Accelerated Aging of Agricultural Soils and the Coupling of the Nitrogen and Proton Cycles. (S05-avila092943-Oral)

Authors:

- M.Avila* - *University of Wisconsin-Madison*
- P.Barak - *University of Wisconsin-Madison*
- J.L.Posner - *University of Wisconsin-Madison*
- D.A.Laird - *National Soil Tilth Laboratory*

Abstract:

Agroecosystems currently utilize about one third of the soils of the world and, in these soils, crop management introduces new variables to the biogeochemical cycles governing soil development. N fixation related to human activities now accounts for about half of the global N budget and has greatly enhanced the role of the N cycle in soil biogeochemistry. Microbial oxidation of ammoniacal N in soils generates acidity far greater than does acid rain, leading to base cation leaching, loss of CEC, and accelerated mineral weathering, measurable over decades. Soil acidification reflects imbalanced N cycling in soils related to the oxidation status of N inputs, the cation/anion balance of nutrient uptake by crops, the net export of reduced N by crop harvest, and the leaching of nitrate and other anions. When acidity is neutralized by soil constituents, chemical changes in the soil properties--including saturation of the exchange complex with exchangeable acidity, depletion of base cations through leaching with anions, and the loss of cation exchange sites due to pH-dependent CEC or mineral weathering--determine the ability of soil to further neutralize acidity.

Corresponding Author Information:

Mauricio Avila
University of Wisconsin
1525 Observatory Dr
Madison, WI 53706

phone: (608) 262 0397
fax: (608) 265 2595
e-mail: mavila@students.wisc.edu

Presentation Information:

Presentation Date: Monday, November 11, 2002
Presentation Time: 2:45 pm

Keywords:

soil acidification, cation leaching, mineral weathering, acid rain