FIELD EXPERIMENT HISTORY

Title: **17 Tillage and Fumigation in Corn and Soybean Production Systems**

Experiment: 17 Tillage **Trial ID** 2598 **Year:** 2004

Personnel: J.G. Lauer, P.J. Flannery, K.D. Kohn, and T.F. Stanger

Location: Arlington, WI **County:** Columbia

Supported By: HATCH

Site Information

Field: ARS396 **Previous Crop:** Corn/Soybean **Soil Type:** Plano Silt Loam

Soil Test: **Date:** 5 /6 /04 **pH:** 6.8 **OM (%)** 3.0 **P (ppm)** 22 **K (ppm)** 139

Plot Management

Tillage Operations: See Factors

		Analysis:	Rate lbs/A:	Date:
Fertilizer:	**Preplant :**	34-0-0	CC - 559 lbs/A CS - 471 lbs/A	5 /17/04
	Starter :	N/A	N/A	N/A
	Post plant :	N/A	N/A	N/A
	Manure:	N/A	N/A	N/A

Herbicide: Roundup 1.5 qt/A 5/17 - All
Roundup Weather Max 1.4pt/A 6/28 - All

Insecticide: Force 3G @ 4.4 lb/A

Irrigation: None

Hybrid/Variety: Trelay 7693 RR2

Planting Date: C: 5/20/04
S: 5/28/04

Row Width: 30"

Planting Method: Kinze Inter-Row Planter

Planting Depth: C: 1.5"
S: 1.0"

Harvest Date: C: 11/2/04
S: 11/6/04

Harvest Method: C: Kincaid Plot Combine
S: Almaco Plot Combine

Experimental Design

Design: RCB Split Plot

Replications: 4

Plot Size Seeded 20' x 100'

Experiment Size: 4.5 A

Harvest Plot Size: 5' x 100'

Factors/Treatments:

Rotation	Tillage for All Rotations
Continuous Corn	CP = Fall chisel plow and 2 spring field cultivator
Corn / Soybean	T1 = NT- Planter unit equipped with 1 13-wave coulter with trash whippers
Soybean / Corn	T2 = NT- Planter unit equipped with 1 13-wave coulter with trash whippers
	T3 = Spring chisel plow, fumigation (Sectagon 42 @ 45 gals/A), and 2 spring field cultivator
	T4 = Spring chisel plow and 2 spring field cultivator
	NT = Planter unit equipped with 1 13-wave coulter with trash whippers

Results: Tables C-81, 82, and 83.

Table C-81. Tillage in Corn and Soybean Production Systems - Corn. Arlington, WI - 2004.

Rotation	Tillage treatment	Residue cover	Yield	Moisture	Test Weight	Grower return	Lodged			Barren	Ears Dropped	Harvest	
							Total	Stalk	Root			plants	ears
		%	bu/A	%	lbs/bu	$/A	%	%	%	%	%	plants/A	ears/A
	CP	25	157	30.0	48	247	0	0	0	3	0	33375	32500
	NT	73	136	30.8	46	211	0	0	0	2	0	33125	32625
	T1	70	143	30.1	47	225	0	0	0	6	0	34375	32375
	T2	66	151	30.8	47	234	0	0	0	2	0	33000	32500
	T3	31	150	30.7	47	235	0	0	0	6	0	32375	30375
	T4	20	151	30.3	47	237	0	0	0	3	0	32375	31375
CC		56	136	31.3	46	211	0	0	0	5	0	33000	31333
SC		40	161	29.6	48	254	0	0	0	2	0	33208	32583
CC	CP	36	148	31.2	47	229	0	0	0	4	0	33250	32000
CC	NT	81	127	31.4	45	196	0	0	0	2	0	32000	31250
CC	T1	80	131	31.0	45	203	0	0	0	8	0	34750	32000
CC	T2	73	141	31.6	46	217	0	0	0	1	0	33000	32750
CC	T3	36	137	31.2	47	212	0	0	0	11	0	32500	29000
CC	T4	28	135	31.3	47	207	0	0	0	5	0	32500	31000
SC	CP	13	167	28.8	48	266	0	0	0	2	0	33500	33000
SC	NT	65	148	30.1	48	232	1	1	0	1	0	34250	34000
SC	T1	60	156	29.2	48	247	0	0	0	4	0	34000	32750
SC	T2	60	161	30.1	48	252	0	0	0	2	0	33000	32250
SC	T3	27	164	30.1	48	257	1	1	0	2	0	32250	31750
SC	T4	13	168	29.4	48	266	0	0	0	2	0	32250	31750
Mean		48	148	30.4	47	232	0	0	0	3	0	33104	31958
Probability(%)													
Rotation (R)		0.9	1.0	33.2	0.7	0.2	39.1	39.1	-	3.0	-	74.9	18.2
Tillage (T)		0.0	0.9	72.2	0.6	0.9	43.5	43.5	-	3.7	-	43.6	29.1
R x T		11.1	71.1	89.9	25.0	69.9	43.5	43.5	-	9.8	-	77.3	66.3
LSD (0.10)													
Rotation (R)		3	5	NS	0	5	NS	NS	-	1	-	NS	NS
Tillage (T)		2	4	NS	0	7	NS	NS	-	1	-	NS	NS
R x T		NS	NS	NS	NS	NS	NS	NS	-	2	-	NS	NS
CV(%)		11	7	4	2	7	441	442	-	99	-	6	7

