Development of Bio Organic Pot Using Different Type of Waste for Germination Stage

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Abstract
Large amount of organic waste in the environment has become one of the main issues globally including in Malaysia, the percentage of organic waste in the environment was between 48 to 68%. There are various of treatments in managing the organic waste including landfill and incineration, biological organic decaying processes is considered as more suitable solution method. Composting is an alternative solid waste management system (SWM), to control the increase of waste. This project has been done to develop bio organic pot from waste as a media for plant at germination stage. Generally, this project was carried out in the nursery, Politeknik Jeli, Kelantan. Bio organic pots have 10 samples for each different media (animal bedding, kitchen waste and banana stem), parameters measured in this project are crop height, leaf width and number of crop leaves at germination stage. Overall, the results show that the plant using media of kitchen waste has recorded the best result which is 0.33 cm growth rate in two weeks compared to other media and the lowest recorded from media of animal bedding which is 0.28 cm growth rate. This shows that kitchen waste has better nutrient for plant growth. In conclusion, compost nowadays is an indispensable material for increasing the sustainability of agriculture and promoting the restoration of disturbed soils, through the improvement of soil biological properties.

Keywords: compost, organic waste, plant growth

1.0 Introduction

Agricultural Wastes (AW) are wastes produced from agricultural activities in agricultural premises and often managed poorly because of the limited access to disposal facilities, hence most of agricultural wastes are burned or incinerated (Aeslina, Nur Wahidah & Siti Noratifah, 2016). It can cause air pollution, affects water bodies when dumped into the water, as well as depletes the ozone layer when burnt, thereby increasing the impact of climate change if it not well manages (Ayilara, Olanrewaju, Babalola & Odeyemi, 2020). Organic residuals diversion collected to a municipal composting program or composting at home conserved energy and natural resources, reduced air and water pollution, and landfill space saved (Mary & Jean, 2011). Many studies reported possible solutions for improving solid waste management in developing countries, such as organic waste buyback programs, with compost or biogas production (Hettiarachchi, Meegoda, Ryu, (2018). According to Silva, Cipriano Rocha & Silva (2018), efficient way of minimizing environmental problems and reducing the volume of discarded solid organic waste is by using composting. Under sustainable resource management, the concept of waste is wealth takes form, thus organic food

waste composting is aggressively promoted in which food waste are broken down into smaller particles and decomposed naturally (Papargyropoulou, Lozano, Steinberger, Wright & Ujang, (2014). According to L. Plošek et al (2013) a good environmental practice is by the application of organic matter to degrade soils.

2.0 Material & method

2.1 Preparation of compost animal bedding, kitchen waste and banana stem.

IMO refers to indigenous microorganisms. This compost is similar to Bokashi and comes from Korea (Nature Farming Movement). IMO1 is obtained by placing rice in a container about 8 cm high and left under a bamboo clump in a remote area for 2-3 days for natural inoculation with water and microorganisms from the air . The inoculated rice is then mixed with molasses at a ratio of 1: 1, this mixture is known as IMO2 fermented for 5 days. Then 1g / 100 ml of IMO2 is added to 10 kg of bran and rice water obtained from rice washing water is added until the mixture reaches 65% moisture. This mixture (IMO3) is left through a fermentation process for 3-5 days. One part of IMO3 is added to 1 part of the soil and fermented for 3-5 days. This mixture known as IMO4 is closed to retain 65% moisture. IMO4 is used as an inoculum for compost. Method of composting is by separating each material (animal bedding, kitchen waste and banana stem) in a different tank, each material is mix with straw in a layer about 10 cm thick and interspersed with IMO4 mixture. This layer is repeated until the height reaches 60-70 cm in height. This stack is closed for the degradation process for about 1 month.

2.2 Production of bio organic pot from animal bedding, kitchen waste and banana stem.

The resulting compost is then mixed with starch separately, with compost: starch ratio at (3:1) and placed in a mold container, compressed using an iron plate and left it to dry (24 hour).

