FIELD EXPERIMENT HISTORY

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

Experiment: 17Tillage **Trial ID** 3286 **Year:** 2009

Personnel: J. G. Lauer, J.M. Gaska, K. D. Kohn, T.H. Diallo

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

Supported By: HATCH

Site Information

Field: 396 **Previous Crop:** Corn / Soybean **Soil Type:** Plano Silt Loam

Soil Test: **Date:** 8 /10/07 **pH** 6.0 **OM (%)** 4.4 **P (ppm)** 107 **K (ppm)** 24

Plot Management

Tillage Operations: See Factors

		Analysis:	Rate lbs/A:	Date:
Fertilizer:	**Preplant :**	N/A	N/A	N/A
	Starter :	N/A	N/A	N/A
	Post plant :	32-0-0	200	6/10/2009
	Manure:	N/A	N/A	N/A

Herbicide: Honcho Plus: 24 oz/acre 5/15/09
Honcho Plus: 24 oz/acre 6/2/09
Honcho Plus: 24 oz/acre 7/1/09

Insecticide: Force 3G: 4.4 lbs/A at planting

Irrigation: None

Hybrid/Variety: Corn: Dekalb DKC5259
Soybean:S21N6

Planting Date: Corn: 4/24 & 5/12/09
Soybean: 5/21/09

Row Width: 30"

Planting Method: Kinze 2000 Interplant planter

Planting Depth: Corn: 1.5"
Soybean: 1"

Target Plant Density: 32500 **Plants/A**

Harvest Date: Corn: 11/3/09
Soybean: 11/9/09

Harvest Method: C: Kincaid plot combine
S: Almaco plot combine

Experimental Design

Design: RCB split split plot

Replications: 4

Plot Size Seeded: 10' X 50'

Experiment Size: 3.6

Harvest Plot Size: 5' x 48'

Factors/Treatments:

Rotation	Tillage For All Rotation	Date of Planting
Continuous Corn	1) CP: Fall chisel plow +2 spring field cultivator.	S1: April 24
Corn / Soybean	2) T1: Fall Strip-Till, knife 9in., Full Berm,	S2: May 12
Soybean / Corn	3) T2: Fall Strip-Till, knife 9in., No Berm,	
	4) T3: Fall Strip-Till, knife 6in., Full Berm,	
	5) T4: Fall Strip-Till, knife 6in., No Berm,	
	6) NT: Spring 1-13 wave coulter	

Results: Tables C- 52 and C- 53

Table C- 52 .Tillage, Rotation, and Date of Planting in Corn and Soybean Production Systems - Corn. Arlington, WI - 2009.

