Quantifying Soil Carbon Losses Following Cultivation of a Long-term Pasture in New Zealand. (S05-curtin204054-Oral)

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Abstract:

A field experiment was established in spring 2000 in Canterbury, New Zealand, to quantify the effects of tillage practices on soil organic matter. The site, which had been under pasture for > 10 years, contained 84 t C/ha in the upper 25 cm layer. The trial includes three tillage treatments: intensive (plowing to ~20 cm), minimum (shallow cultivation to ~10 cm), and no tillage. The protocols used to determine soil C included adjustment for tillageinduced changes in bulk density. One approach involved use of the equivalent mass method whereby the amount of C in a constant soil mass (3500 t/ha = 25) cm sampling depth under pasture) was estimated. A second approach involved adjusting sampling depth based on changes in plot surface elevation, determined from a level monitoring survey. Surface elevation, measured after harvest of the first crop (barley), was raised by 25 mm in the intensively tilled treatment, compared with 3 mm under minimum tillage. Surface elevation did not change under no tillage. In general, estimates of C change were similar for the two measurement protocols. A large quantity of C was lost during the first cropping season under intensive tillage (11% decline), whereas there was very little change in C under no tillage.

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