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**366-5 Stacked Crop Rotation Reduces Soil Organic Carbon and Crop Yield Compared with Alternate-Year Rotation.**

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*Wednesday, November 9, 2016: 9:05 AM*  
*Phoenix Convention Center North, Room 122 A*

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**Abstract:**

Stacked crop rotations and improved cultural practices have been used to control pests, but their impact on soil organic C (SOC) and crop yield are lacking. We evaluated the effects of stacked vs. alternate-year rotations and cultural practices on SOC at the 0- to 125-cm depth and annualized crop yields from 2005 to 2011 in the northern Great Plains. Stacked rotations were durum (*Triticum turgidum* L.)-durum-canola (*Brassica napus* L.)-pea (*Pisum sativum* L.) (D-D-C-P) and durum-durum-flax (*Linum usitatissimum* L.)-pea (D-D-F-P). Alternate-year rotations were durum-canola-durum-pea (D-C-D-P) and durum-flax-durum-pea (D-F-D-P). Cultural practices were traditional (conventional till, recommended seed rate, broadcast N fertilization, and reduced stubble height) and ecological (no-till, increased seed rate, banded N fertilization, and increased stubble height). Annualized biomass residue (stems and leaves) returned to the soil and grain yield were greater with D-C-D-P and D-D-C-P than D-D-F-P and greater with the ecological than the traditional practice. The SOC at 5 to 10 cm was lower with D-D-C-P than other crop rotations and lower with the ecological than the traditional practice. At 20 to 50, 50 to 88, and 0 to 125 cm, SOC was lower with D-D-F-P than D-C-D-P and D-F-D-P. Regardless of treatments, SOC declined linearly from 2005 to 2011. The SOC at 0 to 125 cm increased linearly with annualized crop yield ( $R^2 = 0.58$ ,  $P \leq 0.01$ ). Stacked rotations reduced SOC storage and crop yield compared with alternate-year rotations. Ecological cultural practice increased crop yield with minimum impact on SOC compared with the traditional practice.

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