DEVELOPMENT OF EMPTY FRUIT BUNCHES (EFB) SEEDLING POT FOR SEEDLING GROWTH

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ABSTRACT

Palm oil industry is one of the major industries in Malaysian agriculture. 70% of waste quantity in the form of empty fruit bunches (EFB) and palm shells is derived from fresh fruit processing. EFB is a agricultural waste accumulated in a factory area that can be a reproduction of pests and venomous animals that can harm humans and cause disease infections. EFB is also openly burned that can cause pollution that can affect the environment and local communities. There are several ways used by the local community to reduce the wastage of EFB used as organic fertilizer because EFB has good nutrients for soil and plant. Therefore, the rest of the EFB needs to be recycled naturally to acquire value-added innovation products to country and local communities. This study is to development of seedling pot from EFB for seedling growth. The EFB is immersed in clean water and boiled at a temperature of 100℃ for 30 minutes and then air drying for one day until dry. Then the EFB is blended in the blender machine before being immersed in an anti-fungal solution and dried again until dry. The EFB will be mixed with organic binder is starch flour with three ratios of 50%: 50%, 60%: 40% and 70%: 30% to be used as a seedling pot. The results showed that seedlings that were sown in EFB seedling pot with a ratio of 70%: 30% managed to grow well within 14 days. Hopefully this EFB seedling pot can be used extensively in plantation sector for forest tree seedling with various sizes.

Keywords: *Empty Fruit Bunch, Seedling Pot, Seedling Growth.*

1.0 INTRODUCTION

The agricultural industry plays a significant role in the overall economic growth in the world. The second agricultural crops grown in Malaysia are palm oil has a total area planted of 4.7 million hectares by 2015 [1] and the yields produced within a year are estimated 65 million [2]. Globally, 998 million tonnes of agricultural waste is produced per year and landfills annually [3]. Almost 70% of the volume form the processing of fresh fruit bunch is removed as waste in the form of empty fruit bunches (EFB), fibre and shells [4]. For the production of oil palm waste estimated at 80 million tonnes in 2016 and is expected to increase by 100 million tonnes in the 2020s [5]. Subsequently, production for the remaining EFB is 20 million tonnes a year and EFB production is 7 times higher than Malaysia's wood production [6]. The

disposable method for this oil palm are left to decay at the factory area some are used for animal feeds. EFB waste left in the plantation which is susceptible to open burning. Another, it can be dwelling pests like a rats, snake, scorpion and this can pestilence for human. This ways can bring side effect for human and environment [7]. Therefore, the rest of the EFB needs to be recycled naturally to acquire value-added innovation products to country and local communities.

Unfortunately, the excessive use of polybag in nursery and plantation area will cause environmental pollution. The bags will likely take about 1,000 years to decompose. Because such a large number of bags are produced and it takes a long time for them to decompose, the plastic bags that are thrown away create a lot of waste in the landfills on top of the trash that may be inside of them. Previous research from group of Innovative Forestry Diploma III student management creates a replant of a seedling container to reduce the pollution of plastic waste in the nursery named "Cocopeat Polybag". This innovation is one of the results of the Student Creativity Program in the field of Karsa Cipta which has been passed and funded by the Ministry of Technology and Higher Education.

Hence, this study was carried out to development of seedling pot from empty fruit bunch (EFB) for seedling growth.

2.0 METHODOLOGY

2.1 Materials

i. Empty Fruit Bunch (EFB)

EFB are produced after fresh palm bunches are processed by the process of steaming, separating or treating palm oil for oil production [8]. The EFB used in this study were taken from Palm Oil Factory Felda Lepar Utara 04, Bandar Pusat Jengka, Pahang Darul Makmur, Malaysia. The EFB was soak and boil in clean water to remove impurities or soil attached to EFB and remove tannin substances that can delay the seedling. Dried EFB was cut and grind before mix with starch binder.

ii. Starch

The starch used made from tapioca flour is mixed with 350ml of water at temperature 100℃ before pour into the mould to produced EFB seedling pot.

