

**Nitrification potential of a tropical peat soil under oil palm (*Elaeis guineensis* Jacq.)  
cultivation at different operational zones and soil depths**

ABSTRACT

The factors driving nitrification under oil palm (*Elaeis guineensis* Jacq.) cultivation in peat soil provide fundamental knowledge on managing available nitrogen (N) from losses. Characterization of operational zones and depths that are sensitive for N transformation is crucial for site specific N management. N fertilization in oil palm cultivation caused the inorganic N susceptible to losses through leaching and gasses emission. In order to understand nitrification in peat oil palm cultivation, specific area and depth that are susceptible to nitrification need to be characterized. Peat soil from three operational zones namely weeded circle (WC); frond heap (FH) and harvesting path (HP) was sampled up to six depths (0-10, 10-20, 20-30, 30-45, 45-60 and >60 cm) in an oil palm plantation in Perak, Malaysia. The samples were analyzed for potential nitrification rate (PNR), ammonium ( $\text{NH}_4^+$ ), nitrite ( $\text{NO}_2^-$ ) and nitrate ( $\text{NO}_3^-$ ) concentration. Results showed nitrification was found to be concentrated in the top soil WC zone as shown by the PNR (0.367 - 0.48 mg N kg<sup>-1</sup> day<sup>-1</sup>). Deeper soil layer (>30cm for WC and >10 cm for both HP and FH) unable to show positive nitrification in PNR. Therefore, it can be assumed that most nitrifiers community are concentrated on the topsoil. It is also assumed that nitrate availability in the subsoil originated from vertical movements from the topsoil. Therefore it is believed nitrification in cultivated peat soil was concentrated in surface and fertilized soil due to favorable condition - lower moisture content and available substrate.

**Keyword:** Nitrification; Peat soil; Oil palm; Potential nitrification rate (PNR); Inorganic nitrogen