

On-Farm Corn and Soybean Population Demonstration Trials

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Introduction

Corn and soybean planting is one of the most critical operations of the season. As corn and soybean seed prices continue to rise, and grain prices fall, it is important for farmers to find a population that maximizes both yield and profit. Planting too high of a corn population can result in increased barrenness and thus lower yields, but too low of a population also can result in lower yields. Past studies have indicated soybean yields are similar across a wide range of populations, but too low of a population can result in reduced yields and too high of a population can reduce profits. The objective of these trials was to investigate the effect of various plant populations on corn and soybean yield.

Materials and Methods

In 2019, six trials investigated the effects of various plant populations on corn yield, and five trials investigated the effects of various plant populations on soybean yield (Table 1). Some of the trials were conducted on-farm by farmer cooperators using the farmer's equipment, and some trials were conducted on research farms. Strips were arranged in a randomized complete block design with at least three replications per treatment. Strip length and width varied from field-to-field

depending on field and equipment size. All plots were machine harvested for grain yield.

Soybean Trial 1 investigated a planting population of 100,000 seeds/acre versus 130,000 seeds/acre (Table 2). Soybean Trial 2 investigated planting populations of 90,000, 110,000, 125,000, and 140,000 seeds/acre. In soybean Trial 3, two varieties were planted on two planting dates and at three populations. The planting populations were 100,000, 125,000 and 165,000 seeds/acre. In soybean Trials 4 and 5, planting populations of 120,000, 140,000, and 160,000 seeds/acre were investigated.

In corn Trials 6 and 7, planting populations of 28,000, 32,000, and 36,000 seeds/acre were investigated. In corn Trial 8, planting populations of 30,000, 32,000, 34,000, 36,000, and 38,000 seeds/acre were investigated. In corn Trial 9 a planting population of 26,000 seeds/acre was compared with a planting population of 32,000 seeds/acre. In corn Trial 10, planting populations of 30,000, 32,000, 34,000, and 36,000 seeds/acre were investigated. In corn Trial 11, a planting population of 34,000 seeds/acre was compared with a planting population on 37,000 seeds/acre.

Results and Discussion

In soybean Trial 1, there was no difference in yield between a planting population of 100,000 and 130,000 seeds/acre (Table 2). In soybean Trial 2 there was no difference in yield with planting populations from 90,000 to 140,000 seeds/acre. In soybean Trial 3, there was no difference in yield with the three populations from 100,000 to 165,000 seeds/acre within each variety and planting date. However, Croplan CP1788X planted

May 16 yielded more than Asgrow AG24X9 planted April 26 at the populations of 100,000 and 125,000 seeds/acre and also yielded more than Asgrow AG24X9 planted May 16 at a population of 100,000 seeds/acre. In soybean Trial 4, there was no difference in yield with planting populations from 120,000 to 160,000 seeds/acre. In soybean Trial 5, the soybeans planted at 160,00 seeds/acre yielded three bushels/acre more than the soybeans planted at 140,00 seeds/acre but there was no difference in yield to the soybeans planted at 120,000 seeds/acre ($P = 0.05$). Past studies have indicated that soybean yields are similar with a wide range of seeding rates. It is usually recommended to seed about 140,000 seeds/acre in order to have a final plant stand of 100,000 plants/acre or more. These trials indicate seeding rates less than 140,000 seeds/acre may be sufficient, although results will likely vary from year-to-year.

There was not a significant difference in yield among the various planting populations in any of the corn trials. This includes a population of as low as 26,000 seeds/acre in corn Trial 6 and as high as 38,000 seeds/acre in corn Trial 8.

Seeding rates of 35,000 seeds/acre or more are usually recommended. Based on these trials, it is apparent that seeding rates of as low as 28,000 seeds/acre may be adequate for maximum corn yields. Thus, there may be opportunities for some farmers to reduce their seeding rates, although results will likely vary from year-to-year.

NOTE: The results presented are from replicated demonstration trials. Statistics are used to detect differences at a location and should not be interpreted beyond the single location.

Table 1. Variety, row spacing, planting date, planting population, previous crop, and tillage practices in the 2019 population trials on corn and soybean.

