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The effect of hyacinth *(Eichhornia crassipes)* liquid organic fertilizer fermented by *Trichoderma* sp. to the growth of onion *(Allium ascalonicum* L.*)*

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Key words: Hyacinth, *Trichoderma* spp., Growth, Onion, Hyacinth, liquid Organic fertilizer, *Trichoderma* sp.

Abstract

This research is very important to be done to increase public knowledge on onion cultivation by utilizing the available local resource potential. The long-term objective of this study is to produce shallot cultivation technology products by utilizing local resources so as to reduce production input costs. While the specific purpose of this study is to increase the production of shallots in West Nusa Tenggara Province. This study aims to determine the growth and yield of red onion treated with water hyacinth liquid organic fertilizer fermented Trichoderma sp (LOF-FT). This research was carried out in Sakra Village, East Lombok Regency. The research method used is an experimental method with experiments in the field. This study was designed using a single factor randomized block design (RBD) with 12 levels and 3 replications to obtain 36 experimental units. The results of the research data were analyzed using Regression analysis test. The results of this study indicate that the highest value of b is obtained in the parameters of the results of Fresh Tubers Weight of 3.35 and the best dose is 55 ml / liter of LOF-FT. With the acquisition of the b coefficient which is always positive and P-value <0.05 and R Square tends to ≥ 80%, the conclusion of the results of this study is LOF-FT provide a positive and significant impact on the growth and yield of shallots in the province of West Nusa Tenggara.

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Introduction

The objectives targeted by the Directorate General of Horticulture of developing vegetable plants products quality, is the reasons in developing onion production. Based on the Pusdatin projection (2015), the total national demand for shallots in 2019 will increase by 1,149,627 tons, with the average of consumption is2.55 kg/capita/year; while the total of onion reaches 1,309,539 tons. Unfortunately, the surplus of onion production is predicted to decline continuously with an average reduction of 0.33% per year.

The productivity of onion in Nusa Tenggara Barat Province Furthermore, was reported fluctuate within last five years (2012-2016) respectively 8.19 tons/ha (2012), 10.95 tons/ha (2013), 10.20 tons/ha (2014), 11.03 tons/ha (2015) and 10.99 tons/ha (2016) (BPS, 2017). Although NTB is one of center for onion production in Indonesia, its productivity remains low compared to onion productivity in Central Java, East Java and West Java (Pusdatin, 2016).

To anticipate the decrease of national onion stocks and to avoid onion deficiency, there must be technical efforts to improve the quality of land that can support the increase in onion productivity in Nusa Tenggara Barat.

The Agriculture and Food Crops of West Java Province (2013) reported that the usage of organic matter are able to improve land quality. Suntoro (2003) stated that the provision of organic matter can improve the physical, chemical and biological properties of soil. It was also reported that the absorption of nutrients by plants would not be optimal without the usage of organic matter (Yuniwati *et al.*, 2012).One form of organic material that is good to use is liquid organic hyacinth fertilizer fermented by *Trichoderma* sp. As a result of the research by Apzani *et al.* (2017) shows that the liquid organic fertilizer of hyacinth can increase lettuce growth.

Based on the description above, it is necessary to conduct research to increase the production of shallots in the province of West Nusa Tenggara with the use of organic water hyacinth available in NTB

Materials and methods

Location and Execution Time

The research was conducted from February to August 2018 in Sakra Village, East Lombok Regency, West Nusa Tenggara Province.

Equipments and Materials

The tools used were Laminar Air Flow Cabinet, autoclave, hot plate, water bath, petri dish, Erlenmeyer tube, beaker, measuring cup, test tube, pipette, knife, ose needle, Bunsen lamp, microscope, bucket, sprayer, scales analytic, meter, ruler, soil processing equipment and stationery.

The materials used were *Trichoderma* spp. rice, hyacinth, sugar, gelatin, potatoes, distilled water and onion seeds.

Research Stages

Experiment Preparation and Implementation

Trichoderma sp. isolated from the rhizosphere of bamboo plants, then purified with Potato Dextrose Agar.

(PDA) media (Fig. 1), so that *Trichoderma* sp. pure with morphology (Fig. 2) which is seen without other fungal contamination. After that, *Trichoderma* sp. purely propagated using 5 kg of solid rice media (Fig. 3).

Liquid organic water hyacinth is made from a mixture of 40 kg of solid hyacinth, 5 kg of Trichoderma sp. solid media of rice, 50 liters of clean water, and 2 kg of brown sugar. All ingredients are then put into a fermenter to be fermented for 20 days.

The field was tillaged and formed to be 36 plots of 1m x 2 m square. Each plot was planted 30 onion seed. Then Hyacinth LOF fermented by *Trichoderma* spp. was applied at properly doses to the plant at the age of 42 days after planting, and repeated at the interval of 7 days. Irrigation is carried out according to soil moisture conditions. Pests controlled both by mechanically and by used of insecticides in order with pests disturbance. While weed cleaning was done weekly.

Observation Variables

The observed variables included plant height, number of leaves, plant wet weight, dry plant weight, number

of seedling, number of tubers, weight of fresh tubers, and weight of dried tubers.

Experimental design

This research was designed by applying a Randomized Block Design (RBD) experiment with single factor of Hyacinth Liquid Organic Fertilizer Fermented by *Trichoderma* sp. (Hyacinth LOF-FT) which consisted of 12 levels of treatment, namely: P0 = 0 ml/liter, P1 = 5 ml/liter, P2 = 10 ml/liter, P3 = 15 ml/liter, P4 = 20 ml/liter, P5 = 25 ml/liter, P6 = 30 ml/liter, P7 = 35 ml/liter, P8 = 40 ml/liter, P9 = 45 ml/liter, P10 = 50 ml/liter, P11 = 55 ml/liter. Every treatment was replicated tree times, so there were 36 units of treatments.

