

Corn Row Width and Population Study

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Row width studies in the northern corn belt have demonstrated increasing yields as row widths are narrowed, especially in high-yield environments. There has also been interest in corn grown in paired rows on 30-inch centers. The paired rows reduce inter-row plant competition while allowing harvest with 30-inch row corn heads. This study was conducted to determine the response of corn grown in 15-inch, 30-inch and paired rows 8 inches apart (10 inches apart in 2006) on 30-inch centers at plant populations of 25,000, 30,000 and 35,000 plants/acre, respectively. Surprisingly, in 2006 and 2007, corn yield was the same in 15-inch rows or paired rows on 30-inch centers, as corn grown in single 30-inch rows. Corn yields were maximized at 230 bu/ac at 30,000 plants/ac in 2006 and at 226 bu/ac at 35,000 plants/ac in 2007.

Materials and Methods

Soil:	Embsen sandy loam, Hecla sandy loam and Maddock sandy loam. Soil-N 29 lbs./acre; soil-P was very high; soil-K was high; and soil-S was very low.
Previous crop:	2007 – edible bean; 2006 - soybean; 2005 – field corn.
Seedbed Preparation:	Worked with soil finisher once on May 5.
Planting:	Planted on May 9 in 30-inch, 30-inch paired (2 rows 8-inches apart on 30-inch centers) and 15-inch row spacing.
Plots:	Plots were 17 ft. long by 10 ft. wide. Plots with 30-inch row spacing had four rows; 30-paired (30pr) had four paired rows; plots with 15-inch spacing had eight rows. Corn was planted at 30K, 37K and 44K seeds per acre and thinned to 25K, 30K and 35K seeds per acre on June 4. There were four replications.
Fertilizer:	April 21 broadcast 28 lbs. N/acre, 44 lbs. P ₂ O ₅ /acre, 55 lbs. K ₂ O/acre and 22 lbs. S/acre as 10-16-20-8. Applied 60 lbs. N/acre as 32-0-0 on May 15. Broadcast 100 lbs. N/acre as urea on June 18.
Irrigation:	Overhead sprinkler irrigation as needed.
Pest control:	Apply Lumax (3 pt/acre) + Buccaneer Plus (32 oz/acre) + NIS (0.5% v/v) + AMS (9.5 lbs/100gal) on May 31.
Harvest:	Hand harvested on October 31. Harvest area was a 10 foot by 5 foot section from each plot (two rows from the 30-inch row plots, two paired rows from the 30-inch paired row plots and four rows from the 15-inch row plots).

Results

Dekalb DKC 47-10 and Pioneer 38H65 were planted in a split, split plot arrangement with hybrid as main plots, row width as split plots and population as split, split plots. Row width had no significant effect on yield or other parameters tested. This is the third year (2006-2008) in which corn row width has not statistically affected yield. This is surprising and contrary to past data. Corn grown in 20-inch rows had a 12 bu/acre yield advantage over corn in 30-inch rows at this same site when studies from 1977-78 and 1980-82 are averaged.

Test weight increased with increasing population. Yield was increased from 197 bu/acre at 25,000 plants/acre to 226 bu/acre at 35,000 plants/acre. Ears were two inches higher when the population exceeded 25,000 plants/ac. There was a significant interaction between hybrid and population for test weight, plants/ac and ears/plant and a significant interaction among hybrid, row width and population for test weight. Plots were thinned to populations of 25,000, 30,000 and 35,000 plants/ac. Stalk counts from the 5 foot by 10 foot harvest samples averaged about 3,500 plants/ac more than the stand counts taken at thinning.

Table 1. Corn row width and population study at the Oakes Irrigation Research Site in 2008.