Exp. no.	Trial	County	Variety	Row spacing (in.)	Planting date	Planting population (seeds/ac)	Previous crop	Tillage
190101	1	Lyon	Pioneer P18A98X	30	6/5/19	100,000 130,000	Corn	Soil finisher
190117	2	Sioux	Pioneer P19A14X	30	5/14/19	90,000 110,000	Corn	No-till
190123	3	Lyon	Croplan RX1788	30	4/26/19 5/16/19	100,000 125,000 165,000	Corn	No-till
190301	4	Monona	LG 2898LL	30	5/19/19	120,000 140,000 160,000	Corn	No-till
190302	5	Monona	LG C1870R2	30	5/17/19	120,000 140,000 160,000	Corn	No-till
190303	6	Monona	LG 59C66	30	5/15/19	28,000 32,000 36,000	Soybean	No-till
190304	7	Monona	LG 5565	30	5/15/19	28,000 32,000 36,000	Soybean	No-till
190411	8	Hancock	Wyffels 4796	30	5/15/19	34,000 36,000 38,000	Soybean	Conventional
190609	9	Cass	Epleys E1712SS	30	5/6/19	26,000 32,000	Soybean	No-till
190715	10	Washington	Pioneer P1197AMXT	30	6/3/19	30,000 32,000	Soybean	No-till
190716	11	Washington	Pioneer P1197AMXT	30	6/3/19	34,000 37,000	Soybean	No-till

Table 2. Yields for on-farm corn and soybean plant population trials in 2019.

Exp. no.	Trial	Treatment	Yield (bu/ac) ^a	P-value ^b
190101	1	Planted at 100,000 seeds/ac	57 a	0.17
		Planted at 130,000 seeds/ac	58 a	
190117	2	Planted at 90,000 seeds/ac	61 a	0.96
		Planted at 110,000 seeds/ac	61a	
		Planted at 125,000 seeds/ac	61 a	
		Planted at 140,000 seeds/ac	62 a	
190123	3	Croplan CP1788X planted at 100,000 seeds/ac 4/26/19	71 abc	<0.01
		Croplan CP1788X planted at 125,000 seeds/ac 4/26/19	72 ab	
		Croplan CP1788X planted at 165,000 seeds/ac 4/26/19	72 ab	
		Croplan CP1788X planted at 100,000 seeds/ac 5/16/19	73 a	
		Croplan CP1788X planted at 125,000 seeds/ac 5/16/19	73 a	
		Croplan CP1788X planted at 165,000 seeds/ac 5/16/19	73 a	
		Asgrow AG24X9 planted at 100,000 seeds/ac 4/26/19	66 c	
		Asgrow AG24X9 planted at 125,000 seeds/ac 4/26/19	66 c	
		Asgrow AG24X9 planted at 165,000 seeds/ac 4/26/19	69 abc	
		Asgrow AG24X9 planted at 100,000 seeds/ac 5/16/19	68 bc	
		Asgrow AG24X9 planted at 125,000 seeds/ac 5/16/19	69 abc	
		Asgrow AG24X9 planted at 165,000 seeds/ac 5/16/19	70 abc	
190301	4	Planted at 120,000 seeds/ac	69 a	0.30
		Planted at 140,000 seeds/ac	73 a	
		Planted at 160,000 seeds/ac	71 a	
190302	5	Planted at 120,000 seeds/ac	59 ab	0.05
		Planted at 140,000 seeds/ac	58 b	
		Planted at 160,000 seeds/ac	61 a	
190303	6	Planted at 28,000 seeds/ac	221 a	0.35
		Planted at 32,000 seeds/ac	224 a	
		Planted at 36,000 seeds/ac	215 a	
190304	7	Planted at 28,000 seeds/ac	239 a	0.99
		Planted at 32,000 seeds/ac	240 a	
		Planted at 36,000 seeds/ac	240 a	
190411	8	Planted at 30,000 seeds/ac	185 a	0.43
		Planted at 32,000 seeds/ac	180 a	
		Planted at 34,000 seeds/ac	187 a	
		Planted at 36,000 seeds/ac	184 a	
		Planted at 38,000 seeds/ac	184 a	
190609	9	Planted at 26,000 seeds/ac	160 a	0.56
		Planted at 32,000 seeds/ac	171 a	
190715	10	Planted at 30,000 seeds/ac	213 a	0.15
		Planted at 32,000 seeds/ac	222 a	
		Planted at 34,000 seeds/ac	223 a	
		Planted at 36,000 seeds/ac	211 a	
190716	11	Planted at 34,000 seeds/ac	223 a	0.43
		Planted at 37,000 seeds/ac	219 a	

^aValues denoted with the same letter within a trial are not statistically different at the significance level of 0.05.

^bP-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.