

FIELD EXPERIMENT HISTORY

Title: Plant Density and Row Spacing Effects on Corn Grain and Silage
Experiment: 06 RS x PD **Trial ID** 2501 **Year:** 2003
Personnel: J.G. Lauer, P.J. Flannery and K.D. Kohn
Location: Arlington, WI **County:** Columbia
Supported By: HATCH

Site Information

Field: ARS 374 **Previous Crop:** Soybean **Soil Type:** Plano Silt Loam
Soil Test: **Date:** 11/01/03 **pH** 7.1 **OM (%)** 3.0 **P (ppm)** 39 **K (ppm)** 139

Plot Management

Tillage Operations: Fall Chisel Plow Field Cultivator Soil Finisher

	<u>Analysis:</u>	<u>Rate lbs/A:</u>	<u>Date:</u>
Fertilizer: Preplant :	46-0-0	325	N/A
Starter :	N/A	N/A	N/A
Post plant :	N/A	N/A	N/A
Manure:	N/A	None	

Herbicide: Dual II 2.0 pt/A **Insecticide:** None
 Hornet 4.0 oz/A **Hybrid:** Dekalb DKC5334
Irrigation: None

Planting Date: 5/2/03 **Planting Depth:** 1.5" **Row Width:** See Factors
Target Plant Density: See Factors **Planting Method:** Kinze Inter-Row Planter
Harvest Date: S: 9/17/03 **Harvest Method:** S:New Holland Plot Chopper
 G: 10/23/03 G:Kincaid Plot Combine

Experimental Design

Design: See Factors **Replications:** 3
Plot Size Seeded: 10' x 75' **Experiment Size:** 0.41 Acre
Harvest Plot Size: S: 5' x 8.75' **Harvest Plant Density:** See Factors
 G: 5' x 66.25'

Factors/Treatments:

Row Spacing:

15 inch
30 inch

Plant Density: (plants/A)

25000, 30000, 35000
and 40000

Results: Table C-63.

**Table C-63. Plant Density and Row Spacing Effects on Corn Grain and Silage Yield and Quality
Arlington, WI - 2003**

Row spacing inches	Grain									
	Density plants/A	Harvest pop plants/A	Broken stalks %	Yield bu/A	Moisture %	Test weight lbs/bu	Grower return \$/A	Yield Components @ 0% moisture		
								Ear number ears/A	Kernels number no./ear	100 Kernel wt grams
	25000	19664	2	128	19.0	57	248	20660	504	26.8
	30000	22568	0	142	19.6	57	274	23066	476	27.8
	35000	26385	2	131	18.0	56	256	26551	429	25.3
	40000	29787	2	151	19.0	55	293	29787	434	25.4
15 inches		23149	2	133	19.2	56	258	23481	471	26.6
30 inches		26053	1	142	18.6	56	276	26551	451	26.1
15 inches	25000	18586	4	115	19.2	57	222	19083	517	25.6
15 inches	30000	21407	1	137	19.9	57	264	21904	492	27.3
15 inches	35000	24062	0	141	19.0	57	273	24394	479	25.9
15 inches	40000	28542	2	141	18.8	54	275	28542	394	27.4
30 inches	25000	20743	0	141	18.8	56	274	22236	490	27.9
30 inches	30000	23730	0	146	19.3	57	283	24228	459	28.3
30 inches	35000	28708	4	121	17.1	54	238	28708	379	24.6
30 inches	40000	31031	2	160	19.2	56	310	31031	474	23.5
Mean		24601	1	138	18.9	56	267	25016	461	26.3
Probability(%)										
Row Space (S)		0.5	82.3	12.8	18.6	35.5	8.1	0.6	44.0	66.2
Plant Density (D)		0.0	74.0	3.1	14.9	11.7	2.3	0.0	16.2	31.5
S x D		72.5	19.1	3.9	36.4	5.2	3.3	87.3	13.4	20.1
LSD(0.10)										
Row Space (S)		1543	NS	NS	NS	NS	17	1653	NS	NS
Plant Density (D)		2183	NS	13	NS	NS	24	2338	NS	NS
S x D		NS	NS	19	NS	2	34	NS	NS	NS
CV(%)										
		9	189	9	6	2	9	9	13	10

continued

Table C-63. Plant Density and Row Spacing Effects on Corn Grain and Silage Yield and Quality
 (continued) **Arlington, WI - 2003**

