

## FIELD EXPERIMENT HISTORY

**Title:** Twenty year Corn/Soybean Rotation Study **Year: 2002**  
**Experiment:** 09 Twenty year Corn/Soybean Rotation  
**Personnel:** J.G. Lauer, R. Borges, J.M. Gaska, and K.D. Kohn  
**Organization:** UW Madsion, Dept. of Agronomy  
**Location:** Arlington Agricultural Research Station, Arlington, WI

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### FIELD INFORMATION

**Field:** ARS 334W  
**Soil Type:** Plano Silt Loam  
**Soil Test Results:** Date:10/99                      pH: 6.5   P: 35 ppm   K: 203 ppm   O.M.: 3.2%  
**Fertilizer Applied:** Soybean : None  
                                   Corn: 210 lb/a nitrogen preemerge  
**Tillage Operations:** No-till and fall chisel plowed  
                                   Spring field cultivated and cultimulched  
**Previous Crop:** Corn and soybean  
**Previous Herbicide:** Roundup  
**Irrigation:** None

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### EXPERIMENTAL PROCEDURE

**Exp. Design:** RCB Split-Split Plot  
**Replicates:** 4  
**Variables:** A: Tillage, B: Rotation Sequence, C: Subsample

	<u>Corn</u>	<u>Soybean</u>
Area Planted:	10' x 35'	10' x 35'
Area Harvested:	5' x 31'	5' x 31'
Row Spacing:	30"	30"
Seeding Rate (spa)	35,000 seeds/acre	130,000 seeds/acre
Hybrid/Variety:	DeKalb DKC5334	Asgrow AG2601
Planting Date:	3-May-02	3-May-02
Planting Equip:	Kinze 2000 Interplant planter	Kinze 2000 Interplant planter
Harvesting Date:	7-Oct	14-Oct and 15-Oct
Harvesting Equip:	Kincaid plot combine	Almaco plot combine #1

  

	<u>Date</u>	<u>Material</u>	<u>Rate</u>	
Herbicides:	23-Apr	Roundup	1.5 qt/a	
	23-Apr	2,4-D	1.0 pt/a	
	1-May	Dual	2.0 pt/a	
	17-Jun	Roundup	1.0 qt/a	
Insecticides:	At planting	Force	4.4 lb/a	corn only

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**Results: Table C-43 and C-44.**

**Table C-43. 20 Year Corn/Soybean Rotation Study - Corn.  
Arlington, WI - 2002**

Tillage	Rotation 20th year	Plot position	Yield bu/A	Moisture %	Test wt. lbs/bu	Grower return \$/A	Lodged %	Harvest population plants/A	Ear density ears/A
		East	211	24.2	52	434	1	30321	30663
		Center	206	23.9	52	425	2	29910	30211
		West	211	23.9	52	433	2	29639	29870
	1st Year Corn		237	23.7	52	487	2	30679	31312
	2nd Year Corn		208	23.1	52	429	2	30211	30398
	3rd Year Corn		207	24.4	52	424	0	29766	29953
	4th Year Corn		192	23.6	52	396	1	29462	29672
	5th Year Corn		208	25.4	52	423	1	30234	30609
	Continuous Corn		189	23.6	52	390	3	29181	29368
	Rotated Corn		227	24.2	52	465	2	30164	30422
	1st Year Corn	East	241	23.6	52	496	2	30984	31616
	1st Year Corn	Center	234	23.8	52	482	2	30703	31476
	1st Year Corn	West	235	23.8	52	484	3	30351	30843
	2nd Year Corn	East	207	23.1	52	428	1	29789	30000
	2nd Year Corn	Center	209	23.1	52	432	3	29649	29789
	2nd Year Corn	West	207	23.1	52	428	1	31195	31405
	3rd Year Corn	East	208	24.6	52	427	0	30703	30914
	3rd Year Corn	Center	202	24.2	51	415	0	29438	29719
	3rd Year Corn	West	210	24.5	52	430	1	29157	29227
	4th Year Corn	East	195	23.8	52	401	0	29789	30000
	4th Year Corn	Center	189	23.5	52	390	0	28876	29157
	4th Year Corn	West	192	23.5	52	397	2	29719	29860
	5th Year Corn	East	212	25.9	52	431	0	30351	30914
	5th Year Corn	Center	200	25.1	52	408	2	30914	31195
	5th Year Corn	West	212	25.4	52	431	2	29438	29719
	Continuous Corn	East	193	23.8	52	398	3	30141	30422
	Continuous Corn	Center	188	23.5	52	386	4	29368	29579
	Continuous Corn	West	187	23.5	52	386	3	28033	28103
	Rotated Corn	East	224	24.8	52	457	2	30492	30773
	Rotated Corn	Center	224	23.9	52	460	2	30422	30562
	Rotated Corn	West	233	23.9	52	479	2	29579	29930
Conventional			212	23.0	52	439	2	29441	29743
No-Till			207	25.0	52	423	1	30472	30753
Conventional		East	214	23.1	52	443	2	30231	30572
Conventional		Center	209	22.9	52	433	3	29107	29468
Conventional		West	213	23.1	53	440	3	28986	29187
No-Till		East	209	25.3	52	425	1	30412	30753
No-Till		Center	204	24.8	51	416	1	30713	30954
No-Till		West	209	24.8	52	427	2	30291	30552

