

ABSTRACT

Atmospheric methane (CH_4) concentrations have considerably increased nowadays, reaching twice the level in the pre-industrial period. It should be noted that both non-biogenic and biogenic sources can emit CH_4 . Biogenic CH_4 emissions comprise more than 70% of the total global emissions, including the wetlands (single largest CH_4 emission source), rice agriculture, livestock, landfills, forests, oceans, and termites. In Thailand, past quantification of CH_4 emissions excluded the wetlands. In the present study, Kwan Phayao (Phayao Lake) was selected as the study site to measure CH_4 emission. It is situated at latitude $19^\circ 10' \text{N}$ and longitude $99^\circ 52' \text{E}$ in northern Thailand. It is the biggest freshwater wetland in northern Thailand and the third largest freshwater lake in the country. It is a semi-natural lake surrounded by agricultural area, Phayao community, and mountains. The water level of the lake is controlled by a sluice gate and spillway at Phayao Freshwater Fishery Research Station.

This work aimed to measure CH_4 flux from aquatic plants in Phayao Lake. Three aquatic plants and their water surfaces were investigated for CH_4 emission, and five sediment samples were collected to study the production potential of CH_4 . The CH_4 flux from the aquatic plants was continuously collected over June 2013 to May 2014 period using the closed-chamber technique. The gas sample was analyzed using gas chromatography (GC). The results indicated that from June 2013 to May 2014, the average methane flux of *Polygonum tomentosum*, *Enhydra fluctuans*, *Eichlomia crassipes*, and their surface water were 13.68, 6.02, 8.67, and 3.25 $\text{mgCH}_4/\text{m}^2/\text{d}$, respectively.

Keywords: aquatic plant, biogeochemistry, methane flux, wetlands