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Utilization of Biodegradable Fabric Waste Compost as Fertilizer for Shallots (Allium cepa L. var. Aggregatum)

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Abstract: *The fast fashion industry is a fashion model that alternates over a short period. One of the efforts to overcome the problem of reducing fast fashion waste is to apply the circular economy concept. Composting from fabric waste is biodegradable, making this a revolutionary solution for the circular economy. So, it can handle water pollution to a minimum value, fabric waste treatment must be separated from the biodegradable materials. Standard SNI 19-7030-2004 compost with specifications, among others, from domestic organic waste that can be used as fertilizer. This study applies compost from biodegradable cotton fibre waste as a result of curing its accompanying material for 30 days. Vegetable and fruit waste materials, husk charcoal, yard soil and EM4 bio activator were used to accelerate the composting process. The results of biodegradable fabric compost are used as fertilizer for shallots (Allium cepa L. var. Aggregatum) of the green stone variety. Soil pH conditions were observed for 30 days based on the P0, P1 and P2 treatments and the average real results were 5.5 – 6, 8. Onion cultivation using biodegradable fabric compost was proven to have positive effects. Tested based on plant physiology, namely the content of chlorophyll a and b leaves at DAT, which is 30 days. The value of plant leaf chlorophyll is control C_a= 0.031 (mg/g), C_b=0.007(mg/g). Shallots from the treatment of compost weight of 200gram and 300 grams, the values of chlorophyll a (Ca-0.0018 mg/g) and C_b were significantly different around 0.007mg/g. Chlorophyll a was tested because of the interaction of fabric compost from the treatment of 200 grams and 300 grams, there was no significant difference. The plant stem height between treatments of 300gram (P_2) cloth compost, the highest value was 29.83 cm.*

Keywords: Circular economy, biodegradable fabric compost, Shallot(Allium cepa L. var. Aggregatum), pH.

I. INTRODUCTION

The fashion industry is the second largest contributor to pollution after the oil industry in the world. The cycles of the fashion industry tend to be short and unstable. Currently, the development of the fashion industry in Indonesia tends to adapt to the world fashion styles, for example from New York, London, Milan and Paris [1]. The fashion industry is currently a primary need with an 18.01% share in influencing potential consumers when deciding to buy a product. In Indonesia, the fashion industry is one of the creative economy industries with the category of Gross Domestic Product. With this creative economy sub-sector, the fashion industry has become very strategic with many jobs being absorbed. In addition, the human resources absorbed in it can provide ideas and knowledge to increase fashion production [2]. The most produced products from the fashion industry are clothing [3]. The textile industry is one of the top 10 industries in the world that pollutes water, soil and air. Based on research from the Boston Consulting Group, in 2015, the water consumed by the fashion industry in clothing was about 79 billion cubic meters of water [4].Furthermore, releasing 1.715 million tons of CO2 and producing 92 million tons of waste. The fashion industry is divided into two, namely fast fashion and sustainable fashion. The fast fashion industry category of the textile industry is a fashion model that alternates with a very short period with poor quality raw materials. The negative impact of the fast fashion industry on the environment is also very large for the safety of its workers. The fast fashion industry is mostly carried out in developing countries, one of which is Indonesia [5]. The environmental impact of fast fashion is because it uses cheap and dangerous textile dyes, and pollutes water which poses a risk to environmental health. Polyester is a raw material

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that is widely used from fossil raw materials [6]. Conditions caused by polyester material when washed result in the emergence of micro-fibres, thereby increasing the amount of plastic waste. While cotton requires a lot of water and is mixed with pesticides that endanger the health of workers. In addition, because of the great amount of water usage, there is a risk of drying out and a decrease in soil quality. The fast fashion industry encourages someone to shop often because it always produces the latest models [7].The phenomenon of fast fashion harms environmental sustainability. The short usage life of a product is a problem in regards to the waste generated. The wasted waste is accumulated during 1 year of production so that it becomes overriding the sustainability of environmental sustainability for economic benefits. One of the efforts to overcome the problem of increasing fast fashion waste is to apply the circular economy concept. Circular economy concept of closed circle economy. An economic order by using resources, raw materials and finished products that can be recycled for a long period. The main thing is that the resulting minimum waste is disposed of in the environment. The circular economy concept is 5R(Reduce, Reuse, Recycle, Recovery, Repair). The term with the application of a circular economy in the fashion industry emphasizes the end of the cycle is the beginning of a new regeneration [8]. Composting from fabric waste is biodegradable, making it a revolutionary solution in treating water pollution to a minimum. Processing waste into compost is one simple way that involves microorganisms. The composting process starts in the household environment without special equipment and is safe for the environment. One of the functions of compost is to increase soil fertility for the benefit of plant growth. According to SNI 19-7030-2004 specifications for compost from domestic organic waste application waste, solid waste is considered useless and must be managed so as not to harm the environment [9]. In the composting process, the biodegradable fabric waste material is sorted by the type of cotton that has the ability to bioprocess with cellulose fibre (plant fibre). Plant fibre cloth waste is included in the group of organic waste that can provide a natural cycle for the environment [10]. However, cotton fibres from fabric waste cannot simply be absorbed by microorganisms because the manufacturing process, dyeing and other supporting materials are also a concern in composting. The cloth waste used in this study is sorted and chopped so that it becomes easily absorbed in the decay process when mixed with household waste materials, namely vegetables and fruit [11]. The composting process is carried out by using cotton fabric fibres that have been sorted no more than 25% from other mixed materials. The purpose of this study was to apply compost from biodegradable cotton fibre waste which was composted for 30 days with a mixture of vegetable and fruit waste materials, as well as husk charcoal to fertilize shallots. The measuring parameters used in this application are onion germination, leaf chlorophyll content, stem height, and several tillers. The soil media used in the compost application process is not added with chemical fertilizers. Compost from curing biodegradable fabric waste is used as organic fertilizer for shallots. This biodegradable fabric compost can be used as food for microbes, fungal worms and other living things in the growing media.

