

## 泥炭湿地におけるアブラヤシプランテーションの排水路における一酸化二窒素排出と発生メカニズム

### Nitrous oxide emission from the drainage and the production processes in oil palm plantation on peatland

\*仁科 一哉<sup>1</sup>、Melling Lulie<sup>2</sup>、平田 竜一<sup>1</sup>、高橋 善幸<sup>1</sup>、豊田 栄<sup>3</sup>、寺嶋 晃太郎<sup>3</sup>、伊藤 雅之<sup>4</sup>

\*Kazuya Nishina<sup>1</sup>, Lulie Melling<sup>2</sup>, Ryuichi Hirata<sup>1</sup>, Yoshiyuki Takahashi<sup>1</sup>, Sakae Toyoda<sup>3</sup>, Kotaro Terajima<sup>3</sup>, Masayuki Itoh<sup>4</sup>

1. 国立環境研究所、2. SARAWAK Tropical Peat Research Institute、3. 東京工業大学、4. 兵庫県立大学

1. NIES National Institute of Environmental Studies, 2. SARAWAK Tropical Peat Research Institute, 3. Tokyo Institute of Technology, 4. University of Hyogo

In South-East Asia, oil palm plantation has rapidly expanded in the past few decades even in peatland areas. In the light of nitrogen cycling, this land-use change would result in enrichment on the ecosystem N cycling due to the N fertilization for the maintaining oil palm growth and the wastewater emission from the palm mills in the plantation. Oil palm plantations converted from peat swamp forests require the drainage to keep cultivation and thus has unique hydrological characteristics. In such plantation, drainage water surface dominates up to 5% of plantation area and therefore it is important to evaluate the gas exchange between the drainage water and atmosphere.

In this study, we have conducted spatial sampling for dissolved  $N_2O$  concentration ( $dN_2O$ ) in the oil palm plantation on drained peat soil in July 2018, in Sarawak, Malaysia in order to evaluate the indirect  $N_2O$  emission from palm oil plantation. We have intensively sampled the water samples from the drainage in the plantation (ca. 120 km<sup>2</sup>) and the water samples from Raja river, which is adjacent to the plantation. 90% of samples (N = 84) in the drainage water showed over-saturation in dissolved  $N_2O$  concentration (up to 570%), suggesting that the drainage water in the oil palm plantation acts the source of  $N_2O$  to the atmosphere. The emission factor for indirect emission (EFr: i.e.,  $dN_2O$ /nitrate concentration) showed relatively higher than the default EFr in IPCC. However, there were no clear linear relationships between the water qualities (including nitrate) and  $dN_2O$ . We have also analyzed the isotopic composition of  $dN_2O$  in both drainage and river samples. This analysis suggested the denitrification contributed  $dN_2O$  in the drainage water.

キーワード：一酸化二窒素、オイルパームプランテーション、窒素同位体

Keywords: Nitrous oxide, Oil palm plantation, Nitrogen stable isotope