2.2 Experimental Design

The experimental design below (Figure 1) shows the three different ratios of EFB, i.e 70%, 60% and 50%. Starch flour solution of 30%, 40% and 50% were used as binding agent. This study was determined the effectiveness of EFB Seedling Pot based on duration of seedling growth testing. For duration of seedling growth testing, observation was made based on 7 days, 14 days, 21 days and 28 days.

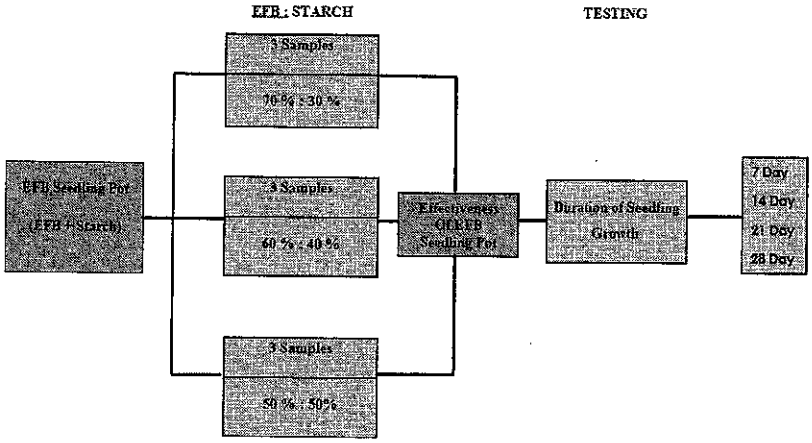


Figure 1 : Experimental Design

2.3 Flow Chart Process

The flow chart below (Figure 2) shows the process of seedling pot from empty fruit bunch (EFB) for seedling growth.

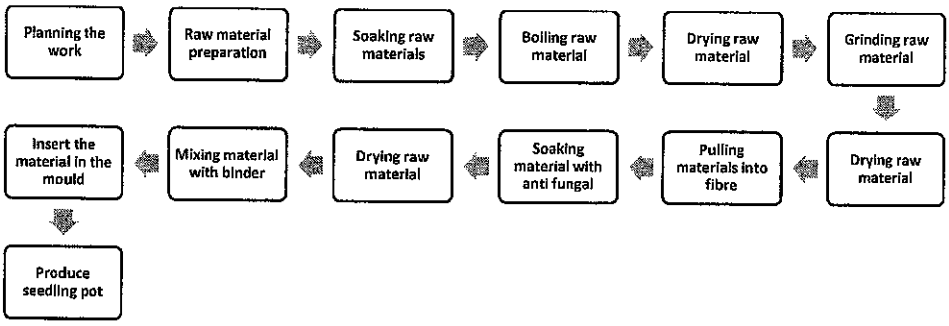


Figure 2 : Flow Chart Process

3.0 RESULT AND DISCUSSION

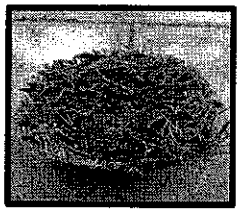
Based on 7 days, 14 days, 21 days and 28 days observation, the results showed that seedlings that were sown in EFB seedling pot with a ratio 70% : 30% managed to grow well within 2 weeks compared with ratio 50%:50% and 60%:40% (Figure 3). From Figure 3, after 28 days of sowing, it shows that the seed sown for 50%;50% have no growth development at all whilst for ratio 60%:40%, showed average seedling growth development with leaflet length

of 2 to 3 cm, and for the 70%:30% ratio mixture showed the highest seedling growth with the longest leaflet length approximately 5cm.

