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Use of shrimp skin waste and *Trichoderma viride* fungi as a palm oil breeding media

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Abstract

This environmental issue needs special attention and more serious pressure as it concerns human survival, both in the present and in the future Environmental issues become very warmly discussed either by community group, government, or institute that move in environment field. The problems include the occurrence of soil fertility degradation due to the opening of the soil layer, water contamination, air pollution and other environmental pollution, both caused by industry, and household and recently also happened global warming. Consumer society, in order to meet the growing need for food, agricultural land per unit area required to achieve maximum efficiency and highest quality product. The nutrition of the plant is the one of the most important factors to control agricultural productivity and quality. Rates of nutrients in the soil affects the quality of yield. Therefore, producers, fertilize the soil, combat pests, irrigation and process of agricultural activities to make more efficient to soil. Fertilizer increase efficiency and obtains better quality of product recovery in agricultural activities. It is one of the most important ways. Non-organic fertilizer mainly contain shrimp skin waste and *T. viride* used as palm oil media. The results of this study are; (1) In general, the decomposed medium with *T. viride* has a better condition for the growth of oil palm seedlings than on the decomposed medium without the fungi; and (2) a mixed medium between shrimp and latosol (1; 1) shrimp waste that has been decomposed with *T. viride* provides better seedling growth.

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Introduction

Environmental issues become very warmly discussed either by community group, government, or institute that move in environment field. The problems include the occurrence of soil fertility degredation due to the opening of the soil layer, water contamination, air pollution and other environmental pollution, both caused by industry, and household and recently also happened global warming. This environmental issue needs special attention and more serious pressure as it concerns human survival, both in the present and in the future (Plantus, 2008).

Consumer society, in order to meet the growing need for food, agricultural land per unit area required to achieve maximum efficiency and highest quality product. It is known that the nutrition of the plant is the one of the most important factors to control agricultural productivity and quality. Rates of nutrients in the soil affects the quality of yield. In the permanents in agricultural land, the soil will be very poor in nutrients. Therefore, producers, fertilize the soil, combat pests, irrigation and process of agricultural activities to make more efficient to soil.

Fertilizer increase efficiency and obtains better quality of product recovery in agricultural activities. It is one of the most important ways. Non-organic fertilizer mainly contain shrimp skin waste and *T. viride* used as Palm oil media.

Shrimp skin contains chemical compounds khitin and chitosan is a waste that is easily available and available in large quantities, which has not been utilized optimally. Given the nature of khitin and chitosan associated with bound amino and hydroxyl groups, it causes chitin and chitosan to have high chemical reactivity and cause the cation polyelectrolyte properties to act as ion exchange (ion axchanger) and can act as an absorbent to heavy metals in (Kurnia, 2009), because it acts as an ion exchanger and as an absorbent, the khitin and chitosan of shrimp waste has the potential to solve the problem of pollution of the aquatic environment with the cheaper absorption and the material is easy to obtain.

The land use as a medium for growing large-scale nurseries on a continuous basis can be serious environmental damage, caused by the loss of fertile soil layers. Besides, the weight of volume unity causes the cost of transport is expensive.

One of the alternatives to represent the land for growing media is the use of shrimp leather waste that has not been utilized optimally. The sort of shrimp leather waste because of its light weight per unit volume, more compact, and plants can utilize khitin and chitosan which is a compound of the compilers of shrimp shrimp waste. Nevertheless, shrimp shrimp feeding directly leads to stunted growth of seedlings, due to nutrient deficiency or nutrient toxicity (Harini, 2003) and also to the effects of heat from the ongoing decomposition process.

This shrimp shell waste is actually a potent organic material that can be utilized for various purposes, if it can be handled properly by applying biotechnology knowledge. One such activity is to prepare a plant nursery media. The use of shrimp shrimp waste as a nursery media is a problem is bound nutrients on a network, so it can not be utilized by the plant.

The problem can be solved by composting shrimp waste waste before being used as a medium by using *T. viride*. The fungus is able to decipher some chemical compounds that make up shrimp waste into available elements. The decomposition process by *T. viride* is faster, so it is expected to improve the growth.

In Tarakan, there are many shrimp farms cultivated by the company. Waste of shrimp skin every day is accumulated. The company does not throw it so that over time becomes an unpleasant scenery and can disrupt the environment, the author tries to use it to have economic value, which makes it as a planting medium for oil palm nursery. To increase the growing power and resistance to pest attack the disease needs to be mixed with *T. viride*.