Data analysis

Data obtained were analyzed using regression analysis of SPSS Statistics Program Version 17.0, to obtain coefficient (b) variable x (Hyacinth LOF-FT), as well as its significance as a good estimation value of the growth and yield of onion.

Results and discussion

Results of onion growth parameter data analysis (Table 1) showed that the Hyacinth LOF-FT had a positive effect to the onion growth which was marked by the achievement of positive value of (b) variable x Hyacinth LOF-FT variable weekly. The highest b value was gain from the fifth week data while the lowest b-value was gain from the first week data. Table 1 show that the b-value increases continuously in line with the increase of plant age. Its mean that the effect of Hyacinth LOF-FT is greater along with the growth of plant roots as functioned in nutrient absorption. Table 1 also showed that the value of R^2 tends to be greater than or equal to 0.8.Itsmean that the effect of Hyacinth LOF-FT on the growth of red onions tends to 80% greater while the external factor has no significant effect.

Table 1. Data analysis result of the regression of onion growth parameter.

Plant age	Plant Height		Number of Leafs		Weight of Fresh Plant		Weight of Dried Plant	
	Coefficient value b	R Square	Coefficient value b	R Square	Coefficient value b	R Square	Coefficient value b	R Square
Week 1	0,061	0,86	0,031	0,83	0,035	0,96	0,004	0,90
Week 2	0,064	0,72	0,065	0,77	0,046	0,93	0,025	0,91
Week 3	0,066	0,73	0,087	0,64	0,147	0,82	0,049	0,89
Week 4	0,129	0,67	0,211	0,63	0,155	0,86	0,059	0,87
Week 5	0,131	0,82	0,224	0,81	0,396	0,81	0,098	0,85
Week 6	0,136	0,83	0,235	0,88	0,464	0,94	0,196	0,87
Note :	Coefficient value b		= value of estimated regression					
	R Square $\geq$ 0.8		= very good					
	R Square $\geq$ 0.7		= good					
	R Square $\geq$ 0.6		= prettty good					

Plant Height and Leaf Amount

Based on Table 1, the b value resulted by application of Hyacinth LOF-FT started to raise significantly in the fourth to fifth week. This is caused by the fast growth phase of onion occur within those plant life, whereas plant grow up significantly (Darma *et al.*,2015) in line with a sigmoid pattern (Azyyati *et al.*, 2016) (Fig. 4 and Fig. 5).

At age of 35 days after planting, the maximum plant metabolic activities occur, in which large amounts of water and nutrients were absorbed by the roots (Robnowitch and Brewster, 1990). As a result, it always generate positive b value, which means that Hyacinth LOF-FT has a positive influence on the onion plant growth.

The results of data analysis listed in Table 1 showed that Hyacinth LOF-FT treatment has a good influence on plant height and number of leaves, as can be seen on R^2 value which tends to be greater than 0.8.It means that the plant has positive responds of Hyacinth LOF-FT application, with an estimated growth as value b on plant height and number of leaves, for every application of 1 ml/liter Hyacinth LOF-FT in plant age of first week to sixth week. According to Apzani *et al.* (2017), result of their research showed that Hyacinth LOF-FT was able to

increase plant height and number of leaf of lettuce plants. The positive effect of this treatment proved that Hyacinth LOF-FT contains essential nutrients that can support plant growth.

Table 2. Result of analysis of hyacinth LOF-FT analysis and soil analysis.

Result of Analysis of Hyacinth LOF Analysis and Soil Analysis			
No	Parameters	Hyacinth LOF-FT	Soil treated with application of 55 ml/lt Hyacinth LOF-FT
1	pH	4,77	6,43
2	C-Organic	0,32%	0,74%
3	N-Total	0,15%	0,08%
4	C/N Ratio	2,13	-
5	P-Available	0,10%	30,32 ppm
6	CEC	-	29,47 cmol/kg
7	K	0,41%	4,97 cmol/kg
8	Ca	2540,32 ppm	3,18 cmol/kg
9	Mg	3256,23 ppm	1,58 cmol/kg
10	Na	863,55 ppm	0,73 cmol/kg

Source: Result of Laboratories Analysis by BPTP Province NTB, 2018.

Based on the result of laboratory analysis conducted by BPTP, nutrients content of Hyacinth LOF-FT are listed as shown at Table 2.

In this table can be seen that Hyacinth LOF-FT contain Nitrogen as much as 0, 15%. Nitrogen is an essential nutrient needed by plant growth phase (Apzani *et al.*, 2015).

Nitrogen actas a trigger of protein formation. (Armiadi, 2009), and then it will be stored in plant biomass (Susanti *et al.*, 2008).

Table 3. Significance P-value of onion growth parameters.