continued

**Table C-43. 20 Year Corn/Soybean Rotation Study - Corn.**  
 (continued) **Arlington, WI - 2002**

Tillage	Rotation 20th year	Plot position	Yield		Test	Grower	Lodged	Harvest	Ear
			bu/A	Moisture %	wt. lbs/bu	return \$/A		population plants/A	density ears/A
Conventional	1st Year Corn		239	24.6	52	489	1	29743	30305
Conventional	2nd Year Corn		207	21.9	53	432	3	29368	29555
Conventional	3rd Year Corn		211	22.3	53	439	1	29368	29555
Conventional	4th Year Corn		198	22.8	52	410	1	29087	29368
Conventional	5th Year Corn		216	23.1	52	446	2	29930	30305
Conventional	Continuous Corn		190	22.2	52	395	5	28431	28712
Conventional	Rotated Corn		224	24.3	52	460	3	30164	30398
No-Till	1st Year Corn		234	22.9	53	486	3	31616	32319
No-Till	2nd Year Corn		208	24.3	52	427	0	31054	31241
No-Till	3rd Year Corn		202	26.5	51	408	0	30164	30351
No-Till	4th Year Corn		186	24.4	51	382	0	29836	29977
No-Till	5th Year Corn		200	27.7	51	400	1	30539	30914
No-Till	Continuous Corn		189	24.9	52	386	1	29930	30024
No-Till	Rotated Corn		229	24.2	52	471	1	30164	30445
Conventional	1st Year Corn	East	247	24.3	52	506	1	30633	31054
Conventional	1st Year Corn	Center	239	24.6	52	488	1	29508	30492
Conventional	1st Year Corn	West	231	24.9	52	472	1	29087	29368
Conventional	2nd Year Corn	East	208	21.9	53	433	1	29649	29789
Conventional	2nd Year Corn	Center	208	21.8	53	433	6	28384	28525
Conventional	2nd Year Corn	West	206	22.0	53	429	2	30070	30351
Conventional	3rd Year Corn	East	214	22.6	53	443	0	30773	31054
Conventional	3rd Year Corn	Center	205	21.8	52	428	0	28665	28806
Conventional	3rd Year Corn	West	215	22.6	53	446	2	28665	28806
Conventional	4th Year Corn	East	200	22.6	52	415	0	29227	29508
Conventional	4th Year Corn	Center	197	23.0	53	407	0	27963	28384
Conventional	4th Year Corn	West	197	22.9	53	408	4	30070	30211
Conventional	5th Year Corn	East	221	23.5	52	457	0	31476	32038
Conventional	5th Year Corn	Center	208	22.9	52	431	3	30070	30492
Conventional	5th Year Corn	West	218	23.1	52	450	3	28244	28384
Conventional	Continuous Corn	East	192	22.3	52	398	5	29227	29649
Conventional	Continuous Corn	Center	188	22.2	53	391	6	29227	29649
Conventional	Continuous Corn	West	190	22.2	53	395	4	26839	26839
Conventional	Rotated Corn	East	220	24.6	52	450	3	30633	30914
Conventional	Rotated Corn	Center	221	24.0	52	453	3	29930	29930
Conventional	Rotated Corn	West	233	24.2	52	478	2	29930	30351