Rotation	Tillage	Date of Planting	Yield	Moisture	Test weight	Grower return	Lodged			Harvest plants
							Total	Root	Stalk	
			bu/A	%	lbs/bu	$/A	%	%	%	plants/A
		24-Apr	209	25.3	52.1	722	0.6	0.4	0.3	30208
		12-May	201	28.0	50.8	683	0.7	0.3	0.4	28833
	CP		209	23.9	52.9	726	0.6	0.4	0.2	28875
	NT		188	29.9	50.4	631	0.4	0.0	0.4	29375
	T1		206	26.1	51.0	707	0.4	0.2	0.2	30250
	T2		218	26.6	51.5	745	1.7	1.0	0.6	29625
	T3		204	26.8	51.7	696	0.4	0.2	0.2	29188
	T4		207	26.4	51.2	709	0.6	0.2	0.4	29813
	CP	24-Apr	211	22.6	53.7	738	1.2	0.8	0.4	30875
	CP	12-May	207	25.2	52.1	714	0.0	0.0	0.0	26875
	NT	24-Apr	193	28.4	50.9	656	0.0	0.0	0.0	29750
	NT	12-May	182	31.5	49.9	606	0.8	0.0	0.8	29000
	T1	24-Apr	207	24.8	51.7	715	0.0	0.0	0.0	30250
	T1	12-May	205	27.3	50.3	699	0.8	0.4	0.4	30250
	T2	24-Apr	223	25.4	52.2	766	0.8	0.4	0.4	30375
	T2	12-May	213	27.8	50.9	724	2.5	1.6	0.9	28875
	T3	24-Apr	201	25.7	52.3	692	0.4	0.4	0.0	29750
	T3	12-May	206	27.9	51.0	701	0.4	0.0	0.4	28625
	T4	24-Apr	221	24.8	52.1	763	1.2	0.4	0.8	30250
	T4	12-May	194	28.1	50.3	655	0.0	0.0	0.0	29375
CC			195	29.4	50.9	656	1.1	0.5	0.6	29229
CS			216	23.8	51.9	749	0.2	0.1	0.1	29813
CC		24-Apr	204	28.4	51.6	689	0.8	0.4	0.4	29875
CC		12-May	187	30.5	50.3	624	1.5	0.7	0.8	28583
CS		24-Apr	215	22.2	52.7	755	0.4	0.3	0.1	30542
CS		12-May	216	25.4	51.2	743	0.0	0.0	0.0	29083
CC	CP		211	24.9	52.7	727	1.2	0.8	0.4	29375
CC	NT		161	34.1	49.4	527	0.8	0.0	0.8	27625
CC	T1		200	29.0	50.4	673	0.8	0.4	0.4	29125
CC	T2		211	29.7	50.7	707	2.5	1.6	0.9	30125
CC	T3		197	30.2	51.3	659	0.8	0.4	0.4	28750
CC	T4		191	28.8	51.1	643	0.8	0.0	0.8	30375
CS	CP		208	22.9	53.1	725	0.0	0.0	0.0	28375
CS	NT		214	25.8	51.3	734	0.0	0.0	0.0	31125
CS	T1		213	23.1	51.6	741	0.0	0.0	0.0	31375
CS	T2		225	23.6	52.3	782	0.8	0.4	0.4	29125
CS	T3		211	23.4	52.0	734	0.0	0.0	0.0	29625
CS	T4		223	24.1	51.3	775	0.4	0.4	0.0	29250

continued

Table C- 52 .Tillage, Rotation, and Date of Planting in Corn and Soybean Production (continued) Systems - Corn. Arlington, WI - 2009.

Rotation	Tillage	Date of Planting	Yield	Moisture	Test weight	Grower return	Lodged			Harvest plants
							Total	Root	Stalk	
			bu/A	%	lbs/bu	$/A	%	%	%	plants/A
CC	CP	24-Apr	218	23.6	53.4	758	2.4	1.6	0.8	31750
CC	CP	12-May	203	26.2	51.9	696	0.0	0.0	0.0	27000
CC	NT	24-Apr	174	33.0	50.0	571	0.0	0.0	0.0	28000
CC	NT	12-May	148	35.2	48.8	482	1.6	0.0	1.6	27250
CC	T1	24-Apr	208	28.4	50.9	701	0.0	0.0	0.0	28000
CC	T1	12-May	192	29.7	49.8	644	1.6	0.8	0.8	30250
CC	T2	24-Apr	222	29.1	51.2	748	0.0	0.0	0.0	31000
CC	T2	12-May	200	30.2	50.2	667	5.0	3.3	1.8	29250
CC	T3	24-Apr	197	29.3	52.1	661	0.9	0.9	0.0	28250
CC	T3	12-May	197	31.2	50.6	657	0.8	0.0	0.8	29250
CC	T4	24-Apr	203	27.0	51.6	692	1.5	0.0	1.5	32250
CC	T4	12-May	179	30.7	50.6	595	0.0	0.0	0.0	28500
CS	CP	24-Apr	204	21.6	53.9	717	0.0	0.0	0.0	30000
CS	CP	12-May	211	24.2	52.4	732	0.0	0.0	0.0	26750
CS	NT	24-Apr	213	23.7	51.8	740	0.0	0.0	0.0	31500
CS	NT	12-May	215	27.9	50.9	729	0.0	0.0	0.0	30750
CS	T1	24-Apr	207	21.3	52.5	728	0.0	0.0	0.0	32500
CS	T1	12-May	218	24.9	50.8	754	0.0	0.0	0.0	30250
CS	T2	24-Apr	223	21.6	53.1	784	1.7	0.8	0.8	29750
CS	T2	12-May	227	25.5	51.6	781	0.0	0.0	0.0	28500
CS	T3	24-Apr	206	22.2	52.6	723	0.0	0.0	0.0	31250
CS	T3	12-May	216	24.6	51.4	746	0.0	0.0	0.0	28000
CS	T4	24-Apr	239	22.5	52.5	835	0.9	0.9	0.0	28250
CS	T4	12-May	208	25.6	50.1	716	0.0	0.0	0.0	30250
Means			205	26.6	51.4	702	0.7	0.3	0.3	29521
Probability (%)										
Rotation (R)			5.6	3.6	11.4	1.7	0.5	13.9	9.4	49.1
Tillage (T)			3.3	0.0	0.0	0.7	19.2	33.1	87.1	62.3
Date of Planting (DOP)			2.8	0.0	0.0	0.2	68.7	96.5	54.9	0.6
R x T			3.9	0.3	31.3	1.9	89.1	56.2	99.2	3.0
R x DOP			1.9	4.5	54.5	3.0	9.2	30.7	24.1	86.1
T x DOP			18.6	77.9	98.1	11.8	6.9	30.2	40.9	23.8
R x T x DOP			69.8	37.0	91.8	74.5	0.4	5.6	15.3	3.2
LSD (0.10)										
Rotation (R)			15.9	3.7	NS	44.8	0.5	NS	0.5	NS
Tillage (T)			14.2	1.2	0.7	47.2	NS	NS	NS	NS
Date of Planting (DOP)			6.1	0.5	0.4	19.9	NS	NS	NS	795
R x T			21.0	2.5	NS	67.9	NS	NS	NS	2086
R x DOP			11.5	2.0	NS	34.6	0.8	NS	NS	NS
T x DOP			NS	NS	NS	NS	1.3	NS	NS	NS
R x T x DOP			NS	NS	NS	NS	1.9	1.5	NS	2810

