizer from household waste. Unlike the JLF Jadam version from plants, this JLF is fertilizer from household waste such as leftover fruit, leftover vegetables, leftover food, such as leftover boiled noodles, leftover rice soup, leftover chicken bones, leftover fried fish heads, leftover shrimp heads, *leri* (rice washing water), and so on. All rotting waste is put into a barrel or drum. Molasses is put into the drum as food for microbes to decompose the waste into fertilizer. So, in the process of making household waste fertilizer, there is the use of molasses.

Leaf Tip POC

Leaf tips have different microbes. The various microbes in the leaf tip can be used to make liquid fertilizer. One of the informants said, "Each leaf/plant has different microbes, so that various microbes are collected. So there is no need to use microbes developed by the company". As done in the making of household waste fertilizer, a drum or bucket is then given molasses to become food for the microbes to process the materials into fertilizer. There is an indica-

tor to know whether the fertilizer has been ready for use. The easiest way to know it is to put it in a plastic drinking bottle. If it is still bubbling and emitting gas, it means the fermentation process is still ongoing. If it no longer emits gas, it is ready to use.

Organic NPK

Organic NPK is one of the forms of natural fertilizer under the concept of JADAM farming. Farmers can make their own organic NPK. The materials needed to make this organic fertilizer consist of a composition such as fish meal, tofu dregs, azolla, vermicompost, chicken manure, horse manure, rice husk charcoal which have a high composition of Nitrogen (N), Phosphate (P), and Potassium (K). All these materials are not a fix composition, it can be suited with the farmers' condition, such stated by the informant, "The composition is not a holy book, so it can be changed according to the availability in our environment".

Pineapple Peel Waste

Pineapple peel can be processed into liquid organic fertilizer. Liquid organic fertilizer from pineapple peel contains macro nutrients (nitrogen, phosphorus and potassium) which are essential for plant growth and development. In addition, pineapple peel also contains very high sugar, which is 9.9 grams in 100 grams of pineapple. The high protein and nitrogen content are very good for plant vegetative and as a fertilizer rich in these nutrients. Therefore, one of the informants said that the fertilizer made from pineapple peel is very effective for both vegetative and generative periods.

Goat Manure Liquid Organic Fertilizer

This fertilizer is very well-known among farmers because of its effectiveness. The method used to make this kind of fertilizer is by soaking goat manure in a tub for one month, then the soaking water is used for fertilizer without adding any more water. The fermentation process of liquid organic fertilizer from goat manure must be carried out perfectly because unprocessed goat manure still contains bad bacteria and pathogens that interfere with plant growth. Therefore, the fermentation process is needed to kill these bad bacteria and pathogens. The dosage for the composition used in the fermentation

process must also be observed carefully.

Various types of natural fertilizers that have been explained can be developed by groups of farmers who are the subjects of research because they can be made from materials that can be easily found in the surrounding environment. Even a number of materials are waste that can be utilized so as not to cause environmental problems. By utilizing items that can be found in the surrounding environment, this also reduces farmer expenses in the process of processing agricultural land. In addition, the process of making fertilizer from the materials found in the surrounding does not need complicated additional materials, so that it can easily be applied by farmers, even new, inexperienced farmers.

Besides findings on the various kinds of organic fertilizer and the materials that can be used, there are some other interesting findings from the study, and the emphasis on the importance of microbial science. The two interesting, important findings will be explained in the following:

Drinkable fertilizer

Drinkable fertilizer has been known among farmers in the last decade. It does not aim to be made as drinks to be consumed by humans but to show that the content of the fertilizer is really safe, even for human. On the research process, one of the informants practiced making organic fertilizer that can be drunk by humans. This fertilizer consists of sprouts, free-range chicken eggs, milk, pineapple and honey. All ingredients are blended and mixed in a clean food-grade container. This fertilizer should be filtered before drinking, and given ice. This training was attended by old farmers as well as millennial farmers. This training is an important media to teach especially to millennial farmers about how we can do a sustainable farming in a simple way.

Microbial Science

The research also brings about the fact on the importance of knowledge about microbial science. One of the informants said that millennial farmers need to understand that the soil is where the microbes that live in the soil live, and make the soil fertile. The input of organic fertilizer can enrich the wealth of microbes and provide nutriti-

on to the soil. Farmers need to be familiar with the knowledge of microbial science. A good understanding on how to plant seed, and control plant pest will make sure that the cultivated land will be successful.

The findings of the research show that JADAM farming can be adapted to the necessities of farmers of different cultures, even countries. The adaptation with local environment bring about some improvements on the life of farmers and contribute to the maintaining of sustainable farming system. This finding is line with research finding of Setyowati et.al. (17) discussing the forms of local wisdom of farmers in cultivating land to contribute to land conservation. A sustainable land cultivation is a must considering that the future generation will not face food scarcity and environmental damages.

In addition, research findings also showed that Jadam natural farming contribute to the farmers' dependence on industrial fertilizer, and the most important thing is that it can empower farmers. As mentioned in various references on empowerment, empowerment is a process of stimulating and encouraging people to improve their standard of living. In this case, empowerment is carried out by stimulating farmers to develop farming knowledge by utilizing local resources around them. This knowledge is conveyed in real practices and directly followed by farmers, so it is hoped that this knowledge can be mastered well and developed continuously. This in turn will encourage farmers to also be able to carry out further innovations which are certainly useful for improving their farming activities, so that they can obtain satisfactory results, and improve their standard of living.

CONCLUSION

Jadam provides a solution that is practically and cognitively satisfying. Practically satisfying because Jadam fertilizer is very easy to make, the ingredients can be obtained from the surrounding environment. Cognitively satisfying because farmers become aware of soil biology and conduct their own experiments in making fertilizer.

The Jadam solution as mentioned above is to make JMS (Jadam Microbiological Solutions) and JLF (Jadam Liquid Fertilizer). In addition, JLF can also be made based on household waste, leaf shoots, organic NPK, and drinks that can be drunk by humans. The addition of this local JADAM model can enrich the JADAM version while attracting the younger generation, because they are interested in scientific experiments and fertilizers that can be drunk by humans.

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