	Harvest Moisture %	Test Weight lb/bu	Grain Yield bu/ac	Population plants/ac	Ears/Plant	Ear Height inch	Silking Date
Hybrid							
Dekalb DKC4710 ¹	20.3	55.6	198.1	33251	1.01	46	7/24
Pioneer P38H65	22.8	56.7	228.2	34146	0.97	52	7/25
Mean	21.5	56.2	213.2	33699	0.99	49.1	7/25
C.V. (%)	3.8	2.9	11.5	4.6	3.3	8.0	
LSD 0.05	0.6	NS	18.4	NS	0.02	3	
Row Width²(Row)							
15	21.6	56.0	209.8	33832	0.99	50	7/25
30	21.6	56.2	213.8	33360	0.98	48	7/25
30pr	21.5	56.2	215.9	33904	1.00	49	7/25
C.V. (%)	4.7	2.0	6.2	5	3.7	3.5	
LSD 0.05	NS	NS	NS	NS	NS	NS	

Table 1. Corn row width and population study at the Oakes Irrigation Research Site in 2008 (cont.).

	Harvest Moisture %	Test Weight lb/bu	Grain Yield bu/ac	Population plants/ac	Ears/Plant	Ear Height inches	Silking Date
Population³(Pop)							
25K	21.8	55.9	197.2	28568	1.01	48	7/24
30K	21.7	56.0	216.2	33868	0.98	50	7/25
35K	21.2	56.6	226.1	38660	0.98	50	7/25
C.V. (%)	4.6	1.3	6.3	3.5	5.9	3.5	
LSD 0.05	NS	0.4	7.8	683	NS	1.0	
Hybrid by Row							
DKC4710 15	20.2	55.4	191.5	33396	1.02	46	7/24
P38H65 15	23.0	56.6	228.1	34267	0.97	53	7/25
DKC4710 30	20.6	55.6	202.0	32815	1.00	46	7/25
P38H65 30	22.6	56.8	225.6	33904	0.95	51	7/25
DKC4710 30pr	20.1	55.8	200.9	33541	1.01	46	7/24
P38H65 30pr	22.8	56.7	230.8	34267	0.99	53	7/25
LSD 0.05	NS	NS	NS	NS	NS	NS	
Hybrid by Population							
DKC4710 25k	20.9	54.8	178.8	27660	1.06	44	7/23
P38H65 25k	22.6	57.0	215.5	29476	0.95	51	7/25
DKC4710 30k	20.4	55.4	201.6	34050	0.98	46	7/24
P38H65 30k	23.0	56.6	230.9	33687	0.97	53	7/25
DKC4710 35k	19.6	56.6	214.1	38042	0.98	48	7/25
P38H65 35k	22.7	56.6	238.1	39277	0.98	53	7/25
LSD 0.05	NS	0.6	NS	966	0.05	NS	
Row by Pop							
15 25K	21.7	55.5	191.3	28096	1.04	48	7/24
30 25k	21.7	56.2	199.4	28750	0.97	47	7/24
30pr 25k	21.9	56.0	200.8	28858	1.02	48	7/24
15 30k	21.6	56.0	211.8	34086	0.97	50	7/25
30 30k	21.8	55.8	217.4	33215	0.97	50	7/25
30pr 30k	21.7	56.2	219.5	34304	0.99	50	7/25
15 35k	21.5	56.6	226.3	39313	0.97	51	7/25
30 35k	21.2	56.6	224.7	38115	0.99	49	7/25
30pr 35k	20.7	56.5	227.2	38551	0.99	51	7/25
LSD 0.05	NS	NS	NS	NS	NS	NS	

Table 1. Corn row width and population study at the Oakes Irrigation Research Site in 2008 (cont.).

