

Influence of treated palm oil mill effluent sludge on maize (*Zea mays*) growth performance and gas exchange

ABSTRACT

The presence of abundant oil palm residues in Malaysia prompted the need to utilize this waste to avoid environmental pollution. This waste was abundant at the oil palm mill and accounted for almost 50% of production. The study was conducted to determine the morphological effect of Palm Oil Mill Effluent (POME) sludge on the maize growth performance and gas exchange. Physicochemical, growth morphology and gas exchange was measured after treated with POME sludge from different treatment pond systems: Mixing, anaerobic, facultative, algae and dumping. The results indicated the pH, C, and CEC of mixing the < anaerobic < facultative < algae < dumping ponds. There was a significant presence of macronutrient (N, Mg, Ca, Fe, S) in the treated POME sludge, contrary to the presence of heavy metal (Cd, Cu, Ni and Pb) elements which were not significantly different in all the treatments and lower than WHO/FAO standard. Root Shoot Ratio (RSR) and Specific Leaf Area (SLA) indicated significant difference in biomass accumulation and yield compared to the control. The gas exchange variable was a significant difference on stomata conductivity (Gs) and transpiration rate (E). However, the POME sludge from the facultative, algae and dumping ponds showed positive correlations between net photosynthesis, stomata conductivity and transpiration rate. Indeed, the increased transpiration rate (E) was correlated with stomata conductance (Gs) after treatment with anaerobic, facultative, algae and dumping ponds. In conclusion, the POME sludge amendment was able to increase the maize biomass and yield.

Keyword: Amylase; Basal stem rot disease; Cellulase; Noncompetitive inhibitors; Uncompetitive inhibitors; Xylanase