INDIAN INSTITUTE OF TECHNOLOGY GUWAHATI
SHORT ABSTRACT OF THESIS

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Thesis Title: Composting of Floating Biomass (Phumdi and *Salvinia natans*) of Loktalk Lake (Manipur, India)

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SHORT ABSTRACT

Composting can be the best alternative for utilization of the huge harvested green phumdi biomass of Loktak Lake because of the high organic contents. Studies were carried out on the physicochemical and bio-chemical transformations including the bioavailability of nutrients and heavy metals during agitated pile composting, drum composting and vermicomposting of phumdi as well as *Salvinia natans* biomass (both blended with cattle manure and rice husk or sawdust) all in five different trials. Trial 4 (5 phumdi:4 cattle manure: 1 rice husk) recorded the highest temperature (46.8ºC on the 8th day) during agitated pile composting of phumdi biomass with highest net volatile solids (VS) reduction (20.4%) after the process. The temperature profile was enhanced during drum composting of the phumdi biomass and the highest temperature (53.1ºC on the 6th day) with highest net VS reduction (22.2% after the process) was shown in trial 4. During vermicomposting of the phumdi biomass, the highest gain of total earthworm biomass (1.3 folds) and maximum net VS reduction (23.4%) were also indicated in trial 4 on day 45. On the other hand, agitated pile composting of *Salvinia natans* showed highest temperature profile (52.2ºC on 6th day) with highest net VS reduction (31.4%) in trial 3 (6 *Salvinia natans*: 3 cattle manure: 1 rice husk). Drum composting of *Salvinia natans* indicated highest temperature (54.2ºC on 4th day) and highest net VS decrease (32.9%) also in trial 3. The highest gain of earthworm biomass (2 folds) and maximum net VS reduction (38.6%) was indicated in trial 4 after the vermicomposting of *Salvinia natans*. The concentrations of total nutrients (nitrogen, phosphorous, sodium, potassium, calcium and magnesium) and total heavy metals (zinc, copper, manganese, iron, nickel, lead, cadmium and chromium) increased in all the processes for both wastes due to net loss of dry mass. The concentrations of the total heavy metals were relatively lower in vermicomposts indicating bio-accumulation of the heavy metals by the earthworms. The bioavailable forms of heavy metals represented by the water soluble, diethylene triamine penta-acetic acid and toxicity characteristic leaching procedure extracts decreased after the process. The vermicomposting with *Eisenia fetida* was very effective in reduction of the bioavailable forms of heavy metals as the gut action facilitated the process. Therefore, drum composting and vermicomposting of phumdi biomass and *Salvinia natans* were found effective with appropriate proportion of cattle manure and rice husk or sawdust.