

Soil Carbon Dynamics in Temperate and Tropical Agroforestry Systems. (A06-oelbermann103821-Poster)

Authors:

- M.Oelbermann* - *University of Guelph*
- R.P.Voroney - *University of Guelph*

Abstract:

Modern cropping practices have resulted in soil organic matter depletion, increasing the total area of marginal land in both temperate and tropical latitudes. Alternative land management strategies, including agroforestry, can rejuvenate marginal soils and increase soil C storage. This study quantified soil organic C to a depth of 40 cm in a 3, 9 and 18 year old tree based tropical agroforestry system with *Erythrina poeppigiana* and *Gliricidia sepium*, and in a 12 year old temperate agroforestry system with hybrid poplar (*Populus deltoids nigra*). Tropical soils were under various land management practices including the addition of chicken manure and *Arachis pinto*i as a groundcover. Soil C in the tropical and temperate alley cropping systems did not differ significantly ($p < 0.05$) with distance from the tree row. This is likely because prunings are spread evenly across the alley in the tropical system, and in the temperate zone autumnal litterfall also creates a relatively uniform distribution within cropping alleys. Soil organic C to a 40 cm depth ranged from 139, 101 to 96 Mg C/ha/y for the 3, 9 and 18 year old tropical systems and 121 MgC /ha/y in the temperate system. However, soil organic C in subplots with chicken manure and *A. pinto*i were not significantly greater ($p < 0.05$). The proportion of C derived from C4 plants to a 20 cm depth in tropical alley crops with *E. poeppigiana* and *G. sepium* was 35% (18 yr) and 24% (9 yr), with similar values (23%) in the temperate system with hybrid poplar. These results suggest that soil organic matter turnover in tropical systems is higher although carbon inputs are double compared to the temperate system.

Corresponding Author Information:

Maren Oelbermann
University of Guelph
Department of Land Resource
Science
Guelph, ON N1G 2W1
Canada

phone: 519-824-4120 x3488
fax: 519-824-5730
e-mail:
moelberm@uoguelph.ca

Presentation Information:

Presentation Date: Tuesday, November 12, 2002

Presentation Time: 2:00-4:00 pm

Poster Board Number: 730

Keywords:

Alley Cropping, Soil Organic Carbon, Carbon-13, Soil Carbon Sequestration