

UTILIZATION OF BIOMOL AND TEA COMPOST SOLUTION FERMENTED BY THE FUNGUS *Trichoderma spp.* ON THE GROWTH OF SOYBEAN (*Glycine Max* (L.) Merr.) IN DRY LAND

Zurriyatun Solihah¹⁾, I Made Sudantha¹⁾, M. Taufik Fauzi^{1*)}

¹⁾ Post Graduate Program of Dry Land Management University of Mataram
Jalan Pendidikan No.37 Mataram-83125

*Corresponding author : imade_sudantha@yahoo.co.id & mtaufikfauzi@gmail.com

ABSTRACT

The purpose of this research is to know whether the use of Biomol and Tea Compost solution fermented by *Trichoderma spp.* can increase the growth and development of soybean plants in dry land. The experiment was conducted in the field and was arranged according to a *Split Plot Design* with the main plot is Tea Compost Solution with 4 levels of treatment, i.e. at the rate of 0, 5, 10, or 15 liters/plot and the subplot is Biomol solution with 4 levels of treatment, i.e. 0, 5, 10, or 15 liters/plot. The treatments were repeated three times. The results showed that the use of the Biomol at the rate of 15 liters/plot and Tea Compost at the of 15 liters/plot can increase the growth and development of soybean plants mainly on plant height. In addition, Biomol and Tea Compost solution applied to soybean can increase the weight of the wet and the dry berangkasan

Keywords: *Biomol, Tea Compost, Soybean, Trichoderma spp.*

INTRODUCTION

Vegetable crops include soybeans that have significance and constitute a very important agricultural commodity, because it has a multi-use. Soybeans can be consumed immediately and can also be used as raw material for agro-industries such as tempe, tahu, tauco, soy sauce, soy milk and fodder for industrial use (Sudadi, 2007).

One of the ways that can be done to improve the productivity of soybean plant with utilization solution of Biomol and solution compost tea that is able to adapt and do not damage the environment. Other obstacles in soybean plant growth on dry land is the inability of plants adapt on conditions of drought, especially in the phases of germination, vegetative growth and flowering (Suprpto, 2001).

Solution of Biomol is a substance that functions the same as fertilizers, but manure is available in liquid form is generated from the leftovers. MOL solution (micro-Organism) is fermented solution made from a variety of resources available from either plants or animals. MOL solution containing micro and macro nutrient elements and also contain bacteria that could potentially as recyclers organic material in the soil, on plants, growth stimulants and as agens plant pest and disease control (Azwar, 1990).

The role of the MOL in the compost heap, as well as suppliers of nutrients also serve as components of bioreaktor who is in charge of maintaining the process of growing the plant optimally. The function of the bioreaktor is extremely complex, functions that have been identified include suppliers of nutrients through the mechanism of exudate, microbial control according to needs of the plant, keeping the stability of the soil conditions towards the conditions ideal for plant growth, even control of disease that can attack the plant. MOL solution is made very simple by utilizing the waste from households or plants around the neighborhood such as the remnants of plants like banana, gedebong banana, pineapple, rice straw, the rest of the vegetables, Rice Casserole, and others (Azwar, 1990).

Compost tea is meant as a compost extracts are brewed with Microbe in liquid media. In compost tea in addition to providing nutrient elements (nutrients) provided at the plant is also equipped with micro-organisms. Principle in making compost tea this should use the compost that is already so called Biokompos (Gifts, 2003).

Compost tea has several advantages and is a product of natural eco-friendly fertilizers, are able to suppress the growth of pathogenic bacteria in compost. Well as natural fertilizer is compost tea can also serve as a natural pesticide, because the compost tea is able to restore the fertility of the soil is naturally and increases durability of plants against pests and diseases (Nadiyah, 2012).

MATERIALS AND METHODS

Experimental Design

Experimental design used i.e. Draft Compartments Divided (Split Plot Design) with two factors, namely:

The main plot: Solution compost tea (B) with 4 levels of treatment i.e.,

B0 control (Without compost tea)

B1 compost tea with a dose of 5 L/plot

B2 compost tea with a dose of 10 L/ plot

B3 compost tea with a dose of 15 L/ plot

The sub plot: Biomol Solution (M) with 4 levels of treatment i.e.,

M0 controls (Without Biomol)

M1 Biomol with doses of 5 L/ plot

M2 Biomol with doses of 10 L/ plot

M3Biomol swath with a dose of 15 L/ plot

The result of a combination of Application Solution Biomol (M) with the application Solution compost tea (B) is 16 and the treatment. Each treatment on repeated 3 times so that there are 48 units of the experiment.