Table C-81b. Tillage in Corn/Soybean Production Systems - Corn Quality Arlington, WI - 2004.

Rotation	Tillage treatment	Grain Composition			Ethanol	
		Oil	Starch	Protein	per bu	per A
		%	%	%	gallons	gallons
	CP	3.3	60.5	7.6	2.86	451
	NT	3.3	60.8	7.2	2.87	390
	T1	3.3	60.9	7.3	2.87	415
	T2	3.3	60.8	7.0	2.88	434
	T3	3.3	60.7	7.4	2.87	431
	T4	3.3	60.7	7.7	2.86	432
CC		3.3	60.9	7.3	2.87	391
SC		3.3	60.6	7.4	2.87	462
CC	CP	3.3	60.6	7.6	2.85	422
CC	NT	3.3	61.1	7.1	2.88	365
CC	T1	3.4	61.0	7.1	2.87	373
CC	T2	3.3	61.0	7.1	2.88	405
CC	T3	3.3	60.8	7.5	2.86	392
CC	T4	3.3	60.8	7.6	2.85	384
SC	CP	3.3	60.5	7.6	2.87	479
SC	NT	3.3	60.5	7.3	2.87	424
SC	T1	3.3	60.8	7.4	2.87	446
SC	T2	3.4	60.6	7.0	2.88	463
SC	T3	3.3	60.6	7.3	2.87	470
SC	T4	3.3	60.5	7.8	2.86	480
Mean		3.3	60.7	7.4	2.87	427
Probability(%)						
Rotation (R)		55.8	10.5	54.5	60.8	0.9
Tillage (T)		93.1	57.1	0.0	0.7	1.2
R x T		3.8	82.5	35.8	13.0	69.1
LSD (0.10)						
Rotation (R)		NS	NS	NS	NS	13
Tillage (T)		NS	NS	0.1	0.00	13
R x T		0.0	NS	NS	NS	NS
CV(%)		1.9	0.63	3.5	0.4	6.9

Table C-82. Tillage in Corn and Soybean Production Systems - Soybean.
Arlington, WI - 2004.

Rotation	Tillage treatment	Residue cover	Yield	Moisture	Grower return	Height	Lodging	Seed Composition			Protein	Oil	Protein + Oil	Fatty Acid Composition					
								Oil	Protein	Fiber				Palmitic	Stearic	Oleic	Linoleic	Linolenic	P/M ratio
		%	bu/A	%	$/A	inches	1 to 5	%	%	%	lbs/A	lbs/A	lbs/A	%	%	%	%	%	
SC	CP	28	44	15.2	226	36	2	17.5	36.4	4.8	929	446	1375	11.8	2.5	25.7	53.5	6.6	2.3
SC	NT	71	50	15.1	255	32	2	17.7	35.8	4.9	1032	510	1543	11.9	2.5	24.6	54.4	6.6	2.5
SC	T1	71	50	15.2	255	33	2	17.7	35.9	4.9	1034	508	1542	12.0	2.4	26.9	52.4	6.3	2.2
SC	T2	72	47	15.0	239	32	2	17.9	35.6	4.9	959	482	1441	11.7	2.5	24.5	54.8	6.5	2.5
SC	T3	29	46	15.3	237	31	2	17.7	36.0	4.9	962	473	1435	12.3	2.5	24.6	53.8	6.8	2.5
SC	T4	32	48	15.1	244	34	2	17.6	35.9	4.9	988	486	1473	12.0	2.6	25.0	54.1	6.4	2.4
Mean		51	48	15.1	242	33	2	17.7	35.9	4.9	984	484	1468	12.0	2.5	25.2	53.8	6.5	2.4
Probability(%)																			
Tillage (T)		0.0	52.8	74.9	52.8	0.3	69.1	60.3	19.6	40.7	64.9	44.5	58.6	37.2	34.2	24.7	30.0	25.1	27.0
LSD (0.10)																			
Tillage (T)		3	NS	NS	NS	1	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
CV(%)		11	10	2	10	4	28	2	1	1	10	10	10	3	6	6	3	4	8

Table C-83. Crop Rotation, Tillage, and Fumigation Influence on Corn Growth and Development. Arlington, WI - 2004.

