1-1-2015

On-Farm Corn Population Trials

Jim Fawcett
Iowa State University, fawcett@iastate.edu

Lyle Rossiter
Iowa State University, ltross@iastate.edu

Wayne Roush
Iowa State University, wroush@iastate.edu

Zack Koopman
Iowa State University, zkoopman@iastate.edu

On-Farm Corn Population Trials

Abstract
Farmers continue to increase corn planting populations in hopes of increasing yields. Planting too high of a population can result in increased barrenness and thus lower yields, but too low of a population also can result in lower yields. As seed prices continue to rise, it is important for farmers to find a population that maximizes both yield and profit.

Keywords
Agronomy

Disciplines
Agricultural Science | Agriculture | Agronomy and Crop Sciences | Natural Resources and Conservation

On-Farm Corn Population Trials

RFR-A1435

Jim Fawcett, extension field agronomist (retired)
Lyle Rossiter, Allee Farm, superintendent
Wayne Roush, Western Farm, superintendent
Zack Koopman, ag specialist

Introduction

Farmers continue to increase corn planting populations in hopes of increasing yields. Planting too high of a population can result in increased barrenness and thus lower yields, but too low of a population also can result in lower yields. As seed prices continue to rise, it is important for farmers to find a population that maximizes both yield and profit.

Materials and Methods

In 2014, 12 trials (Table 1) examined the effect of various planting populations on corn grain yield. All trials were conducted on-farm by farmer cooperators using the farmers' equipment. Strips were arranged in a randomized complete block design with at least three replications per treatment. Strip size varied from field to field depending on equipment size and the size of the field. Plant stand counts and ear counts were made in the fall. All strips were machine harvested for grain yield.

In Trial 1, two corn varieties were planted in 22-in. rows at 45,000 and 50,000 seeds/acre (Table 2). In Trials 2 and 3, corn was planted at approximately 30,000 and 35,000 seeds/acre. In Trial 4, two corn varieties were planted at three populations from 30,000 to 40,000 seeds/acre. In Trials 5 through 7, corn was planted at five populations from 25,000 to 45,000 seeds/acre. In Trials 8 through 12, corn was planted at five populations from 30,000 to 40,000 seeds/acre.

Results and Discussion

In Trials 1 and 4, there was no difference in yield between the two planting populations within each hybrid, but some yield differences occurred between hybrids (Table 2). In Trials 2 and 10, there were no differences in yield due to plant population. In Trial 3, there was a nearly significant yield increase of 5 bushels/acre with the planting population of 37,000 vs. 31,600 seeds/acre ($P = 0.09$). In Trial 12, the lowest planting population of 30,000 seeds/acre had the lowest yield, and the highest yield occurred with the second highest planting population of 37,500 seeds/acre.

In Trials 5, 6, 7, 8, 9, and 11, the lowest planting population had the highest yield or a yield that was not significantly different from higher populations. This occurred with planting rates as low as 25,000 seeds/acre. Ear counts in the fall indicated there was not much difference in barrenness among the different populations in most trials, although there were slightly more barren plants with the higher populations in Trials 9 and 12 (Table 2).

Most past research has shown the optimal planting rate for corn yield falls in a range from about 35,000 to 37,000 seeds/acre. It is not clear why half of the trials conducted in 2014 showed that planting rates lower than this range did not result in any yield loss, although the unusually wet spring and cool summer may have caused results not typical of past years. However, in all but one trial (Trial 5), planting populations of 35,000 seeds/acre or more resulted in a yield that was among the highest.

Table 1. Hybrid, row spacing, planting date, previous crop, and tillage practices from on-farm corn population trials in 2014.

Exp. no.	Trial	County	Variety	Row spacing (in.)	Planting date	Previous crop	Tillage
140201	1	Sac	Stine R9733 & Stine R9631	22	4/25/12	Soybean	Fall chisel, spring disc & field cultivate
140202	2	Buena Vista	Dekalb 50-67	36	5/17/14	Soybean	Spring field cultivate
140206	3	Buena Vista	Pioneer PO193RIB	30	5/8/14	Soybean	Field cultivate
140212	4	Pocahontas	Golden Harvest E98 and W74	30	5/1/14	Soybean	Spring field cultivate
140501	5	Story	Pioneer 115IR	30	5/9/14	Corn	Conventional
140502	6	Boone	Pioneer 636AM	30	5/7/14	Corn	Conventional
140503	7	Dallas	Pioneer P1360HR	30	5/7/14	Corn	Conventional
140312	8	Monona	LG 2602VT3 PRIB	30	5/15/14	Corn	Fall disc, Spring field cultivate
140316	9	Monona	Wyffels W6878RIB LP	30	5/5/14	Soybean	No-till
140319	10	Harrison	Mycogen 2v717 RIB and 2v779 RIB	30	5/4/14	Soybean	No-till
140320	11	Crawford	Renze 6334	30	5/6/14	Corn	Fall disc, Spring field cultivate
140322	12	Monona	Renze 3385RA	30	5/4/14	Soybean	No-till

Table 2. Fall plant stand, fall ear count and yields from on-farm corn population trials in 2014.