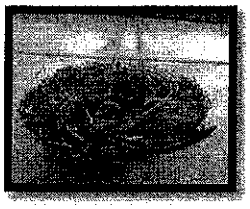
The high percentage of EFB containing in the 70%:30% mixture allows the seedling to grow finely because of the higher nutrient content that is readily available in the EFB itself compared to 50%:50% and 60%:40% mixture.

i. The first date of planting : 24 April 2018

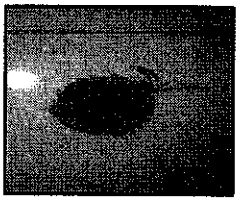
Duration for seedlings grow : 30 April 2018 (7 days)

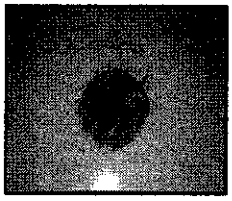

50%:50%

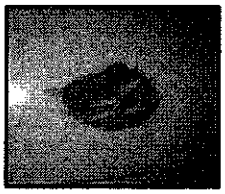

60%:40%


70%:30%

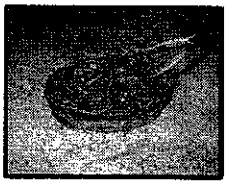
ii. Duration for seedlings grow : 7 May 2018 (14 days)


50%:50%


60%:40%


70%:30%

iii. Duration for seedlings grow : 14 May 2018 (21 days)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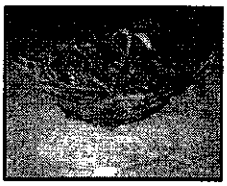
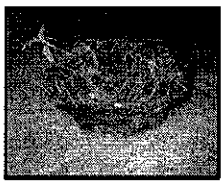
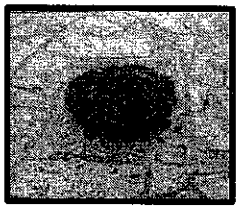
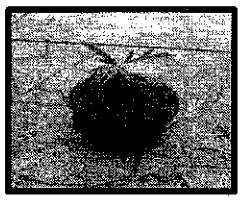

60%:40%


70%:30%

iv. Duration for seedlings grow : 21 May 2018 (28 days)

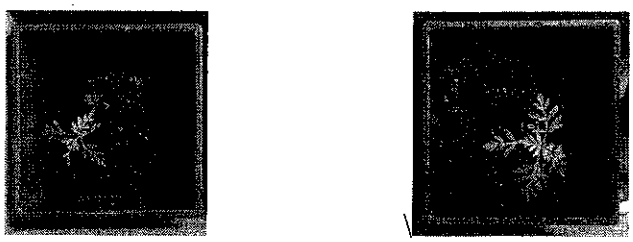

50%:50%


60%:40%


70%:30%

Figure 3 : Duration And Seedling Grow Development

In order to observe the effectiveness of the seedling pod, a control method have been taken. In Figure 4, it shows the controlled normal seedling growth method that was planted in soil without EFB. On the other hand, the seedling that was sown in soil with the EFB waste shows an active growth development. Even the length of the leaflet in the pot with 70%:30% EFB to starch content shows the longest length of 5cm and the most leaflet quantity of 6 leaflets compared to the controlled pot with leaflet length of 3cm and leaflet quantity of 4 leaflets. Hence, the EFB seedling pod not only substituting the use of polybag in agriculture but also act as nourishment provider for young plants to grow.



Control Sample 70% : 30%

Figure 4 : The Growth Of Seedling

4.0 CONCLUSIONS

Overall, based on effectiveness of EFB Seedling Pot observation was found the EFB Seedling Pot has been successfully implemented according to the objectives. From the result, it shows that the EFB Seedling Pot is better than polybag available at the market. This is because, EFB Seedling Pot is a cheap resources, green technology product, suitable in plantation sector, composed in a short time, as fertilizer for plants, cheap EFB seedling pot price, long life services and lightweight.

Hopefully this EFB seedling pot can be used extensively in plantation sector with various sizes and design.

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