Crop	Rotation	Treatment	Observation Day of Year	Leaf Development: Leaf Collars	Leaf Development: Hail Adjusters Method	Leaf Development: Total Leaves	Plant Height
				no./plant	no./plant	no./plant	inches
Corn			163	2.0	3.1	4.0	5.4
Corn			174	4.1	6.0	7.2	14.8
Corn			189	6.7	9.2	11.1	29.6
Corn			202	10.3	12.6	14.6	57.3
Corn			217	17.0	15.5	17.5	92.3
Corn			232	17.8	17.7	17.8	99.1
Corn		CP		9.9	11.0	12.3	51.8
Corn		NT		9.4	10.5	11.8	48.3
Corn		T3		9.6	10.5	12.0	48.6
Corn		T4		9.7	10.8	12.1	49.4
Corn		CP	163	2.1	3.4	4.2	6.0
Corn		CP	174	4.3	6.4	7.6	16.6
Corn		CP	189	6.9	9.3	11.5	31.9
Corn		CP	202	10.8	12.9	15.0	61.3
Corn		CP	217	17.4	16.4	17.6	95.6
Corn		CP	232	17.8	17.8	17.8	99.5
Corn		NT	163	2.0	2.9	3.8	5.5
Corn		NT	174	4.0	6.0	7.0	14.1
Corn		NT	189	6.4	8.9	10.9	28.1
Corn		NT	202	9.9	12.5	14.4	56.1
Corn		NT	217	16.6	15.2	17.2	88.2
Corn		NT	232	17.3	17.3	17.3	98.1
Corn		T3	163	2.0	2.9	3.9	5.3
Corn		T3	174	4.0	5.6	6.9	14.1
Corn		T3	189	6.7	9.0	10.9	28.6
Corn		T3	202	10.1	12.4	14.4	55.6
Corn		T3	217	16.8	15.1	17.6	93.5
Corn		T3	232	18.1	18.0	18.1	100.2
Corn		T4	163	2.1	3.1	4.1	4.9
Corn		T4	174	4.1	6.2	7.2	14.4
Corn		T4	189	6.7	9.5	11.2	29.9
Corn		T4	202	10.4	12.7	14.6	56.4
Corn		T4	217	17.2	15.5	17.6	92.1
Corn		T4	232	17.8	17.8	17.8	98.5

(continued)

Table C-83. Crop Rotation, Tillage, and Fumigation Influence on Corn Growth and Development. Arlington, WI - 2004.
(continued)

Crop	Rotation	Treatment	Observation Day of Year	Leaf Development: Leaf Collars	Leaf Development: Hail Adjusters Method	Leaf Development: Total Leaves	Plant Height
	plants/A			#/plant	#/plant	#/plant	inches
Corn	CC			9.4	10.4	11.7	45.8
Corn	SC			9.9	11.0	12.4	53.3
Corn	CC		163	2.1	3.1	3.9	5.3
Corn	CC		174	4.1	5.9	7.0	14.0
Corn	CC		189	6.4	8.7	10.5	27.7
Corn	CC		202	9.8	12.1	14.1	50.9
Corn	CC		217	16.3	15.0	17.1	85.5
Corn	CC		232	17.5	17.4	17.5	93.7
Corn	SC		163	2.0	3.1	4.1	5.5
Corn	SC		174	4.1	6.2	7.3	15.7
Corn	SC		189	7.0	9.6	11.7	31.6
Corn	SC		202	10.9	13.2	15.1	63.8
Corn	SC		217	17.7	16.1	17.9	98.7
Corn	SC		232	18.0	18.0	18.0	104.5
Corn	CC	CP		9.6	10.7	11.9	47.4
Corn	CC	NT		9.1	10.1	11.5	45.9
Corn	CC	T3		9.3	10.1	11.6	44.2
Corn	CC	T4		9.5	10.6	11.8	45.6
Corn	SC	CP		10.1	11.4	12.6	56.3
Corn	SC	NT		9.6	10.8	12.1	50.8
Corn	SC	T3		10.0	10.9	12.4	52.8
Corn	SC	T4		10.0	11.0	12.3	53.2
Corn	CC	CP	163	2.1	3.4	4.1	5.5
Corn	CC	CP	174	4.3	6.3	7.4	15.4
Corn	CC	CP	189	6.6	8.9	10.8	29.1
Corn	CC	CP	202	10.3	12.5	14.5	52.9
Corn	CC	CP	217	16.9	15.6	17.3	87.8
Corn	CC	CP	232	17.6	17.5	17.6	93.6
Corn	CC	NT	163	2.0	2.9	3.6	5.5
Corn	CC	NT	174	4.0	5.9	6.9	13.8
Corn	CC	NT	189	6.1	8.5	10.3	26.0
Corn	CC	NT	202	9.4	11.9	14.0	50.8
Corn	CC	NT	217	16.0	14.5	16.9	84.4
Corn	CC	NT	232	17.1	17.0	17.1	94.8
Corn	CC	T3	163	2.0	3.0	3.9	5.4
Corn	CC	T3	174	4.0	5.5	6.6	12.5
Corn	CC	T3	189	6.4	8.4	10.3	26.9
Corn	CC	T3	202	9.4	11.8	13.8	49.9
Corn	CC	T3	217	15.9	14.4	17.0	85.5
Corn	CC	T3	232	17.9	17.8	17.9	95.4