Implementation of The Research

Providing The Biomol Solution

Biomol created using the technology of fermentation using household waste or leftover vegetables and fruits that are on the market of sweta. The remains of these nifty little chopped veggies-small then weighed and mixed with water and stirred until the Patty evenly and placed in a bucket or large barrels that have closed. After that the fermented yeast is mixed with *Trichoderma spp.* were then silenced for at least 2 weeks. After 2 weeks then continued with the process of reversal or stirred evenly and then filtered to get the parent solution for biomol. The parent solution diluted with a comparison of 1:5 (1 L aqueous solution diluted with carrier 5 L of clean water).

Provision Tea Compost

Solution compost tea compost tea made using fermented using this technology, namely the fungus *Trichoderma spp.* Dikomposkan materials by way of mixing with the supplements in the form of horse manure and rice bran, then disiramkan mushroom with a solution of t. *koningii* isolates ENDO-02 and t. *harzianum* isolates SAPRO-07 evenly while stirring, until the compost material moisture content reaches 30-40%. Next meetings wrapped and left on for 2 weeks with a reversal after one week. After that the biokompos formed the solution by the addition of water and the fungus *Trichoderma spp.* forming solution.

Provision of Seed

Seed soybeans that will be used in this research is the seed of soybean variety Anjasmoro obtained from the porch of the parent Seed rice, Vegetable and horticulture Province NTB JL. Raya Review Km 8,



Narmada West Lombok Regency. Soybean seed varieties Anjasmoro needs to research this is 2 kg.

The Provision of the Land

Land use 300 m² acres is divided into 48 compartments (each swath measuring 3 x 2 m²). Tillage is carried out by means of piracy and hoe. After the land ploughed lands left in the wind's for 1 week then do hoe to make experimental plots (attachment 1).

Planting Soybeans soybean Seed planted

With distance (30 x 40) cm on each of the compartments which measuring 3 x 2 m² so there are 50 holes to plant perpetak. The seeds are inserted into the planting hole prepared planting hole, each planted with soybean seed as deep as 4 2.0 cm. At the age of 1mst is done thinning with remaining 3 plants per planting hole so there are 150 plants per experimental plots.

Data Analysis

Data were analyzed using analysis of observation results of diversity on the real extent of 5% and continued with the test of a real level at BNJ.

RESULTS AND DISCUSSIONS

High Plant

Observations and analysis of the diversity of influences and biomol solution application solution compost tea against the high growth of plants listed in Appendix 7-10. Diversity analysis results showed that the lack of interaction between the aqueous and aqueous biomol compost tea on 2 mst however shows the interactions at the age of 3, 4 and 5 pm mst. Further test results BNJ 5% presented on tables 1 and 2.

Based on table 1 there is real interaction between the treatments compost tea and biomol high against the plant. There is a tendency that the combination of compost tea dosage 15 liters/plot with biomol dose 15 liters/plot capable of

producing a better plant than other treatments. This possibility that the granting of compost tea and biomol at increasingly high doses can increase the availability of nutrient elements in soil to support plant nutrient availability to complete the cycle. Junita et al. (2002), stated that the more organic material provided on the ground, will be followed by the increase in stability of soil binding water to some extent and increase in total nitrogen.

The growth of soybean plants 5 mst the most high based on the influence of compost tea and biomol found in compost tea applications treatment a dose of 15 liters/plot and biomol dose 15 liters/plot with a height of 78.14 cm, while the soybean plant growth the lowest found in compost tea applications without treatment and biomol 39.42 cm. height this occurs due to the womb fungus t. koningii isolates ENDO-02 which is fermented into a compost tea and biomol is able to suppress the development of the pathogens in the vegetative phase the soybean crop could also spur the growth of soybean plants and with a high content of mushrooms t. harzianum isolates SAPRO-07 which is also fermented into compost tea and biomol is able to suppress the development of pathogens on the generative phase. Sudantha (2011), stating that the fungus Trichoderma spp. saprofit issued chemical substance or hormone that diffused into the plant tissues of soybeans that can spur the growth of higher plants.