2.3 Sampling technique

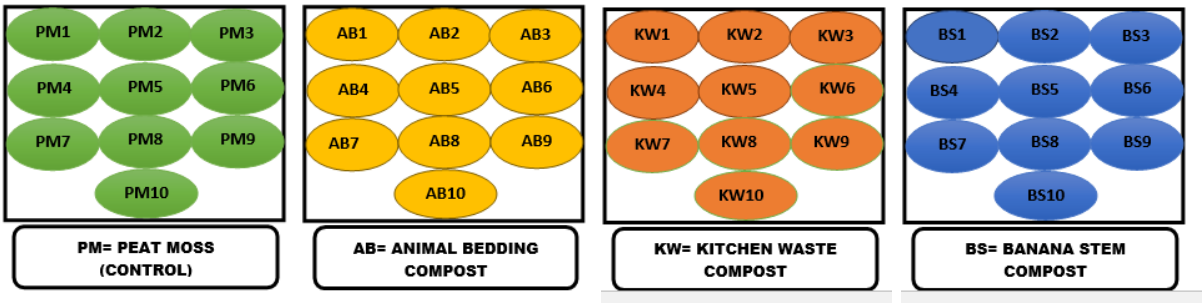

Figure 1: Bio Organic Pot type of treatment

Complete Randomized Design (CRD) with 3 replications is used to study the growth of Pak Choy (*Brassica rapa chinensis L.*) with a different type

of bio organic pot and peat moss is set for control. Each treatment has 10 Bio organic pot (include peat moss). The seed of Pak choy is sown in each treatment included peat moss for 2 weeks. Data is taken every 2 days for 14 days with parameter use is the plant height, leaf width and a number of leaf.

2.4 Analysis method

In this study, Microsoft Excel is used to analyze the data and the data is interpreted into graph.

3.0 Result & discussion

3.1 Plant height, leaf width, number of leaf and overall growth rate

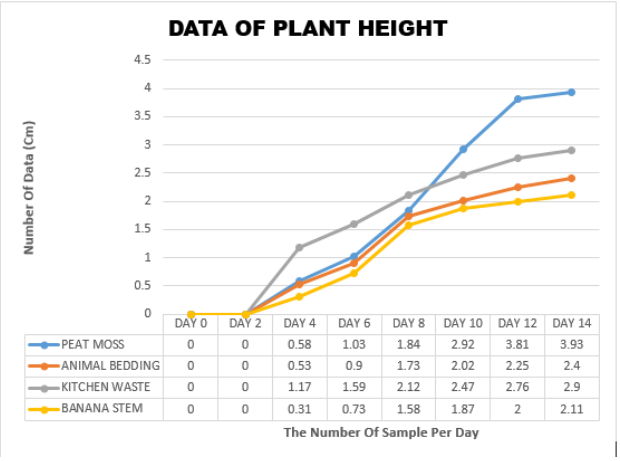

Figure 3.1: Plant weight (cm)

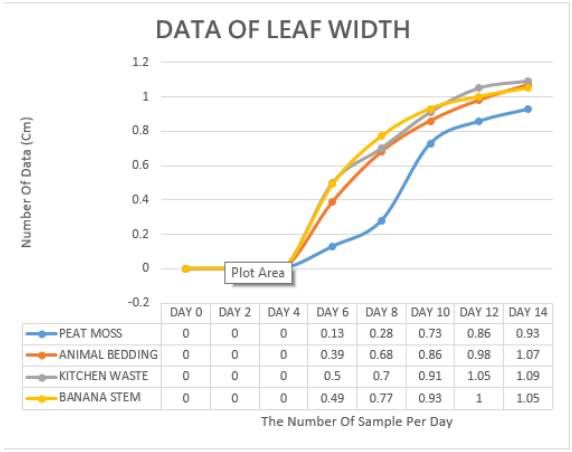

Figure 3.2: Leaf width (cm)

