

Winter rye cover crop effect on corn seedling pathogens

Abstract:

Scientists conducted laboratory and field studies to find out what effects cereal rye cover crops might have on corn yield under different conditions and different management tactics.

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Spraying a rye cover crop with glyphosate 10 to 14 days before corn planting can reduce the risk of root infections in corn seedlings following a rye cover crop.

What was done and why?

Cover crops are an excellent management tool that can increase soil organic matter, recycle nutrients, reduce erosion, and minimize nitrate losses in tile drainage water and runoff. One cover crop species used successfully in Iowa corn-soybean rotations is winter rye. Unfortunately, a winter rye cover crop occasionally causes a yield decrease of the following corn crop.

One potential cause of the corn yield decrease is that glyphosate-killed rye cover crops may be hosts for corn seedling pathogens and may increase their inoculum levels in the soil. If soil inoculum levels of these pathogens are high enough and environmental conditions (cold and wet) are favorable for them to infect corn plants, then these pathogens can reduce corn plant population, slow and reduce growth, and possibly decrease final yield.

Objectives for the project were to:

- Determine whether a winter rye cover crop increases infection of corn seedlings by soil borne pathogens, such as *Pythium* and *Fusarium*.
- Investigate whether the corn yield depression and reduced shoot growth and population sometimes observed following a winter rye cover crop are caused by increased corn seedling infection.
- Investigate strategies such as seed-applied fungicides, corn planting date, or non-grass cover crop species to reduce infection of corn seedlings following winter cover crops.

What did we learn?

Strip trials by Iowa Learning Farms and Practical Farmers of Iowa indicate that farmers rarely have yield reductions following a cereal rye cover crop after the first few years. Thus, rather than preventing yield decreases by understanding and managing a rye cover crop to reduce the risk of increased corn pathogens, farmers may be able to expand the potential for corn yield increases due to improved soil conditions over time by reducing this risk.

This work should result in new research into how individual cover crops and cover crop mixtures affect crop pathogens, both positively and negatively, and how cover crops impact the soil microbial community dynamics in general. In the future, Iowa farmers may be able to use cover crops and cover crop species selection to suppress pathogens and to promote beneficial soil microorganisms. This will allow them to reach the full potential of cover crops to improve yields and sustainability.



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