Factors affecting soil organic matter dynamics within a tree-based intercropping system in southwestern Ontario

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**Tree-based Intercropping**

- Agroforestry system which allows for trees and crops within the same area of land\(^1\)
  - An alternative land management practice to reduce agriculture’s role within global carbon emissions\(^2\)
  - Soil C increase due to consistent rotation of nutrients between various biotic and abiotic constituents of an ecosystem\(^3\)

**Soil Organic Matter**
- Approximately 10% of earth’s total C pool is stored as stable soil organic matter in agriculture soils\(^4\)
- Global soil organic C pool is 3.3 and 4.5 times larger than atmospheric and biotic C pools, respectively
- Altering the stability of soil organic matter, can become a large source of CO\(_2\)\(^5\)

**Objectives**
- Quantify belowground carbon accumulation at depth and distance from the 5 tree species
- Compare carbon accumulation between agroforestry site and monocrop control
- Measure soil and plant residue factors controlling formation and turnover of varying components of SOM
- Refine Biophysical simulation models CENTURY and DAYCENT

**Methodology**
- Study-site located on Victoria Rd. Guelph, ON
  - 5 tree species
  - Three replicates of each tree species

**Depth and Distance Samples from tree**
- Cores abstracted N, S, E and W from tree
- Each core divided into 4 depths:
  - 0-10cm
  - 10-20cm
  - 20-30cm
  - 30-40cm

**Temporal Samples**
- To a depth of 15cm
- Taken 2m N, S, E, W
- Taken at 3 times during the year:
  - Summer 2012
  - Fall 2012
  - Spring 2013

**Mono-crop Control**
- Plot adjacent to agroforestry field
- Replicates taken for both the Soil Core Samples and the Temporal Samples

**Significance**
- Historically, most research in agroforestry has been fulfilled in tropical ecosystems
- Many studies in Canada have focused on the carbon sequestration potential of poplar tree-based intercropping systems
- Research can be used in order to encourage coordinated policy on beneficial management practices for tree-based intercropping systems

**References**