S1= March 24, S2 = May 12. DOP = Date Of Planting.

Table C- 53. Corn and Soybean Cropping Systems - Soybean
Arlington, WI - 2009.

Tillage treatment	Yield	Moisture	Grower return
	bu/A	%	$/A
CP	50	10.2	487
NT	49	10.0	487
T1	53	10.2	526
T2	54	10.1	527
T3	55	10.1	540
T4	53	10.1	518
Mean	52	10.1	514
Probability(%)			
Tillage (T)	20.5	47.1	20.5
LSD(0.10)			
Tillage (T)	NS	NS	NS

Addendum Table C-63. Tillage and Rotation Systems Influence on Corn Stover Agronomic and Biofuel Measurements. Arlington, WI - 2009. †

Rotation	Tillage	Harvest Density	Moisture	Yield					CP	ADF	NDF	NDFD	ADL	Lignin	Glucan	Xylan	Cell	Hem
				Stover		TEP	TE	Etoh										
		plants/ A	%	g/plant	T/A	G/T	G/A	g/L	----------%----------									
	CP	30900	28.3	90	3.1	97.9	580	4.41	4.7	50.0	82.3	43.2	3.8	11.6	35.0	21.2	43.2	32.4
	NT	29800	39.7	90	3.0	95.7	602	4.76	5.1	49.4	81.5	44.0	3.7	11.7	34.1	20.8	42.6	32.3
	T3	29800	35.4	90	3.0	95.6	591	4.85	4.9	49.9	81.7	43.6	3.8	12.1	34.1	20.7	42.7	32.1
CC		29300	38.9	90	2.9	95.8	576	4.70	4.9	49.7	81.7	43.6	3.8	11.6	34.1	20.8	42.6	32.1
CS		30900	30.0	90	3.1	97.0	606	4.65	4.9	49.9	82.0	43.6	3.8	12.0	34.6	21.0	43.0	32.5
CC	CP	31800	30.4	92	3.2	97.5	591	4.30	4.5	50.4	82.3	43.0	3.8	11.6	34.9	21.1	43.1	31.8
CC	NT	28000	46.1	88	2.7	95.0	561	4.87	5.4	48.8	81.2	44.3	3.6	11.3	33.7	20.7	42.3	32.5
CC	T3	28300	40.3	91	2.9	94.8	575	4.94	4.8	49.8	81.6	43.6	3.9	12.0	33.8	20.6	42.5	32.0
CS	CP	30000	26.2	89	2.9	98.3	570	4.53	5.0	49.6	82.3	43.5	3.9	11.5	35.1	21.4	43.3	32.9
CS	NT	31500	33.3	93	3.2	96.3	643	4.65	4.8	50.0	81.9	43.7	3.7	12.1	34.4	20.9	42.9	32.1
CS	T3	31300	30.6	89	3.0	96.4	606	4.77	4.9	50.1	81.7	43.6	3.7	12.2	34.4	20.9	43.0	32.3
Mean		30100	34.5	90	3.0	96.4	591	4.68	4.9	49.8	81.8	43.6	3.8	11.8	34.4	20.9	42.8	32.3
Probability (%)																		
Rotation (R)		15.8	7.8	89.4	35.6	27.8	49.0	81.0	84.5	51.1	36.4	91.0	82.9	52.2	13.9	41.2	14.5	32.8
Tillage (T)		4.9	27.5	39.9	11.1	79.7	57.4	19.3	3.8	6.1	53.5	32.8	57.3	67.7	55.9	85.9	37.3	20.4
R x T		47.8	0.3	99.3	71.6	0.7	90.4	60.5	12.0	25.1	5.0	11.7	39.1	55.9	0.4	4.2	0.3	83.3
LSD (0.05)																		
Rotation (R)		NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Tillage (T)		3190	NS	NS	NS	NS	NS	NS	0.6	NS	NS	NS	NS	NS	NS	NS	NS	NS
