

**EFFECTS OF ORGANIC FERTILIZER TYPES AND DOSAGE ON BIOLOGICAL PROPERTIES OF SOIL, GROWTH AND PRODUCTS OF ONION (*Allium ascalonicum* L.) OUTSIDE THE PLANTING SEASON IN BUAHAN VILLAGE, BALI, INDONESIA**

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**ABSTRACT**

Planting shallots in Buahon Village is only carried out once a year, namely in July. The continuous use of synthetic fertilizers at high doses without being balanced with natural fertilizers has degraded the land so that soil fertility has decreased. The negative impact caused is a decrease in the yield of shallots. Quality organic fertilizers can overcome this problem. Organic vermicompost and bioslurry fertilizers are quality organic fertilizers that can replace synthetic fertilizers to increase the growth and yield of shallots. The research objective was to determine the growth and yield of shallots by giving the type and dose of organic fertilizers outside the growing season. The research was conducted from March to July 2019 in Buahon Village, Kintamani District, Bangli Regency. The study used a simple randomized block design with one factor with 6 treatments, namely B<sub>0</sub> (Without Organic Fertilizer), B<sub>1</sub> (2000 kg / ha vermicompost); B<sub>2</sub> (1000 L / ha bioslurry) B<sub>3</sub> (1000kg / ha vermicompost + 500 L / ha bioslurry); B<sub>4</sub> (4000 kg / ha vermicompost); B<sub>5</sub> (2000 L / ha bioslurry); B<sub>6</sub> (2000kg / ha vermicompost + 1000 L / ha bioslurry); B<sub>7</sub> (4000 kg / ha vermicompost + 2000L bioslurry) and B<sub>8</sub> (5000 kg / ha vermicompost + 3000L / ha bioslurry). The parameters observed were plant height, number of tillers, tuber wet weight per clump, harvest dry weight of tubers per clump and number of cloves per clump, soil pH, N-total (%), C-organic and total population of soil microorganisms. The results showed that the type and dose of organic fertilizer had a significant effect on all the meters observed. Treatment of 5000 kg / ha vermicompost + 3000L / ha bioslurry gave the highest yield, namely 56.8 g per clump, 60% higher than the control 35.5 g per clump.

*Keywords:* Bioslurry, organic fertilizer, shallot, vermicompost

**INTRODUCTION**

Bali province's shallot production in 2019 according to the Agriculture Service quoted from BPS (2019) was 19,687 tons, with an average yield of 10 tons per ha. Buahon Kintamani Village with Lake Batur is a leading tourist area in Bali, also known as the center for

producing highland shallots in Bali. Buahon Village only grows shallots once a year, from July to August. The reason is, since ancient times the habit of planting between July and August has not been carried out from generation to generation outside that month. This is because at the age of 1 to 2 months it

started raining so that growth was disrupted and the attack of pests was very high (interview with farmer). The use of synthetic fertilizers and pesticides is very high without being balanced with organic fertilizers, high costs and contamination of soil and lake water by chemical waste. This causes soil degradation so that its fertility decreases, followed by a decrease in shallot yield by 8 tons per ha.

Onion yields can be increased again by improving environmentally friendly cultivation systems using organic fertilizers. This is in accordance with the results of Wididana's research, 1994 that organic fertilizers improve the physical, chemical and biological properties of soil and the residue does not have a negative impact. This is supported by Laude and Hadid, 2007, that the application of organic fertilizers does not have a residual effect that damages the soil. One of the roles of organic fertilizers is to improve soil quality, the soil structure into crumbs is very suitable as a living medium for shallots. The solution is the use of quality organic fertilizers such as vermicompost organic fertilizer combined with bioslurry can improve the physical properties, chemical biology of the soil, growth and yield of shallots. The problems are (1). Can the type and dose of organic fertilizer increase soil pH, total N and organic C ?; (2). Can the type and dosage of

organic fertilizers increase the growth and yield of shallots?. The aim of the study was to determine the effect of vermicompost and bioslurry on soil biological properties, growth and yield of dairy onions in Buahan village.

