Forage Radishes

Introduction

Forage radishes (*Raphanus sativus* var. *longipinnatus),* also referred to as tillage radishes, have in recent years gained popularity as a late-summer cover crop. Unlike oil radishes, which have a stubbier, branched taproot and tend to be more winter hardy, forage radishes produce an elongated penetrating taproot and more above-ground biomass, but are likely to winterkill during January or February. In this fact sheet we present benefits, potential challenges, and establishment practices for forage radishes as cover crops.

Benefits

The large taproots of forage radishes can help alleviate soil compaction by penetrating through dense soil layers. In addition, when seeded in early to mid-August, radishes quickly provide a thick canopy that can reduce erosion and shade out many winter annual weeds.

When temperatures drop below 20°F for multiple days, radishes begin to die. Thus, in New York State there is typically no need for chemical or mechanical kill the following spring. Once decomposed, the tuber and taproot leave a channel for water infiltration in early spring (Figure 1), which can help soils warm up and dry out faster.

Figure 1: The tuber and taproot provides a channel for water infiltration in early spring which allows fields to warm up and dry out faster in the spring.

Forage radishes can take up large amounts of nutrients, especially nitrogen (N), phosphorus (P), sulfur (S), calcium (Ca), and boron (B). Recent work in western New York indicated radishes seeded at the end of July or early August can uptake 100-170 lbs. N/acre, prior to winter. As the large taproot breaks up the soil, the root can bring up nutrients from deeper soil layers, making those nutrients available for uptake by the next crop and reducing the need for extra fertility additions. Because of this uptake of nutrients, tillage radishes can also reduce nitrate leaching and P runoff and leaching, very important for fields with elevated risk of nutrient loss. However, these nutrient benefits can only occur if there is a growing crop that can take up the nutrients as they are released through decomposition of the forage radishes.

In addition to the nutrient uptake, radishes can also increase soil organic matter levels. Studies in Western New York have shown that radishes can provide over 3 tons of organic matter per acre, if seeded by early August.

Potential Challenges

Though they provide many benefits, forage radishes are not a cure-all for every field. First, wet soils inhibit radish germination. Low spots in fields where water can collect or fields that suffer from late season moisture problems are not the ideal areas to plant tillage radishes.

Radishes also need adequate time for growth before the first frost. Radishes seeded in September, after corn silage harvest, in western New York accumulated only about 300 lbs of C (less than 0.5 tons DM/acre) and about 30 lbs of N per acre, compared to July/August seeded radishes which showed an accumulation of 2000-3000 lbs of C/acre (2.7-4 tons DM/acre) and 100-170 lbs N/acre (compare growth in Figures 2a and 2b).

Because radishes can take up over 100 lbs of N when seeded in July/August, N deficient soils will not support the same level of growth as in these studies. For such soils, 30 to 60 lbs of N may be needed for adequate early growth

before the radishes can take advantage of the N in deeper layers in the soil.

The biggest disadvantages of radishes as a cover crop in New York are: (1) odors generated during radish decomposition in the spring can result in complaints from surrounding neighbors; and (2) early decomposition which can result in leaching of large amounts of N and P if there is no other crop in place to take up the released nutrients. If there is a time-gap between decomposition (nutrient release) and planting of the following crop, having bare soil that is well drained and contains large amounts of nitrate can result in nitrate leaching deep within the soil.

Figure 2: Radish growth in the fall after seeding in (A) summer following a small grain harvest; and (B) fall after corn silage harvest). Seeding after corn silage harvest is not recommended.

Radish Establishment

The preferred planting time is late July or early August, but radishes can be planted as late as August 25th for acceptable growth for root development and weed suppression. Seeding can be done various ways and seeding rates depend on the method used (Table 1). Ideally, plant seeds 1/4 to 1/2 inch deep with average soil conditions and up to 1-inch if the soil is dry. When broadcasting, good soil-seed contact is essential. This can be obtained with very light disking and/or use of a roller.

Table 1: Recommended seeding rate for tillage radishes.

Method	Stand composition	Seeding rate
		lbs/acre
Broadcast	Radish only	8
	Radish and clover or forage oat/pea or mix with two other species	6
Drilled	Radish only	6-8
	Radish and clover or forage oat/pea	4
	Radish mix with two other species	2
Planter 15” rows	Radish only	5
Planter 30” rows	Radish only	2.5

Cover Crop Mixtures

To better control nutrient release in early spring, mixed cropping with a winter grain (rye, triticale or wheat) or legume (forage peas or clover) is recommended. These crops act as a catch crop for the nutrients released by decomposing radishes. Because these crops survive the winter, they need to be killed before planting of the following crop.

Additional Resources

- Forage radish: New multi-purpose cover crop for the Mid-Atlantic. Maryland Extension Factsheet 824. http://extension.umd.edu/publications/pdfs/fs824.pdf.
- Björkman, T. and J.W. Shail. 2010. Cornell cover crop guide for forage radish. Cornell University. http://www.hort.cornell.edu/bjorkman/lab/covercrops/pdf/radish.pdf.

Disclaimer

This fact sheet reflects the current (and past) authors’ best effort to interpret a complex body of scientific research, and to translate this into practical management options. Following the guidance provided in this fact sheet does not assure compliance with any applicable law, rule, regulation or standard, or the achievement of particular discharge levels from agricultural land.

For more information

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