Waste Water Minimization: Utilization of Rubber Latex Residue and Swine Dung as Fertilizer for Para Rubber Seedling Growth

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Abstract

Centrifuged residue of concentrated latex production is the by-product or waste of latex processing of the Hevea tree (Heveabrasiliensis). The 10-15% residue of fresh latex causes waste disposal cost and environmental problems for factories. Because this residue contains some nutrients (N, P, K) in available forms, it can potentially enhance para-rubber tree growth. However, this centrifuged residue (CR) has some small rubber pieces mixed within that needs to be blended to prevent soil problems. The waste of swine dung or manure (SD) has similar problems on farms. This waste contains some essential plant nutrients, but it requires a period of time for microorganisms to decompose into the available compounds for plant growth. Thus, the blended fertilizer of latex residue with swine dung can potentially act as a preferable blended fertilizer because the nutrients from both wastes can enhance the plant growth from the initial stage. The aim of this study was to study the feasibility and effectiveness of the blended fertilizer at consideration ratio of 1:1 (CR and SD) alone and at nutrient adjustment to equal to chemical fertilizer usage for Hevea tree as a study case. We found that the blended fertilizer was feasible for para rubber seedlings, from the view point of growth enhancement, soil properties and water leachates.

Key words: Rubber Latex Residue/ Swine Manure/ Blended Fertilizer/ Para Rubber Seedling

1. Introduction

Para rubber or Hevea tree (Heveabrasiliensis) (Nair, 2010) is one of the important economic plants of Thailand, and occupies a total plantation area of 16.89 million rai. About 2,710,000 tons of Para rubber latex production was exported in the year 2007 (Rubber Research Institute of Thailand, 2010). Consequently, large amounts of fertilizers, such as nitrogen, phosphorus and potassium, were introduced for 0.3, 0.05 and 0.18 kg/ plant / year respectively (Rubber Research Institute of Thailand, 2010a). Which Potiwattatham (2001) estimated to be worth 1,178 baht/rai.

In order to produce concentrated latex, it is previously necessary to add to the rubber a stabilizing agent (ammonia) to prevent the latex from coagulating. Moreover, to keep a good quality of natural rubber before delivering to the concentration process, chemicals such as Tetra Methyl Thiiuram Disulphide (TMTD), Zinc Oxide (ZnO), Diammonium phosphate (DAP), are added. At the factory process, the aforementioned raw rubber is then forwarded to a centrifuge process to remove water and increase the rubber content or concentration of the latex. This product is called “latex concentrate”, while the residue in the centrifuge machine is called “residual latex powder or centrifuged residue (CR)”. The CR actually has an average of 10-15% remaining (Tekprasit, 1999; Rajana, 2006). It was considered as useless material, and mostly remedied by using as landfill. Ubon et al., (2007) report that the nutrient content of CR was as much as 1.02-2.53% (N), 22.15-48.19% (P) and 0.39-0.60% (K), in dry weight. Moreover,