II. Research Methods

This research was conducted at the Plant Breeding Laboratory at Brawijaya University, Malang, East Java, Indonesia. The time of research was carried out from April to July 2022. The research was carried out in two stages, namely composting biodegradable fabric waste using a plastic container with a hole at the bottom so that the water given in the composting process could flow out. The plastic container with a size of (50x25x30) cm. The composition of the composting of biodegradable fabric under layers of husk charcoal, vegetable and fruit waste, mature manure, and rags that have been washed and cleaned of plastic materials are then cut into small pieces. The addition of water mixed with EM4 so that the compost can decompose quickly with the help of local microorganisms (EM). Composting is made from biodegradable cotton fabric waste with a composition (1:1:1), meaning that the capacity of the composting container is regulated, except for the weight of the fabric waste, which is about 30 grams. The compost is stirred every 2 days and the changes are observed until the biodegradable fabric begins to decompose for about 30 days. After 30 days, the compost appears to have begun to ripen and is separated from the non-biodegradable material and cleaned about 5% of the non-biodegradable material from the whole compost mixture. The compost is not exposed to direct sunlight but is sufficient to suppress the growth of fungi. After 5 days of drying, the compost is suitable for use as plant fertilizer. Quality test of biodegradable fabric compost used as fertilizer for shallot seeds ((Allium cepa L. var. Aggregatum)). Shallots used from superior varieties of Batu ijo. The Batu ijo variety was used to test biodegradable fabric compost by observing plant height, leaf chlorophyll content, and the number of onion tillers. This study used 3

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pots with a diameter of (30x40)cm. Each pot was set to P0 (control), P1 (200 grams of cloth compost), and P2 (300 grams of cloth compost fertilizer). Each pot is filled with a mixture of loose soil, husk charcoal and manure. Except for pots P1 and P2 without manure, only compost made from mature compost made of biodegradable cloth. Each pot is filled with 4 onion bulbs with a distance of 5 cm between the bulbs. Watering is done every 2 days by testing the quality of the soil pH in the pot as well as temperature and humidity. The end of the tuber is cut off by 1/3 part and inserted into a 7 cm deep hole. Next, the tubers are buried and covered with soil.

III. Discussion Analysis

Fertilizer is the main source of nutrients that increase the growth and production of shallots. Nutrients can show certain symptoms in plants, especially if these elements are reduced in plant media. The compost fertilizer used from biodegradable fabric waste is expected to encourage the formation of chlorophyll in shallots, as well as the formation of root nodules. The results of the growth test showed a significant effect on the parameters of plant height and the number of plant leaves. Plant height was measured from the soil surface to the tip of the highest leaf. The number of leaves was observed from 5 to 30 days of age. The data on the average number of leaves per onion per bulb obtained is following the graph in Figure 1.

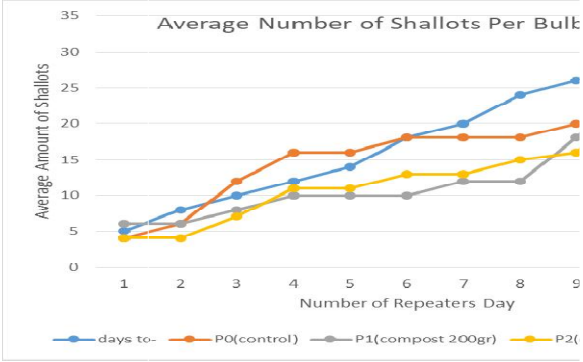

Figure 1. Graph of Average Number of Shallots on Day -30

Based on observations from day 5, the average number of leaves per bulb was growing with the day after planting (DAT) the real difference was that on day 24 the provision of cloth compost between 200 grams and 300 grams in onion plant pots was significantly smaller than the amount. the leaves that grow are between 12.8 strands. While the control P0 without fabric compost was 11.2 strands. The humidity of the growing media between (50-60)% was measured every two days with watering every day in the morning. While the height of the stem on the plant gives a change value as shown in the graphs of the data on the height of the stem from the soil surface and the longest leaf was tested on the 24th day of the average measurement on tubers with the same number of tillers.

