

## Phytotechnology and Land Treatment Application on the Quality of Wastewater Generated at a Roofing Sheet Manufacturing Industry, Ibadan, Nigeria

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### Abstract:

**Background:** Environmental pollution arising from industrial wastewater contamination poses serious environmental problems especially in a developing country like Nigeria.

**Motivation and Objective:** This study was carried out to explore the effectiveness of combining phytoremediation with land application systems in the treatment of industrial wastewater.

**Statement of Contribution / Methods:** Using a field and laboratory-based experiment, physiochemical and heavy metal (Pb, Cr, Cd and Zn) concentrations of the wastewater generated from a rolled-steel industry were assessed before and after phytotechnology and land application treatments. Specifically, the samples assessed included industrial wastewater, *Phragmites karka* used in phytoremediation tank for baseline and uptake of heavy metals, treatment and control (taken 20m and 40m away from the phytoremediation tank) plants and soils as well as water-stable aggregates of the soil, using it as an indicator of soil health and effect of irrigation with the wastewater. To treat the wastewater, a reed bed was constructed for the growing of *Phragmites karka* consisting of three tanks. Tank 1 contained raw wastewater directly from industry, Tank 2 contained the wastewater partially treated with *Phragmites karka* and Tank 3 contained the wastewater finally treated with land application.

**Results:** Total hardness (mg/L CaCO<sub>3</sub>) measured 421.40±3.46, 209.93±5.25 and 196.18±0.74 while Chloride (mg/L) concentrations were 381.44±4.21, 342.56±12.62 and 439.74±4.21 for Tanks 1, 2 and 3 respectively.

**Conclusions:** It is evident that phytoremediation (using *Phragmites karka*) combined with land application is effective in the removal of Cr, Zn and Pb from industrial wastewater. The use of this system is therefore recommended, especially when the volume of flow is large and wastewater carries heavy metals at levels that are more than the permissible limits.

**Keywords:**

Groundwater resources, heavy metal concentrations, industrial wastewater, land application system, *Phragmites karka*, phytoremediation tank.