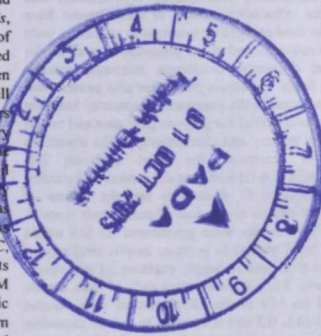


Application of Recycled Paper Mill Sludge on the Growth of *Khaya senegalensis* and Its Effect on Soil Properties, Nutrients and Heavy Metals

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Abstract—The paper industry performs an essential role in the global economy of the world. A study was conducted on the paper mill sludge that is applied on the *Khaya senegalensis* for 1 year planning period at University Agriculture Park, Puchong, and Selangor, Malaysia to determine the growth of *Khaya senegalensis*, soil properties, nutrients concentrations and effects on the status of heavy metals. Paper Mill Sludge (PMS) and composted Recycled Paper Mill Sludge (RPMS) were used with different rates of nitrogen (0, 150, 300 and 600 kg ha⁻¹) at the ratio of 1:1 (Recycled Paper Mill Sludge (RPMS) : Empty Fruit Branch (EFB)). The growth parameters were measured twice a month for 1 year. Plant nutrients and heavy metal uptake were determined. The paper mill sludge has the potential to be a supplementary N fertilizer as well as a soil amendment. The application of RPMS with N, significantly contributed to the improvement in plant growth parameters such as plant height (4.24 m), basal diameter (10.30 cm), total plant biomass and improved soil physical and chemical properties. The pH, EC, available P and total C in soil were varied among the treatments during the planting period. The treatments with raw and RPM compost had higher pH values than those applied with inorganic fertilizer and control. Nevertheless, there was no salinity problem recorded during the planting period and available P in soil treated with raw and RPMS compost was higher than the control plots that reflect the mineralization of organic P from the decomposition of pulp sludge. The weight of the free and occluded light fractions of carbon concentration was significantly higher in the soils treated with raw and RPMS compost. The application of raw and composted RPMS gave significantly higher concentration of the heavy metals, but the total concentrations of heavy metals in the soils were below the critical values. Hence, the paper mill sludge can be successfully used as soil amendment in acidic soil without any serious threat. The use of paper mill sludge for the soil fertility shows improvement in land application signifies a unique opportunity to recycle sludge back to the land to alleviate the potential waste management problem.

Keywords— growth, heavy metals, nutrients uptake, production, waste management.



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