On-Farm Cover Crop Demonstration Trials

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Mike Witt, On-Farm trials coordinator,
extension field agronomist
Jim Rogers, Armstrong Farm, ag specialist
Chris Beedle, Western Farm, superintendent
Chad Hesseltine, Southeast Farm, ag specialist
Andrew Weaver, Northwest Farm,
ag specialist

Introduction

Cover crops can benefit farmers by aiding in soil erosion control, increasing organic matter in the soil, and reducing nitrate losses into surface waters. Cover crops also have been promoted to alleviate soil compaction and improve soil drainage. Cover crops are an important practice in meeting Iowa's nutrient reduction strategy goals. However, some research has indicated that planting corn or soybean following a cover crop or interseeding a cover crop can result in yield reductions. The objective of these trials is to evaluate yield potential for corn and soybean crops based on cover crop planting, timing, and species.

Materials and Methods

In 2020, cover crop use was examined in seven trials in corn and one trial in soybean (Table 1). In five of the trials, the cover crop mixture of 3.5 lb/acre of red clover, 17.5 lb/acre of cowpea, 3.5 lb/acre of radish, and 24 lb/acre of cereal rye was interseeded into corn. Trials 200104, 200305, and 200606 used this mixture and were interseeded at a V5 growth stage in corn. Trials 200121 and 200611 also used this mixture but were interseeded at a V8 growth stage. These interseeding plantings were done by an ISU interseeding machine that planted seeds under the surface of soil with minimal disturbance. Trial 200122, 20 lb/acre of annual ryegrass was interseeded in corn at the V8 growth stage with a Dordt University interseeding machine that planted seeds under the surface with minimal disturbance. Trial 200705 and 200706 had a fall drilled cover crop of 37 lb/acre of cereal rye and 2 lb/acre of turnips. 200706 cover crop was terminated four days prior to corn planting with herbicide. Trial 200705 was terminated 15 days prior to planting soybean with herbicide. Three trials were conducted on-farm by farmer cooperators, two trials at Dordt University, and four trials on ISU research farms. 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 field and equipment size. All strips were machine harvested for grain yield.

Results and Discussion

In the six interseeding trials, none of the trials showed significant yield losses from the cover crop at a level of $P \leq 0.10$. Trial 200611 had a field notation of increased snapping of plants due to the V8 corn tall stature with the later application. This contributed to the 6 bushels/acre yield loss for the cover crop mixture strips. Trial 200706 in corn and trial 200705 in soybean both showed no significant differences between the cover crop and the untreated strips with the fall planted rye and turnip mixture. The results of these trials indicate corn and soybean can be planted following a cover crop without hurting the yield. These trials also indicate it is possible to interseed a cover crop into standing corn without affecting the yield, but there may be application issues.

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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 from cover crop trials in corn and soybean in 2020.

Trial	County	Variety	Row spacing (in.)	Planting date	Planting population (seeds/ac)	Previous crop	Tillage practices
Corn							
200104	Sioux	Pioneer PO157AM	30	4/24/20	34,000	Oats	Convent.
200305	Monona	LG 59C66 VT2	30	4/29/20	32,000	Soybean	Disked
200606	Pottawattamie	Dekalb DK58-35 RIB	30	4/21/20	35,000	Soybean	No-till
200121	Lyon	Dekalb DKC 54-65	30	5/2/20	34,000	Soybean	Convent.
200611	Adair	Dekalb DK58-35 RIB	30	4/22/20	35,000	Soybean	No-till
200122	Sioux	Pioneer PO157AM	30	4/24/20	34,000	Oats	Convent.
200706	Henry	Pioneer P1366AM	30	4/26/20	34,000	Soybean	No-till
Soybean							
200705	Henry	Pioneer 32A87	30	5/8/20	154,000	Corn	No-till

Table 2. Yield from cover crop in corn and soybean trials in 2020.

Trial	Treatment	Seeding growth stage	Yield (bu/ac)[a]	P-value[b]	Cost per acre[c]
Corn					
200104	24 lb/ac rye + 3.5 lb/ac red clover + 3.5 lb/ac radish + 17.5 lb/ac cowpea	V5	203 a	0.51	Seed $36.40/ac
	No cover crop		205 a		Drill $15.00/ac
200305	24 lb/ac rye + 3.5 lb/ac red clover + 3.5 lb/ac radish + 17.5 lb/ac cowpea	V5	228 a	0.20	Seed $36.40/ac
	No cover crop		240 a		Drill $15.00/ac
200606	24 lb/ac rye + 3.5 lb/ac red clover + 3.5 lb/ac radish + 17.5 lb/ac cowpea	V5	218 a	0.93	Seed $36.40/ac
	No cover crop		220 a		Drill $15.00/ac
200121	24 lb/ac rye + 3.5 lb/ac red clover + 3.5 lb/ac radish + 17.5 lb/ac cowpea	V8	219 a	0.85	Seed $36.40/ac
	No cover crop		219 a		Drill $15.00/ac
200611	24 lb/ac rye + 3.5 lb/ac red clover + 3.5 lb/ac radish + 17.5 lb/ac cowpea	V8	206 a	0.16	Seed $36.40/ac
	No cover crop		212 a		Drill $15.00/ac
200122	20 lb/ac Annual rye grass	V8	192 a	0.98	Seed $18.00/ac
	No cover crop		192 a		Drill $15.00/ac
200706	37 lb/ac rye + 2 lb/ac turnip	Fall	225 a	0.68	Seed $14.00/ac
	No cover crop		227 a		Drill $15.00/ac
Soybean					
200705	37 lb/ac rye + 2 lb/ac turnip	Fall	59 a	0.98	Seed $14.00/ac
	No cover crop		59 a		Drill $15.00/ac

[a]Values denoted with the same letter within a trial are not statistically different at the significance level of 0.10.
[b]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. This is consistent for demonstration trials.
[c]Cost per acre is based on current cost estimates from multiple distributors. Local costs will vary. No bulk discounts.