

# Improving Soil Health with Winter Wheat



Figure 1. Slake test proxy for water stable aggregates. Left to right: Alfalfa, CCSW(rc)-NT, CCSW(rc)-CT, CCCC-CT, CCSS-NT, and CCSS-CT. NT=No-till, CT=Conventional till, C=corn, S=soybean, W=wheat, rc=red clover. Photo credit: Bill Deen, Univ. of Guelph

### Current issue

Soil health (biological, physical, and chemical) has been a popular focus with emphasis on utilizing no-till and cover crops in eastern Nebraska. However, **a more diverse crop rotation is often left out of the discussion as a way to improve soil health.** The corn-soybean rotation is the most widely utilized cropping system in eastern Nebraska. Despite the potential benefits adding a third or fourth crop to this rotation to improve soil health, few farmers in eastern Nebraska have because of various adoption barriers. Winter wheat is a strong consideration to be added to the rotation.

### Crop rotation benefits

A diverse crop rotation along with:

- No-till, cover crops, and livestock integration

Two long-term (14 & 15 years) crop rotation studies in the Midwest have shown that **including winter wheat into the corn-soybean rotation** results in the following **improvement in soil health:**

1. **Increase in water stable aggregates** (most sensitive and best single indicator of soil physical health, example in Figure 1)
2. **Higher total nitrogen (N), potentially mineralizable N in soil, and N use efficiency**
3. **Reduced N rates** needed in corn for maximum economic return
4. **Higher yields in corn and soybeans**

These aspects of soil health were increased by adding wheat into the rotation regardless of the tillage system, conventional and no-till. The dense fibrous root system of wheat and nitrogen derived from wheat root deposits is likely the cause of these measurable differences. The long-term crop rotation study in Illinois did not include cover crops and the other study near Michigan (east of Detroit in southern Ontario) only had dormant-seeded red clover in then wheat year of the rotation.

### Overcome barriers to adding wheat

Barriers producers share

- Economics of wheat grain yield only/input cost compared to corn and soybean production
- Logistics of planting and harvesting only 1 or 2 fields
- Concerns about the learning curve of growing a new crop

Overcoming these barriers

- Improve economics by capturing good basis (Lincoln & Fremont), selling straw, growing forage crop after wheat, higher corn and soybean yield in rotation, and USDA programs payments
- Improve logistics with custom drilling and harvesting. Also, a business opportunity
- Reduce learning curve through new website, peer-learning group, and working with cropping systems extension educator

### Local grower quote

*"Winter wheat gives you an additional 45 to 60 days for the cover crop to grow, which results in more material to graze if you choose to, and more root mass to help build organic matter in the soil." Local Farmer - Nebraska Farmer Magazine*

### For more information

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*Wheat resources for Eastern Nebraska at [croptechcafe.org/winterwheat](http://croptechcafe.org/winterwheat)*