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Natural Rubber Biodegradation in Soil in Relation to the Waste Disposal of Used Latex Products

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Biodegradation was studied by burying natural rubber (NR) latex gloves in tropical soils amended with nitrogen (N) and phosphorus (P), and in a composting environment created from dried grass clippings, cattle manure and soil. Manipulating soils to favour microbial growth enhanced biodegradation compared to natural attenuation processes in unamended soils. The mean specific degradation rate of NR glove pieces in a high soil nutrient treatment was three times higher than in the unamended controls. The synthetics, neoprene and nitrile, remained intact after 40 weeks, while vinyl showed small weight losses due to plasticiser and other additive losses. In a composting environment, biodegradation rates over a 24-week period were twice that compared to the fertilised treatment in soils, suggesting an efficient means of waste disposal. Leachates of accelerator residues from NR gloves undergoing 12-weeks burial in soil lysimeters were however not significant. Soil degradation of NR condoms were slower compared to gloves with 42 per cent of their initial weights remaining after 48 weeks. In contrast, the manufactured polyurethane condoms were hardly biodegradable. The stimulating effect of nutrient application on indigenous soil microbes, the likely effects of accelerators or antioxidants, or of the interactions of modulus and thickness in affecting NR latex product degradation are discussed.

Keywords: NR latex gloves, synthetic gloves, biodegradation, landfills, soils, composting, soil nutrients.