Wet and Dry Weight of Berangkasan

Observations and analysis of diversity the influence of application of compost tea and biomol against berangkasan wet and dry weight attached at attachment 11 and 12. Diversity analysis results indicate that the presence of interactions between the compost tea with biomol, a factor of compost tea and biomol on heavy wet and berangkasan parameters on the parameters of the weight of dry berangkasan gave a different real influence. Further test results compost tea and biomol factors presented in table 2 and 3.

Table 1. The average height of the plant based on the influence of the interaction of biomol solution and tea compost

Treatment		Pengamatan umur		
		3 mst	4 mst	5 mst
without compost tea	Without biomol	20,033 a	29,773 a	39,42 a
	Biomol 5 liters/plot	26,44 b	36,08 b	46,927 b
	Biomol 10 liters/plot	28,133 cd	38,4 c	49,287 c
	Biomol 15 liters/plot	30,047 e	40,307 de	50,893 d
Compost tea 5 litres/plot	Without biomol	26,773 d	35,953 b	47,347 b
	Biomol 5 liters/plot	28,447 d	40,467 e	51,167 d
	Biomol 10 liters/plot	30,927e f	42,42 ef	53,74 e
	Biomol 15 liters/plot	31,48e f	42,993 fg	57,88 g
Compost tea 10 litres/plot	Without biomol	32,073 fg	41,533 de	55,113 f
	Biomol 5 liters/plot	33,54g h	43,673 gh	57,2 g
	Biomol 10 liters/plot	34,133 h	44,567 h	59,747 h
	Biomol 15 liters/plot	36,393 i	46,26 i	62,92 i
Compost tea 15 litres/plot	Without biomol	30,187 e	40,36 de	51,74 d
	Biomol 5 liters/plot	33,393 g	44,447 h	61,747 i
	Biomol 10 liters/plot	37,08 i	48,073 j	65,713 j
	Biomol 15 liters/plot	40,347 j	52,173 k	78,14 k
BNJ 5%		1,49	1,24	1,26

Description: the figures in each column that is followed by the same letter in each of the treatments did not differ markedly in the extent BNJ test 5%.

Based on the table 2 and 3 seem that heavy wet berangkasan of the highest dose of compost tea is present on 15 litres/plot and Biomol dose 15 litres/plot with a weight of 103.93 g, and the lowest is present on the control/without compost tea and biomol weighing 36.73 g. of soy Plant applications of compost tea and biomol combination each 15 liters/swath of heavier and faster growing compared with other treatments. This is likely due to the influence of the granting of compost tea and biomol given high doses are capable of suppressing the growth of pathogenic bacteria in the compost and compost tea biomol because this is a natural fertilizer products that are environmentally friendly so it is able to give higher weight. Sudantha (1997), stated that the fungus

Trichoderma spp. can effectively control the disease-causing fungus Sclerotium rolfsii fell for and can give the results of a high content of soybean pods.

From table 3 can be found that the weight of the dried plant the highest soy berangkasan contained on the application of the combination of compost tea with biomol weighing 22, 33g as for the lowest weight is contained on the application without compost tea or biomol weighing 9, 87g per plant. Further test results from the look that the combination of compost tea applications with different biomol real with other treatments. This is likely because the dosage application combination of compost tea with a high population of biomol fungus Trichoderma spp. in it increases rapidly. Sudantha



(2003), reported that *T. Harzianum* fungus has the ability to grow quickly, namely at the age of three days after the insulation has been covering the entire petri dish. Bharat et al.

(1988) reported that the fungus *Trichoderma* spp. other than are as antagonistic towards pathogenic fungus can also act as a parser organic wastes.

Table 2. Average wet weight of berangkasan based on the influence of the interaction of compost tea and biomol

Treatment		Berat berangkasan basah (g)	
Without compost tea	Without biomol	36,73	a
	Biomol 5 liters/plot	53,97	b
	Biomol 10 liters/plot	57,6	c
	Biomol 15 liters/plot	62,37	d
Compost tea 5 litres/plot	Without biomol	54,1	b
	Biomol 5 liters/plot	56,3	bc
	Biomol 10 liters/plot	65	de
	Biomol 15 liters/plot	73,97	h
Compost tea 10 litres/plot	Without biomol	56,03	bc
	Biomol 5 liters/plot	67,93	f
	Biomol 10 liters/plot	70,97	g
	Biomol 15 liters/plot	79,63	i
Compost tea 15 litres/plot	Without biomol	65,83	ef
	Biomol 5 liters/plot	73,5	gh
	Biomol 10 liters/plot	84,43	j
	Biomol 15 liters/plot	103,93	k
BNJ 5%		2,92	

Description: the figures in each column that is followed by the same letter in each of the treatments did not differ markedly in the extent BNJ test 5%.

