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On-Farm Corn Planter Trials

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Abstract
Corn planting is one of the most critical operations of the season. Correct seed-soil contact is important in order to optimize yields.

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Introduction

Corn planting is one of the most critical operations of the season. Correct seed-soil contact is important in order to optimize yields.

Materials and Methods

In 2014, 20 trials investigated the effects of various aspects of corn planter operations on corn yield (Table 1). 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/treatment. Strip size varied depending on equipment size and field size. All strips were machine harvested.

Trials 1 and 2 examined closing-wheel type and wheel down-pressure. Treatments consisted of conventional press-wheels, finger press-wheels, and half conventional and half finger press-wheels, each with both high- and low-downward pressure. These trials, conducted in Boone County, were nearly identical in design, but Trial 1 was no-till and Trial 2 was conventionally tilled (Table 1). Rate of emergence were recorded.

Trials 3–7 investigated possible soil compaction caused by the planter by comparing corn yield from rows planted with the center of the planter with rows planted with the planter wings. The planters in these studies had bulk center-fill tanks for the seed, which caused more weight in the center of the planter.

Trial 8 investigated the effect of corn planter speed on corn yield. Trials 9–20 compared the factory-installed spring-pressure with hydraulic down-pressure on a Kinze 3600 planter using V-Set vacuum disks in 12 fields in Osceola County.

Results and Discussion

There were no differences in corn grain yield between the high down-pressure and the low down-pressure in either Trial 1 or 2 (Table 2). There also was no difference among the various closing wheel configurations in Trial 1 conducted on no-till, but there was a lower yield with the "half & half" press-wheel configuration in Trial 2 with conventional tillage. The yield depression using a mix of one finger and one conventional press-wheel in 2014 was unexpected. There was not a difference among any of the treatments in either trial in rate of emergence or final plant stand ($P = 0.05$).

In Trials 3–7, there was no yield difference between the rows planted with the center of the planter with those planted with the planter wings in four of the trials, but there was an increase in corn yield of 3 bushels/acre with the corn planted with the planter wings in Trial 5 (Table 3).

In Trial 8, there was no difference in yield between the corn planted at 6 mph and the corn planted at 7 mph. In Trials 9–12, there was no yield difference in any of the trials between corn planted with the spring down-pressure with corn planted with the hydraulic down-pressure (Table 3). When all 12 trials and 37 reps were analyzed together, there was no difference in corn grain yield between the two treatments, with each yielding 201 bushels/acre ($P = 0.38$).

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

Exp. no.	Trial	County	Hybrid	Row spacing (in.)	Planting date	Planting population (seeds/A)	Previous crop	Tillage practices
140509	1	Boone	Pioneer PO636AM	30	6/3/14	35,700	Soybean	No-till
140510	2	Boone	Pioneer PO636AM	30	6/3/14	35,700	Soybean	Conventional
140108	3	Osceola	Dekalb 4413	30	4/25/14	35,500	Soybean	Conventional
140117	4	Lyon	Croplan 5412	30	5/2/14	34,500	Soybean	Conventional
140105	5	Lyon	DeKalb 5378	20	5/7/14	35,000	Soybean	Conventional
140141	6	Lyon	Dekalb 5356	30	5/2/14	33,500 (VR)	Soybean	Spring strip till
140116	7	Lyon	Croplan 5412	30	5/20/14	34,500	Soybean	Conventional
140182	8	Lyon	Pioneer PO297	22	5/3/14	35,000	Corn	Conventional
140140	9	Osceola	DeKalb 5077	30	4/26/14	35,700	Soybean	Conventional
140184	10	Osceola	Pioneer PO297	30	4/26/14	34,000	Soybean	Conventional
140185	11	Osceola	Pioneer PO193	30	4/25/14	35,000	Soybean	Conventional
140186	12	Osceola	Channel 197-68	30	4/25/14	30,000	Soybean	Conventional
140187	13	Osceola	Channel 197-68	30	4/21/14	30,000	Soybean	Conventional
140188	14	Osceola	DeKalb 4812	30	4/25/14	35,000	Soybean	Conventional
140189	15	Osceola	DeKalb 5077	30	4/25/14	35,000	Soybean	Conventional
140190	16	Osceola	Pioneer PO297	30	4/25/14	35,000	Soybean	Conventional
140191	17	Osceola	Pioneer PO216	30	4/25/14	33,600	Soybean	Conventional
140192	18	Osceola	DeKalb 5077	30	4/26/14	35,700	Soybean	Conventional
140193	19	Osceola	DeKalb 5378	30	4/22/14	35,700	Soybean	Conventional
140194	20	Osceola	DeKalb 5378	30	4/22/14	VR (32,000)	Soybean	Conventional

Table 2. Yields from on-farm corn planter trials with multiple treatments in 2014.

Exp. no.	Trial	Wheel	Yield (bu/A)*	P-value	Down pressure	Yield (bu/A)[x]	P-value
140509	1	Conventional	152 a	0.67	High	154 a	0.26
		Finger press	153 a		Low	149 a	
		Half & half	149 a				
140510	2	Conventional	147 a	0.01	High	145 a	0.32
		Finger press	151 a		Low	142 a	
		Half & half	133 b				

[x]Values denoted with the same letter within a trial are not statistically different at the significance level of 0.05.

Table 3. Yields from on-farm corn planter trials in 2014.

Exp. no.	Trial	Treatment	Yield (bu/A)[x]	P-value
140108	3	Rows in center of planter	193 a	0.81
		Rows in planter wings	192 a	
140117	4	Rows in center of planter	168 a	0.26
		Rows in planter wings	167 a	
140141	5	Rows in center of planter	218 a	0.03
		Rows in planter wings	221 b	
140105	6	Rows in center of planter	193 a	0.47
		Rows in planter wings	197 a	
140116	7	Rows in center of planter	168 a	0.26
		Rows in planter wings	167 a	
140182	8	Planter speed 6 mph	191 a	0.72
		Planter speed 7 mph	191 a	
140140	9	Spring down-pressure	198 a	0.55
		Hydraulic down-pressure	198 a	
140184	10	Spring down-pressure	208 a	0.94
		Hydraulic down-pressure	208 a	
140185	11	Spring down-pressure	195 a	0.63
		Hydraulic down-pressure	196 a	
140186	12	Spring down-pressure	199 a	0.91
		Hydraulic down-pressure	199 a	
140187	13	Spring down-pressure	196 a	0.66
		Hydraulic down-pressure	196 a	
140188	14	Spring down-pressure	204 a	0.46
		Hydraulic down-pressure	205 a	
140189	15	Spring down-pressure	196 a	0.85
		Hydraulic down-pressure	196 a	
140190	16	Spring down-pressure	211 a	0.76
		Hydraulic down-pressure	211 a	
140191	17	Spring down-pressure	209 a	0.59
		Hydraulic down-pressure	210 a	
140192	18	Spring down-pressure	214 a	0.52
		Hydraulic down-pressure	216 a	
140193	19	Spring down-pressure	190 a	0.74
		Hydraulic down-pressure	191 a	
140194	20	Spring down-pressure	193 a	0.73
		Hydraulic down-pressure	191 a	

[x]Values denoted with the same letter within a trial are not statistically different at the significance level of 0.05.