Managing Disease Risk When Cover Cropping Before Corn

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Introduction

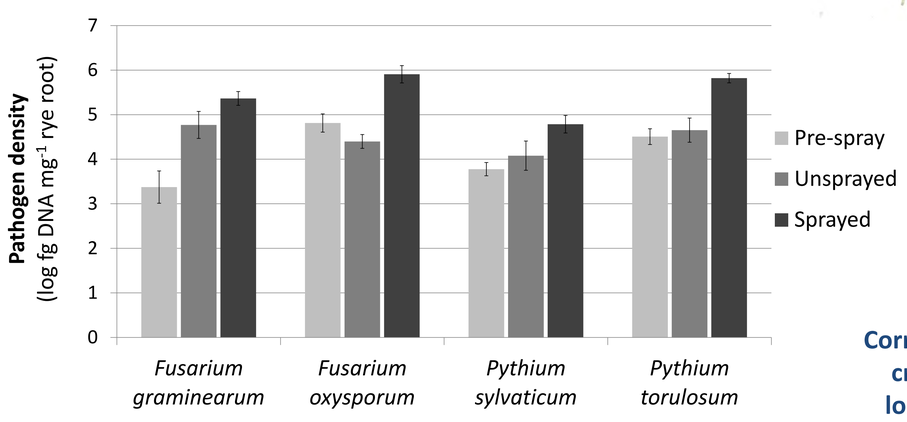
Cover cropping offers substantial benefits to soil health and water quality. At present, the winter cereals are the most effective cover crops in the upper Midwest for limiting erosion, scavenging nutrients, and providing meaningful amounts of new biomass. Unfortunately, winter cereal cover crops preceding corn may diminish beneficial rotation effects by growing two grass species in succession.

Our research has shown that rye cover crops can host pathogens capable of causing corn seedling disease. We quantified pathogen density in roots of rye cover crops and of corn seedlings. Pathogen density in rye roots differed among fields and among years for particular fields, but every pathogen tested was able to increase in density over time on roots of herbicide-terminated rye, suggesting the potential for rye cover crops to elevate corn seedling pathogen densities in soil. The radicles of corn seedlings planted following a rye cover crop had higher pathogen densities compared to seedlings following a winter fallow.

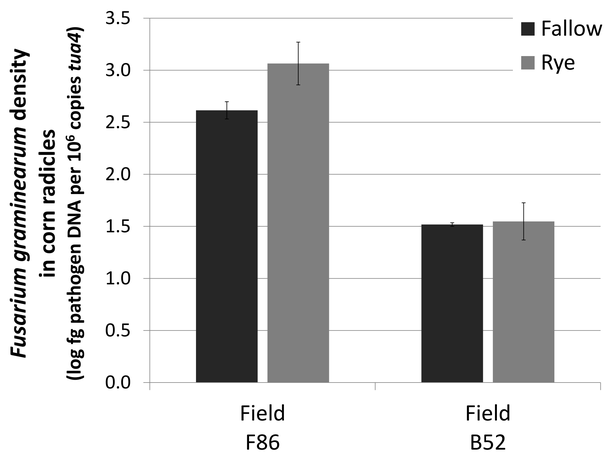
Management practices that limit seedling disease may be required to allow corn yields to respond positively to improvements in soil health brought about by cover cropping.

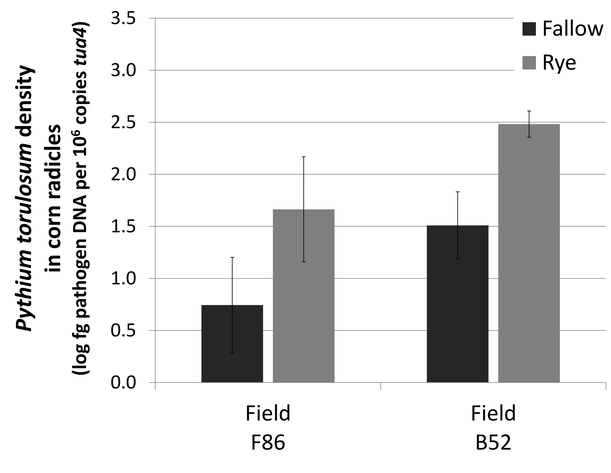
Pathogens isolated from rye cover crop roots can cause corn seedling disease. Left: inoculated with pathogen from rye. Right: check.

Pathogens can increase in density as rye plants are killed with herbicide.



Corn roots following rye cover crops have higher pathogen load than corn roots in plots without a cover crop.





Methods

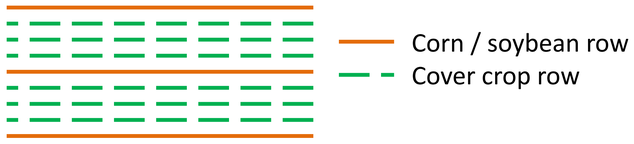
- Roots of winter rye and of corn seedlings were collected from no-till corn-soybean fields near Boone, IA.
- Pathogens were isolated from these roots, or pathogen densities were measured via quantitative PCR.
- Cover crops were terminated at different times in the spring in order to allow for sampling of rye roots at different durations post herbicide application.
- Plots with a rye cover crop were contrasted with control plots with no cover crop.

Conclusions

- Cereal rye can host pathogens capable of causing corn seedling disease.
- These pathogens can grow on dying cover crop roots, potentially elevating inoculum for the subsequent corn.
- Pathogen load was higher in roots of corn seedlings following a rye cover crop than in corn seedlings that did not follow a cover crop.

Disease risk can be managed

- Selecting alternative cover crop species that share fewer pathogens
- Selecting corn hybrids with better disease resistance or tolerance
- Managing timing of cover crop termination relative to corn planting
- Using chemically treated corn seed
- Planting cover crops precisely to maintain distance from corn rows



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