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On-Farm Corn and Soybean Management Trials

Jim Fawcett
Iowa State University, fawcett@iastate.edu

Josh Sievers
Iowa State University, sieversj@iastate.edu

Wayne Roush
Iowa State University, wroush@iastate.edu

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Abstract
Farmers are faced with many decisions in managing corn and soybeans as new technologies are introduced, such as droughttolerant corn hybrids, air reels for combines, and land-rolling equipment. Land rolling is the practice of pulling a large, heavy roller across soybean fields in order to push down rocks, smooth the surface of the field, and help break up residue. The purpose is to protect harvest equipment that could be vulnerable to rocks and corn roots. Yields are expected to improve by creating a more uniform harvest.

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On-Farm Corn and Soybean Management Trials

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Jim Fawcett, extension field agronomist (retired)
Josh Sievers, Northwest Farm, superintendent
Wayne Roush, Western Farm, superintendent

Introduction

Farmers are faced with many decisions in managing corn and soybeans as new technologies are introduced, such as drought-tolerant corn hybrids, air reels for combines, and land-rolling equipment. Land rolling is the practice of pulling a large, heavy roller across soybean fields in order to push down rocks, smooth the surface of the field, and help break up residue. The purpose is to protect harvest equipment that could be vulnerable to rocks and corn roots. Yields are expected to improve by creating a more uniform harvest.

Fungicide application to corn at the VT stage or after has become a popular practice. One concern with this practice is applications with ground equipment may cause mechanical injury to the corn. Planting and harvesting at the proper times also are important management decisions farmers must make in obtaining optimum corn and soybean yields.

Materials and Methods

In 2014, six trials investigating various management practices in corn and soybeans were conducted (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 per treatment. Strip width and length varied from field to field depending on equipment size and size of field. All strips were machine harvested for grain yield.

In Trial 1, a drought tolerant corn hybrid was compared with a conventional hybrid. In Trial 2, potential yield loss from mechanical damage to the corn by a sprayer was studied. A sprayer was driven through the field at 5.5 mph (without applying a pesticide) when the corn was at the VT stage. Corn yield from strips that did not have the sprayer pass over them were compared with strips under the spray boom and strips under both the machine axle and the spray boom. The corn was 119 in. tall to the top of the tassel at the time of the sprayer pass. The corn was 17 in. taller than the boom height and 47 in. taller than the axle.

In Trial 3, yield of soybeans harvested using a Crary air reel were compared with soybeans harvested with the air reel turned off. In Trial 4, yields of corn harvested at three different harvest moistures (approximately 15, 20, and 25%) were compared. In Trial 5, soybean yields from strips that were land-rolled immediately after planting were compared with soybean yields from strips not land-rolled. In Trial 6, yields were compared with soybeans planted on April 21 to soybeans planted on May 15.

Results and Discussion

There was no yield difference between the drought-tolerant hybrid and the non-drought tolerant hybrid in Trial 1 (Table 2). There were no drought conditions in this field in 2014. In Trial 2, there was no yield difference between the control and the corn that had the spray boom pass over it, but there was a yield loss of 34 bushels/acre in the strips that had both the machine axle and boom pass over them. A typical sprayer with a boom width of 90-120 ft would have about 10 percent of the rows passing under the machine axle. A 34-bushel/acre yield loss in these rows could mean a yield loss of about 3-4 bushels/acre in the field. This may be something for farmers

to consider in making fungicide application decisions. Also, it should be noted the corn was almost 10 ft tall. There was no difference in soybean yield between the soybeans harvested with or without the air reel in Trial 3. Even though there was no yield difference, there may be other advantages to using the air reel, such as faster harvest and harvesting under adverse conditions. There was no corn yield difference among the three harvest timings in Trial 4. There was no difference in soybean yield between soybeans on ground that was land-rolled vs. soybeans on non-rolled ground in Trial 5. In Trial 6, the soybeans planted on April 21 yielded eight bushels/acre more than the soybeans planted on May 15. This agrees with most other research on soybean planting dates that have shown soybeans planted in late April or early May usually yield better than soybeans planted in mid-May or later.

Table 1. Variety, planting date, planting population, previous crop, and tillage practices in on-farm trials investigating various management practices in corn and soybean in 2014.

Exp. no.	Trial	Mgmt practice	County	Variety	Row spacing	Planting date	Planting population (seeds/A)	Pre-vious crop	Tillage
140307	1	GMO drought tolerance in corn	Monona	Pioneer P1151AM and Pioneer P1023AM	30	5/4/14	32,300	Soybean	No-till
140324	2	Corn injury from sprayer at VT	Monona	LG5541STX RIB	30	5/5/14	32,300	Soybean	No-till
140144	3	Harvest with Crary air reel in soybean	Lyon	Pioneer 22T69	15	5/20/14	140,000	Corn	No-till
140129	4	Harvest timing in corn	Sioux	Pioneer PO193	30	4/26/14	34,300	Soybean	Conven-tional
140131	5	Land rolling in soybean	Sioux	Pioneer 22T41	30	5/15/14	150,000	Corn	No-till
140132	6	Planting date in soybean	Sioux	Pioneer 22T41	30	4/21/14 and 5/15/14	150,000	Corn	No-till

Table 2. Yields for on-farm trials investigating various management practices in corn and soybean in 2014.

Exp. no.	Trial	Treatment	Yield (bu/A)[x]	P-value[y]
140307	1	Pioneer P1023AM (not drought tolerant)	210 a	0.36
		Pioneer P1151AM (drought tolerant)	208 a	
140324	2	Control (no injury)	197 a	<0.01
		Under boom (boom passed over rows - corn 17 in. taller than boom)	205 a	
		Under machine (boom and axle passed over rows – corn 47 in. taller than axle)	163 b	
140144	3	Crary air reel	39 a	0.63
		Control (air reel turned off)	39 a	
140129	4	15% harvest moisture (actual moisture 12%)	226 a	0.54
		20% harvest moisture (actual moisture 16%)	222 a	
		25% harvest moisture (actual moisture 21%)	226 a	
140131	5	Land rolled	70 a	0.46
		Control	71 a	
140132	6	Soybeans planted 4/21/14	73 a	<0.01
		Soybeans planted 5/15/14	65 b	

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

[y]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.