## MATERIALS AND METHODS

The research was conducted in Buahan Kintamani Village from April to July 2019. Materials and tools: vermicompost, bioslurry, onion seeds, vegetable pesticides, water, hoe, gembor, shovels, scales, buckets, meters. This study used a randomized block design with a simple pattern consisting of one factor of 9 treatments, were B0 (Without Organic Fertilizer), B1 (2000 kg vermicompost per ha); B2 (1000 L bioslurry per ha) B3 (1000 kg vermicompost + 500 L bioslurry per ha); B4 (4000 kg vermicompost per ha); B5 (2000 L bioslurry per ha); B6 (2000kg vermicompost per ha + 1000 L bioslurry per ha); B7 (4000 kg vermicompost + 2000L bioslurry per ha) and B8 (5000 kg vermicompost + 3000L bioslurry per ha), if the significant effect is followed by LSD test. The meters observed were plant height (cm), number of tillers (fruit), tuber wet weight per hill (kg), tuber dry weight per hill (kg) and number of cloves per hill, soil pH, N-total (%), C-organic, and C / N ratio.

The research began with clearing the

land to be planted from grass, plant debris, and rocks that interfere with plant growth. Then the land is processed and loosened using a hoe with a depth of 20 cm so that the roots of the onion plant can grow well. The size of the beds is 1m x 1m and the distance between the beds is 30 cm and between blocks the distance is 50 cm. The vermicompost organic fertilizer is given during soil processing. Bioslurry given at planting, 1 week, 2 weeks, 3 weeks and 4 weeks of age. Bulbs are used with seeds with the same size criteria and relatively the same weight. Tubers cleaned of dry roots and leaves. Seedlings are soaked in water a few hours before planting. Spacing 20 x 20 cm. Plant 1 seed per planting hole. Watering is done until the plants are 4 weeks after planting

Embroidering early growth at the age of 7 days after planting by replacing rotten tubers with healthy tubers. The aim is to control weeds that grow in the treatment beds and around the experimental area. Weeding on the treatment beds was done manually and around the hoe experiment area. Heading is done at the age of 4 to 7 weeks after planting (every week). This aims to keep the plants from collapsing, creating a suitable environment for tuber growth. Disease control is carried out by spraying vegetable pesticides made by farmers on all parts of the plant, this is done for control. Harvesting is done at the age of 70 days after

planting (HST) when the soil is dry to avoid disease by pulling out the entire plant by hand and then cleaning the roots and soil.

Harvesting is done when 70% of leaf necks are limp and dense tubers are sticking out, and the skin color is shiny. This can be seen when the plants grow 69 days after planting so that they are harvested at 69 days old. How to harvest by pulling all the plants, the roots and soil is cleaned. Drying is done for 2 weeks, spread on the floor.

## RESULTS AND DISCUSSION

### Result

Table.1 Average Results of Soil Analysis After Harvest

Treatment	Soil pH	N-total (%)	C-organic(%)	C/N ratio
B0	6,00 c	0,10 b	0,95 c	9,50 a
B1	6,15 c	0,17b	1,30 b	7,65 ab
B2	6,10 c	0,12 b	1,10 c	9,16 a
B3	6,15 c	0,17 b	1,25 bc	7,35 ab
B4	6,25 b	0,19 b	1,45 b	7,63 ab
B5	6,15 c	0,15 b	1,15 c	7,67 ab
B6	6,45 a	0,25 ab	1,70 a	6,80 b

Table 2. Average growth and yield of shallot plants Harvest Dry Weight (g / clump)

Treatment	Plant Height (cm) 7 DAS	Number of tillers (fruit) & DAS	Wet Weight (g / clump)	Harvest dry weight (g/clump)
B0	34,06 b	5,55 ab	35,50 c	30,37 c
B1	34,75 b	5,96 ab	40,83 c	33,98 c
B2	34,40 b	5,68 ab	38,64 c	31,79 c
B3	34,76 b	5,99 ab	40,68 c	36,03 c
B4	35,21 ab	6,64 a	45,76 bc	38,98 bc
B5	34,70 b	5,59ab	40,87 c	34,02 c
B6	36,30 a	6,62 a	48.64 b	41,97 b
B7	36,65 a	6,80 a	55,94 a	48,78 a
B8	36,90 a	6,99 a	56,80 a	49,95 a

The treatment has a significant effect on all observed parameters. The degree of soil acidity (pH) in control (B0) 6.00, an increase in B8 (6.70), an increase of 0.70 (11.67%). N-total in control (B0) 0.10% and the highest at B8 of 0.45%, an increase of 0.35%. C-organic in the

control (B0) was 0.95% and the highest was B8 1.95%, an increase of 1%. C / N ratio in the control (B0) was 9.50% and the lowest was at B8 4.33%, there was a decrease of 5.17 % .Kascing and biosllury can increase pH, N-total and C-organic and can lower the C / N ratio which provides excellent environmental conditions for shallot plants.