Plant Age	P-value			
	Plant Height	Number of Leafs	Weight of Fresh Plant	Weight of Dry Plant
week 1	$1,5 \times 10^{-5}$	4×10^{-5}	3×10^{-8}	$2,4 \times 10^{-6}$
week 2	5×10^{-4}	$1,9 \times 10^{-4}$	$4,6 \times 10^{-7}$	1×10^{-6}
week 3	4×10^{-4}	$1,7 \times 10^{-3}$	6×10^{-5}	3×10^{-6}
week 4	$1,1 \times 10^{-3}$	2×10^{-3}	2×10^{-5}	9×10^{-6}
week 5	4×10^{-5}	$7,3 \times 10^{-5}$	6×10^{-5}	2×10^{-5}
week 6	$4,3 \times 10^{-5}$	7×10^{-6}	$1,6 \times 10^{-7}$	9×10^{-6}
Note :	P-value < 0.05	= significance		
	P-value > 0.05	= not significance		

This is in accordance with a statement of Napitupulu and Winarto (2010) in which nitrogen is essensial nutrient for growth and formation of leaves of onion plants. Since the length of the leaf is an indicator of height of onion plant (Nubuwwah, 2015), leaf growth will affect the data on the parameters of onion plant height. Nitrogen in the form of NO_3^- and NH_4^- is needed in large quantities for the formation of amino acids (Salisburry and Ross, 1995) which will then be assembled into proteins (Windrati *et al.*, 2010) then the protein in sequence will initiate the formation of biomass (Saptiningsih, 2007).

Furthermore, Parnata (2004) states that if plants came through nitrogen deficiency in it growth phase, then the elongation and formation of leaves will be inhibited. In consider that the leaves are the main organ in the photosynthesis process (Lakitan, 2001), nitrogen deficiency will certainly have a bad impact on the assimilation of the onion biomass. Nitrogen contained in Hyacinth LOF-FT also plays a role in the formation of growth hormone in plants (Dewi, 2016), one of the growth hormones formed is aux in which can stimulate plant growth in the vegetative phase (Iswati, 2012).

Table 4. Result of data analysis on onion yield parameters.

Result of Analysis of Plant Yield Parameters				
No	Parameters	Value b	R Square	P-value
1	Number of Onion Seedling	0,06	0,89	$3 X 10^{-6}$
2	Number of Onion Tubers	0,56	0,78	$1 X 10^{-4}$
3	Fresh Tubers Weight	3,35	0,91	$1,5 X 10^{-6}$
4	Dried Storage Tubers Weight of Onion	2,72	0,90	$2,4 X 10^{-6}$
Note :	Value of b-coeffisient	= value of estimated regression		
	R Square $\geq$ 0.8	= very good		
	R Square $\geq$ 0.7	= good		
	R Square $\geq$ 0.6	= prettty good		
	P-value < 0.05	= significance		
	P-value > 0.05	= not significance		

The P-value in Table 3 areas a significance indicator estimated by b values in Table 1. The P-value in Table 3 showed that the b value gained was significant in every single coefficient (b) variable x Hyacinth LOF-FT which is marked with lower P-value compared to the alpha (0.05). That is for the b-value is used to estimate the onion growth.

Fig. 1. Purificatioan *Trichoderma* sp. With PDA Media.

Weight of Fresh Plant and Dry Plant

Results of data analysis (Table 3) show that the weight of the plant was influenced by the Hyacinth LOF-FT treatment factor. This can be seen from the P-value which is smaller than alpha (0.05).

In addition, Table 1 shows the value of R Square tends to be greater than 0.8.It means that more than 80% of the Hyacinth LOF-FT factor affected to the weight of fresh plant as well as to the weight of dry plant.

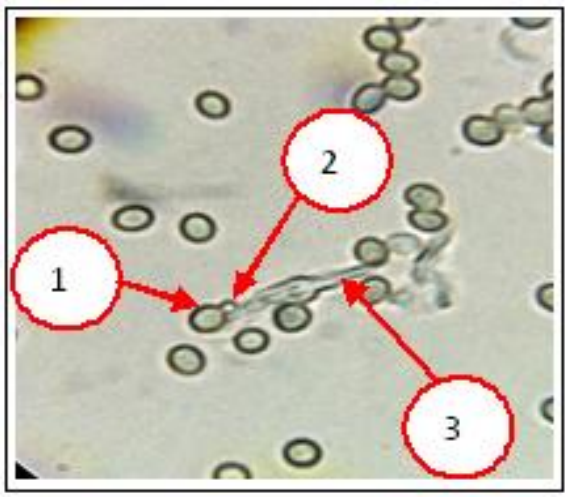

Fig. 2. Morphology *Trichoderma* sp. (1 = phialide, 2 = phialosprore, 3 = konidiofor).

The increasing of the fresh and dry plant weight as much as b value (Table 1), occurred at every application of 1ml/l Hyacinth LOF-FT, which is indicated weekly by positive b-value . The estimation of increasing of fresh and dry plant weight in line with increasing of plant age (Fig. 6 and Fig 7), which is influenced by development of water and nutrient absorption surface of root due to the weekly application of Hyacinth LOF-FT. In the first to fourth week, the value-b of plant was smaller than others, because the plant growth was not optimal yet. While at the fifth week and sixth week. The plant grew obviously with a bigger value-b, which means that the plant gave response positively to the factor of Hyacinth LOF-FT as an in line with the development of plant root absorption.

Fig. 3. Muliplication of *Trichoderma* sp. with Rice Media.

The increasing of fresh and dry plant weight due to Hyacinth LOF-FT treatment indicated that Hyacinth LOF-FT was effectively support onion plant growth. The previous research conducted by Apzani *et al.* (2017) showed that Hyacinth LOF-FT was able to increase lettuce biomass. It came about the Hyacinth LOF contains complete nutrients (Table 2). Results of laboratories analysis of nutrient contents (Table 2), shows that the soil treated by application of Hyacinth LOF at 55 ml/liter comprised multy-essential nutrient needed for plants growth.

