Long-term Impacts of Cover Cropping
Research of the ARS Cropping Systems and Water Quality Research Unit

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Mulch till

No-till

No-till with Cover Crops

Plot Research

• Grain Production
• Root-zone Water Quality
• Runoff Water Quality
• Soil Quality
1991-2003: Corn-Soybean-Wheat (CC after wheat only)
- Hairy vetch
- Red clover
- Cereal rye
- Annual rye
2004-2013: Corn-Soybean-Wheat (CC after all grains)

- Cereal rye after corn and soybean
- Red clover or mix (legumes, brassicas, and grass) after wheat
Soil Aggregate Stability

- Min. Till CS (1)
- No Till CS (2)
- ICM No Till CSW (5)
- CRP (6)
Improved Water Infiltration
Soil Management Assessment Framework (SMAF)

- water-stable aggregates
- bulk density
- water-filled pore space,
- EC
- pH
- soil P
- exchangeable K
- soil organic C
- microbial biomass C
- soil glucosidase activity
88-Acre Research Field

1991-2003
Corn-Soybean Mulch-Till

2004-present
Soybean-Wheat (N) Soybean-Corn (S)
No-Till + Cover Crop
• Cereal Rye
• Rye Grass
• Sudex (following wheat)
• Grass/Legume/Brassica Mix
Grass/Legume/Brassica Mix

- Hair Vetch 6.9 lbs/ac
- Dwarf Essex Rape 3.6 lbs/ac
- Winter Barley 16.6 lbs/ac
- Austrian Winter Peas 16.6 lbs/ac
- Ground Hog Tillage Radish 1.38 lbs/ac
- Winter Wheat 5.55 lbs/ac

Seed Cost $27.14/ac
Monthly Runoff Normalized

Average 10-year monthly
\((F1/P201)/(W1/P298)\)

- 25-30% reduction in runoff
Average Annual Sediment Loss

Rate of Soil Formation

350% more @ Field than Watershed

1993-2003
Percent Reduction in Sediment in Runoff
(summary of studies; Langdale et. al., 1991)
Questions.....