## Crop diversity effects on near-surface soil condition under dryland agriculture

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The northern Great Plains of North America has recently undergone an unprecedented transition in agricultural land use involving conversion of grassland to annual crops coupled with increased prevalence of monoculture cropping. Such trends underscore the value of understanding crop rotation effects on soil properties that infer the status of critical soil functions. Given this context, we sought to quantify effects of crop rotation on a suite of soil properties within four long-term cropping systems in south-central North Dakota.

Cropping system treatments included small grain – fallow and three continuously cropped rotations (three year, five year, and dynamic).

Soil acidification was greater in the three year rotation compared to the small grain – fallow and dynamic rotations. The five year and dynamic rotations possessed greater soil organic carbon and total nitrogen compared to the three year rotation and small grain – fallow. Among the four long-term cropping systems evaluated in this study, only the five year and dynamic rotations increased soil organic carbon over time.

Collectively, our results suggest crop rotations characterized by longer rotation cycles and greater crop diversity minimize soil acidification and increase soil organic carbon. These rotation-induced outcomes serve to foster the maintenance and/or improvement of soil ecosystem services that affect agricultural sustainability.

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