Table 3. The average weight of dry berangkasan based on the influence of the interaction of compost tea and biomol

Treatment		Berat berangkasan kering (g)	
Without compost tea	Without biomol	9,87	a
	Biomol 5 liters/plot	14,37	b
	Biomol 10 liters/plot	15,5	bc
	Biomol 15 liters/plot	17,1	bcd
Compost tea 5 litres/plot	Without biomol	15,6	bcde
	Biomol 5 liters/plot	14,87	cdef
	Biomol 10 liters/plot	17,43	cdef
	Biomol 15 liters/plot	17,83	cdef
Compost tea 10 litres/plot	Without biomol	16,87	def
	Biomol 5 liters/plot	16,63	defg
	Biomol 10 liters/plot	17,77	efg
	Biomol 15 liters/plot	18	fg
Compost tea 15 litres/plot	Without biomol	16,83	fg
	Biomol 5 liters/plot	18,53	fg
	Biomol 10 liters/plot	19,5	g
	Biomol 15 liters/plot	22,33	h
BNJ 5%		2,06	

Description: the figures in each column that is followed by the same letter in each of the treatments did not differ markedly in the extent BNJ test 5%.

CONCLUSIONS

Applications of compost tea and Biomol fermented yeast of *t. koningii* isolates ENDO-02 and *T. Harzianum* isolates SAPRO-07 high interaction effect on soybean plants. Applications of compost tea in the planting hole with a dose of 5 litres/plot, a dose of 10 liters/cplot and a dose of 15 liters/swath of high yield soybean crops gives higher compared to applications without compost tea and biomol.

Treatment by using compost tea and biomol each 15 liters/plot provide wet and dry weight of berangkasan is higher than with the treatments without compost tea and biomol

REFERENCES

Timeless. A. I. 2003. Plant Pathology I First Edition. Bayumedia Publishing and the Faculty of Agriculture

University of Brawijaya, Malang, East Java – Indonesia. 137 it
 Abdurohim. OIM. 2008. Influences of Compost Against the availability of Nutrient And crop production Caisin On Latosol Soil Of Mount Sindur, a thesis. In IPB Repository.
 Adisarwanto. 2005. The process of Cultivation Shorgum: Soy Edamame. Journal of agriculture Vol. (3): 124-126.
 Adisarwanto t. danR. Wudianto,2002. Boost yields of soybeans in Wetland-dry-PasangSurut. Bogor: The Diffuser Is Self-help.
 Adisarwanto. T., 2005. Aquaculture with effective Fertilization and optimization on the role of soy Rhizobia. Bogor: The Diffuser Is Self-help.
 Arsyad and Sham. 1998. The resource growth of Soybean production and cultivation technical research and Development Center for food crops. Agency for