The nutrients that has play a role in the process of forming plant weight is phosphorus (P) (Nusantara *et al.*, 2010). Result of research conducted by Sutarwi *et al.* (2013) showed that phosphorus was able to increase the biomass of peanut crops. The phosphorus works by fostering high energy Adenosine Triphosphate (ATP) to support cell metabolism in plants (Simamora, 2007). ATP is used for metabolic processes including the assimilation of biomass in the plant growth phase (Parman, 2007). The results of assimilation are Tran located to all parts of the plant to support the weight of the plant (Simanjuntak, 2000). In addition, phosphorus has charge for assimilate transplants, and transfers energy from photosynthates that are used in other metabolic processes (Liferdi, 2010). It was also reported that these nutrient deficiencies can lead to disruption of the metabolic process of the formation of biomass which has an impact on the low weight of plants (Kasno, 2009),due to of the lack of agents that are useful in transferring energy (Suprianto *et al.*, 2016) and translocating the results of assimilation such as protein, carbohydrates and fats to all plant organs (Marlina *et al.*, 2015).

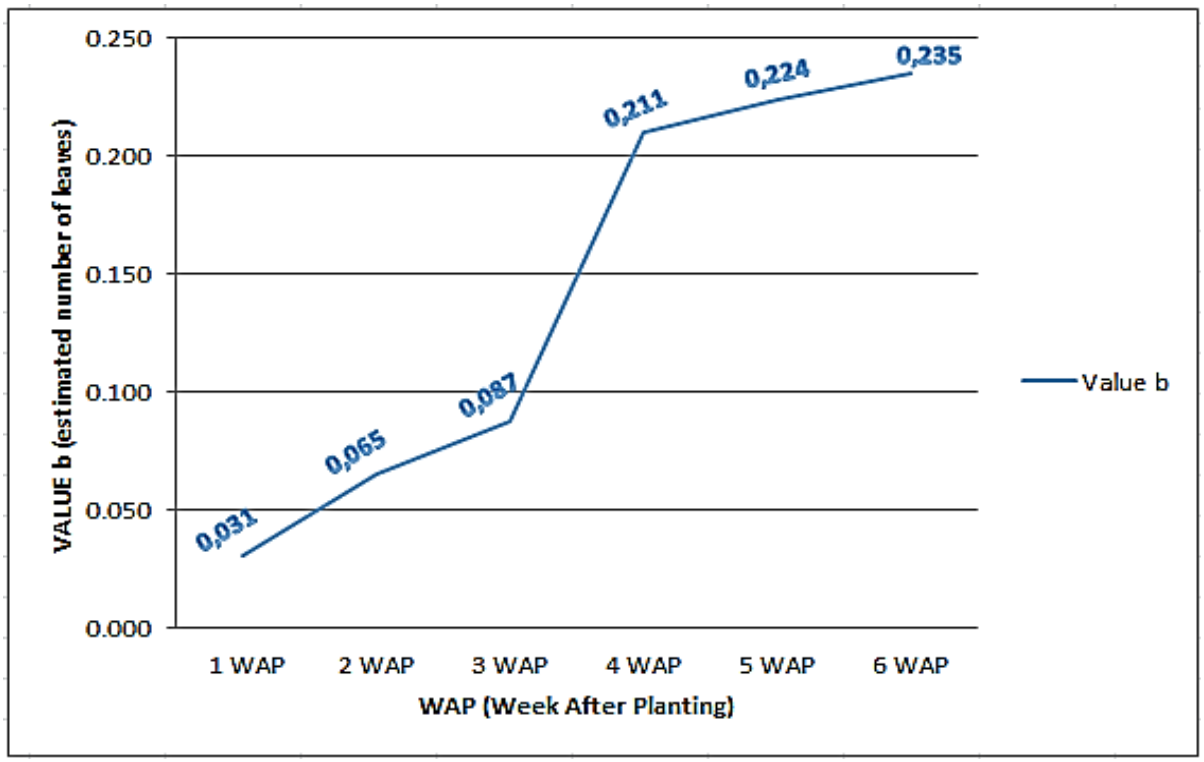

Fig. 4. Sigmoid Curve of Plant Height at Vegetative Phase.

The Hyacinth LOF-FT contains micro nutrients such as Ca, Mg, and Na, as well as macro nutrients (N, P, K) (Table 2) which are play a role in supporting plant growth (Supartha *et al*., 2012). Magnesium (Mg) is a component of chlorophyll (Prihantini *et al*., 2007) which acts as a trigger for CO2 fixation in photosynthesis to produce photosynthates (Ai and Banyo, 2011), which are then Tran located to the roots of plants and shoots, so that initiate the formation of plant biomass (Lakitan, 2007).

