

Oilseed Radish: A New Cover Crop for Michigan

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Introduction

Michigan farmers have a long tradition of improving their cropping systems by using cover crops. Among the cover crops currently grown in Michigan, oilseed radish is relatively new and is being rapidly adopted by both field crop and vegetable growers. Oilseed radish provides several benefits when integrated into cropping systems. This bulletin was produced to help farmers manage oilseed radish cover crops in order to optimize those benefits and the efficiency of their farming systems. This publication summarizes results of studies conducted at the Michigan State University W.K. Kellogg Biological Station and the MSU Muck Research Farm, and in on-farm demonstrations.

Description

Oilseed radish (*Raphanus sativus* [L.] var. *oleiferus* Metzger [Stokes]), belongs in the Brassicaceae or Cruciferae plant family, commonly called the mustard family. This family includes many crops (cabbage, broccoli, cauliflower, Brussels sprouts, kale, radish and mustard), weed species (shepherd's-purse and



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Fig. 1. Oilseed radish plant with large taproot.

wild radish) and cover crop species (brown mustard, oriental mustard, yellow mustard, black mustard, field mustard, white mustard and oilseed radish). Most members of the mustard family produce glucosinolate compounds, which are secondary metabolites. Glucosinolates' breakdown products are volatile and similar to the active chemical in the commercial fumigant Vapam. They have shown potential for control of nematodes, diseases and weeds (Brown and Morra, 1997; Fahey et al., 2001; Lauzier, 2002; Tsao, 2002).

Fig. 2. Four cultivars of oilseed radish.



Todd Martin

Oilseed radish has a very large taproot (Fig. 1) and was originally developed for oil production. Because of its quick establishment and rapid growth in cool weather, it has been used successfully in Michigan as a cover crop in diverse production systems.

Cultivars, seed source and cost

Oilseed radish cultivars used as cover crops include Adagio, Arena, Colonel, common, Remonta, Revena, Rimbo and Ultimo (Fig. 2). Most of these cultivars are imported from Europe. As its name implies, the common cultivar is the most readily available in Michigan. Oilseed radish seed is generally more expensive than seed of other cover crops commonly grown in Michigan. Check with your local seed supplier for availability.

Benefits

Fast growth and large biomass production

Whether planted in spring, late summer or early fall, oilseed radish grows quickly and produces a large amount of biomass in a relatively short time. Four oilseed radish cultivars (Adagio, Arena, Rimbo and common), seeded in August, were tested in Michigan over two years and produced similar amounts of dry biomass (Fig. 3). Total biomass generally exceeds four tons/acre. Most cultivars produce more shoot

than root biomass, but the common cultivar produces more root biomass and tends to have a better balance of shoot/root biomass.

Erosion control

Oilseed radish establishes very fast, even under moderate drought situations. This provides excellent protection against wind or water erosion, which can be particularly helpful for muck or sandy soils.

Forage

Like other mustards, oilseed radish is a highly digestible forage for early- and late-season grazing.

Soil aeration

Oilseed radish produces large taproots (Fig. 1). Upon decomposition, these roots leave large holes in the ground that improve water infiltration and possibly soil microbial activity.

Weed suppression

Oilseed radish emerges shortly after planting and provides quick ground cover that smothers weeds. When planted in fall, oilseed radish prevents weed germination and, consequently, seed production. Oilseed radish may also reduce weed populations by producing allelochemicals (Fig. 4 and 5).

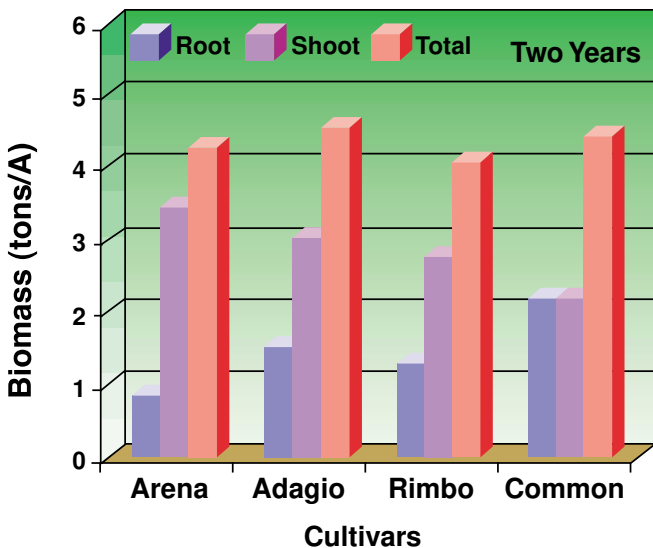


Fig. 3. Biomass production.

