FIELD EXPERIMENT HISTORY

Title: **Plant Density and Row Spacing Effects on Corn Grain and Silage.**

Experiment: 06RSxPD **Trial ID** 3296 **Year:** 2009

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

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

Supported By: HATCH

Site Information

Field: ARS407 **Previous Crop:** Alfalfa **Soil Type:** Plano Silt Loam

Soil Test: **Date:** 10/1 /09 **pH** 6.6 **OM (%)** 3.4 **P (ppm)** 60 **K (ppm)** 149

Plot Management

Tillage Operations: Fall Chisel Plow Field Cultivator Soil Finisher

		Analysis:	Rate lbs/A:	Date:
Fertilizer:	**Preplant :**	N/A	N/A	N/A
	Starter :	N/A	N/A	N/A
	Post plant :	46-0-0	93	6 /16/09
	Manure:	N/A	N/A	N/A

Herbicide: Dual II Mag 1.5 pt/A
Hornet 4.0 oz/A

Insecticide: None

Hybrid: Dekalb DKC52-59

Irrigation: None

Planting Date: 5/19/09 **Planting Depth:** 1.5" **Row Width:** See Factors

Target Plant Density: See Factors **Planting Method:** Kinze 2000 Inter-Row Planter

Harvest Date: S: 9/28/09
G: 11/6/09

Harvest Method: S: NH 707
G: Massey Ferguson 8XP

Experimental Design

Design: RCB split-plot **Replications:** 4

Plot Size Seeded: 10' x 100' **Experiment Size:** 0.6 Acre

Harvest Plot Size: S: 5' x 8.75'
G: 5' x 100'

Harvest Plant Density: See Factors

Factors/Treatments:

Row Spacing:	Plant Density: (plants/A)
15 inch 30 inch	25000, 30000, 35000 and 40000

Results: Table C-30.

Table C-30. Plant Density and Row Spacing Effects on Corn Grain and Silage Yield and Quality Arlington, WI - 2009.

		Grain													
Row		Harvest				Test	Lodged			Grower	Grain Composition			Ethanol	
spacing	Density	population	ears	Yield	Moisture	weight	Total	Stalk	Root	return	Oil	Starch	Protein	per bu	per A
inches	plants/A	plants/A	ears/A	bu/A	%	lbs/bu	%	%	%	$/A	%	%	%	gallons	gallons
	25000	24891	25514	202	25.3	54	0	0	0	696	3.2	59.3	7.4	2.89	584
	30000	29496	29745	200	24.5	54	2	2	0	691	3.2	59.2	7.4	2.89	577
	35000	32981	32981	200	24.2	54	2	2	0	694	3.2	59.6	7.3	2.90	581
	40000	38582	38582	209	22.7	54	3	3	0	729	3.1	59.8	7.3	2.91	607
15		33479	33541	208	23.6	54	2	2	0	723	3.2	59.4	7.4	2.90	603
30		29496	29870	197	24.7	54	1	1	0	682	3.1	59.5	7.3	2.90	572
15	25000	25887	26136	212	25.4	55	0	0	0	728	3.2	59.2	7.4	2.89	612
15	30000	31363	31363	201	23.3	54	1	1	0	701	3.2	59.1	7.5	2.89	582
15	35000	35097	35097	202	23.2	54	4	4	0	706	3.1	59.6	7.2	2.91	589
15	40000	41569	41569	216	22.7	54	4	4	0	756	3.1	59.7	7.3	2.90	627
30	25000	23896	24891	192	25.2	54	0	0	0	663	3.2	59.4	7.4	2.89	557
30	30000	27629	28127	198	25.6	54	2	2	0	682	3.1	59.3	7.3	2.89	572
30	35000	30865	30865	198	25.3	54	0	0	0	682	3.2	59.5	7.3	2.89	573
30	40000	35595	35595	201	22.8	53	2	2	0	701	3.1	59.8	7.3	2.92	586
Mean		31488	31705	203	24.2	54	2	2	0	703	3.2	59.4	7.3	2.90	587
Probability(%)															
Row Space (S)		0.0	0.0	52.8	1.7	28.3	25.6	25.6	-	35.8	29.1	9.3	26.3	7.4	43.6
Plant Density (D)		1.2	1.5	10.8	12.7	15.3	51.2	51.2	-	9.0	69.3	55.6	37.2	74.5	10.7
S x D		30.6	15.1	53.7	20.9	85.9	28.3	28.3	-	70.7	44.2	89.9	30.8	19.3	60.2
LSD(0.10)															
Row Space (S)		1765	1715	NS	1.2	NS	NS	NS	-	NS	NS	0.4	NS	0.01	NS
Plant Density (D)		1693	1714	NS	NS	NS	NS	NS	-	39	NS	NS	NS	NS	NS
S x D		2496	NS	NS	NS	NS	NS	NS	-	NS	NS	NS	NS	NS	NS

