Improved Systems Trials: 2024 and 2025

Mark Licht, associate professor and extension cropping systems specialist | Fernando Marcos, research scientist | Agronomy Department

Introduction

Iowa contributes significantly to the increase of hypoxia in the Gulf of Mexico due to phosphorus and nitrogen leaching. One strategy to reduce the loss of these important nutrients is the use of cover crops. This study focuses on how to improve the current grower standard practice (GSP) by incorporating cover crops and other modifications to field management. However, instead of studies focusing on only one set of treatments, it integrates a completely new system and compares it with the standard used by farmers. The objective is to validate and accelerate the adoption of improved cropping systems that enhance profitability, minimize nutrient losses, and enhance soil health.

Materials and Methods

This experiment was conducted in 2024 and 2025 in four different ISU research farms across the state of Iowa (NRF, NWRF, SERF, and SWRF). The Improved System (IS) had a cover crop that was established in the previous fall with the planting of a mixture of cover crop seeds, varying if it was seeded before corn (cereal rye and turnips) or soybean (triticale, red clover, and winter rapeseed). Besides the cover crop component preceding the cash crop, the IS treatment had shorter crop maturities, resulting from later planting and earlier harvest.

Key Takeaways

- In the corn phase of the trial, the grower standard practice had similar corn yields in Crawfordsville and Kanawha, however, in Sutherland, the corn yields were 28.3 bushels/acre higher under the improved system.
- In the soybean phase of the trial, the two systems had similar soybean yields at Sutherland. There was a 3.4 bushel/acre soybean yield advantage to the improved system in Crawfordsville, however, a 11.5 and 6 bushel/acre yield penalty at Kanawha and Lewis, respectively.

Acknowledgements

We'd like to thank Iowa Soybean Association for providing the funding through a USDA NRCS CIG grant to conduct this trial. We appreciate the work of the Iowa State Research Farm crew for assistance with this trial.

Table 3. Grain yields at 15% (corn) and 13% (soybean) in 2024 and 2025.

	Corn		Soybean	
	Grower Standard Practice	Improved System	Grower Standard Practice	Improved System
Crawfordsville	150.3	145.2	71.5 b	74.9 a
Kanawha	168.0	151.7	70.0 a	58.5 b
Lewis*	.	.	72.2 a	66.2 b
Sutherland	201.9 b	230.2 a	32.8	32.2

*Corn year was severely lodged after a windstorm

Table 1. Management information for the corn season across locations in 2024 and 2025.

Corn	Improved System	Grower Standard Practice
Fall before corn	**Cover crops;** Interseed cover crop mixture of triticale, red clover, winter rapeseed the last week of August or 1st week of September (Or drilled before October 1).	**Cover crops;** No cover crops
	Fertilizer; No fall N fertilizer	**Fertilizer;** Apply fertilizer at 100% of MRTN Apply 30 # S/ac as AMS or ATS
Spring	**Fertilizer;** Apply 40-60% of N preplant or at planting as early injected UAN or broadcast with stabilized urea. Apply 30 # S/ac as AMS or ATS	**Fertilizer;** No pre-plant N
	Corn planting; NT plant green into cover crop ~ April 20; 35,000 seeds/ac; 5-d shorter maturity than GSP Complete f&I seed treatment	**Corn planting;** ~ April 20; 35,000 seeds/ac; Well adapted maturity Complete f&I seed treatment
	Herbicide program; Terminate cover crop at 6-12 inches tall (full labeled rate). If termination before planting use a pre-emergent. If termination after planting, apply a post emergence program with residual activity	**Herbicide program;** Apply a glyphosate burndown with a pre-emergent
Summer	**Herbicide program;** Apply a post emergence program with residual activity	**Herbicide program;** Apply a post emergence program with residual activity
	Fertilizer; Apply 60-40% of remaining N need as early sidedress UAN or broadcast with stabilized urea	**Fertilizer;** No in-season fertilizer
Fall	**Cover crops;** Interseed a cover mixture of cereal rye and turnips	**Cover crops;** No cover crops
	Harvest; Based on treatment maturity (should be earlier than GSP because it is a 5 CRM earlier hybrid)	**Harvest;** Normal timing

Table 2. Management information for the soybean season across locations in 2024 and 2025.

Soybean	Improved System	Grower Standard Practice
Fall before soybean	**Cover crops;** Interseed a cover mixture of cereal rye and turnips in R5.5-R6 corn stage	**Cover crops;** No cover crops
Spring	**Soybean planting;** NT plant into green cover crop ~May 10, 2023 140,000 seeds/acre 0.5 MG earlier than GSP Complete f&i seed treatment	**Soybean planting;** ~May 1 140,000 seeds/acre Well adapted MG Complete f&i seed treatment
	Herbicide program; Terminate cover crop at 12-24 inches tall with glyphosate (full labeled rate). Skip pre-emergent.	**Herbicide program;** Apply a glyphosate burndown with a pre-emergent.
Summer	**Herbicide program;** Post emergence with residual herbicide for weed control program.	**Herbicide program;** Apply standard post-emergence weed control program
	Foliar applications; Foliar fungicide and insecticide at R3 if needed based on IPM	**Foliar applications;** Foliar fungicide and insecticide at R3 if needed based on IPM
Fall	**Cover crops;** Interseed cover crop mixture of triticale, red clover, winter rapeseed the 1st week of September (Or drilled before October 1).	**Cover crops;** No cover crop
	Harvest; Based on treatment maturity (should be 7-10 d earlier than GSP because it is a 0.5 MG earlier variety)	**Harvest;** Normal timing