continued

**Table C-43. 20 Year Corn/Soybean Rotation Study - Corn.**(continued) **Arlington, WI - 2002**

Tillage	Rotation 20th year	Plot position	Yield		Test	Grower		Harvest	Ear
			bu/A	Moisture %	wt. lbs/bu	return \$/A	Lodged %	population plants/A	density ears/A
No-Till	1st Year Corn	East	235	23.0	52	486	2	31335	32178
No-Till	1st Year Corn	Center	230	23.0	53	475	2	31897	32459
No-Till	1st Year Corn	West	239	22.7	53	495	6	31616	32319
No-Till	2nd Year Corn	East	206	24.3	51	423	0	29930	30211
No-Till	2nd Year Corn	Center	210	24.3	52	431	0	30914	31054
No-Till	2nd Year Corn	West	209	24.3	52	428	0	32319	32459
No-Till	3rd Year Corn	East	203	26.6	51	410	0	30633	30773
No-Till	3rd Year Corn	Center	199	26.6	51	401	0	30211	30633
No-Till	3rd Year Corn	West	204	26.3	51	413	0	29649	29649
No-Till	4th Year Corn	East	190	25.1	51	387	1	30351	30492
No-Till	4th Year Corn	Center	182	24.0	51	374	0	29789	29930
No-Till	4th Year Corn	West	188	24.1	52	385	0	29368	29508
No-Till	5th Year Corn	East	203	28.2	51	405	0	29227	29789
No-Till	5th Year Corn	Center	192	27.3	51	385	1	31757	31897
No-Till	5th Year Corn	West	205	27.7	51	411	2	30633	31054
No-Till	Continuous Corn	East	195	25.2	52	398	0	31054	31195
No-Till	Continuous Corn	Center	187	24.9	52	382	3	29508	29508
No-Till	Continuous Corn	West	184	24.7	51	377	1	29227	29368
No-Till	Rotated Corn	East	227	25.0	51	464	1	30351	30633
No-Till	Rotated Corn	Center	227	23.9	52	467	0	30914	31195
No-Till	Rotated Corn	West	234	23.7	52	481	3	29227	29508
Mean			210	24.0	52	431	2	29957	30248
<b>Probability(%)</b>									
Tillage (T)			21.8	0.6	0.4	9.6	38.9	2.1	1.7
Rotation (R)			0.0	20.9	62.6	0.0	57.0	69.9	47.7
T x R			88.0	1.2	1.3	60.3	46.6	94.5	94.8
Plot Position (P)			0.3	4.7	5.2	0.8	23.8	23.6	16.8
T x P			80.0	15.1	69.7	66.2	74.2	18.0	23.0
R x P			11.7	74.1	29.3	14.1	90.4	59.4	63.4
T x R x P			63.1	85.7	85.2	70.9	71.6	76.3	73.1
<b>LSD(0.10)</b>									
Tillage (T)			NS	0.6	0.8	16	NS	541	496
Rotation (R)			14	NS	NS	26	NS	NS	NS
T x R			NS	2.1	0.8	NS	NS	NS	NS
Plot Position (P)			2.6	0.2	0.2	5	NS	NS	NS
T x P			NS	NS	NS	NS	NS	NS	NS
R x P			NS	NS	NS	NS	NS	NS	NS
T x R x P			NS	NS	NS	NS	NS	NS	NS
<b>CV(%)</b>									
			4	3	1	4	210	7	7