continued

Table C-30. Plant Density and Row Spacing Effects on Corn Grain and Silage Yield and Quality

(continued) **Arlington, WI - 2009.**

		Whole Plant														
Row		Harvest	Dry Matter		Kernel	KMR	SMR	VMR	Crude			In Vitro			Milk per	
spacing	Density	population	yield	Moisture	milk	0-5	0-5	0-10	protein	ADF	NDF	Digest	NDFD	Starch	Ton	Acre
inches	plants/A	plants/A	tons/A	%	%				%	%	%	%	%	%	lbs/T	lbs/A
	25000	26875	11.1	61.6	51.9	2.6	2.0	4.6	6.2	20.7	40.8	79.7	50.2	35.1	3139	34762
	30000	30625	10.4	61.9	51.9	2.6	1.9	4.5	6.3	21.0	41.3	79.5	50.4	34.3	3122	32467
	35000	35000	10.1	62.7	52.5	2.6	1.5	4.1	6.3	21.3	41.8	79.2	50.3	33.9	3100	31287
	40000	42750	10.8	62.7	56.3	2.8	1.5	4.3	6.4	21.1	41.4	79.5	50.6	34.6	3121	33554
15		36750	10.8	61.6	53.8	2.7	1.4	4.1	6.3	20.7	40.9	79.8	50.5	35.1	3140	33847
30		30875	10.4	62.9	52.5	2.6	2.0	4.7	6.4	21.3	41.7	79.2	50.3	33.9	3101	32188
15	25000	30500	11.5	60.3	51.3	2.6	1.7	4.3	6.2	20.4	40.4	79.8	49.9	36.1	3147	36280
15	30000	34000	10.3	61.9	47.5	2.4	1.3	3.7	6.2	20.7	40.6	79.6	49.7	35.3	3134	32331
15	35000	36750	10.2	62.4	53.8	2.7	1.3	4.0	6.4	20.4	40.6	80.3	51.5	34.8	3171	32294
15	40000	45750	11.1	61.7	62.5	3.1	1.3	4.5	6.4	21.5	41.9	79.4	50.9	34.0	3108	34481
30	25000	23250	10.6	62.8	52.5	2.6	2.3	5.0	6.3	20.9	41.1	79.7	50.5	34.0	3131	33244
30	30000	27250	10.5	61.9	56.3	2.8	2.5	5.3	6.5	21.4	42.0	79.5	51.1	33.2	3110	32602
30	35000	33250	10.0	63.0	51.3	2.6	1.7	4.3	6.2	22.2	42.9	78.2	49.2	33.1	3029	30280
30	40000	39750	10.4	63.7	50.0	2.5	1.6	4.1	6.4	20.7	40.9	79.7	50.4	35.2	3134	32628
Mean		33813	10.6	62.2	53.1	2.7	1.7	4.4	6.3	21.0	41.3	79.5	50.4	34.5	3120	33018
Probability(%)																
Row Space (S)		0.0	24.6	71.0	74.0	74.0	19.6	68.1	83.2	92.8	89.5	94.5	98.7	81.3	93.4	10.2
Plant Density (D)		2.3	42.5	46.3	73.4	73.4	6.0	24.2	57.4	46.0	42.9	45.0	80.7	25.3	43.0	39.6
S x D		77.7	69.1	70.2	17.3	17.3	45.0	17.3	59.3	60.5	63.3	54.4	42.2	48.7	55.9	67.3
LSD(0.10)																
Row Space (S)		3365	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Plant Density (D)		3229	NS	NS	NS	NS	0	NS	NS	NS	NS	NS	NS	NS	NS	NS
S x D		NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS

Addendum Table C-62. Plant Density and Row Spacing Influence on Corn Stover Agronomic and Biofuel Measurements. Arlington, WI - 2009.†

	Density			Yield														
Row Spacing	Target	Harvest	Moisture	Stover		TEP	TE	Etoh	CP	ADF	NDF	NDFD	ADL	Lignin	Glucan	Xylan	Cell	Hem
inches	plants/A		%	g/plant	T/A	G/T	G/A	g/L	%	%	%	%	%	%	%	%	%	%
15		33500	53.0	104	3.8	92.3	349	4.56	6.1	45.8	76.1	57.7	3.3	32.9	20.0	13.3	39.6	29.5
30		29500	52.6	107	3.4	92.9	317	5.04	6.2	45.3	75.9	58.0	3.3	33.2	20.1	13.0	39.3	29.5
	25000	24900	58.6	116	3.2	92.3	293	5.30	6.2	45.5	76.0	57.9	3.3	32.9	20.1	12.9	39.4	29.4
	30000	29500	55.4	116	3.7	91.5	341	4.55	6.0	46.1	77.5	57.5	3.4	32.6	19.9	13.4	39.9	29.6
	35000	33000	50.6	97	3.5	93.8	328	4.63	6.3	45.5	75.8	57.9	3.3	33.5	20.3	12.9	39.6	29.8
	40000	38600	46.5	94	4.0	92.9	369	4.74	6.2	45.1	74.8	58.0	3.3	33.3	20.0	13.3	38.9	29.2
15	25000	25900	59.3	113	3.3	91.5	298	4.64	6.0	45.6	76.5	57.5	3.4	32.7	19.8	13.4	39.4	29.5
15	30000	31400	52.7	117	4.0	92.1	369	4.13	6.0	46.4	77.2	57.2	3.4	32.6	20.2	13.4	40.1	29.4
15	35000	35100	50.1	92	3.5	93.4	331	4.78	6.4	45.6	75.0	57.8	3.3	33.4	20.3	13.2	39.8	29.9
15	40000	41600	50.0	94	4.3	92.4	396	4.71	6.0	45.4	75.8	58.0	3.3	33.0	20.0	13.1	39.2	29.3
30	25000	24000	58.0	118	3.1	93.2	287	5.95	6.3	45.4	75.5	58.2	3.3	33.0	20.4	12.4	39.4	29.3
30	30000	27600	58.2	114	3.4	90.9	312	4.96	6.0	45.9	77.7	57.7	3.3	32.5	19.6	13.5	39.8	29.8
30	35000	30900	51.1	101	3.4	94.2	324	4.48	6.2	45.3	76.6	58.0	3.2	33.7	20.4	12.7	39.4	29.7
30	40000	35600	43.0	94	3.7	93.5	343	4.77	6.4	44.8	73.9	58.1	3.3	33.5	20.1	13.4	38.5	29.1
Mean		31500	52.8	106	3.6	92.6	333	4.80	6.2	45.6	76.0	57.8	3.3	33.1	20.1	13.1	39.5	29.5
Probability (%)																		
Population (D)		0.0	0.6	4.9	5.4	8.7	6.0	2.2	68.0	21.9	2.7	23.2	17.4	13.9	27.6	39.7	2.5	0.0
Row Spacing (S)		1.2	84.8	70.2	15.5	43.3	17.1	6.5	57.5	32.2	80.5	43.6	44.5	43.8	60.4	53.9	24.4	56.7
S x D		30.6	28.4	91.4	69.7	40.9	64.7	1.2	68.5	97.9	16.4	66.4	86.2	88.8	5.5	21.1	73.1	1.0
LSD (0.05)																		
Population (D)		2140	6.6	19.6	NS	NS	NS	0.5	NS	NS	1.6	NS	NS	NS	NS	NS	0.7	0.2
Row Spacing (S)		2290	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
S x D		3050	NS	NS	NS	NS	NS	0.7	NS	NS	NS	NS	NS	NS	NS	NS	NS	0.3

† 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