Norway is also developing shrimp waste traditionally for organic fertilizer for farmers as a planting medium, besides this shrimp shell waste can cause environmental pollution problem also contains high enough nutrition (Bastaman, 1973). Tarakan peasant community is also using shrimp shrimp waste as a traditional vegetable medium rught now, which is collecting shrimp leather waste by bagungan then silence approximately one month later the sack is stepped on to leveling the waste, after the shrimp shells evenly used (Setyawibawa *et al.*, 1998).

The purpose of this study is to obtain alternative substitution of soil as a medium of seedlings by knowing the influence of T. viride on the growth of oil palm seedlings with shrimp waste media and, and to find combination of media that give best growth. While the Output and Contribution in this research is Publication about the Use of Shrimp Skin Waste and *T. viride* Fungus As Media of Palm Oil Nursery.

Materials and methods

The materials used in this research are: tillage of palm oil plant as much as 100 plants; Shrimp shell waste; Soil; PDA Media (Potato Dextrose Agar); Pure culture inoculum *T. viride*; Alcohol 70%; Distilled water and mineral water "Hoagland solution"; Tween 80; Filter paper, sterile cotton and aluminum foil; Chemicals for the manufacture of nutrients; namely $(NH4)2$, $KH2PO4$, $MgSO4.7H2O$, $CaCl2$, $MnSO4.H2O$, $ZnSO4$, $FeSO4.7H2O$ and $CoCl2.6H2O$. The equipment are autoklav, oven, scales, blander, strainer, plastic tub, plastic pot, plastic bag, erlenmeyer, measuring flask, test tube, stirring spoon, tweezers, needle inoculase , injection tool, spirit light, incubator, rulers, and hand sprays.

Liquid culture preparation of T. viride

T. viride used to compost shrimp waste was first cultured in the Ypss liquid medium, placed in an erlenmeyer. To obtain a large number of cultures, the glass erlenmeyer shaken with "shaker" for 7 days. This culture is then incubated in room temperature (approximately 29° C).

Making starter

To accelerate the process of composting shrimp waste, then made a starter of fine bran ingredients inoculated with liquid *T. viride*. Liquid culture inclusion with bran is done little by little, so it can be evenly distributed. Comparison between liquid culture with bran used is 1 liter of liquid culture mixed into 10 kg organic matter (shrimp shell waste). The end result of this composting depends on the microorganisms contained in starter (*T. viride*) to grow and develop in organic matter as compost. In addition, the ability of these microorganisms to produce enzymes that can break down organic matter. Therefore, into the mixture between shrimp and soil waste with straters will be added nitrogen source and distillate water, so that the water content reaches approximately 60-65%.

The mixture of waste shrimp skin, soil and starter is then placed in a plastic tub. The mixture is incubated for 14 days in space at room temperature, which every 7 days of stirring to allow the moisture and temperature to be evenly distributed.

Media setup is growing

The seedling medium in question is a medium that has been placed in polybags to support seed growth until the end of the study in accordance with the treatment.

Displacement and maintenance of seedlings

Seeds weaned from selected germination tubs that have the same height and diameter. Besides, also selected seeds that have a strong and healthy appearance. Transfer of seeds in polybag done with care and cultivated so that the roots of seedling not broken and broken.

Observation of seedling growth

To determine the final quality of the seeds produced, it will be measured against several growth variables, among others: The increase in height and diameter of the stem. Measurements of the height variables and diameter of the plant started from seeds 1 week after removal.

Experimental design

The environmental design used in this experiment was the Factorial Completely Randomized Design (CRD Factorial) consisting of two factors: organic matter (factor A) with three combinations and *T. viride* (factor B) with two treatments; without and with *T. viride*.

For more details, the kinds of combinations and treatments given can be seen in the following table.

Results and discussion

High Increase of Palm Seeds

The result of variance analysis showed that there were significant increase of palm oil seedlings significantly influenced by media influence, *T. viride* and its combination (Table 2.) 50% of shrimp shrimp waste medium and 50% of latosol soil have an effect on average of higher increase better than other media from Duncan distance test results (Table 3.) shows the real difference.

The use of T. viride gave a different effect to that without the fungus and an increase of 36.67 cm.

Table 1. Combination of intermediate treated treatment with *T. viride* and not with organic material.

Treatment Code		
T.viride	Organic Material	Treatment Combination
V_1	K_0	V_1K_0
	K_1	V_1K_1
	K_2	V_1K_2
V_2	K_0	V_2K_0
	K_1	V_2K_1
	K_2	V_2K_2

Description: Factor A (KO = 100% shrimp shell waste, K1 = 50% shrimp shrimp waste + 50% latosol soil and K2 = 100% latosol soil) and Factor B (V1 = given T. viride and V2 = without T. viride).