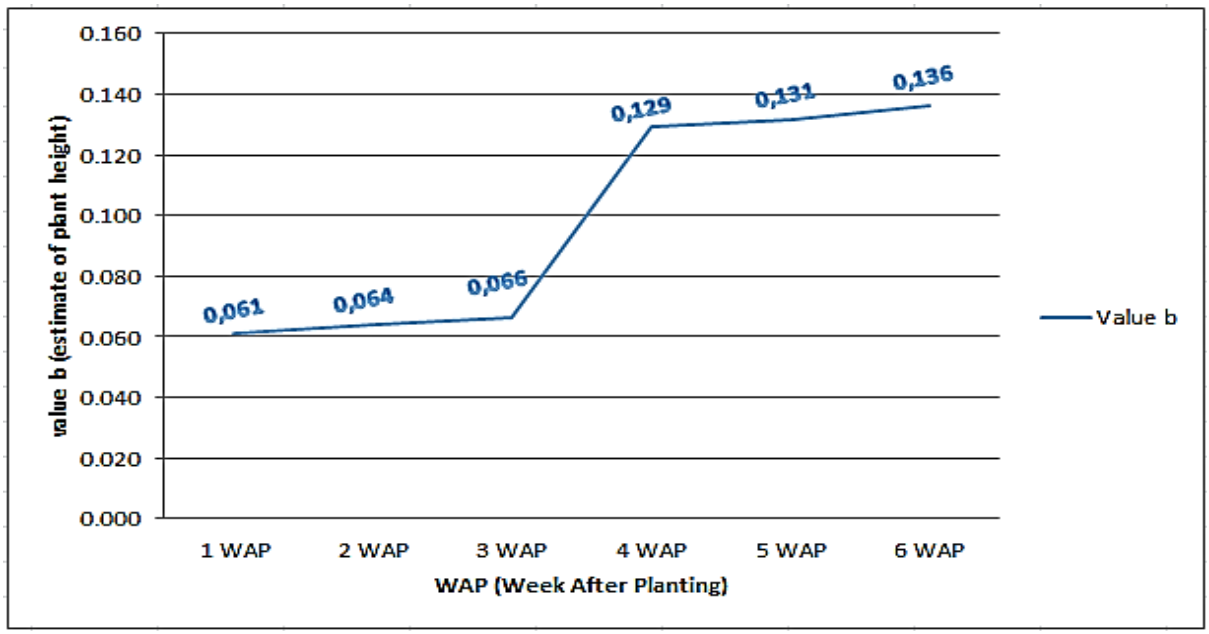

Fig. 5. Sigmoid Curve of Number of Leaf at Vegetative Phase.

The development of plant roots was being initiated by photosynthates, as well as stimulated by the presence of *Trichoderma sp*. (Lestari *et al*., 2007) which is contained in Hyacinth LOF-FT. Suwahyono (2003) stated that the application of *Trichoderma* sp. to the plantwill generate more fibrouse roots (Fig. 8). This happens because *Trichoderma* sp. is able to produce auxin hurmones (Subowo, 2015) which can increase the development of lateral roots and hair roots in onion plants (Casimiro *et al*., 2001), and lead to the optimal nutrient absorption so that it will increase the weight of onion plant.

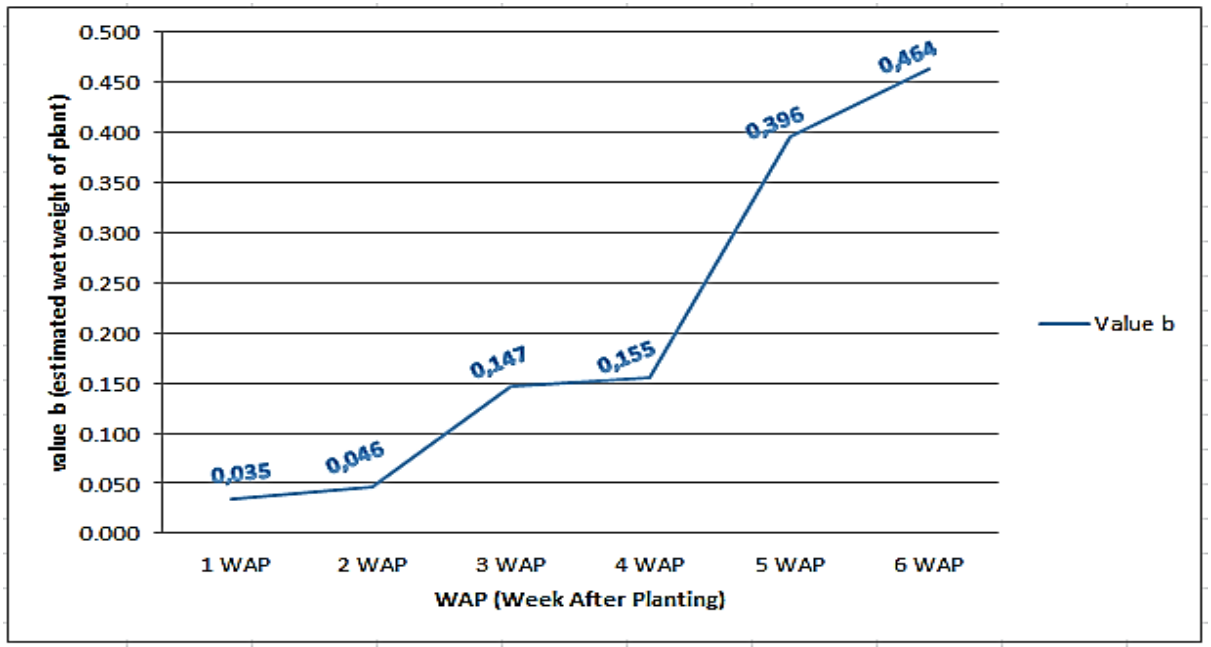

Fig. 6. Sigmoid Curve of Weight of wet Plant at Vegetative Phase.

Results of data analysis on the parameters of onion production (Table 4) show that Hyacinth LOF-FT has a positively and significantly effects on the onion yield which includes number of seedling, number of tubers, weight of fresh tubers and weight of dried tubers. The positive value of b on coefficient of variable x (Hyacinth LOF-FT) has value of R Square which tends to be greater than or equal 0.8 and the P-value is lower than 0.05. These proved that Hyacinth LOF-FT can be applied in onion cultivation and increasing its productivity as well.