R x T		NS	5.6	NS	NS	1.4	NS	NS	NS	NS	NS	NS	NS	NS	0.5	0.4	0.3	NS

† TEP, Theoretical ethanol potential; TE, Theoretical ethanol; Etoh, ethanol; CP, crude protein; ADF, acid detergent fiber; NDF; neutral detergent fiber; NDFD, neutral detergent fiber digestibility; ADL, acid detergent lignin; Cell, cellulose; Hem, hemicellulose

Addendum Table C-64. Tillage, Rotation Systems, and Plant Segment Influence on Corn Stover Agronomic and Biofuel Measurements. Arlington, WI - 2009. †

					Yield														
Rotation	Tillage	Plant Segment	Harvest Density	Moisture	Stover		TEP	TE	Etoh	CP	ADF	NDF	NDFD	ADL	Lignin	Glucan	Xylan	Cell	Hem
			plants/ A	%	g/plant	T/A	G/T	G/A	g/L	%----------									
CC			29500	39.9	45.2	3.6	95.8	346	4.73	4.8	49.9	81.8	43.6	3.8	11.7	34.2	20.8	42.9	31.8
CS			31100	30.6	45.0	3.8	97.0	368	4.67	4.9	50.1	82.1	43.5	3.8	12.1	34.7	21.0	43.3	32.2
	CP		31100	28.6	45.2	3.8	97.9	372	4.41	4.7	50.2	82.4	43.1	3.9	11.7	35.0	21.2	43.4	32.2
	NT		29900	40.8	45.1	3.7	95.6	349	4.84	5.0	49.7	81.6	44.0	3.8	11.8	34.1	20.7	42.9	32.0
	T3		30000	36.3	45.0	3.7	95.7	350	4.85	4.8	50.2	81.8	43.5	3.9	12.2	34.2	20.7	43.0	31.9
CC	CP		32000	30.6	46.1	4.0	97.6	386	4.40	4.4	50.4	82.3	43.0	3.8	11.7	34.9	21.1	43.2	31.7
CC	NT		28200	47.6	43.9	3.3	94.9	317	4.42	5.2	49.3	81.3	44.2	3.8	11.4	33.8	20.6	42.6	32.0
CC	T3		28400	41.5	45.6	3.5	95.0	337	5.12	4.7	50.1	81.7	43.6	4.0	12.1	33.9	20.6	42.8	31.7
CS	CP		30200	26.6	44.3	3.6	98.2	358	4.56	4.9	49.9	82.4	43.3	3.9	11.7	35.2	21.3	43.6	32.7
CS	NT		31700	34.0	46.4	4.0	96.3	382	4.67	4.8	50.2	81.9	43.7	3.8	12.2	34.5	20.8	43.1	31.9
CS	T3		31400	31.2	44.4	3.8	96.4	364	5.03	4.9	50.3	81.8	44.9	3.8	12.3	34.5	20.8	43.2	32.1
		BE		45.1	34.4	2.8	96.5	273	4.73	3.9	53.4	83.0	42.8	4.6	13.0	35.3	20.1	46.1	28.9
		AE		25.4	55.8	4.6	96.3	441	4.67	5.7	46.7	80.8	44.3	3.1	10.8	33.6	21.6	40.1	35.2
CC		BE		50.9	33.5	2.7	96.2	258	4.76	3.9	53.3	82.8	43.2	4.6	12.7	35.1	20.0	45.9	28.6
CC		AE		28.9	56.9	4.5	95.5	434	4.70	5.6	46.6	80.8	44.0	3.1	10.7	33.3	21.5	39.9	35.1
CS		BE		39.3	35.3	3.0	96.8	288	4.70	3.9	53.6	83.3	42.5	4.6	13.2	35.5	20.2	46.4	29.2
CS		AE		21.9	54.8	4.6	97.1	449	4.63	5.8	46.7	80.8	44.5	3.1	10.9	33.9	21.8	40.2	35.2

