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Socialization and Education on Mass Production of Liquid Organic Fertilizer with the Addition of Local Microorganism Suspension (MOL) of *Bacillus cereus* Strain NIGR in Pantai Cermin Village, Tanjung Pura District, Langkat Regency

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Abstract. In order to succeed in the development of agricultural sector in accordance with the Regulation of the Minister of Agriculture Number 67/Permentan/SM.050/12/2016 concerning Farmer Institutional Development, it is necessary to provide community service in the agricultural sector and plant cultivation as efforts to strengthen food self-sufficiency, especially during the Covid 19 pandemic. For this reason, we need to carry out community service activities for the production of liquid organic fertilizer using microorganism *Bacillus cereus* in Pantai Cermin Village, Tanjung Pura District. As we know Pantai Cermin Village, Tanjung Pura District, Langkat which about is 63.6 Km from Medan. In general, the majority of farmers own rice and corn areas and are members of the Gemah Ripah farmer group consisting of 30 farmers. From the results of dedication program, there are around 3000 hectares of rice and corn fields that have become a rice barn for the last 15 years, especially in Langkat Regency. Based on the results of the survey and partner interviews, several priority problems were obtained, including: a. There was a decrease in the selling price of corn in Langkat by Rp. 1,900,-/Kg from the selling price of corn in 2019 of Rp. 4,900,-/Kg to Rp. 3,000,-/Kg currently in Langkat; b. Rice farmers experienced a decrease in purchasing power of chemical compost during the Pandemic, because the price of solid organic compost from the Probiodek brand that functions as a decomposer of organic matter rose to Rp. 40,000,-/Kg; c. Farmers experienced a decline in purchasing power of chemical insecticides on the market; d. Farmers in Langkat currently do not have a knapsacksprayer and they only use 2 units of knapsacksprayer from government assistance to spray plant pests & diseases and this tool is used interchangeably for all farmer groups; e. Farming management is carried out in a simple and conventional way, namely using local F1 seeds (yield) from the previous corn harvest); f. Rice harvesting as well as shelling corn use a simple method of rice mill machine. In order to develop the potential of rice and corn barns, it is necessary to strengthen the independence of farmers through community dedication program (PKM) training in the production of liquid organic fertilizer using microorganism *Bacillus cereus* from Ristekdikti. The focus is to develop production of liquid organic fertilizer as an alternative to chemical fertilizers and chemical insecticides. The use of microorganisms *Bacillus cereus* is especially useful for facilitating the decomposition of organic matter in liquid fertilizer solutions so that it is more easily absorbed by plants as fertilizer and insecticide, as well as assisting and motivating partners to continuously continue producing liquid organic fertilizers because it saves costs in purchasing chemical fertilizers and pesticides in the future so as to create economic independence for partners. This will certainly improve the economy of farmer group partners so that life can be more prosperous. All of these activities aim to foster independence in partners when the program ends. It is hoped that food self-sufficiency can be realized that is free from residues of chemical fertilizers and insecticides so that environmentally sustainable agriculture can be realized.

Keywords: Liquid Organic Fertilizer Production, POC, MOL, *Bacillus cereus* Strain NIGR

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1. Introduction

The potential resources for liquid organic fertilizer (POC) of cow manure are available at the Gemah Ripah Farmer's Group but the technology for utilization of local microorganisms (MOL) Bacteria *Bacillus cereus* Strain NIGR is not yet available and has not been produced by the local community. Pantai Cermin Village is located in the Tanjung Pura District, Langkat Regency, which is one of the largest centers and granaries for rice farming in Langkat. Pantai Cermin Village is one of the villages whose source of income is farming, namely rice cultivation, with rice cultivation carried out twice a year with an agricultural land area of 3000 Ha [1] and a corn barn with an area of 5,600 Ha. So far, rice and corn cultivation activities have been carried out conventionally using chemical fertilizers, chemical insecticides and do not apply the concept of sustainable organic agriculture.

The use of chemical fertilizers from year to year results in a decrease in soil quality which limits soil productivity. The physical properties of the soil from year to year are getting harder and less responsive to chemical fertilization. This condition in addition to limiting production also increases farming costs because farmers tend to increase the dose of chemical fertilizers and chemical insecticides to increase crop yields. This is a heavy economic burden felt by farmers because they use excessive resources as indicated by high farming costs but not followed by a real increase in production. The following is a picture of a rice field area that is routinely fertilized with chemical fertilizers and insecticides.

Chemical fertilizers and chemical insecticides from subsidies are limited in number and are not always available when farmers need them. This is a problem often faced by farmers and so far it has not been resolved even though a definitive group needs plan (RDKK) has been proposed by farmer groups through the local agriculture office [2]. Therefore, farmers have to buy non-subsidized chemical fertilizers and insecticides to meet the needs of fertilizers at higher prices and tend to increase when the planting season enters. This results in increased farming costs that must be incurred by farmers every planting season.

The solution offered to increase production and land productivity is done by giving liquid organic fertilizer derived from liquid cow dung, known as liquid organic fertilizer (POC) [3]. Liquid compost is an extract from the decomposition of organic materials. Organic materials can come from plant residues, solid waste, liquid waste from animals and humans, which contain more than one nutrient element. By extracting the organic waste, we can take all the nutrients while absorbing bacterial and bacterial microorganisms [4].

The benefits of POC play an important role in every process of plant metabolism, namely the synthesis of amino acids and proteins so as to ensure the continuity of cell elongation, contain nitrogen and micro elements that act as catalysts in the process of protein synthesis and chlorophyll formation, rich in organic and inorganic nutrients and can be applied by spraying using knapsacks sprayer, very easily absorbed by plant roots so as to accelerate plant growth, very effective in overcoming nutrient deficiencies, providing nutrients quickly. The macronutrient content of cow POC is 0.52% nitrogen, 0.01% phosphorus, 0.56% potassium and 0.007% calcium.