**Table C-44. 20 Year Corn/Soybean Rotation Study - Soybean.  
Arlington, WI**

Tillage	Rotation 20th year	Plot location	Yield bu/a	Moist. %	Plant height in	Lodge score 1-5	Seeds/ lb
Notill			54.7	13.9	30.7	1.0	2844
Conventional			50.0	14.0	29.7	1.0	2899
	5th year soybean		48.6	13.9	28.9	1.0	2966
	4th year soybean		49.5	14.0	29.5	1.0	2885
	3rd year soybean		52.6	14.1	30.5	1.0	2868
	2nd year soybean		54.6	14.1	31.2	1.0	2854
	1st year soybean		58.5	14.1	32.4	1.0	2801
	S/C rotation		54.7	14.1	31.3	1.0	2820
	Continuous soybean		48.0	13.7	27.5	1.0	2908
Notill	5th year soybean		51.1	13.8	28.4	1.0	2952
Notill	4th year soybean		51.8	14.0	31.1	1.0	2848
Notill	3rd year soybean		56.3	14.1	31.3	1.0	2812
Notill	2nd year soybean		57.3	14.0	31.2	1.0	2817
Notill	1st year soybean		60.3	13.9	33.0	1.0	2800
Notill	S/C rotation		56.8	14.0	31.7	1.0	2798
Notill	Continuous soybean		49.3	13.6	28.2	1.0	2881
Conventional	5th year soybean		46.1	13.9	29.3	1.0	2979
Conventional	4th year soybean		47.3	14.1	27.8	1.0	2921
Conventional	3rd year soybean		48.9	14.0	29.8	1.0	2925
Conventional	2nd year soybean		51.9	14.1	31.3	1.0	2890
Conventional	1st year soybean		56.7	14.2	31.8	1.0	2802
Conventional	S/C rotation		52.5	14.2	31.0	1.0	2842
Conventional	Continuous soybean		46.8	13.8	26.8	1.0	2935
		East	52.1	14.0	30.7	1.0	2857
		Center	53.6	14.0	30.0	1.0	2867
		West	51.4	14.0	29.9	1.0	2891
Notill		East	54.4	13.9	31.3	1.0	2851
Notill		Center	56.3	14.0	30.5	1.0	2830
Notill		West	53.3	13.9	30.3	1.0	2852
Conventional		East	49.7	14.0	30.1	1.0	2863
Conventional		Center	50.9	14.0	29.5	1.0	2905
Conventional		West	49.5	14.1	29.5	1.0	2930
	5th year soybean	East	48.8	13.8	29.4	1.0	2953
	5th year soybean	Center	49.4	13.9	28.6	1.0	2938
	5th year soybean	West	47.7	13.9	28.6	1.0	3006
	4th year soybean	East	49.7	14.0	29.6	1.0	2886
	4th year soybean	Center	50.3	14.2	28.4	1.0	2894
	4th year soybean	West	48.6	14.0	30.4	1.0	2874
	3rd year soybean	East	53.0	14.0	31.8	1.0	2867
	3rd year soybean	Center	54.2	14.1	30.6	1.0	2858
	3rd year soybean	West	50.6	14.1	29.3	1.0	2880

**Table C-44. 20 Year Corn/Soybean Rotation Study - Soybean.  
Arlington, WI**

Tillage	Rotation 20th year	Plot location	Yield bu/a	Moist. %	Plant height in	Lodge score 1-5	Seeds/ lb
	2nd year soybean	East	53.4	14.1	32.1	1.0	2849
	2nd year soybean	Center	55.6	14.1	31.0	1.0	2854
	2nd year soybean	West	54.8	14.1	30.5	1.0	2857
	1st year soybean	East	57.4	14.1	33.0	1.0	2784
	1st year soybean	Center	59.7	14.1	32.0	1.0	2797
	1st year soybean	West	58.5	14.0	32.1	1.0	2822
	S/C rotation	East	54.7	14.2	31.9	1.0	2783
	S/C rotation	Center	56.5	14.1	31.5	1.0	2849
	S/C rotation	West	52.7	14.1	30.6	1.0	2829
	Continuous soybean	East	47.6	13.7	27.3	1.0	2874
	Continuous soybean	Center	49.5	13.8	27.8	1.0	2882
	Continuous soybean	West	47.0	13.6	27.5	1.0	2969
Notill	5th year soybean	East	52.6	13.7	29.5	1.0	2998
Notill	5th year soybean	Center	51.8	13.9	28.3	1.0	2864
Notill	5th year soybean	West	49.0	13.9	27.5	1.0	2995
Notill	4th year soybean	East	51.7	13.9	31.3	1.0	2880
Notill	4th year soybean	Center	53.3	14.3	30.3	1.0	2867
Notill	4th year soybean	West	50.4	13.9	31.8	1.0	2799
Notill	3rd year soybean	East	56.6	14.1	32.8	1.0	2848
Notill	3rd year soybean	Center	58.4	14.2	31.3	1.0	2756
Notill	3rd year soybean	West	53.8	14.1	29.8	1.0	2832
Notill	2nd year soybean	East	57.1	14.2	31.8	1.0	2798
Notill	2nd year soybean	Center	58.2	14.0	30.5	1.0	2843
Notill	2nd year soybean	West	56.4	14.0	31.3	1.0	2811
Notill	1st year soybean	East	57.9	13.9	33.8	1.0	2758
Notill	1st year soybean	Center	62.7	14.0	32.3	1.0	2811
Notill	1st year soybean	West	60.3	13.9	33.0	1.0	2829
Notill	S/C rotation	East	55.9	14.0	32.0	1.0	2792
Notill	S/C rotation	Center	59.0	14.1	32.3	1.0	2818
Notill	S/C rotation	West	55.7	13.9	30.8	1.0	2784
Notill	Continuous soybean	East	49.3	13.6	28.0	1.0	2882
Notill	Continuous soybean	Center	50.8	13.6	28.8	1.0	2851
Notill	Continuous soybean	West	47.7	13.6	27.8	1.0	2911
Conventional	5th year soybean	East	44.9	13.8	29.3	1.0	2909
Conventional	5th year soybean	Center	47.1	14.0	29.0	1.0	3012
Conventional	5th year soybean	West	46.4	14.0	29.8	1.0	3016
Conventional	4th year soybean	East	47.7	14.1	28.0	1.0	2892
Conventional	4th year soybean	Center	47.3	14.1	26.5	1.0	2922
Conventional	4th year soybean	West	46.8	14.0	29.0	1.0	2949

