

Investigating Corn Yield Decreases Following Cereal Rye Winter Cover Crop

Issue: In Iowa, lack of experience with cover crops and the predominance of the corn-soybean rotation, late harvests, early planting and long cold winters have limited adoption of cover crops. The Iowa Science Assessment of Nonpoint Source Practices identified cover crops as an effective means of reducing the transport of nitrate and phosphorus from row cropland. Future research needs included cover crop management techniques adapted to Iowa to limit the risk to corn yield reduction.

Objective: Although work on other potential cover crops is underway, winter cereal rye currently is the only species known to consistently grow well enough statewide to provide water quality benefits. For farmers, a drawback from considering use of winter rye or other grass cover crops is that occasionally they can cause a corn yield decrease the following year.

One potential cause of lower yields is a decrease in corn population or plant vigor caused by soil-borne fungal pathogens. This may occur because grass cover crops can be hosts for some of the same pathogens that infect corn seedlings. After herbicide treatment, pathogen populations may increase rapidly on the roots of the dying cover crop plants. If corn is planted soon after grass cover crops are terminated, the soil inoculum levels of these pathogens will be very high just as the corn is germinating and emerging. If environmental conditions are favorable for the pathogens to infect corn plants (i.e. cold and wet), these pathogens may reduce plant population, slow and reduce growth and decrease final yield. When planting conditions are warm and dry, or when background inoculum levels are low, the pathogens may have little or no effect.

Approach: Controlled-environment lab studies will be conducted under cold, wet conditions that should enhance infections. Field experiments will be planted as early as possible, to increase the likelihood of cold, wet soil conditions. Management practices such as seed-applied fungicides and timing of cereal rye termination before corn planting will be examined to see how those affect soil pathogens, corn growth and yield.

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