			Harvest	Test	Grain			Ear	
			Moisture	Weight	Yield	Population	Ears/Plant	Height	Silking
			%	lb/bu	bu/ac	plants/ac		inches	Date
Hybrid by Row by Pop									
DKC4710	15	25k	20.6	54.0	168.4	27443	1.10	45	7/23
P38H65	15	25k	22.8	57.0	214.3	28750	0.97	51	7/25
DKC4710	30	25k	21.0	55.4	185.5	27443	1.02	44	7/24
P38H65	30	25k	22.4	57.1	213.3	30057	0.92	50	7/25
DKC4710	30pr	25k	21.1	55.1	182.6	28096	1.07	44	7/23
P38H65	30pr	25k	22.8	56.9	219.0	29621	0.97	52	7/25
DKC4710	15	30k	20.1	55.6	194.4	34630	0.96	46	7/25
P38H65	15	30k	23.0	56.5	229.2	33542	0.97	53	7/26
DKC4710	30	30k	21.1	54.8	204.8	33324	1.00	47	7/24
P38H65	30	30k	22.6	56.8	230.0	33106	0.95	52	7/25
DKC4710	30pr	30k	20.0	56.0	205.5	34195	0.99	46	7/24
P38H65	30pr	30k	23.4	56.4	233.6	34413	1.00	53	7/25
DKC4710	15	35k	19.9	56.7	211.8	38115	0.98	48	7/24
P38H65	15	35k	23.1	56.4	240.9	40511	0.96	54	7/25
DKC4710	30	35k	19.7	56.8	215.8	37680	1.00	46	7/26
P38H65	30	35k	22.8	56.5	233.7	38551	0.99	51	7/25
DKC4710	30	35k	19.2	56.2	214.6	38333	0.98	48	7/25
P38H65	30pr	35k	22.3	56.9	239.9	38768	1.00	54	7/26
LSD 0.05			NS	1.0	NS	NS	NS	NS	

¹Yield was significantly lowered by bird damage in DKC4710.

²Row widths are in inches. Two rows were planted 8-inches apart on 30-inch centers in the 30pr row width configuration.

³Population is x 1,000. Example 35k = 35,000 plants/ac

Planting date = May 9 ; Previous crop soybean ; Harvest date = October 31

Irrigation = 13"; Fertilizer Rate lb/ac: N = 188, P₂O₅ = 44, K₂O = 55, S = 22

SUMMARY 2006 -2008

Although a statistical analysis was not performed for three year means, a discussion of trends and differences shown in graphs 1 to 5 is appropriate. Figure 4 contains means from 2007-2008 only. Interestingly, row width had no statistical affect on yield, grain moisture, test weight, ears/plant or ear height in any given year. The trend was for hybrid 38H65 to yield more, be wetter, lower in test weight, less ears/plant and a higher ear placement than DKC 4710. Yield increased with increased population each year. No real difference in moisture or test weight is noted at different populations. Ears/plant tended to be higher at the lowest population. Ear height increased at populations above 25,000 plants/acre.

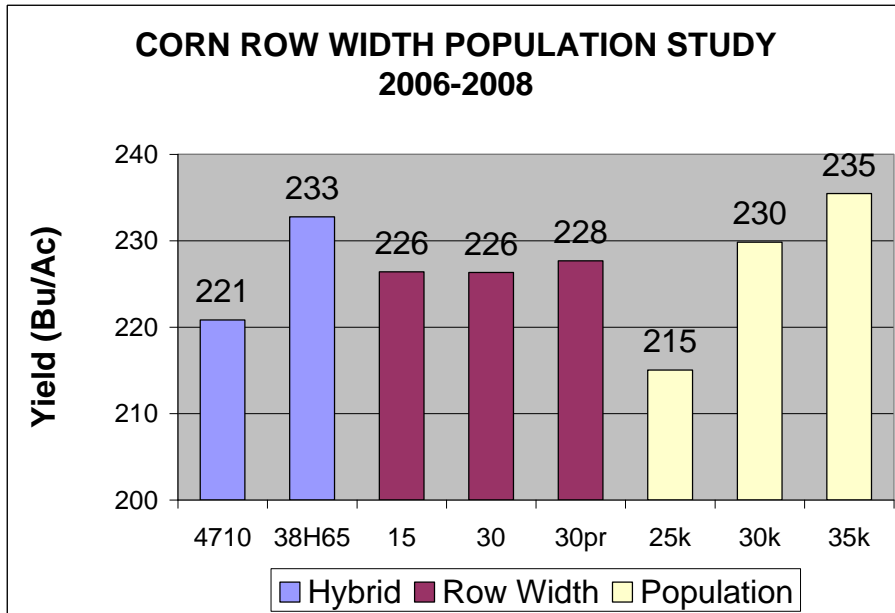


Figure 1. Corn grain yield for hybrids, row width and population from 2006-2008 at the Oakes Irrigation Research Site.

