

Interseeding cover crops in row-cultivated corn



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Key facts

- Interseeding involves planting a cover crop while a cash crop is still growing in the field.
- It can be challenging to establish cover crops after corn harvest, but interseeding allows for earlier planting (before corn is harvested).
- Wisconsin research has demonstrated red clover, winter rye, and radish established well in an interseeding system.
- Interseeding cover crops in row-cultivated corn in Wisconsin has potential, but each farming system offers unique challenges and considerations.

Why interseeding?

There are many known benefits of including overwintering cover crops in a crop rotation. Cover crops can have positive impacts on soil and water quality as well as nutrient and pest management (Clark 2007, Curran et al. 2018, Reicosky and Forcella 1998). However, in the Upper Midwest it can be challenging to establish cover crops due to the lack of growing degree days after corn is harvested. This late planting window also limits the diversity of cover crop species that can be used (Curran et al. 2018, NCR SARE and CTIC 2016, Singer 2008, Wayman et al. 2017). Interseeding provides a way to establish cover crops earlier in the growing season by planting cover crops when corn is still growing.



Interseeding methods

Planting methods

Cover crops can be interseeded into corn during the growing season by broadcasting, using either aerial or ground equipment (e.g. airflow or broadcast fertilizer spreader). Cover crops can also be interseeded using a high-clearance or modified grain drill, which increases seed-to-soil contact (Curran et al. 2018, Noland et al. 2018, Wilson et al. 2014). Noland et al. (2018) found that drill interseeding had better cover crop establishment than broadcasting for most cover crop species tested.

Corn growth stage

If interseeded too early, cover crops have the potential to affect corn yields. On the other hand, cover crops may not successfully establish if interseeded too late (due to corn canopy closure). Curran et al. (2018) found that cover crops did not affect corn yield when interseeded at the V4 corn growth stage or later. Noland et al. (2018) were able to establish cover crops as late as the V7 corn growth stage.

Cover crop species

A wide range of cover crop species have been tested in interseeding systems. It is important to select species that can tolerate the shaded environment under the corn canopy, that can overwinter in your climate and that can be terminated in your cropping system. The cover crop should also have limited growth under the corn canopy to avoid competing with the corn. Success of a particular species in an interseeding system will also depend on season-specific conditions; for example, drought stress may increase competition between the cover crop and corn.

Interseeded winter rye



Interseeded red clover



Interseeded radish (will winterkill)



What works in Wisconsin?

In 2014 and 2015, research at the Arlington Agricultural Research Station showed that red clover, winter rye, and radish can all establish in an interseeding system in Wisconsin. The experiment evaluated cover crop interseeding practices including tillage and cover crop species. Prior to corn establishment, the field was chisel-plowed and cultivated. The prior crop was soybeans and nutrient applications were based on University of Wisconsin, Division of Extension optimum soil fertility recommendations. Prior to interseeding, half of the plots were row-cultivated to evaluate tillage effects on interseeding. The cover crops were interseeded at V5–V6 corn growth stage. The experiment was in a conventional cropping system; herbicides were utilized in the study for additional weed control treatments. In certified organic systems, interseeding should take place at or just after last cultivation. Following interseeding, any mechanical weed control methods may damage the interseeded cover crop. Additionally, controlling seed depth will be challenging in heavily tilled fields.

Cover crop seeding rates used in Wisconsin research (*seeding rates should be adjusted for the goal of the cover crop*):

- Winter rye: 83 lb/acre
- Red clover: 8.3 lb/acre
- Radish: 8.3 lb/acre

Crop yield was not significantly impacted by cover crop interseeding (Figure 1). This study was completed under ideal weather conditions. Additional studies in Wisconsin have shown yield reductions when interseeding with winter rye. Typically, radish is not recommended since radish will not overwinter and prior to harvest produces very little below-ground biomass.

Annual ryegrass may also be a viable cover crop species for interseeding in Wisconsin. However, other species, such as oats, peas, berseem and crimson clovers, were previously tested and often germinated, although they failed to produce enough biomass or root growth to justify interseeding.



Interseeding has been successful in corn that was row-cultivated. However, due to soil loss concerns, if row-cultivation is not necessary for weed control, interseeding has worked well using a modified no-till drill and broadcast spreading equipment. The equipment on-hand and cropping system should guide the interseeding approach.