continued

Addendum Table C-64. Tillage, Rotation Systems, and Plant Segment Influence on Corn Stover Agronomic (continued) **and Biofuel Measurements**. **Arlington, WI - 2009. †**

		Plant	Harvest		Yield														
Rotation	Tillage	Segment	Density	Moisture	Stover		TEP	TE	Etoh	CP	ADF	NDF	NDFD	ADL	Lignin	Glucan	Xylan	Cell	Hem
			plants/ A	%	g/plant	T/A	G/T	G/A	g/L	----------%----------									
	CP	BE		36.3	37.5	3.2	97.9	310	4.29	3.8	53.6	83.5	42.3	4.6	13.1	36.0	20.4	46.5	29.2
	CP	AE		20.9	52.9	4.4	97.8	435	5.00	5.5	46.8	81.3	44.0	3.2	10.3	34.1	22.0	40.3	35.2
	NT	BE		52.7	32.0	2.6	95.4	247	4.90	4.2	52.9	82.5	43.4	4.5	12.6	34.7	20.0	45.8	28.7
	NT	AE		29.0	58.3	4.7	95.8	452	4.53	5.8	46.6	80.8	44.5	3.1	11.0	33.5	21.4	40.0	35.2
	T3	BE		46.5	33.7	2.7	96.2	263	4.67	3.8	53.8	83.1	42.8	4.8	13.2	35.2	19.9	46.1	28.8
	T3	AE		26.2	56.3	4.6	95.2	436	4.80	5.8	46.6	80.4	44.3	3.0	11.2	33.2	21.5	39.9	35.0
CC	CP	BE		39.5	38.6	3.3	98.1	327	4.15	3.5	54.1	83.6	42.4	4.5	12.8	35.8	20.5	46.3	28.5
CC	CP	AE		21.8	53.5	4.6	97.0	444	4.44	5.4	46.8	81.1	43.5	3.2	10.5	34.1	21.6	40.0	34.9
CC	NT	BE		60.2	29.8	2.2	94.4	211	5.52	4.6	52.0	82.1	43.8	4.5	12.2	34.4	19.8	45.5	28.8
CC	NT	AE		35.1	58.1	4.4	95.4	423	4.48	5.9	46.5	80.6	44.6	3.1	10.5	33.2	21.5	39.8	35.3
CC	T3	BE		53.1	32.2	2.5	95.9	238	4.60	3.7	53.7	82.7	43.3	4.9	13.0	35.3	19.8	45.9	28.3
CC	T3	AE		29.8	59.1	4.6	94.1	434	5.19	5.7	46.5	80.7	43.9	3.0	11.2	32.6	21.3	39.8	35.1
CS	CP	BE		33.1	36.3	3.0	97.7	292	4.66	4.1	53.0	83.4	42.2	4.7	13.3	36.2	20.2	46.7	29.9
CS	CP	AE		20.1	52.4	4.3	98.5	425	4.40	5.7	46.8	81.5	44.4	3.2	10.1	34.2	22.4	40.5	35.5
CS	NT	BE		45.1	34.2	2.9	96.4	283	4.71	3.8	53.7	82.9	43.0	4.5	12.9	35.0	20.3	46.1	28.6
CS	NT	AE		22.9	58.5	5.0	96.3	481	4.63	5.8	46.8	80.9	44.4	3.1	11.4	33.9	21.4	40.2	35.2
CS	T3	BE		39.8	35.3	3.0	96.4	289	4.74	3.8	54.0	83.5	42.3	4.6	13.5	35.2	20.1	46.4	29.2
CS	T3	AE		22.6	53.4	4.5	96.2	438	4.86	5.9	46.7	80.1	44.7	3.0	11.1	33.8	21.6	40.0	35.0
Mean			30300	14.2	42.5	3.5	90.9	318	4.70	4.5	47.2	77.2	41.1	3.6	11.2	32.5	19.7	40.6	30.2