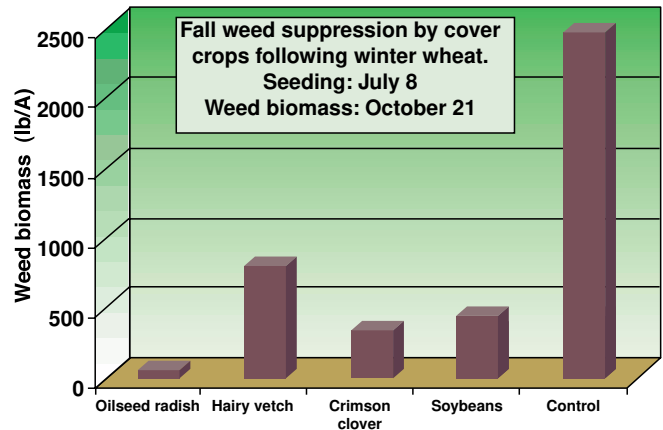


Fig. 4. Weed suppression.



Fig. 5. Weed suppression by oilseed radish.

Nitrate cycling

Oilseed radish is an excellent scavenger of nitrate from deeper soil layers after harvest of the cash crop. Upon decomposition, the nitrogen uptake becomes available to the next cash crop. Cultivar Renova, for example, was shown to recycle more than 140 pounds of nitrogen per acre in a growing season. In muck soil, the common cultivar recycled more than 60 pounds of nitrogen per acre in two months.

Insect, disease and nematode suppression

Plants in the Cruciferae family produce glucosinolates. These are secondary metabolites that have shown activity on insects, fungi and other pests. Studies in Michigan are looking at the effects of oilseed radish on diseases and pests. Certain cultivars such as Adagio and Ultimo are reported to give better nematode suppression (especially cyst nematodes) than other cultivars. To suppress nematode populations, a high seeding rate is recommended. Higher populations provide a larger number of small and fine roots. More roots mean more root exudates that stimulate egg hatching and more surface area for the nematodes to attach to in the absence of a suitable host. Oilseed radish should be used to enhance current management strategies, not as the sole control measure.

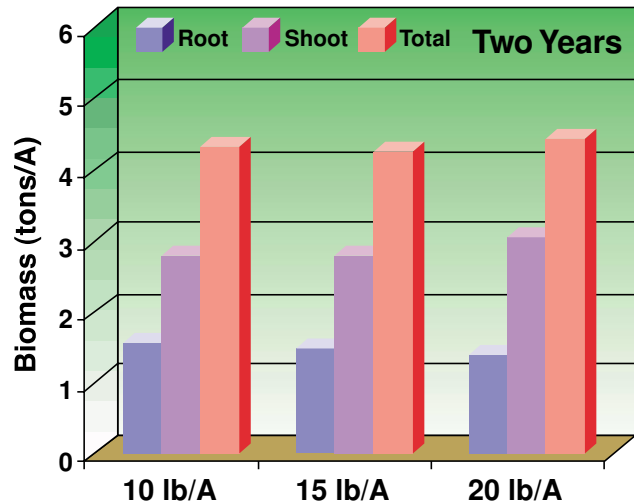


Fig. 6. Seeding rate.

Seeding rate and establishment

Oilseed radish seeding rates are typically 10 to 20 pounds per acre (lb/A). Studies conducted in Michigan showed that rates of 10, 15 and 20 lb/A produced similar amounts of biomass (Fig. 6). Low rates are generally recommended because of the high cost of seeds. In some situations, however, high rates may be more beneficial. These include cases where control of weed, disease and nematode problems is the primary focus.

Seed is planted at a depth of one-quarter to one-half inch, either drilled or broadcast and incorporated with a light tillage. When seeds are broadcast, use higher rates because some seeds will be exposed at the soil surface. Oilseed radish is killed by frost, however, it tolerates light frost (down to 25 degrees F), especially at the seedling stage.

Fitting oilseed radish into your cropping system

An oilseed radish cover crop can fit into diverse cropping systems. It can be seeded after harvest of a short-season crop such as pickling cucumbers, snap beans, wheat, rye, early potatoes or celery. In the fall, it will cover the soil, smother weeds and recycle nitrogen for the next crop. It can also be planted in early spring to provide green manure for cash crops planted in late May or early June.

Oilseed radish leaves low surface residue in the spring, so it is very appropriate for crops that require a well prepared seedbed. This is particularly important for small-seeded crops and for efficient operation of transplanters. It is currently being tested on other vegetables and farming systems.

Rotation restrictions

To improve weed and pest management, planting oilseed radish on the same field more than two years in a row is not recommended. Also avoid planting oilseed radish in rotation with cole crops such as cabbage, broccoli and radish because they may be susceptible to similar diseases and insects such as clubroot disease caused by the soil-borne fungus *Plasmodiophora brassicae*, cabbage root maggot (*Delia radicum*) and flea beetle (*Phyllotreta* species). Controlling oilseed radish in brassica crops may be challenging.

Potential problems

Seed production by oilseed radish may lead to volunteer plants in succeeding crops. In Michigan this is normally not a problem because oilseed radish planted in August-September will be killed by frost before setting seeds. Purchase oilseed radish seed early because it may be difficult to locate. Local seed production would be helpful in the near future.

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