Changing Soil Carbon and Nitrogen Pools in Intensively Tilled Rotations. (S03griffin123652-Oral)

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Abstract:

Information is needed on the ability of different crop management factors to maintain or increase soil C and N pools, especially in intensively-tilled short crop rotations. Soil samples from field experiments in Maine were used to assess the effect of cover crop, green manure crop, and intermittent or annual amendment on soil carbon (C) and nitrogen (N) pools. These field experiments, of 6-13 yr duration, were all characterized by 2-yr rotation with either sweet corn (Zea mays L.) or potato (Solanum tuberosum L.), and primary tillage each year. Total, particulate organic matter (POM), and microbial biomass (SMB) C and N pools were assessed for each experiment. Total C and N stocks were not affected by red clover (Trifolium pratense L.) crop or legume green manure, but were increased by 25-53% via single application of papermill sludge or annual manure and/or compost amendment. With the exception of continuous potato production which dramatically reduced SMB-C and SMB-N concentration. SMB-C and N were minimally affected by changes in cropping sequence, but were quite sensitive to amendments, even those that were primarily C. Particulate organic matter (POM) C and N, associated with the coarse mineral fraction (0.053-2 mm) were more responsive to management factors, compared to total C and N in soil. The change in soil C fractions was a linear function of increasing C supply,

across all experiments and treatments. Within these intensivelytilled, 2-yr crop rotations, substantial C and N inputs from amendments are needed to significantly alter soil C and N pools, although cropping sequence changes can influence more labile pools responsible for nutrient cycling.

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