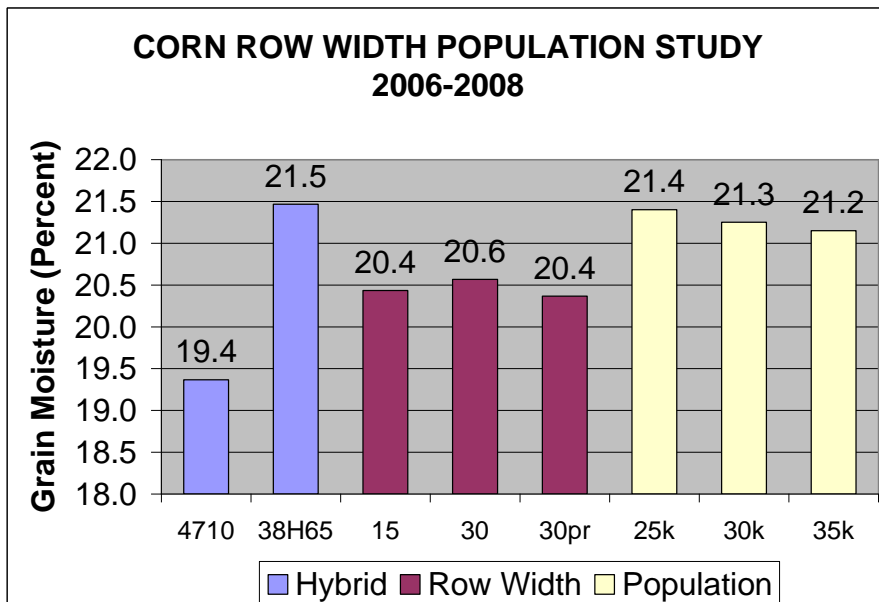


Figure 2. Corn grain moisture for hybrids, row width and population from 2006-2008 at the Oakes Irrigation Research Site.

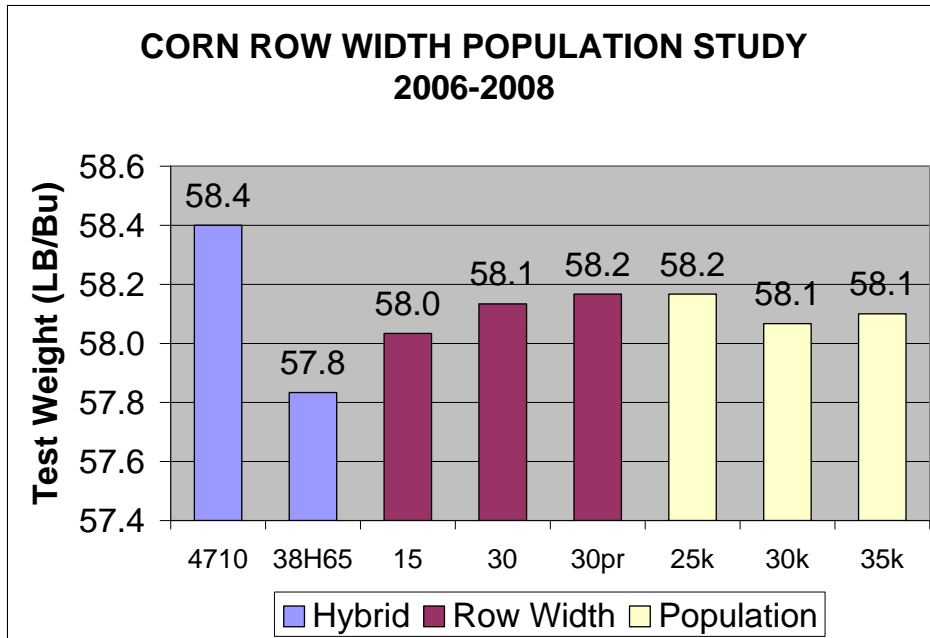


Figure 3. Test weight for hybrids, row width and population from 2006-2008 at the Oakes Irrigation Research Site.

