Nutrient Availability Research

Does Cover Crop Radish Supply Nitrogen to Corn?

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What’s the Question?

Does cover crop radish supply nitrogen to corn?

Why Does it Matter?

A radish cover crop can provide many benefits such as compaction reduction, nitrogen scavenging and general improvements in soil physical condition and microbial communities. In Wisconsin, radish is most often used after the harvest of winter wheat or early harvested vegetables so it has adequate time to grow prior to winter. These are also systems that can benefit from a cover crop due to lack of crop residue after harvest. Radish is also a desirable cover crop choice because it will winterkill, in contrast to red clover which will need to be chemically or mechanically terminated.

It is known from other studies that radish can accumulate a significant amount of nitrogen when planted by late summer. Unfortunately, while radish can reduce fall soil nitrate content, most studies report little effect on nitrate content in the subsequent growing season. Differences in climate and soil type influence the availability of the nitrogen released from decomposing radish biomass so this study was designed to evaluate the nitrogen contribution from a radish cover crop to corn in Wisconsin.

In short...

- A radish cover crop can provide many benefits such as compaction reduction, nitrogen scavenging and general improvements in soil physical condition and microbial communities.
- Environmentally meaningful amounts of N were contained in plant biomass, however the cause of the variation in yield effects is not clear, and the study suggests that radish has no N fertilizer replacement value to the subsequent crop.
What are the Results?

The objectives of this project were to: 1) measure radish growth and N uptake, 2) determine the effect of radish growth on plant available N content in soil throughout the subsequent growing season, and 3) determine the effects of radish on corn yields and response to N fertilizer.

The experiment was conducted at three locations in Wisconsin (Rock County, Sheboygan County, and Washington County) during three cover and corn crop growing seasons (which began in the summer with planting of the cover and ended following corn harvest; 2011-2012, 2012-2013, and 2013-2014), for a total of nine site-years. Specific treatments and tillage practices varied by site-year.

In Wisconsin, radish did not supply N to the subsequent corn crop. There was little evidence of radish’s ability to replace conventional N fertilizer, and only once did radish appear to increase plant available N (PAN) during the corn growing season. There were two instances of potentially positive effects from radish on corn yield, but additional N was required to achieve it, further negating any potential reduction in optimal N rate to a subsequent corn crop. In two of nine site-years, radish appeared to have a negative effect on yield, but only when radish was used with no-till and compared with no cover crop, chisel plowed treatments. In five of nine site-years, radish had no effect on corn yield. In a way, these results agree perfectly with the broader literature which has shown positive, neutral, and negative effects of radish as a cover crop on

What’s the Status of the Research? Are There Updates?

The research concluded in 2014, and there are no updates at this time.

Positive, neutral, and negative effects on subsequent crop yield have been reported when radish is used as a cover crop. Observed yield benefits of crops planted after radish may be attributable to changes to the physical structure of the soil such as root channels left behind by radish providing subsequent crop roots with low resistance paths to subsoil water. Yield benefits may also be attributed. It is known that radish grown as a cover crop can accumulate a significant amount of N when planted by late summer. However, it remains unclear if the N in the radish can supply N to a subsequent corn crop.