

VandenBygaart, A. J., X. M. Yang, B. D. Kay, and D. Aspinall. 2002. **Variability in carbon sequestration potential in no-till soil landscapes of southern Ontario.** *Soil & Tillage Research* 65 (2): 231-241.

### **Abstract**

Soil organic carbon (SOC) in Canadian agricultural soils plays an important role in the global cycle of C, and management can influence its fate. Although the scientific literature suggests that practicing no-till (NT) can sequester C, this is not always the case. Furthermore there are many other factors including climate, management history, soil type and soil landscape processes that may affect the dynamics of SOC under NT. We measured the changes in SOC under NT in southern Ontario, at varying positions in the landscape in Gleyic and Orthic Luvisols at the end of a 15 year period. Soil cores taken to depths beyond the solum, were segmented with depth, and total SOC was determined for each segment on an equivalent mass basis. When the entire soil column was considered there was a loss of SOC in more profiles than there were gains. Furthermore, the erosion/deposition history at each landscape position appeared to influence the dynamics of SOC. In depression areas where Ap horizons were greater than 27 cm thick due to a history of soil deposition from upslope and local hydrology, there was a loss of total SOC after 15 years of NT. While where the Ap thickness was less than 27 cm, there were 18 profiles with SOC gains and 15 with net losses. Multiple linear regression analysis revealed that the change in SOC after 15 years was negatively related to the initial total SOC content and positively related to mass of clay. The results of this study suggest that landscape position and erosion/deposition history play a significant role in the ability of NT soils to sequester SOC. Interpretations of long-term SOC monitoring studies must take into account the location of samples within fields if useful information is to be gained on C dynamics in agricultural soils.