

## **EFFECTIVENESS OF FOOD WASTE BIO-COMPOSTED FERTILIZERS ON PLANTATIONS**

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### **Abstract**

This research studied the production of organic fertilizer from food wastes through composting in view of its easy availability in Malaysia. In methodology, food wastes such as banana peels, Chinese kale and eggshells in different proportions will be stacked up layer by layer in a compost bin prepared with the inclusion of bulking agents such as dry leaves and soil to produce matured compost to supply useful microorganisms to the decomposition process. Results from the application of the biofertilizers produced on the growth of water spinach and green onion plants had revealed the potential of banana peels in supporting the growth of the plants, while for the ones produced from the combinations of eggshells and Chinese kale, nitrogen loss could be observed, thereby suppressing their growth and resulting in a much slower growth rate. Meanwhile, from the statistical analysis conducted, the findings obtained were proven to be significant, indicating the positive influence of fertilizers type on the growth of plants. Hence, it could be concluded that this research would certainly provide an insight to the potential management of organic waste in our country by converting organic wastes from food into biofertilizer.

Keywords: Biofertilizer, Composting, Organic waste, Statistical analysis.

## 1. Introduction

Generally, a total of approximately 38 billion metric tons of biodegradable wastes are produced all over the world every year [1]. This dramatic increment of waste production is due to increased consumption rate, population explosion and human behaviour. Apparently, as the wastes are regarded as disposable and unusable, deposition and burning have always been some of the primary treatment methods. Unfortunately, numerous adverse environmental effects occur due to the dumping of the wastes such as atmospheric pollution as well as the alteration in the status of heavy metal present in the soil [2]. To deal with this challenging issue, several practices and methods in treating the organic wastes as aforementioned have been formulated and applied all over the world, of which one of it is food waste composting. Primarily, food waste refers to all unconsumed food substances produced from markets, hawker centres, households, food courts, supermarkets and other eating establishments which are to be recycled and disposed of [3]. Meanwhile, composting can be viewed as an easy, natural and economical biodegradation process, converting the components present in the organic waste into relatively stable humus-like substances to be used as soil amendment and organic fertilizer afterwards [4]. Obviously, through composting, the number of wastes can be drastically reduced and at the same time, useful nutrients can be returned to soil to increase its fertility.

In general, it is common that fertilizers are important in supplying essential nutrients such as potassium, nitrogen and phosphorus to plants for the sake of crop yield increment [5]. However, over the past few years, the needs to replace those traditional chemical fertilizers with so-called biofertilizers have been receiving widespread attention and have also aroused a growing interest in the public in view of the adverse impacts brought about using chemical soil amendment, whereby one of the most significant effects caused by it is carbon dioxide emissions during its production process, which have certainly worsened the condition of global warming [6]. In fact, the production of chemical fertilizers, with a relatively high energy consumption, has been widely regarded as one of the most environmentally harmful production and distribution activities around the world. Hence, there is a need to look for more economical and environmental viable technology as any untimely application of artificial fertilizers will negatively affect not only the natural balance of the soil crop ecosystems, but it also affects the microbial ecology which will then lead to a sharp decline in crop yield.

The continuous dependence on chemical fertilizers for future agricultural growth reflected that there would have further loss in soil quantity with the possibilities of water contamination as well as an unsustainable burden on the fiscal system [7]. Apparently, the abundance of raw materials in Malaysia has in turn give assurance on the feasibility of turning to biofertilizer for enhancement of crop yield. In Malaysia, an increase in this plantation area has indicated a rise in the production of potential raw materials for organic fertilizer production. Another organic material which is one of the focuses in this study is food waste, with a total production amount of 15,000 tonnes in Malaysia in the year 2016 as reported [8].

Food waste composts consisted of tea leaves, coffee grounds, banana peels, lemongrass leaves and eggshells in different ratio was proven to help in plant growth and managed to substitute chemical fertilizer [9]. According to Wazir et al. [10], household waste such as banana peel improved the height of the plant in both