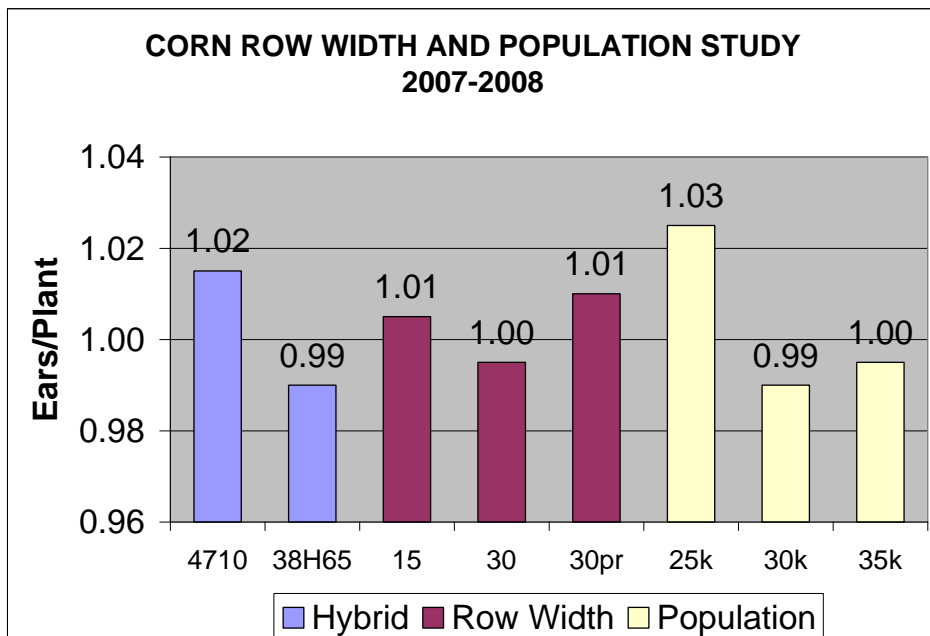


Figure 4. Ears/plant for hybrids, row width and population from 2007-2008 at the Oakes Irrigation Research Site.

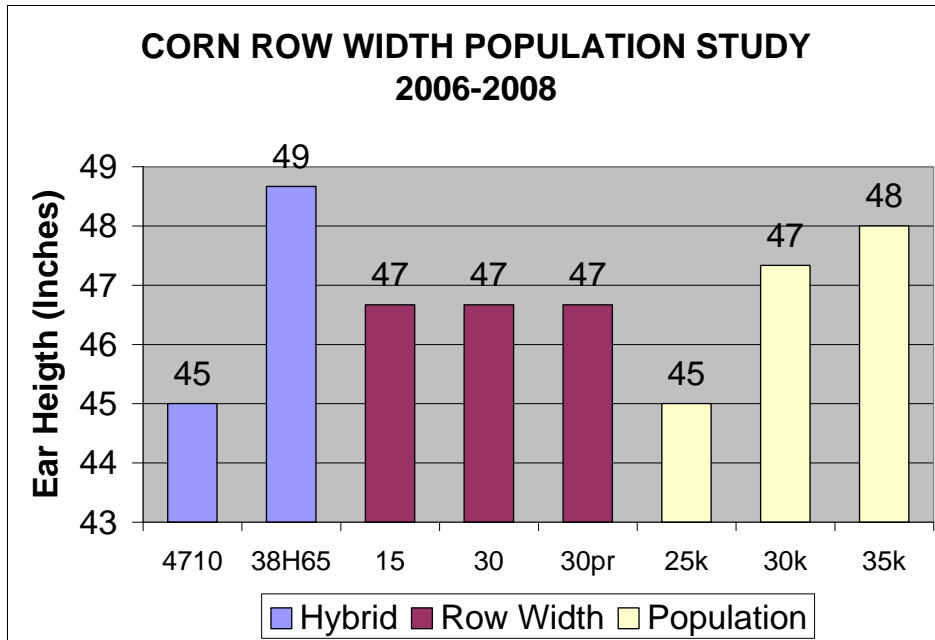


Figure 5. Ear height for hybrids, row width and population from 2006-2008 at the Oakes Irrigation Research Site.