

Improving nitrogen availability on a tropical peat soil cultivated with *Ananas comosus* L. Merr. using pineapple residue ash

ABSTRACT

The objectives of this study were to use pineapple residue ash to (i) reduce ammonium and nitrate leaching and (ii) improve essential nutrient availability on a tropical peat soil under pineapple cultivation. Laboratory leaching experiments were carried out to determine the effectiveness of pineapple residue ash in controlling nitrogen loss from a tropical peat soil. Ion exchange resin method was used to determine nitrogen availability. Treatments evaluated were (i) different amounts of pineapple residue ash (25, 50, 70, and 100%) + NPK fertilizer, (ii) NPK fertilizer, and (iii) peat soil alone. Peat soils with pineapple residue ash reduced ammonium and nitrate losses because of adsorption of ammonium and nitrate by hydroxyl and C–O radicals of the pineapple residue ash. There was an improvement in ammonium and nitrate availability because the pineapple residue ash was able to increase the peat soil pH and this facilitated organic nitrogen mineralization and nitrification. The pineapple residue ash also improved nitrogen uptake, pineapple fresh fruit yield, and fruit quality. Ammonium and nitrate varied with soil depth because of high preferential flow of the peat soil water. Combined use of NPK fertilizers and 25% pineapple residue ash improved nitrogen availability whereas amending NPK with 50%, 70%, and 100% pineapple residue ash were more effective in improving nitrogen uptake, fresh fruit yield, and fruit quality of pineapple. Pineapple residue ash can also have significant liming effect.

Keyword: Adsorption; Ammonium; Nitrate; Nutrient leaching; Soil amendments; Waste management