Exp. no.	Trial	Treatments (seeds/A)	Fall plant stand (plants/A)	Fall ear count (ears/A)	Yield (bu/A)[1]	P-value (yield)[2]
140201	1a[3]	45,000	39,000	38,300	174 ab	0.03
		50,000	44,200	43,800	173 b	
	1b[3]	40,000	32,100	31,700	188 a	
		45,000	40,000	39,800	183 ab	
140202	2	30,000	29,300	28,700	148 a	0.93
		35,000	34,100	33,300	148 a	
140206	3	31,600	29,700	29,500	221 a	0.09
		37,000	34,000	33,700	226 a	
140212	4a[4]	30,000	29,800	29,300	220 a	<0.01
		35,000	32,900	32,300	221 a	
		40,000	37,800	36,900	211 ab	
	4b[4]	30,000	28,100	27,800	195 b	
		35,000	32,900	32,600	196 b	
		40,000	35,800	35,400	195 b	
140501	5	25,000	23,400	23,200	163 ab	<0.01
		30,000	28,400	27,900	172 a	
		35,000	33,600	32,600	158 bc	
		40,000	38,200	36,900	163 ab	
		45,000	43,200	41,100	151 c	
140502	6	25,000	27,800	27,300	185 a	<0.01
		30,000	31,500	31,000	182 a	
		35,000	34,500	33,800	178 ab	
		40,000	38,800	37,800	169 b	
		45,000	42,300	41,000	154 c	
140503	7	25,000	24,500	24,300	196 ab	0.01
		30,000	28,400	28,200	198 a	
		35,000	33,500	33,600	199 a	
		40,000	38,600	37,900	196 ab	
		45,000	43,100	43,600	193 b	
140312	8	30,000	28,200	27,800	200 a	0.01
		32,500	29,800	29,200	195 ab	
		35,000	33,500	32,500	182 ab	
		37,500	35,500	33,900	175 b	
		40,000	37,500	35,100	174 b	
140316	9	30,000	30,600	29,700	194 a	0.01
		32,500	31,300	30,300	191 ab	
		35,000	34,600	31,800	189 ab	
		37,500	38,400	34,600	189 ab	
		40,000	40,000	36,200	185 b	

[1]Values denoted with the same letter within a trial are not statistically different at the significance level of 0.05.
[2]P-Value = the calculated probability that the difference in yields can be attributed to the treatments and not other factors. For example, if a trial has a P-Value of 0.10, then we are 90 percent confident the yield differences are in response to treatments. For P = 0.05, we would be 95 percent confident.
[3]Variety was Stine R9733 for 1a and Stine R9631 for 1b.
[4]Variety was Golden Harvest E98 for 4a and Golden Harvest W74 for 4b.
[5]Variety was Mycogen 2v717 RIB (flex) for 10a and Mycogen 2v779 RIB (semi-flex) for 10b.

Table 2. Fall plant stand, fall ear count and yields from on-farm corn population trials in 2014 (continued).

140319	10a[5]	29,000	31,700	29,200	214 a	0.60
		32,000	34,700	32,300	213 a	
		35,000	36,100	34,300	213 a	
		38,000	36,700	35,300	213 a	
	10b[5]	29,000	30,100	28,400	203 a	
		32,000	30,700	29,600	207 a	
		35,000	33,200	32,900	203 a	
		38,000	34,700	34,000	206 a	
140320	11	28,000	26,200	26,100	201 a	0.02
		30,000	28,100	27,700	200 a	
		32,000	30,000	29,800	198 ab	
		35,000	34,300	33,800	194 ab	
		38,000	35,600	34,700	185 b	
140322	12	30,000	28,700	25,400	164 a	<0.01
		32,500	30,600	27,600	173 b	
		35,000	34,000	30,800	185 c	
		37,500	34,300	29,700	206 e	
		40,000	36,700	31,200	197 d	

[1]Values denoted with the same letter within a trial are not statistically different at the significance level of 0.05.
[2]P-Value = the calculated probability that the difference in yields can be attributed to the treatments and not other factors. For example, if a trial has a P-Value of 0.10, then we are 90 percent confident the yield differences are in response to treatments. For P = 0.05, we would be 95 percent confident.
[3]Variety was Stine R9733 for 1a and Stine R9631 for 1b.
[4]Variety was Golden Harvest E98 for 4a and Golden Harvest W74 for 4b.
[5]Variety was Mycogen 2v717 RIB (flex) for 10a and Mycogen 2v779 RIB (semi-flex) for 10b.