Row spacing inches	Density plants/A	Whole Plant										Milk per	
		Harvest pop plants/A	Yield tons/A	Moisture %	Kernel milk %	Crude protien %	ADF %	NDF %	In Vitro Digest %	NDFD %	Starch %	Ton lbs/T	Acre lbs/A
	25000	25000	7.6	46.7	26	7.0	23.2	46.6	84.4	66.9	40.0	3455	26454
	30000	27833	8.2	48.5	23	6.5	27.8	53.1	81.6	65.9	33.8	3284	27120
	35000	30000	7.7	43.4	17	7.3	23.0	47.1	85.1	68.7	39.1	3510	27019
	40000	33333	8.2	52.2	24	6.3	30.3	56.6	79.4	64.5	30.0	3155	27236
15 inches		27417	8.0	49.7	22	6.6	26.8	51.9	82.1	66.5	35.0	3323	27553
30 inches		30667	7.8	45.7	23	7.0	25.3	49.8	83.1	66.4	36.5	3379	26388
15 inches	25000	24000	7.6	48.5	28	6.7	24.9	49.4	83.2	66.7	37.7	3387	25933
15 inches	30000	26667	8.2	50.5	20	6.5	28.9	55.1	81.2	66.8	31.1	3292	27224
15 inches	35000	26667	7.6	45.4	13	7.3	21.0	44.3	86.3	69.3	42.0	3580	27220
15 inches	40000	32333	9.2	54.5	27	6.0	32.3	58.7	77.8	63.4	29.1	3032	30974
30 inches	25000	26000	7.7	44.8	23	7.3	21.4	43.7	85.6	67.2	42.3	3523	26975
30 inches	30000	29000	8.2	46.5	27	6.6	26.6	51.1	82.0	65.0	36.5	3276	27017
30 inches	35000	33333	7.7	41.4	20	7.4	25.0	49.9	83.9	68.0	36.1	3440	26817
30 inches	40000	34333	7.5	49.9	22	6.6	28.2	54.4	81.0	65.6	30.9	3277	24743
Mean		29042	7.9	47.7	23	6.8	26.0	50.8	82.6	66.5	35.7	3351	26945
Probability(%)													
Row Space (S)		2.0	53.8	17.3	89.5	18.3	67.1	66.1	69.0	96.2	75.3	71.6	54.3
Plant Density (D)		0.2	51.3	21.8	73.8	7.7	38.3	39.0	36.9	38.4	41.0	36.6	98.5
S x D		48.6	36.0	100	82.7	79.2	83.0	81.8	85.9	82.7	81.9	81.8	72.6
LSD(0.10)													
Row Space (S)		2172	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Plant Density (D)		3071	NS	NS	NS	0.7	NS	NS	NS	NS	NS	NS	NS
S x D		NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
CV(%)													
		10	11	15	67	10	32	22	7	6	32	11	19

FIELD EXPERIMENT HISTORY

Title: Narrow Row Corn x Population Study
Experiment: 06 RS x PD **Trial ID:** 03C53 **Year:** 2003
Personnel: M.G. Bertram
Location: Marshfield, WI **County:** Wood
Supported by: Marshfield Ag. Research Station

Site Information

Field: W9 **Soil Type:** Withee Silt Loam
Soil Test : **Date:** 10/25/02 **pH** 6.5 **OM (%)** 2.9 **P (ppm)** 44 **K (ppm)** 107

Plot Management

Tillage Operations: Chisel Plow Field Cultivator

Fertilizer:	<u>Analysis</u>	<u>Rate</u>	<u>Date</u>
Preplant	none	N/A	N/A
Starter	none	N/A	N/A
Post plant	46-0-0	300	6/23/2002
Manure	none	N/A	N/A

Herbicide: Harness 1.8 pt/A **Insecticide:** None
 Hornet 2.4 oz/A
 Atrazine 1.0 qt/A
 Permit 1.07 oz/A

Irrigation: None **Hybrid:** Pioneer 38K07

Planting Date: 5/2/2003 **Planting Depth:** 1.5" **Row Width:** Varies

Target Plant Density: Varies plants per acre **Planting Method:** Varies

Harvest Date: 10/27/2003 **Harvest Method:** John Deere plot combine

Notes:

Experimental Design

Design: RCB **Replications:** 4
Plot Size Seeded: 30' x 10' **Experiment Size:** 0.87 A
Harvest Plot size: **Silage:** 10' x 4.5 - 5'
Grain: 20' x 4.5 - 5'

Factors/Treatments:

<u>Row Spacing</u>	<u>Target Population</u>
John Deere 7000 corn planter: 30"	30000
John Deere 450 grain drill: 30"	45000
John Deere 450 grain drill: 18"	60000
John Deere 450 grain drill: Twin 30"	75000

Results: Table C-64.