(continued)

Table C-83. Crop Rotation, Tillage, and Fumigation Influence on Corn Growth and Development. (continued) **Arlington, WI - 2004.**

Crop	Rotation	Treatment	Observation Day of Year	Leaf Development: Leaf Collars	Leaf Development: Hail Adjusters Method	Leaf Development: Total Leaves	Plant Height
	plants/A			no./plant	no./plant	no./plant	inches
Corn	CC	T4	163	2.3	3.1	4.1	5.0
Corn	CC	T4	174	4.3	6.0	7.1	14.3
Corn	CC	T4	189	6.4	9.1	10.8	28.6
Corn	CC	T4	202	10.0	12.3	14.3	50.1
Corn	CC	T4	217	16.5	15.6	17.1	84.5
Corn	CC	T4	232	17.4	17.4	17.4	91.0
Corn	SC	CP	163	2.0	3.4	4.3	6.4
Corn	SC	CP	174	4.3	6.5	7.9	17.9
Corn	SC	CP	189	7.1	9.6	12.3	34.6
Corn	SC	CP	202	11.4	13.4	15.5	69.8
Corn	SC	CP	217	18.0	17.3	18.0	103.5
Corn	SC	CP	232	18.0	18.0	18.0	105.4
Corn	SC	NT	163	2.0	3.0	4.0	5.4
Corn	SC	NT	174	4.0	6.1	7.1	14.5
Corn	SC	NT	189	6.8	9.3	11.5	30.1
Corn	SC	NT	202	10.5	13.1	14.9	61.4
Corn	SC	NT	217	17.1	15.9	17.5	92.0
Corn	SC	NT	232	17.5	17.5	17.5	101.5
Corn	SC	T3	163	2.0	2.9	4.0	5.2
Corn	SC	T3	174	4.0	5.8	7.1	15.7
Corn	SC	T3	189	7.0	9.6	11.5	30.4
Corn	SC	T3	202	10.9	13.1	15.0	61.3
Corn	SC	T3	217	17.6	15.8	18.1	99.5
Corn	SC	T3	232	18.4	18.3	18.4	105.0
Corn	SC	T4	163	2.0	3.1	4.0	4.9
Corn	SC	T4	174	4.0	6.4	7.3	14.5
Corn	SC	T4	189	7.0	9.9	11.6	31.1
Corn	SC	T4	202	10.8	13.1	15.0	62.6
Corn	SC	T4	217	17.9	15.4	18.0	99.8
Corn	SC	T4	232	18.1	18.1	18.1	106.0
Mean				9.6	10.7	12.0	49.5
Probability(%)							
Rotation (R)				0.0	0.0	0.0	0.0
Treatment (T)				0.0	0.0	0.0	0.0
R x T				40.0	49.2	45.3	0.8
DOY (D)				0.0	0.0	0.0	0.0
R x D				0.0	1.4	0.0	0.0
T x D				0.9	10.1	5.3	4.6
R x T x D				94.6	62.6	93.7	34.3
LSD (0.10)							
Rotation (R)				0.2	0.3	0.1	1.5
Treatment (T)				0.1	0.2	0.1	0.9
R x T				NS	NS	NS	1.3
DOY (D)				0.1	0.2	0.1	2.0
R x D				0.2	0.4	0.2	2.3
T x D				0.3	NS	0.3	2.3
R x T x D				NS	NS	NS	NS
CV(%)				4	6	3	6