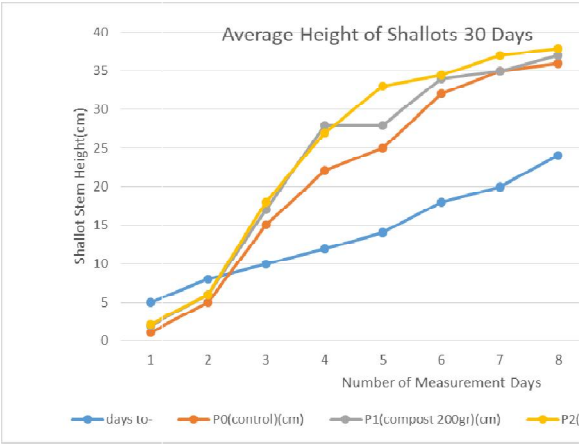

Figure 2. Average Height of Shallot Day 24

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From Figure 2, the treatment of biodegradable fabric compost as a fertilizer mixture obtained a better average height than the control. P1 (200gram fabric compost) and P2 (300gram fabric compost) were significantly different from the control results. The average plant height at P2 (biodegradable fabric compost) was 29.83 cm from HST planted shallot seedlings. Environmental factors as well as the intensity of the sunlight can affect the growth of this onion. Shallot seeds grown in this application are also influenced by loose soil, the level of aeration (porosity) of soil containing nutrients according to the needs of shallots. Soil pH conditions were also observed for 30 days from three treatments and measured with a soil pH meter every 2 days the average obtained was between 5.5 – 6.8 for the planting medium. Shallot cultivation requires crumb soil that has a medium to clay texture and contains high organic matter. In addition to soil nutrient conditions, the plant's physiological chlorophyll a and b leaves were observed on the day after planting, which was 30 days. Leaf chlorophyll in plants gave a control value of C_a = 0.031 (mg/g), C_b = 0.007 (mg/g). Meanwhile, the red onion compost treatment with 200gram and 300-gram values of chlorophyll a(Ca-0.0018 mg/g) and C_b was significantly different about 0.007mg/g. Chlorophyll due to the interaction of fabric compost from a capacity of 200 grams and 300 grams did not show a significant difference. Meanwhile, chlorophyll b is due to the average treatment received on shallots so that the results of the treatment of biodegradable fabric compost are not too different. The results of this study showed that the growth of shallots from the treatment of mature compost from the application of biodegradable cloth waste gave a positive response to the growth of shallots of the Batu ijo variety. Biodegradable fabric compost can hold water to regulate the moisture quality of the onion growing media.

REFERENCES

[1]. Mukono, H. J. (2020). Analisis Kesehatan Lingkungan Akibat Pemanasan Global. Airlangga University Press.

[2]. Ritonga, M. (2021, December). Upaya Mengurangi Pengangguran Melalui Ekonomi Kreatif. In Prosiding Seminar Nasional Pengabdian Kepada Masyarakat (Vol. 2, No. 1, pp. SNPPM2021EK-61).

[3]. Kristiana, S. U., & Dian Retnaningdiah, S. E. (2014). Upaya Pengembangan Ekonomi Kreatif melalui Usaha Kecil Tenun Lurik ATBM. Kompetensi Jurnal Ekonomi, Manajemen dan Akuntansi, 12(2), 39-48.

[4]. Kant, R. (2011). Textile dyeing industry an environmental hazard.R. E. Sorace, V. S. Reinhardt, and S. A. Vaughn, "High-speed digital-to-RF converter," U.S. Patent 5 668 842, Sept. 16, 1997.

[5]. Nidia, C., & Suhartini, R. (2020). Dampak Fast Fashion Dan Peran Desainer Dalam Menciptakan Sustainable Fashion.

[6]. Sulasih, L. I., Fasa, M. I., & Suharto, S. (2022). Analisis Kesadaran Industri Fashion dalam Upaya Meningkatkan Sustainable Development Goals (SDGs) melalui Produksi dan Konsumsi Sustainable Fashion Menurut Perspektif Ekonomi Islam. Youth & Islamic Economic, 3(02), 1-18.

[7]. Shogren, R., Wood, D., Orts, W., & Glenn, G. (2019). Plant-based materials and transitioning to a circular economy. Sustainable Production and Consumption, 19, 194-215.

[8]. Tahalele, Y. K. S. (2020). Analisa Produk Fesyen Berkelanjutan: Tantangan Dan Penentu Keberhasilan. "PDCA12-70 data sheet," Opto Speed SA, Mezzovico, Switzerland.

[9]. Siahaan, C. Analisis Kualitas Sampah Dan Kondisi Tps Sawah Baru, Kecamatan Dramaga, Bogor Solid Waste Quality Analysis And Sawah Baru Solid Waste Disposal Condition, Kecamatan Dramaga, Bogor.

[10]. Yetri, Y., Nur, I., & Hidayati, R. (2018). Produksi Pupuk Kompos Dari Sampah Rumah Tangga. Jurnal Katalisator, 3(2), 77-81..

[11]. De Corato, U. (2020). Agricultural waste recycling in horticultural intensive farming systems by on-farm composting and compost-based tea application improves soil quality and plant health: A review under the perspective of a circular economy. Science of the Total Environment, 738, 139840.