- Agricultural Research and development. Department of agriculture 30 things.
- Aryany. N. i. m. Sudantha and i. w. Sutresna, 2011. The influence of different types of organic fertilizer Resources and Results Against Brangkasan Fresh Corn some varieties. A Seminar Paper Masters Program In Management Of Arid Land Resources Graduate Program University Of Mataram, Mataram.
- Azwar. 1990. Environmental stress Physiology. Pau-IPB: Bogor.
- M. Zinati. 2005. Compost in the 20th Century: A Tool to Control Plant Diseases in Nursery and Vegetable Crops. HortTechnology 15:61-66.
- Gifts. K.p. Arbianto and I.N.P. Aryantha (2003). Study of highly pathogenic Bacteria Entamopathogenik Local Hyposidra Talaca Larvae in Wlk and optimization of Growth Medium. A monthly seminar on Biotechnology – Biotechnology PPAU ITB, 15 September 2004, Bandung.
- Junita, f., s. Muhartini and d. Kastono. Influence of frequency of Watering and Manure toward a rate of growth of Pakchoi and results. The Science Of Agriculture. IX (1): 37 – 45
- Agricultural R & D. 2009. The potential and Availability of land for development of Soybean in Indonesia. Website: <http://pustaka.litbang.deptan.go.id/>.
- Litterick. A.M.; Harrier, L.; Wallace, P.; Watson, C. Wood, m. 2004. The Role of Uncomposted Materials, Composts, Manures and Compost Extracts in Reducing Pest and Disease Incidence and Severity in Sustainable Temperate Agricultural and Horticultural Crop Production: A Review. Critical Reviews in Plant Sciences 23 (6), 455-479.
- Minardi. S., 2009. Optimization of the management of the dry land for the development of Agricultural food crops. Website: <http://pustaka.uns.ac.id/>.
- Mulyadi. 2009. Nematodes agriculture. Gadjah Mada University Press. Yogyakarta it 5-7
- Nadiah. A.. Technical Guide 'The Development Of The Technology Of Compost Tea To OPT Control Plantations'. The great Hall Perbenihan protection and Crop Plantations.
- Purwasasmita. M. 2009. Local Microorganisms As A Trigger For The Cycle Of Life. In Bioreaktor Plants. Indonesia's national chemical engineering seminar, 19-20 October 2009.
- Pirngadi k., 2009. The role of organic materials in Sustainable Rice Production Increased Support to national food security. Development of Agricultural Innovation 2 (1): 48-63
- Rukmini. 2006. Cultivation and Fertilization is good for soy. Grafindo. Surabaya
- Sudadi. 2007. The availability of K and yield of soybeans (Glycine max l. Merrill) on a Pressurized Vertisol Soil mulch and manure. Journal of the science of soil and Environment vol. 7 No. 1 (2007) p.: 8-12
- Sudantha. I. m. 2009. Application of the fungus Trichoderma spp. (Isolates ENDO-02 and 04 and SAPRO-07 and 09) as Biofungisida, and Bioaktivator This growth and flowering plants of vanilla and its development in plants horticulture and Other Food in NTB. Research Report Grants Competence Of Higher Education DP2M, Mataram.
- Sudantha. I. m. 2011. Test the application some type of Biokompos (Fermented Fungus t. koningii isolates Endo-02 and t. Harzianum isolates sapro-07) on two varieties of Soybean against Fusarium Wilt Disease and Soy Results. Agroteksos No. 1:2.
- Sudantha. I. M. And A. L. Immortal. 2007. Sinergisme and Saprofit Fungus Endophyte Antagonistic in increasing Resilience to disease Induction Vanilla Seeds Rotten Trunk Fusarium. Fundamenatal DP2M HIGHER EDUCATION Research Report. Faculty of Agriculture University of Mataram, Mataram 105 things.
- Sudantha. I. M. 2007. Characterization and potential Endophyte and Saprofit Fungus as a Biological Control Agens Antagonistic Fungus Fusarium oxysporum f. SP. vanillae on Vanilla Plants on the island of Lombok, NTB. Dissertation Of Agricultural Sciences Doctoral Program Graduate Program Faculty Of Agriculture University Of Brawijaya, Malang.
- Sudantha. I. M. 2010. Appropriate technology books: application of Biofungisida and Biokompos in organic farming. Faculty Of Agriculture University Of Mataram, Mataram.
- Sudantha. I. m. 2011. Test the application some type of Biokompos (Fermented Fungus t. koningii isolates Endo-02 and t. Harzianum isolates sapro-07) on two varieties of Soybean against Fusarium Wilt Disease and Soy Results. Agroteksos No. 1:2.
- Suprpto. I. M., 1991. Cultivation Of Soy. Jakarta: The Diffuser Is Self-help.
- Supriyatin and Marwoto. 2000. The effectiveness of Some Vegetable Material against Pests of Soybean Leaf Destroyer. Management of Land Resources and Biodiversity at the plant nuts and tubers. PPTP. 458p unfortunate.
- Suardji And Tejowulan. 2003. Diktat Dryland resource management. The Graduate Program Of The Faculty Of Agriculture University Of Mataram.
- Suardji.. Dry Land Development Strategy Plan of the province NTB. Bappeda, NTB. 157 pages.
- Sudradjat. 2006. Managing Trash City, Jakarta: the diffuser is Self-help.