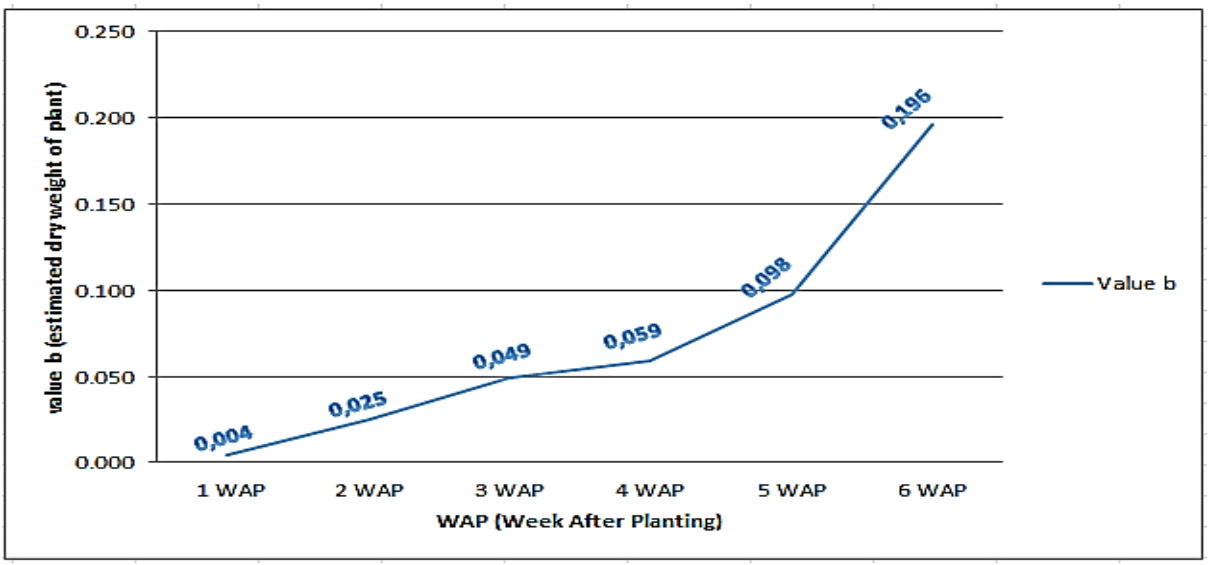

Fig. 7. Sigmoid Curve of Weight of Dry Plant at Vegetative Phase.

See Table 4, the highest b value (3,35) is achieved as an effect of application Hyacinth LOF-FT on weight of fresh onion tuber. Its means that every additional application of 1 ml/liter of Hyacinth LOF-FT, will able to increase the weight of fresh tuber by 3.35 gr. Meanwhile, the lowest b value (0.06) was achieved as an influence of application Hyacinth LOF-FT on number of onion seedling as an the begun of generative phase of onion plants.

This means that every additional application of 1 ml/liter Hyacinth LOF-FT will able to increase the number of onion seedling by 0.06 seedling.

Number of Onion Seedling and Onion Tubers

Result of regression analysis listed in Table 4 showed that the application of Hyacinth LOF-FT had a positive effect on formation of onion seedling and onion tubers. It can be seen from the achievement of values-b at 0.06 and 0.56, which means that number of onion seedling increase as much as 0,06 and number of onion tubers increases as much as 0.56 for every application of 1ml/liter of Hyacinth LOF-FT.

At number of onion seedling parameter, the P-value obtained was 3 X 10^{-6}, smaller than 0.05 and R Square which is obtained 0.89, while at parameter number of onion seedling produces a P-value of 1 X 10^{-4} smaller than 0, 05 and R Square which is obtained 0.78, very close to 0.8. By same interpretation as the previous discussion, it was known that the value-b produced a significant value and fair enough to be used as an estimated value of increasing the number of tillers and the number of onion tubers.

The number of onion seedling is linear to the number of onion tubers, because the onion tubers are a development of onion seedling. The increasing number of onion seedling and onion seedling, which is is influenced by the presence of *Trichoderma sp.,* as said by Ramadhani (2007), thatstated *Trichoderma sp.* can support plant growth by producing auxin at 9,656 µM. Auxin hormones work by pumping H^+ ions to the side of the cell wall so that the pH of the cell wall decreases (Wijayati *et al.,* 2005).

The decrease in pH will activate the enzyme to break the cellulose molecular chain of the cell wall so that water can enter as a result the cell grows bigger (Lakitan, 1996). Furthermore, the cell continues to grow by synthesizing the cell wall and cytoplasmic material (Pamungkas *et al.,* 2009). This certainly will increase the vegetative phase of plant growth that lead to affect the generative plant growth phase.

In addition, *Trichoderma sp*. also able to produce giberelin hormones (Mariani and Musleh, 2017).Giberelin has an important role in the formation of onion tubers (Nursayuti, 2018). This hormone plays a role in optimizing the generative plant growth phase such as onion seedling and onion tuber (Wulandari *et al*., 2014).

