

Cover Crops May Improve Yield, Nutrient Availability in Corn-Soybean Crop Systems



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Study, by Author

We need to adapt agricultural systems to meet rising global food demands.

Corn-soybean rotation is the most popular crop system in the Midwest United States (Patel et al., 2019), which accounts for 80% of the national, and **33% of the global corn and soybean production** (Basche et al., 2019). Studies show that adding cover crops to these cash crop rotations can provide additional yield and agroecological benefits (Pittman et al., 2020). Farmers **plant cover crops, or noncommercial crop species, between cash crop rotations**. Regardless, cover crops are only utilized in 2.3% of cropland in the Midwest U.S. Many farmers have not yet adopted cover crops because of perceived yield, economic, competition, management, and timing concerns. Better nutrient availability in the soil profile typically increases yield, which is the most influential incentive to farmers. **Do cover crops increase nutrient availability and yield in corn-soybean rotations?**

Reviewed Studies Needed to Include 4 Criteria

The studies needed to be published in the past 5 years, focus on cover crops in corn (*Zea mays* L.) and soybean (*Glycine max* [L.] rotation, analyze yield, and mention nutrient availability in the results. I also preferred that the study take place in a Midwest or temperate climate.

Relevant studies included field experiments and a meta-analysis to collect data.

Five Studies used field experiments to measure **yield and soil health** through evaluations and soil sampling. Field experiments took place over **4-6 years**. One study used a meta-analysis of previous studies of one cover crop in corn-soybean systems.

References



Cover Crop Effect

	Acharya et al. (2020)	Adeli et al. (2019)	Boselli et al. (2020)	Cubins et al. (2019)	Patel et al. (2019)	Pittman et al. (2020)
Nutrient Availability	+	+	+/0	+	+	+
Cash Crop Yield	+/0	+	+/0/-	+/0	0/-	+

Figure 1. Significant Effects of Cover Crops from 6 Studies



Cover Crops can increase cash crop yields and nutrient availability in several ways.

The purpose of cover crops is not necessarily to increase yields, but to not decrease yields while maintaining soil nutrient availability over time. **Cover crops can improve yield, soil health, water retention, microbial activity, and biodiversity** (figure 1). They can also **reduce emissions, pest susceptibility, and erosion**. They improve these agricultural aspects by increasing soil organic matter accumulation, preventing nitrogen leaching, encouraging arbuscular mycorrhizal fungi, and reducing pesticide and fertilizer use. Winter cover crops reduce the risk of early-season corn-cover crop competition. Farmers also struggle to find time to plant cover crops, which could be minimized by interseeding cover crops into V1-V7 corn.

Growers need more long-term research to improve management practices.

Although cover crops can increase yield and nutrient availability, their benefits are highly dependent on the weather and cover crop species. Farmers need a stable market and reliable results to profitably implement cover crops into corn-soybean rotations. They also need widespread seed availability. Cover crops do not provide short-term economic benefits. Cover crops are long-term investments that need more long-term (>10 year) research to find the best management practices. Large-scale field studies are expensive but would produce the best results, particularly to account for weather trends (Basche et al., 2016). With research and better management practices, cover crops may help us feed the growing population and reduce the effects of climate change.