

Rotation Impact on W.Wheat Dakota Lakes Research Farm

Rotation	Yield	Precip*
Corn-Pea-WW 2006	60	7.9
SB-Corn-Pea-WW 2006	29	
Corn-Pea-WW 2005	92	23.7
Sb-Corn-Pea-WW 2005	57	
Corn-Pea-WW 2002	56	6.4
SB-Corn-Pea-WW 2002	28	

Rotation Impact on W.Wheat Yields in 2002

Rotation	WW Yield
Corn-Canola-WW	28
Corn-Pea-WW	56
SF-Corn-Canola-WW	10
SB-Corn-Pea-WW	28

Rotation Impact on W.Wheat Yields in 2016

Rotation	WW Yield
Sorghum-Pea-WW	95
SB-Sorghum-Pea-WW	84
SB-Sorghum-Carinata-WW	60
Sorghum-Corn-Pea-SW-WW	95

ROTATION IMPACT ON W.WHEAT 15 ROTATION STUDY LYMAN COUNTY, SD 1995, 1997, 1998, 1999, and 2000

Interval Between Wheat	Yield
Alternate Year Wheat-XXX	46.8
Two Years Out Wheat-Corn-XXX	53.0
Two In – Two Out SW-WW-Corn-XXX	48.4
Three Years Out WW-Corn-SB-Pea	57.9

W.Wheat Cost/Unit of Production
1994-1995 & 1997-1999 Lyman County

<u>Rotation</u>	<u>Cost in \$/bu.</u>
WW-Fallow	\$4.60
WW-Corn-Fallow	\$3.79
WW-Corn-Pea	\$2.45
SW-WW-Corn-SB	\$2.64

**Rotation Impact on Spring Wheat
WCS 2002**

• Rotation	SW Yield
• Wheat-Canola	15.4
• Wheat-Fallow	20.7
• Wheat-Corn-Fallow	23.7
• Wheat-Corn-Pea	25.8
• Wheat-Corn-Soybean	8.9

Commonality Among Tillage Tools

- **All Tillage Tools Destroy Soil Structure.**
- **All tillage tools decrease water infiltration**
- **All tillage tools reduce organic matter**
- **All tillage tools increase weeds.**

27,000 gallons of water provides 1 inch of water on 1 acre.

There are 1,800,000 lbs of soil in 1 acre 6 inches deep.

If 1% OM there is 18,000 lbs.

If 4% OM there is 72,000 lbs.

OM holds 5 to 10 times its weight
in water

In top 6 inches total water held on
the OM alone with

1% OM is 0.39 to 0.78 inches
4% OM is 1.5 to 3.1 inches

OM holds 5 to 10 times its weight
in water

In top 12 inches total water held
on the OM alone with

1% OM is 0.78 to 1.56 inches
4% OM is 3.0 to 6.2 inches

“Within all textural groups, as organic matter increased from 1 to 3%, the available water capacity approximately doubled. When organic matter content increased to 4%, it then accounted for more than 60% of total AWC“.8

When soil water storage capacity is low, much of the rain that falls during extended periods of precipitation is lost. In contrast, a high water storage capacity, combined with the effective capture of rain and snowmelt over the fall, winter and spring can support a crop through an extended dry period.

2013 Yield Data
Dakota Lakes Research Farm

- **C – SB rotation (Cover Crops historically increases soybean yield 7.3 bu/a on average vs no CC in this rotation).**
- **Yield 2013: Soybean with WW CC 62.9 bu/a. We would have expected around 55.6 bu/a without CC.**

2013 Yield Data
Dakota Lakes Research Farm

- **C – C – SB – Wheat - SB rotation**
- **1st year SB yield - NO cover crop = 76.3 bu/ac**
- **2nd SB yield – Cover Crop = 81.2 bu/ac**

2013 Yield Data
Dakota Lakes Research Farm

- **Cover crop increased SB yield (7.3 bu/ac), but more importantly crop diversity increased SB yield by 15.9 bu/ac.**
- C – SB rotation = 62.9**
- C – C – SB – Wheat – SB = 78.8 bu/ac**

DIVERSITY IMPACT IF 5,000 ACRES

- **CONTINUOUS CORN**
 - 203 bu/a
- **CORN-SOYBEAN**
 - 217 bu/a
- **C-C-SB-W-SB**
 - 235 Corn

DIVERSITY IMPACT IF 5,000 ACRES

- **CONTINUOUS CORN**
 - 1,015,000 corn, 0 soybean, 0 wheat
- **CORN-SOYBEAN**
 - 542,500 Corn, 157,250, 0 Wheat
- **C-C-SB-W-SB**
 - 470,000 Corn, 157,600, 120,000 Wheat

Pio 33P67 C-SB 2005.

Nitrogen	Starter	Pop-up	Yield	Moisture
28% TOP	Surface	Yes	194	23.2
Urea Side	Yes	Yes	207	21.7
Urea Side	Yes	Surface	202	23.3
Urea Side	Surface	Yes	197	23.6

Pio 33P67 W/cc 2005.

Nitrogen	Starter	Pop-up	Yield	Moisture
Urea Side	Surface	Yes	207	23.7
Urea Side	Yes	Yes	212	24.4
Urea Side	Yes	Surface	215	23.1
28% TOP	Surface	Yes	200	23.7

Pioneer 33W44 Diverse Pinto 2005

Nitrogen	Starter	Pop-up	Yield	Moisture
28% Surface	Yes	Yes	220	18.5
28% Surface	Surface	Yes	223	19.3
Urea Side	Yes	Yes	223	18.6

Starter Response by Corn in Different Tillage Systems in Indiana

Type of tillage	Number of responses out of 11 bu/A	Average response (all sites)
Conv.	1	0.9
No-till	8	7.8

Pio 0448 AM1 Corn II Diverse 2013 Olsen P less than 5 ppm

Nitrogen	Starter P	Pop-up	Yield
60 N side	Yes	Yes	217
60 N side	Yes	No	214
60 N Over row	Over row	Yes	198
60 N Middle	Middle	Yes	197

Mycogen 2T498 Corn II Diverse 2013 Olsen P less than 5 ppm

Nitrogen	Starter P	Pop-up	Yield
60 N side	Yes	Yes	206
60 N side	None	Yes	212
60 N side	Yes	None	206
60 N side	None	None	204

Fertility Management

- **Some starter P with the seed.**
- **Other nutrients placed near row at seeding or on soil surface after crop canopy.**
- **broadcast fertilizer before or at seeding encourages weeds.**
- **Three key factors**
 - 1 Available Nutrient
 - 2 Moisture
 - 3 Roots