



## Nitrogen Leaching from Saybrook Soil Amended with Biosolid and Polyacrylamide

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### ABSTRACT

In this study, Nitrogen leaching following surface application of biosolid with and without polyacrylamide (PAM) coating was investigated using soil column experiments. Three treatments including bare soil (C), a commercially available biosolid (BS) and PAM coated biosolid (PAM + BS), were applied to manually packed (bulk density: 1.3 g cm<sup>-3</sup>) growth chamber soil columns (GC columns: 5 cm diameter by 40 cm long) and greenhouse soil columns (GH columns: 15 cm diameter by 40 cm long). The application rates for BS and PAM + BS were 729 and 740 kg/ha, respectively. The GC columns were incubated for 60 days in a dark chamber at 25°C and no crop was grown in the columns. The GH columns were incubated for 60 days in a greenhouse and Ryegrass (seed rate: 252 kg/ha) was grown in these columns under 16 h daylight and at about 25°C. The columns were irrigated weekly using 270 mL DI-water for GC columns and 850 mL for GH columns and leachate was analyzed for Ammonium (NH<sub>4</sub>-N), Nitrate (NO<sub>3</sub>-N) and total Nitrogen (TN). The GH column experiments were repeated with three times greater biosolid application rate (2187 kg/ha) while keeping the PAM and Ryegrass seed rate constant. The leachate volume and NH<sub>4</sub>-N, NO<sub>3</sub>-N and TN concentration/load were not significantly different among the treatments for the GH columns but were significantly different during the incubation period. The same was true for GC columns with the exception of NO<sub>3</sub>-N and TN concentration/load which, overall, were higher for the BS and PAM + BS treatments than for the C treatment. In the beginning of the incubation, the leachate from all treatments (GC and GH) contained the highest NH<sub>4</sub>-N concentrations (>USEPA target level: 0.1 mg/L) and decreased, in some cases rapidly, to near zero. The NO<sub>3</sub>-N concentrations were highest in the middle of the incubation and greater than the USEPA target level (10 mg/L). The NO<sub>3</sub>-N concentrations were lower for cropped GH columns compared to GC columns due to NO<sub>3</sub>-N uptake by plants. The three fold increase in biosolid application rate did not increase NH<sub>4</sub>-N concentrations in leachate but did increase NO<sub>3</sub>-N and TN concentrations/loads in leachate on average 2.5 to 2.7 times. The non-significant differences among treatment means for NH<sub>4</sub>-N, NO<sub>3</sub>-N and TN concentrations/loads for the GH columns suggest that land application of biosolid (with or without PAM) to cropped silt loam landscapes at the rates considered may be safe within the context of groundwater pollution.

### KEYWORDS

Biosolid; Polyacrylamide; Ammonium; Nitrate; Nitrogen; Leachate

### Cite this paper

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