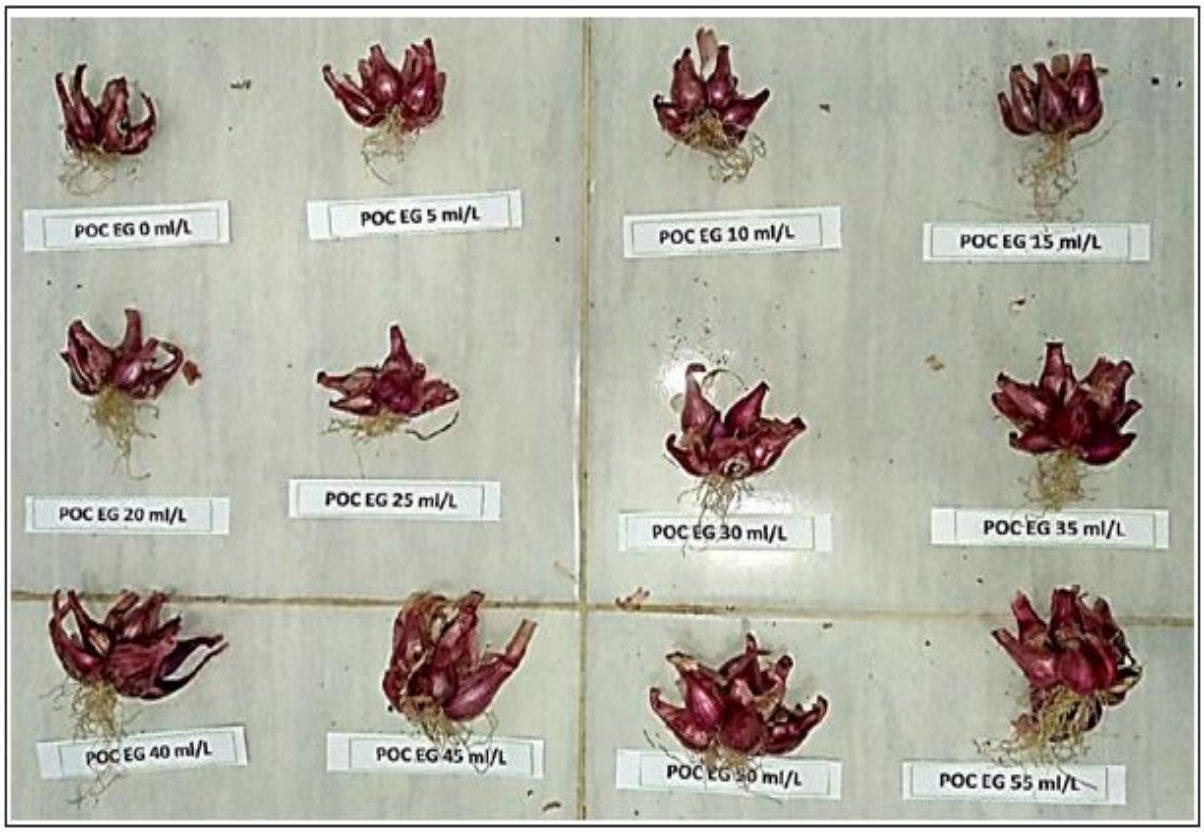

Fig. 8. Comparative Visualization of Root Growth at Each Dose Treatment of Hyacinth Liquid Organic Fertilizer Fermented by *Trichoderma* sp.

This hormone can trigger cell division and enlargement (Gardner *et al*., 1991). And then these will increase the weight and the number of onion tubers. Beside, being influenced by *Trichoderma* sp., the development of onion tubers is also affected by the soil which has important role for nutrient availability, especially in terms of cation exchange capacity (CEC) (Nursyamsi, 2006). As shown in Table 2, the soil treated with Hyacinth LOF-FT at a dose of 55 ml/l had a CEC of 29,47 cmol/kg. This happens because organic fertilizer can increase soil CEC (Suntoro, 2003) through its carboxyl (-COOH) and phenolic (-OH) groups (Brady, 1990). The mechanism of cation exchange begins with the occurrence of carboxyl hydrolysis characterized by the presence of H^+deprotonization of carboxyl (COOH) groups due to the presence of hydroxide ions (OH^-) (Wahyudi, 2009). This causes the carboxyl group to become negatively charged (COO^-) which is very reactive to bind nutrient cations (Tangio, 2013). After saturation of the nutrient cations achieved, the nutrient is released from the carboxyl group and can be absorbed by the plant root (Apzani *et al*., 2015). Nutrients absorbed by plants are then immediately converted into amino acids and eventually assembled into structural proteins (Winarni *et al.,* 2015) with differentiation into various plant organs including tubers (Surtinah and Mutryarny, 2013).

This has a positive impact on the growth and development of onion seedling and tubers *Fresh Tubers Weight and Dried Storage Tubers Weight of Onion*.

The results of data analysis in Table 4 show that Hyacinth LOF-FT has a positive and real effect in increasing the weight of fresh tubers and dried storage tubers. These can be seen from the positive value-b of 3.35 for fresh onion tubers weight, and 2.72 for the dried storage tubers weight.

It is also known that the R Square values of both variables were 0.91 and 0.90 (greater than 0.8), which means that the fresh onion tuber weight and dry storage onion tubers weight were 91% and 90% were influenced by Hyacnth LOF-FT and the rest was influenced by external factors. The P-value that lower than alpha (0.05) strengthens the estimation that the significance of b value is considered to calculate the increase of tuber weight on harvest at every application of 1 ml/l Hyacinth LOF-FT.

