## ABSTRACT

**Evaluation of the fertilizer-use potential of food processing wastewater residuals in a vegetable and a pasture production system.**

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Pollution and the problems associated with waste disposal have become major environmental and economical issues. Utilization of organic wastes and/or by-products as amendments to agricultural soils can be beneficial to crop production while simultaneously providing an efficient and cost-effective method of disposal. An incubation experiment utilizing three tropical soils in a factorial design with two replicates was therefore conducted to evaluate the nitrogen mineralization of the wastewater residual. Net nitrogen mineralization of the food processing wastewater residual was significantly higher in the coarse-textured soil and those with low pH values. Incorporation of the wastewater residual significantly increased net nitrogen mineralization. In addition, a field experiment involving two trials (dry and wet season) in a randomized complete block design with three replicates was conducted to evaluate the fertilizer-use potential of food processing wastewater residuals in Pak-Choi (*Brassica rapa var. chinensis*) and Tanner Grass (*Brachiaria arrecta*) production. The wastewater residual was compared to inorganic sources of N and P (urea and triple superphosphate respectively) at 0, 50 and 200 kg N/ha and 0, 50 and 100 kg P/ha respectively in a randomized complete block design. The wastewater residual and the inorganic N gave similar pak-choi dry matter yields in both trials, while tanner grass dry matter yields were similar only after the second trial. Tanner grass crude protein content and

macronutrient concentrations of pak-choi and tanner grass respectively were higher for those treated with wastewater residual than the unfertilized control. Tanner grass Zn and Cr concentrations were significantly increased above that of the control in response to wastewater residual application. However, Zn concentration was lower than that in response to artificial fertilizer. Pak-Choi Zn and Cu concentrations were significantly increased in response to the wastewater residual at a rate of 200 kg N/ha. However, significant reductions in Mn and Fe were observed, while Cr concentration was unaffected. After two applications of the food processing wastewater residual, no significant build up in soil available N, P, Zn, Cu and Fe was observed in the top-soil. However, soil pH was significantly increased. Land application of food processing wastewater residuals for pasture production is a viable and beneficial alternative to the traditional means of disposal.

Keywords: wastewater residuals, nitrogen mineralization, organic wastes