Continued

**Table C-44. 20 Year Corn/Soybean Rotation Study - Soybean.  
Arlington, WI**

Tillage	Rotation 20th year	Plot location	Yield bu/a	Moist. %	Plant height in	Lodge score 1-5	Seeds/ lb
Conventional	3rd year soybean	East	49.3	14.0	30.8	1.0	2887
Conventional	3rd year soybean	Center	50.0	14.0	30.0	1.0	2960
Conventional	3rd year soybean	West	47.4	14.1	28.8	1.0	2927
Conventional	2nd year soybean	East	49.7	14.1	32.5	1.0	2900
Conventional	2nd year soybean	Center	52.9	14.1	31.5	1.0	2866
Conventional	2nd year soybean	West	53.2	14.2	29.8	1.0	2904
Conventional	1st year soybean	East	56.8	14.4	32.3	1.0	2810
Conventional	1st year soybean	Center	56.7	14.1	31.8	1.0	2783
Conventional	1st year soybean	West	56.7	14.2	31.3	1.0	2814
Conventional	S/C rotation	East	53.6	14.3	31.8	1.0	2774
Conventional	S/C rotation	Center	54.1	14.1	30.8	1.0	2879
Conventional	S/C rotation	West	49.8	14.2	30.5	1.0	2873
Conventional	Continuous soybean	East	45.9	13.7	26.5	1.0	2865
Conventional	Continuous soybean	Center	48.1	14.0	26.8	1.0	2914
Conventional	Continuous soybean	West	46.3	13.7	27.3	1.0	3026
<b>Means</b>			<b>52.4</b>	<b>14.0</b>	<b>30.2</b>	<b>1.0</b>	<b>2872</b>
<b><u>Probability</u></b>							
Tillage (T)			3.8	28.2	1.1	>50	11.4
Rotation (R)			<0.1	0.1	<0.1	>50	0.2
T x R			>50	43.4	>50	>50	>50
Plot location (L)			<0.1	24.7	1.5	>50	9.1
T x L			32.6	14.4	>50	>50	6.4
R x L			>50	36.2	21.1	>50	>50
T x R x L			>50	21.7	>50	>50	22.6
<b><u>LSD 10%</u></b>							
Tillage (T)			3.1	NS	0.4	NS	NS
Rotation (R)			3.3	0.2	1.8	NS	62.3
T x R			NS	NS	NS	NS	NS
Plot location (L)			0.9	NS	0.5	NS	26.2
T x L			NS	NS	NS	NS	65.2
R x L			NS	NS	NS	NS	NS
<b>CV %</b>			<b>5</b>	<b>1</b>	<b>5</b>	<b>0</b>	<b>3</b>