Interseeding has worked well in grain and silage corn. Cover crop biomass in the silage corn system often exceeds comparable systems in grain corn due to the lack of competition after silage harvest.

What are the challenges?

In a conventional crop rotation, residual herbicides may cause injury to cover crops (Cornelius and Bradley, 2017). Interseeded cover crops are more susceptible to injury due to the proximity of herbicide application and cover crop seeding. Cover crops and herbicides should be selected ahead of planting since herbicides differ in injury potential and effect (Wallace et al. 2017).

Another challenge can be competition for sunlight with the corn. Possible solutions to this challenge include planting corn at lower plant densities or wider row spacing to increase light penetration through the canopy. Similarly, hybrid corn varieties with more vertical plant architecture may also allow more light penetration (Baributsa et al. 2008, Curran et al. 2018).

For organic corn, one of the major challenges of interseeding cover crops is planting at the appropriate time. If cover crops are planted too early, they can impact corn yield. Early planting can also impact weed control, since cultivation can no longer be used manage weeds after cover crops are interseeded. However, cover crops must be planted early enough to adequately establish before canopy closure (Curran et al. 2018, Noland et al. 2018).

Table 1. 2014 and 2015 cover crop interseeding fall above-ground dry biomass weight (lb/acre) in a row-cultivated system at the University of Wisconsin Agricultural Research Station

	in Arlington, Wisconsin.	
	2014	2015
	lb/acre	
Red clover	230	513
Winter rye	210	487
Radish	904	638
Cultivation + Red clover	225	401
Cultivation + Winter rye	266	244
Cultivation + Radish	546	1845

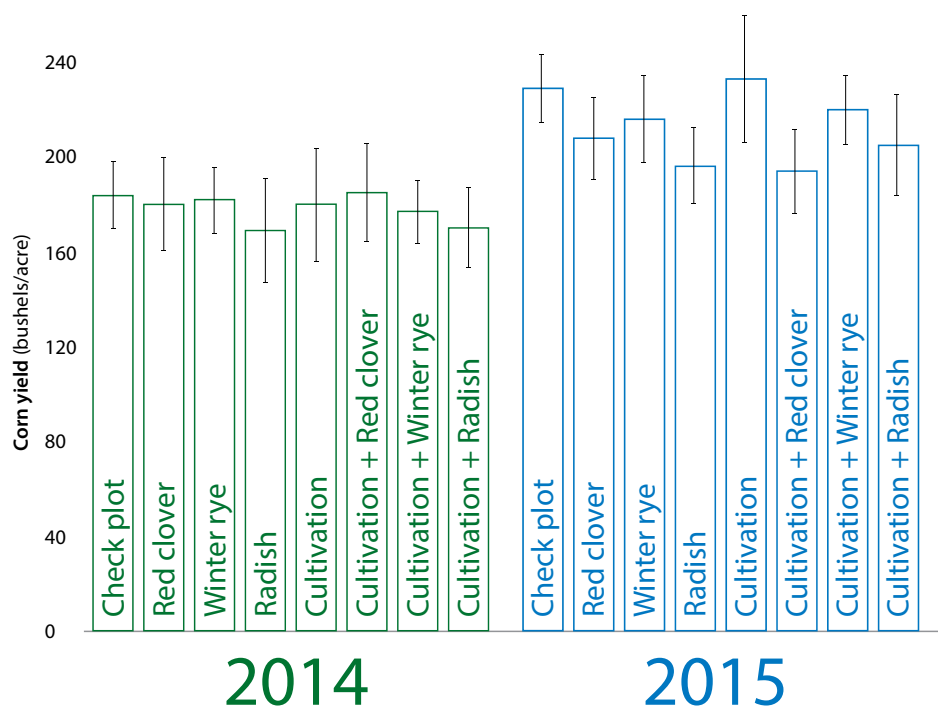
Spring growth from interseeded red clover (~1,294 lb dry biomass, 2015 data only)



Spring growth from interseeded winter rye (~768 lb dry biomass, 2015 data only)



Figure 1. 2014 and 2015 cover crop interseeding corn yields at the University of Wisconsin Agricultural Research Station in Arlington, Wisconsin.



No significant difference between yields ($p < 0.05$) in each growing season.

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Further Reading

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