



Deutscher Tropentag, October 11-13, 2005, Hohenheim

“The Global Food & Product Chain—
Dynamics, Innovations, Conflicts, Strategies”

Aerobic Pre-Treatment of Municipal Solid Waste to Prevent Pollution by Landfill Leachates

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Abstract

In developing countries municipal solid waste (MSW) is either dumped or landfilled without prior treatment. As a consequence, agricultural production is negatively affected by hazardous leachate in the surroundings of the landfill. A biological pre-treatment of municipal solid waste reduces methane emissions and leachate from landfills. In Can Tho (South Viet Nam) leather is manufactured and the waste is landfilled, too. As a consequence, the leachate may contain heavy metals (chrome), high loads of organic compounds and ammonium. We tested a simple method to pre-treat municipal solid waste with leather waste to adapt this system to tropical conditions. Two hundred litres (ca. 80 kg) of municipal solid waste (with/without leather waste) was aerated in isolated small windrows. During the first six weeks the material was mixed, and moistened if necessary, weekly, later on every second week.

After a short lag phase, the temperature in the windrows was higher than 60°C for ca. four weeks. Then the temperatures decreased slowly and after three months they adapted to ambient temperature. During the treatment only small amounts of methane and nitrous oxide were produced. The oxygen consumption, an indicator for microbial stability of the substrate, decreased from 58.4 mg O₂ g⁻¹ DM for MSW at the beginning of the experiments to 3.6 mg O₂ g⁻¹ DM at the end of the incubation. MSW mixed with leather waste showed similar rates of oxygen depletion indicating that the treatment is sufficient to produce a stabilised waste and to reduce the risk for agricultural production next to the landfills.

Keywords: Composting, waste