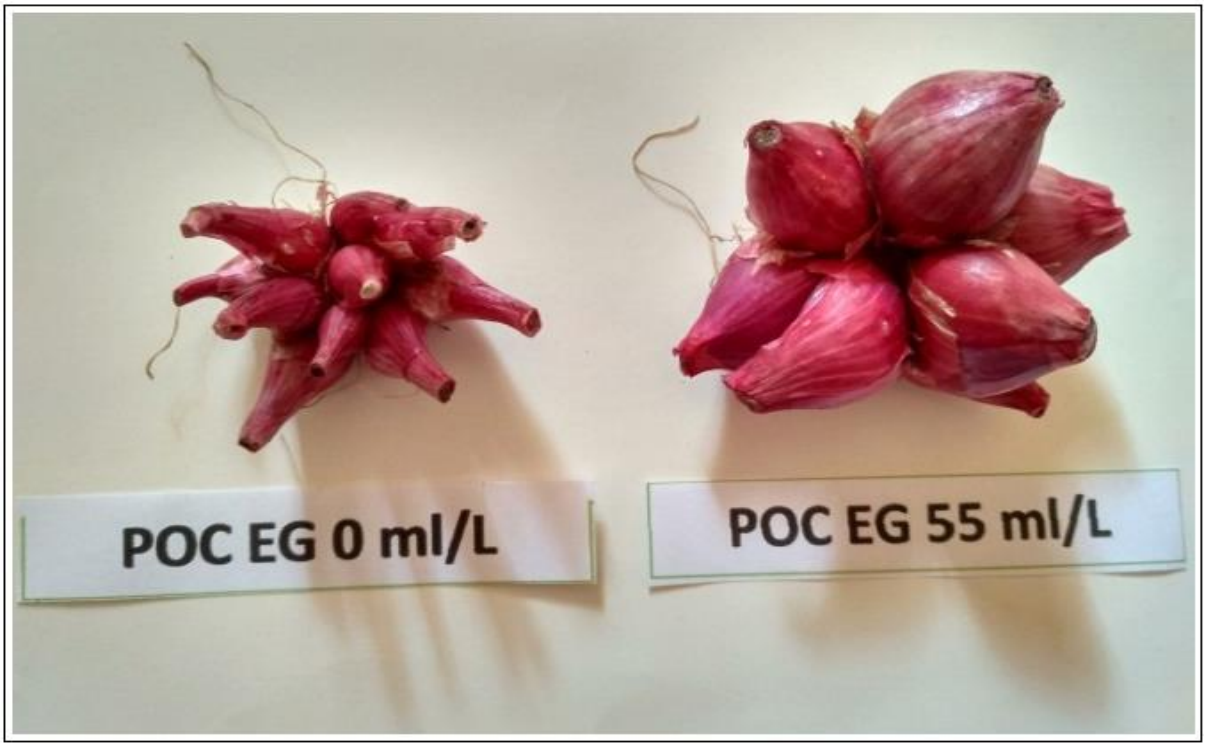

Fig. 9. Comparative Visualization Biomass of Onion Tubers at Dose Treatment 55 ml/l Hyacinth LOF Fermented by *Trichoderma* sp.

Tuber weight is an indication of nutrient absorption efficiency as the main ingredient for the formation of plant tuber biomass (Saptiningsih, 2007). The availability of essential nutrients in soil is determined by organic acids (Irawan *et al*., 2016) contained in Hyacinth LOF-FT, which is characterized by a low pH value of Hyacinth LOF-FT (pH = 4.77, see Table 2). Organic acids such as humic acid and Fulvic acid (Yelianti *et al*., 2009) are the result of decomposition of organic matter (Syam, 2008). These organic acids can produce organic anions which can bind Al, Fe and Mn metal ions from soil colloids (Harahap *et al*., 2013), that will form chelating organ metal complexes (Raka *et al*., 2012) which causes the release of essential nutrient ions from the absorption of metal ions (Raharjo *et al*., 2007). It was also reported that fulvic acid has a relatively small molecular size so that it can penetrate through the canopy by carrying micro nutrients into plant tissues (Suwahyono, 2011). These can support the availability and adequacy of nutrients for the growth and development of onion tubers.

The development of onion tubers is also influenced by potassium nutrient (K) which is contained in Hyacinth LOF-FT of 0,41%, as stated by Gunadi (2009) that potassium nutrients in onion plants can

provide better tuber yield, and tubers remain solid even stored for a long time. Potassium plays a role in the tuber enlargement process (Suminarti, 2010) in the mechanism of action as an enzyme cofactor (Azman *et al.*, 2017), assist in the metabolism of carbohydrate formation (Subhan *et al.*, 2009), translocate photosynthate to the root (Mulyadi, 2012), ensuring the roots still absorb water optimally (Poerwowidodo, 1992), and assist in enlargement of cells (Wandana *et al.*, 2012). Due to many functions it has so as to make potassium very important in biomass metabolism, especially for the development of onion tuber. Besides containing essential nutrients, Hyacinth LOF-FT also contains vitamin compounds that are good for plant cell development. As stated by Sulistyorini (2005), results of fermentation of organic material by microorganisms can be in the form of vitamins.

According to Widiastoety *et al.* (2009), vitamins play a role in cell growth as a catalyst in the metabolic process. It was also reported that vitamins can stimulate root growth (Limarni *et al.,* 2008), which will have a positive impact on the area of nutrient absorption by the roots. Water and nutrients are absorbed through the roots with the mechanism of simplas and amylop last flow (Haryanti *et al.,* 2009), then nutrients are brought to the ribosome to be synthesized (Agustina *et al.*, 2011) or to be assembled together with photosynthetic organic compounds into various assimilates (Apzani, 2015).In addition, asymylate is distributed to all parts of the plant through floem (Muna, 2012), then asimilat is accumulated to form the weight (biomass) of tubers in the generative phase of onion (Fatimah and Handarto, 2008). Thus, Hyacinth LOF-FT is very useful in supporting the production of onion plants (Fig. 9) on Lombok Island.

Conclusion

From the results of this study can be obtained the highest b value on the parameters of the results of Fresh Tubers Weight of 3.35 and the best dose is 55 ml/liter LOF-FT. With the acquisition of the b coefficient which is always positive and P-value <0.05 and R Square tends to ≥ 80%, the conclusion of the results of this study is LOF-FT fermented *Trichoderma* sp. provide a positive and significant impact on the growth and yield of shallots in the province of West Nusa Tenggara. Then it is recommended to increase the concentration of LOF-FT solution to be more concentrated, and to analyze the content of organic acids and vitamin content in this product.

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