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**Development of a Semi Automated Small Scale Machine for Composting
Residues Produced During Palm Oil Production**

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Palm oil production is becoming popular both locally and globally. During the refining process of palm oil, one of the main processes is to mechanically crush the fresh palm fruit bunches in order to produce crude palm oil, which is refined thereafter. During the mechanical crushing processes, empty fruit bunches (EFB) and palm oil mill effluent (POME) are produced as wastes, leading to considerable negative environmental impact if not processed systematically and timely. However, as these wastes are rich in organic matter, they are naturally suitable as fertilizer for plants, if decomposed as compost fertilizer. Such composted EFB and POME can be directly used at oil Palm plantations as a free fertilizer. However, conventional composting methods demand more time, land area and man power. Out of that, particularly the time is the main factor where conventional composting usually takes 2-3 months, which is not fast enough to meet the industrial demand to cater higher EFB and POME generations. In this background, this research focused to develop a semi-automated small scale EFB and POME composting machine which can mainly reduce the composting cycle time, land area and man power. The designed composter consist of a horizontally placed stationary metallic cylinder having 200 l capacity and an internal bladed shaft which is rotated using an electric motor. The metallic cylinder acts as the storage cabin, which is filled with composting ingredients EFB and POME at 1:3 weight ratio. During the experiments, the cylinder was filled for about 60% and the shaft was made to rotate at 2 rpm to facilitate slow mixing of the ingredients. At the bottom half of the cylinder, metallic tubes were installed which carry hot water at 60 °C, so that the appropriate higher temperature environment is maintained to speed up the composting process. Additionally, controlled amount of fresh air was allowed to enter the cabin. Using this setup, a series of experiments were conducted and it was found out that when the composting is set to occur inside of the semi-automated composter for 3 to 7 days, there is a considerable volume reduction (approximately 70%), which is mainly due to composting. Based on these findings, it can be concluded that the semi-automated composter system can reduce the composting time of EFB and POME mixture. However, further experimentation need to be conducted in order to identify the optimum feed mixture, rotating speeds, moisture contents and the temperatures to be maintained at the composting mixture in order to achieve faster and economical composting.

Keywords: semi-automated composter, empty fruit bunch (EFB), composting, palm oil mill effluent (POME), rapid composting.