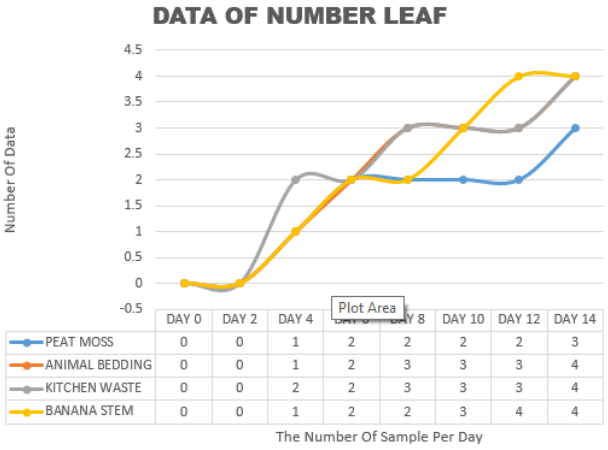

Figure 3.3: Number of leaf

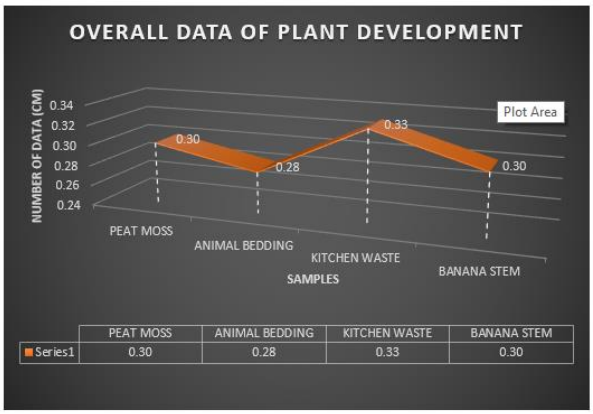

Figure 3.4: Overall growth rate

Peat and compost containing abundant nutrients that can improves soil fertility and availability of nutrients to plants that influences plant growth and yield (Ali et al, 2017). Based on Figure 3.1, the following graph showed that Pak Choy in peat moss shows the highest of plant height which is 3.93 cm

average, while pak choy in banana stem compost records the lowest plant height which is 2.11 cm behind animal bedding compost (2.40 cm) and kitchen waste (2.90 cm) in 14 day. For width leaf, Figure 3.2 showed that kitchen waste compost have the highest number which is 1.09 cm followed by animal bedding compost (1.07 cm), banana stem compost (1.05 cm) while pak choy plant from peat moss records the lowest average of 0.93 cm. While at Figure 3.3, number of leaf for growing Pak Choy in peat moss recorded the lowest data which is get three number of leaf compared to other compost within 14 day. And for overall growth rate, Figure 3.4 showed that Kitchen waste compost recorded the highest growth rate which is 0.33 cm while animal bedding compost shows the lowest growth rate at 0.28 cm behind peat moss and banana stem which is same growth rate at 0.30 cm in14 days.

Present findings are supported by (Haque, Haque, Ilias & Molla, 2010) who found that household/kitchen wastes composted with *Trichoderma harzianum* T22 and apply to mustard (*Brassica campestris*) that is grown under field condition showed improvement in growth, dry matter production, yield and yield attributes. Similar results showed by (Convertini , Giorgio, Ferri , Cava & Giglio,1999) who reported that application of MSW compost alone significantly improve plant height, number of flowers and fruits produced per plant, plant dry matter and yield. (Namasivayam & Bharani, 2012) found that fruit waste compost improves plant growth parameters such as shoot length, leaf surface area, and total chlorophyll, height of the plant, total leaves and branches emerged in the plant, total foliage density/plant, distinct reduction in pest infestation and disease spots. Dufa (2000) found that the compost promoted the growth of lettuce while investigated the effect of urban domestic refuse compost on lettuce growth.

4.0 Conclusion

In general, this project has been carried out and achieved the objective. As conclusion, we found that media from compost kitchen waste is the best medium for Pak Choy growth in the germination stage compared to other medium. However, all the treatments have pros and cons that can be improve. For further, there should be more study on its capacity and ability to holding macronutrient or micronutrient for plant intake.

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