Table 2. Analysis of the variety of high growth of oil palm seedlings.

Value of F					
Sources of diversity	Dof	Sos	Mos	Hitung	Tabel 5 %
Treatment					
A	1	388,80	388,800	26,57*	4,18
B	4	61,87	15,467	1,06	2,70
AB	4	13,87	3,467	0,24	2,70
Error	20	292,67	14,633		
CoD = 12,58 %					

Description: * = significant difference in confidence level of 5%

Dof = degree of freedom, Sos = sum of squares, Mos = Middle of Squares, CoD = coefficient of diversity.

Additional diameter of palm seedlings

The media factor, *T. viride* factor and its combination gave a significant different effect on the increase of diameter of oil palm seedlings based on the analysis of variance (Table 4).

The addition of *T. viride* led to an increase in the average increase in diameter of oil palm seedlings on shrimp waste media and its combination compared with the medium without fungi (Table 5).

The high growth of seedlings as one of the indicators of whether or not the growth of seedlings is a picture of its productivity, namely a process of photosynthesis process. With the high growth of oil palm seedlings can be expected to indicate the presence of high carbohydrate supply and balanced nutrient content in high enough amounts, to jointly form or enlarge the cells in the growth process.

Table 3. Duncan spacing test of high palm seedlings.

Treatment	Average height of seedlings (cm)
V_1K_0	35,0 ab
V_1K_1	36,67a
V_1K_2	32,67abc
V_2K_0	27,33cd
V_2K_1	28,33bcd
V_2K_2	28,00bcd

Description: The number followed by the same lowercase letters means no significant difference 5%.

Based on observations of high growth and stem diameter it is estimated that the content of phosphorus on media decomposed with *T. viride* is much greater is N and K. As known these elements are absolutely necessary in the preparation of living cells, play an active role in transferring energy in the cell, on enzyme work and carbohydrate translocation. Sufficient supply of these elements will facilitate the physiological activities of seedlings.

Table 4. Analysis of the variety of seed diameter of oil palm seedlings.

Value of F					
Sources of diversity	Dof	Sos	Mos	Hitung	Tabel 5 %
			Treatment		
A	1	16,13	16,133	52,32*	4,18
B	4	0,88	0,72	0,72	2,70
AB	4	0,78	0,196	0,64	2,70
Error	20	6,17	0,308		
KK = 13,43 %					

Description: * = significantly different at the confidence level of 5%

Dof = degree of freedom, Sos = sum of squares, Mos = Middle of Squares, CoD = coefficient of diversity.

This can be explained because all the inorganic nitrogen available in the medium will be converted into the organism's body in organic form (Fakuara *et al.*, 1989). At this time nitrification can be said to be halted due to lack of available ammonium so that nitrogen competition between host and microorganism occurs. Accordingly, it is understandable that the seedling inhibited in the medium without *T. viride* is due to ammonium, which is one form of nitrogen that can be directly utilized by seedling, less available. Although the decomposition in this medium is more submitted by the provision of moist conditions, but did not rule out the entry of other decomposer microorganisms into the media. So there is competition in taking ammonium by seedlings and microorganisms are possible. As a result the supply for the seedlings became slight.

Table 5. Duncan spacing test of seed diameter of oil palm.

Treatment	Average seed height (cm)
V_1K_0	5,33a
V_1K_1	4,83a
V_1K_2	4,83a
V_2K_0	3,33b
V_2K_1	3,50b
V_2K_2	3,67b

Description: The number followed by the same lowercase letters means no significant difference 5%.

This means there has been a release of nitrogen from organic matter due to decomposition. In such circumstances some of the organic material has become absolute, where the energy ingredients have been reduced. This situation will support the process of nitrification and nitrate began to accumulate.

Conclusion

The use of *T. viride* with the aim of speeding up the decomposition process also means accelerating the reduction of energy materials, so that the seedlings are no longer nitrate deficient. Therefore, on the media decomposed with these fungi, they all show better growth rates.The results of this study are; (1) In general, the decomposed medium with *T. viride* has a better condition for the growth of oil palm seedlings than on the decomposed medium without the fungi; and (2) a mixed medium between shrimp and latosol (1; 1) shrimp waste that has been decomposed with *T. viride* provides better seedling growth.It will recommended that used organic fertilizer as shrimp waste that has been decomposed with *T. viride* for the next future.

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