POC when added with a mixture of bacterial microorganisms of the Bacillus and Lactobacillus groups is very fast and effective in degrading cow dung POC waste about 2 weeks after the addition of liquid microorganisms (*Bacillus cereus* Strain NIGR). This is evidenced by the lighter weight of cow dung after adding bacteria and the dilution of POC liquid waste from cow dung. The reason for using MOL (B. cereus Strain NIGR) [5] is that farmers can easily mix MOL and POC into their planting area, it is also more economical because it can be made in a simple way without spending the cost of buying the EM4 formulation on the market. POC and MOL (B.cereus Strain NIGR) technology are more effective and targeted for rice and corn farmers in Gemah Ripah Farmer Group, Pantai Cermin Village.

The purpose of the PKM activity is to encourage the independence of rice and corn farmers so that they can produce liquid organic fertilizer as a substitute for chemical fertilizers and chemical insecticides so that environmentally friendly sustainable organic agriculture can be realized. This service activity is specifically focused on the mass production of liquid organic fertilizer and organic insecticide with the Bacill Nigr trademark of about 250 ml/month each. With the implementation of the focus of service activities, farmers in Pantai Cermin Village, Tanjung Pura District, Langkat Regency will be more independent and increase farmers' income, save on the purchase of fertilizers and insecticides and are more environmentally friendly and sustainable programs will be established in the future. The following photos and figure of PKM implementation are shown in the followings:

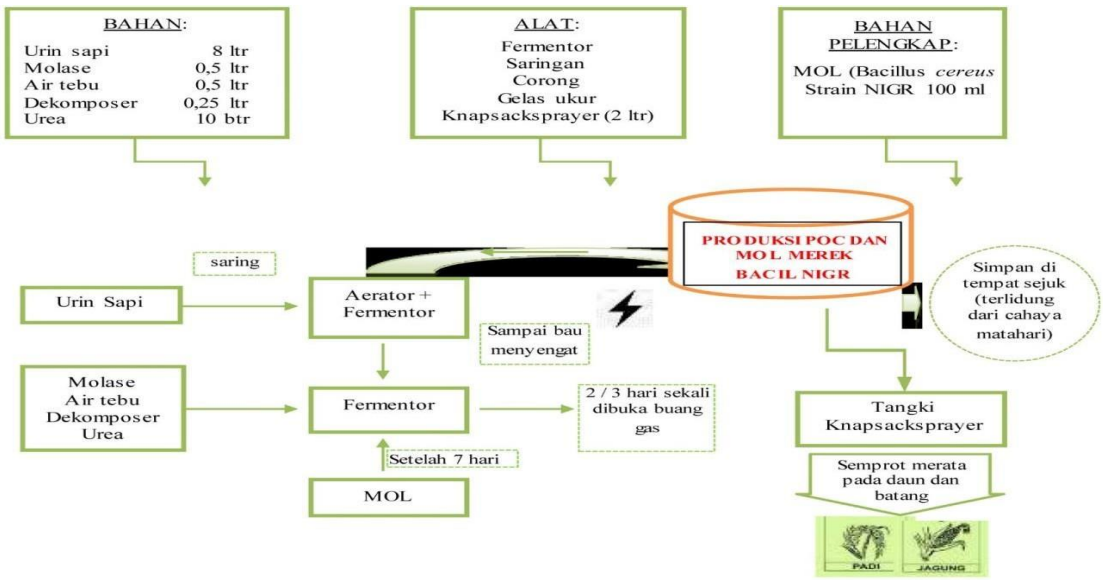

Fig. 1. Method of PKM Implementation.

PKM in science and technology is transferred to the community, starting from soaking certified superior seeds soaked in a liquid organic fertilizer solution and added with local microorganisms, namely *Bacillus cereus*. and plant diseases in the field, the production solution is given the trade mark Bacill Nigr, and partners use it as a substitute for chemical fertilizers and chemical insecticides so that when applied to rice and corn plants on the partner lands of the Gemah Ripah farmer group. Members of the agricultural cultivation team will calculate and provide instructions for the use of fertilizer and insecticide doses that will be used by partners on the land according to the area of rice and corn farmers.

In order to realize self-sufficiency in the food sector, especially in Langkat, this PKM is realized by farmer partners, namely rice and corn farmers, which consists of 30 people. The form of food independence has been carried out by the Langkat government by providing training in liquid organic fertilizer in 2022, but has not added local microorganisms namely *Bacillus cereus* Strain NIGR is useful as an activator and degradator of liquid organic fertilizer so that it is more easily absorbed as organic fertilizer and organic insecticide on rice and corn plants. So far, the use of local microorganisms at the farmer and partner level is only in the form of using EM4, which must be purchased by farmers at a price of almost Rp. 45,000, -/liter.

The use of *Bacillus cereus* Strain NIGR here will replace the function of EM4 so that partners are more

economical and cheaper in producing it. Of course, this is beneficial for plants and soil because it does not cause chemical residues in the rice and corn harvests. So that it will further nourish us humans who consume the harvest. Rice and corn harvests will be free of insecticide residues and safe for human consumption and also increase economic income because they can be sold in the market; Agribusiness team members will be able to perform analysis calculations on rice and corn farming using PKM products, the amount of production cost savings for organic fertilizers and organic insecticides so that farmers' welfare is realized towards sustainable organic agriculture.

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