continued

Addendum Table C-64. Tillage, Rotation Systems, and Plant Segment Influence on Corn Stover Agronomic (continued) **and Biofuel Measurements**. **Arlington, WI - 2009. †**

Rotation	Tillage	Plant Segment	Harvest Density	Moisture	Yield				CP	ADF	NDF	NDFD	ADL	Lignin	Glucan	Xylan	Cell	Hem
					Stover		TEP	TE	Etoh											
			plants/ A	%	g/plant	T/A	G/T	G/A	g/L	%----------										
Probability (%)																				
Plant Part (PP)				0.0	0.0	0.0	69.4	43.9	78.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Rotation (R)			15.8	0.0	91.4	30.5	3.1	31.4	79.2	75.7	49.2	23.2	75.4	96.5	32.3	0.8	19.7	0.0	16.7	
Tillage (T)			47.8	0.0	99.6	73.3	0.1	80.0	19.6	35.7	36.5	2.2	17.8	68.1	44.5	0.0	5.1	0.0	64.2	
R x PP				26.8	27.8	55.5	36.9	76.5	97.0	67.6	79.3	38.4	10.6	86.6	55.5	37.8	67.5	65.7	37.8	
R x T			3.4	16.7	57.3	10.4	74.7	31.0	58.6	68.7	12.6	63.8	60.7	63.1	65.6	64.0	97.7	96.2	32.3	
T x PP				26.5	5.1	14.6	54.7	95.8	24.1	18.8	42.0	21.5	80.2	31.9	40.3	10.9	88.8	29.8	76.9	
R x T x PP				43.7	64.2	26.7	37.8	97.9	29.9	35.4	14.8	39.7	80.9	77.5	82.0	18.7	11.3	96.9	53.6	
LSD (0.05)																				
Plant Part (PP)				5.1	3.6	0.4	NS	NS	NS	0.4	0.6	0.5	0.7	0.2	0.7	0.4	0.3	0.4	0.6	
Rotation (R)			NS	4.2	NS	NS	1.0	NS	NS	NS	NS	NS	NS	NS	NS	0.4	NS	0.3	NS	
Tillage (T)			NS	4.2	NS	NS	1.3	NS	NS	NS	NS	0.6	NS	NS	NS	0.4	NS	0.3	NS	
R x PP				NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	
R x T			3210	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	
T x PP				NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	
R x T x PP				NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	

† TEP, Theoretical ethanol potential; TE, Theoretical ethanol; Etoh, ethanol; CP, crude protein; ADF, acid detergent fiber; NDF; neutral detergent fiber; NDFD, neutral detergent fiber digestibility; ADL, acid detergent lignin; Cell, cellulose; Hem, hemicellulose; BE, below ear portion of plant; AE, above ear portion of the plant.