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EVALUATION OF ORGANIC MATERIALS FOR THE IMPROVEMENT OF SOIL FERTILITY IN RUBBER CULTIVATION

BY

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The work described in this was carried out at the Rubber Research Institute of Sri Lanka, under the supervision of Dr (Mrs) Lalani Samarappuli of the Rubber Research Institute of Sri Lanka and Dr. P.A.J. Yapa of the University of Sri Jayawardenepura. This thesis has been based on the independent work carried out by the author. It has not been submitted and will not be submitted to any other University for a similar Degree.

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We certify that the above statement made by the candidate is true and that this thesis is suitable for submission to the university for the purpose of evaluation.

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EVALUATION OF ORGANIC MATERIALS FOR THE IMPROVEMENT OF SOIL FERTILITY IN RUBBER CULTIVATION

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ABSTRACT

Possibility of using organic materials for enhancement of soil fertility in rubber plantation was investigated in this study by assessing soil chemical properties and its influence on the performance of *Hevea* during its nursery and immature period.

In general it was observed that addition of organic manures has increased the soil pH. Addition of rubber factory effluent sludge gave a significantly higher soil pH value of 6.1 compared to 4.5 of the initial soil. Also many organic manures were found to enhance soil organic carbon content by 10-25 %. Addition of organic manure like paddy straw, refused tea and coir dust increased the organic carbon content significantly. *Pueraria* leaves and refused tea brought a significant increase in soil ammonium nitrogen (N). The highest increase was recorded for mulching with *Pueraria* leaves and that was 140 ppm. Moreover application of organic manures favourably influenced the availability of phosphorus (P) level in the soil. Addition of rubber factory effluent sludge to the soil increased the soil P content to 1202 ppm, the highest available P level. Also the addition of *Pueraria* leaves, poultry manure and refused tea recorded significantly highr P levels in the soil. Mulching with *Pueraria* leaves and refused tea have improved the soil exchangeable potassium (K) to 450 ppm, which was eight times greater than the K content of the initial soil. Application of sludge as a mulch gave 150-250 ppm the highest exchangeable magnesium (Mg) content and it was 10-14 times greater than the soil Mg

content before application of sludge. *Pueraria* leaves, poultry manure and cowdung also gave significantly higher values for soil Mg.

It was concluded that organic materials such as refused tea, poultry manure and coir dust in combination with infertile soil (sub soil) have favourable effect similar to that of good fertile top soil, which can be used to fill poly bags for *Hevea* nursery plants.

Possibility of using controlled release fertilizer technology using coir dust encapsulated block was also investigated in this study. Fertilizer encapsulated with coir dust was found to release nitrogen, potassium and magnesium slowly over an extended period of time and was of no advantage for P fertilizers

The growth was better with encapsulated fertilizers for both nursery and 1st year of rubber plants. It can therefore be concluded that there is a possibility of using controlled released fertilizer for rubber.

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