Table C-64. Narrow Row Corn x Population Study

Marshfield, WI

Equipment type	Row spacing	Target population	Early population	Average spacing	Std. Dev spacing	Grain population	Ear:Plant ratio	Barren stalks	Broken stalks	Grain		Partial return ¹
		K ppa	ppa	in.	in.	ppa		%	%	%	bu/A	\$/A
Planter	30	30	26281	7.6	4.8	26622	99.5	5.9	0.9	17.3	91.9	143
Planter	30	45	42471	4.5	2.7	40285	91.6	9.3	1.5	18.1	90.3	116
Planter	30	60	50457	4.2	2.7	50207	90.3	7.4	0.7	18.5	90.2	93
Planter	30	75	87193	2.4	1.5	84245	78.1	22.5	1.6	19.7	73.8	36
Drill	30	30	26281	7.4	5.9	28077	97.4	8.3	0.4	16.9	86.1	131
Drill	30	45	37825	5.7	4.6	37305	93.7	6.6	0.9	17.8	89.4	115
Drill	30	60	42108	4.6	3.7	44720	88.9	11.1	0.9	18.2	87.4	88
Drill	30	75	53071	3.7	3.0	51840	89.1	9.1	0.4	17.8	87.7	67
Drill	18	30	22909	13.7	12.1	26101	100.2	6.5	0.5	17.0	79.1	117
Drill	18	45	36300	8.5	7.5	38332	92.9	7.4	0.0	18.7	89.5	113
Drill	18	60	39527	6.9	6.5	44200	92.0	8.3	0.7	17.5	93.4	101
Drill	18	75	52353	6.2	5.7	57160	88.2	10.4	0.6	18.8	99.0	88
Drill	Twin 30	30	24176	14.4	11.0	26013	102.1	3.8	0.0	17.7	86.9	132
Drill	Twin 30	45	38914	8.6	7.4	39152	92.9	7.1	1.8	17.6	77.9	92
Drill	Twin 30	60	46972	7.6	5.6	48912	90.3	9.5	0.7	18.0	95.9	105
Drill	Twin 30	75	57717	6.0	5.0	58360	88.8	11.6	1.0	18.1	94.1	80
Mean			42785	7.0	5.6	43846	92.2	9.1	0.8	18.0	88.3	101
Probability (%)			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	>50	0.1	30.6	<0.1
LSD (0.10)			5868	2.2	2.1	5508	5.7	3.8	NS	0.9	NS	29
C.V. (%)			12	26	31	11	5	35	150	4	14	24

(continued)

1/ Partial return is calculated using: \$2.24 per bushel minus seed cost: \$118/80K unit; drying: \$0.02/bu over 15.5% moisture; handling: \$0.02/bu; hauling: \$0.04/bu; and trucking: \$0.11/bu.

Table C-64. Narrow Row Corn x Population Study

(continued) Marshfield, WI

Equipment type	Row spacing	Target population	Silage population	Ear:Plant ratio	Kernel milk	Whole Plant		Crude					Milk Per		
						Moisture	Yield	protein	NDF	ADF	IVTDMD	Starch	NDFD	ton	acre
	in.	K ppa	ppa	%	%	%	tn dm/A	%	%	%	%	%	%	lb/t	lb/A
Planter	30	30	26572	108	50.0	54.9	4.7	6.4	46.8	23.0	84.4	28.5	66.7	3836	17884
Planter	30	45	43124	95	57.5	53.4	5.5	6.2	45.2	22.0	84.7	30.4	66.4	3882	21412
Planter	30	60	51183	93	42.5	55.1	5.2	6.2	50.1	25.1	83.2	25.7	66.8	3749	19319
Planter	30	75	87338	81	32.5	58.9	5.3	5.9	50.8	26.0	83.4	22.1	67.5	3749	19778
Drill	30	30	27443	105	50.0	52.8	4.6	6.3	49.9	24.2	83.8	26.5	67.5	3817	17513
Drill	30	45	41382	96	47.5	56.1	5.0	5.7	49.4	24.8	83.2	26.8	66.0	3772	19059
Drill	30	60	45520	89	47.5	54.9	5.1	6.1	47.6	23.1	84.1	28.3	66.5	3836	19728
Drill	30	75	55975	91	55.0	55.7	5.1	6.4	48.3	23.6	84.3	28.0	67.5	3838	19772
Drill	18	30	27104	70	52.5	56.4	4.5	5.8	50.7	25.3	83.1	24.4	66.7	3763	17102
Drill	18	45	40172	65	45.0	56.6	5.2	5.8	47.8	23.8	83.7	27.8	66.0	3817	19814
Drill	18	60	43560	65	47.5	55.7	5.1	6.3	48.3	23.4	84.3	27.9	67.5	3851	21755
Drill	18	75	53240	60	57.5	53.4	5.9	5.8	47.3	23.0	83.9	30.1	66.2	3826	22557
Drill	Twin 30	30	26354	104	42.5	55.3	4.7	6.3	46.7	22.6	85.2	28.4	68.3	3933	18479
Drill	Twin 30	45	46174	92	62.5	53.8	5.5	5.9	47.0	23.4	83.8	30.3	65.6	3835	20945
Drill	Twin 30	60	51183	91	57.5	54.0	5.1	6.6	48.2	23.6	84.3	27.1	67.5	3808	19510
Drill	Twin 30	75	63815	90	47.5	55.0	5.9	5.8	49.9	24.6	83.8	26.3	67.5	3824	22574
Mean			45633	87	49.7	55.1	5.2	6.1	48.4	23.8	84.0	27.4	66.9	3821	19831
Probability (%)			<0.1	<0.1	1.80	0.60	2.60	3.70	>50	>50	>50	8.20	>50	>50	9.00
LSD (0.10)			6649	7	11.7	2.2	0.7	0.5	NS	NS	NS	4.0	NS	NS	3064
C.V. (%)			12	7	20	3	11	6	7	9	2	12	3	4	13