### **Discussions**

Plant height, number of tillers, wet weight at harvest and harvest dry weight were the lowest in the control and the highest was given by giving 5000 kg of vermicompost and 3000 L of biosllury per ha. This is because vermicompost is an organic fertilizer as well as biological fertilizer which when given can be absorbed directly by the plant. and to meet the needs of nitrogen by giving biosllury which is given gradually every week starting 1 week after planting until the plants are 6 weeks old (5 times). The results achieved are strongly supported by soil conditions whose fertility quality is improving with the application of vermicompost and biosllury. It is proven that there is an increase in pH, N-total, C-organic and a decrease in C / N ratio.

The degree of soil acidity (pH) increases because organic fertilizers can function as a buffer so that the soil pH can be maintained close to neutral. N-total soil can increase

because the activity of microorganisms such as azotobacter increases due to the addition of organic fertilizers, because organic fertilizers are a source of energy for microorganisms in the soil. C-organic increases due to increased humus levels due to the addition of organic fertilizers. The C / N ratio decreases due to the increased activity of microorganisms, this greatly affects the availability of nutrients for plants.

### **CONCLUSION**

Organic vermicompost and biosllury fertilizers can increase soil pH, N-total, C-organic and C / N ratio. Organic vermicompost and biosllury fertilizers can increase plant height, number of tillers, wet weight and dry weight of garlic harvest. The dry weight yield of control harvest was 30.37 g / clump and treatment of 5000 kg and 3000 kg per ha of 49.95 g / clump increased by 19.58 g / hill, not different from treatment of 4000 gk vermicompost + 2000L per ha and 2000 kg vermicompost and 1000 L per ha.

### **SUGGESTION**

Research needs to be repeated at different months in Buahana Village. In the meantime, 2000 kg of vermicompost and 1000 L of biosllury per ha can be suggested.

## REFERENCES

- Jeanne P. and A. Pinari. (2015). Growth and production of shallots (*allium ascalonicum* l.) Based on bovine biourine applications. *Eugenia*, 21 (3) October 2015
- Mulyani, O, E. Trinurani, A. Sandrawati. (2007). Effect of Municipal Waste Compost and Chicken Manure on Several Chemical Properties of Soil and Sweet Corn Yield in Fluventic Eutrudepts Asla Jati Nangor, Sumedang Regency. Research Institute, Faculty of Agriculture, Padjajaran University, Bandung
- Napitupulu, D and L. Winarto. (2009). The Effect of N and K Fertilizers on the Growth and Production of Shallots. *North Sumatra Agricultural Technology Research Institute, J-Hort*. 20 (1): 22-35 2010.
- Nizar, M. (2011). The Effect of Several Types of Organic Ingredients on the Growth and Yield of Rice Using the SRI Method. Accessed from (<http://faperta.unand.ac.id/solum/v08-1-03-p19-26.pdf>). January 5, 2013.
- Rahman, A. Nugroho and R. Soeslistyono. (2016). Shallots (*allium ascalonicum* l.) In land and polybags with various kinds and doses of organic fertilizers. *Journal of Plant Production* Vol. 4 No. 7, October 2016: 538-546 ISSN: 2527-8452
- Sudaryono. (2000). Level of Surface Water Pollution at the Yogyakarta Regional Military Command. Research Staff of the Directorate of Environmental Technology, BPPT. *Journal of Environmental Technology*. Vol. 1 No. 3.
- Sumarni, N., Rosliani R., Basuki. R. S., and Hilman Y. (2012). Effect of Soil Varieties, K-Soil Status and Doses of Potassium Fertilizer on the Growth of Tuber Yields, and K Nutrient Uptake of Shallot Plants. *Horticulture Research and Development Center*. Jakarta. *J-hort* 22 (3):233-241, 2012.
- Susanto, R. (2002). *Application of Organic Agriculture*. Canisius. Yogyakarta.
- Valentina T., A. Fariyanti, N. Tinaprilla. (2016). Analysis of Farmers' Perceptions of the Use of Local and Imported Shallot Seeds in Cirebon Regency, West Java. *Journal of Extension*, March 2016 Vol. 12 No. 1