ORGANIC FARMING RESEARCH FOUNDATION

WEED MANAGEMENT

The Organic Farming Research Foundation **2022 National Organic Research Agenda (NORA)** is a report informed by surveys and focus groups conducted in 2020 with over 1,100 certified organic farmers and ranchers across North America.

What Farmers Said

- In the NORA report, two-thirds of survey respondents (67%) cited weed management as a substantial production challenge.
- Specific feedback from organic farmers also underscores the need for additional research on controlling weeds such as bindweed, Canadian thistle, giant ragweed, foxtail, and nutsedge.

Controlling Weeds is the #1 challenge among organic producers.

Knowing Your Weeds

Farmers and researchers alike acknowledge that weeds pose the greatest barrier to building healthy soils in organic cropping systems. Management of weeds in an organic cropping system involves integration of many separate management tactics. Which tactics you use will depend on the weed species present, the crop, the time of year the crop is planted, the type of equipment you have available, other crops in the rotation, and other site and operation-specific factors. This is why understanding how weeds operate as species is so critical: Only through understanding can you effectively match your tactics to your site, your goals, and the weed problem at hand.

A crop rotation, cultivation tool, or integrated strategy that works wonders for one producer may require modification or fail entirely at another farm with a different soil, climate, weed flora, land base, and production system. So it is important to consider the following to guide the suite of practices for your farm:

- What are your top five or ten weed species? Get to know their life cycles - when they emerge and flower, ecological niche and nutrient responses, and weak points that can be exploited.
- What is your soil type, texture and condition; topography; climate and rainfall regime?
- What is your land base, scale of operation, enterprise mix, equipment, labor, and other resources?
- What crop rotation opportunities and constraints do you have based on production goals and market needs?

Check Out the National Organic Research Agenda (NORA)
http://www.ofrf.org/research/nora

OUTSMART THE WEEDS

Exclude weeds
» Avoid weedy manure and mulch hay.
» Plant cover crop on harvest day or sooner.

Confuse weeds
» Vary crops, tillage, and timing.

Starve weeds
» Feed crops in row.
» Avoid surplus plant-available N and P.
» Mop up leftover nutrients with cover crops.

KEYS TO SOIL HEALTH

» Keep the soil covered.
» Maximize living roots in the soil profile.
» Minimize soil disturbance.
» Energize the system with biodiversity.

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WEED PROFILE

CANADA THISTLE	
Family	Aster family, Asteracea
Other common names	creeping thistle, small-flowered thistle, perennial thistle, green thistle, field thistle, cursed thistle, corn thistle
Habit	Prickly perennial herb spreading by deep thickened storage roots
Germination	Seeds germinate best at warm daytime temperatures (77–86°F) but are inhibited from germination by hot (104°F) temperatures. Light, day/night fluctuation in temperature, and to a lesser extent, nitrate, all increase germination.
Season of emergence	Seedlings emerge primarily in the spring, with some emerging in summer. Shoots from rootstocks begin emerging in mid-spring and emerge continuously until frost.

Source: SARE Manage weeds on your farm: a guide to ecological strategies, 2021

MANAGEMENT

Because Canada thistle has a deep root system, the only approach for controlling this weed is to exhaust the storage roots and prevent further weed seed contamination. Food reserves in the roots reach a minimum near the onset of hot weather when the shoots reach about 12" tall and then increase as energy flows from the shoots to the storage roots.

TIMING

Remove Shoots by Late Spring

Repeated removal of the shoots before they attain several leaves will exhaust the storage roots within two years and eliminate the weed.

- Several studies found a 21-day weeding schedule was optimal. Since buds on the roots will continue to sprout well into the fall, persistence is required.

Cover Crop and Rotation Considerations

- A dense cover crop of sorghum-sudangrass or a mixture of sorghum-sudangrass with compatible species mowed once or twice during the season reduced Canada thistle shoot density and mass to less than 20% of initial values.
- Consider Alfalfa: Because alfalfa is mowed several times per year over a period of several years, this crop is very useful for managing Canada thistle.
- An integrated rotation proposed for central Pennsylvania includes three years of alfalfa followed by a three-year sequence of fall brassicas, early spring vegetables and a summer vegetable.
- On a Maryland organic farm, a program including two years of repeated summer cultivations followed by dense plantings of winter barley for haylage reduced a heavily infested field of Canada thistle by 76%, allowing transition to alfalfa followed by successful establishment of row crops with minimum Canada thistle populations after five years.
- Long fallow periods may not be cost-effective unless thistle pressure is severe, but growing crops that allow repeated cultivation close to the row achieves a similar effect for at least part of the season.
- Control of established Canada thistle stands for one year is usually insufficient for long-term control.
    - » Hay that is mowed only once per year is less helpful for managing this weed.

Consider Occultation

The root reserves are sufficient to push the shoot through any amount of loose mulch, and Canada thistle growth will benefit from the soil moisture conserved by the mulching materials. A tough synthetic tarp, however, can prevent shoots from reaching light. Transfer of energy into the dying shoots reduces vigor of the storage roots.

Rotational Grazing

High intensity, low frequency grazing over two to three years provided better control than high frequency grazing for a short duration.

Preventive Measures

- Eliminate Canada thistle growing along field margins, fence rows or drainage ditches - these seeds can easily spread into neighboring fields.
- Be cautious with your use of baled grain straw and manure that includes grain straw bedding. These are commonly contaminated with Canada thistle stalks, including mature seeds.

This infosheet was informed by free resources available for download:

- **Weed Management - an ecological approach.** (OFRF Report, 2017.)
  An analysis of ecological weed management challenges, best practices, resources, and ongoing research of ecological weed management.
  https://ofrf.org/soil-health-and-organic-farming-reports/weed-management-an-ecological-approach/

- **Manage Weeds on your Farm.** (SARE Guidebook, 2021.)
  Provides in-depth information about dozens of agricultural weeds and the best ways to manage them. Part One describes the strengths and limitations of the most common cultural management practices, physical practices and cultivation tools. Part Two is a reference section that describes the identification, ecology and management of 63 of the most common and difficult-to-control weed species found in the U.S.
  https://www.sare.org/resources/manage-weeds-on-your-farm/

- **Building Healthy Living Soils for Successful Organic Farming in the Southern Region.** (OFRF Guidebook, 2021.)
  Comprehensive guidebook on building soil health in soils in the Southeast.
  https://ofrf.org/soil-health-and-organic-farming-reports/building-healthy-living-soils/

Farmer Field Trials - Organic Weed Management

- **Mechanical [intensive tillage] and biological [cover crops, less tillage] strategies to remove invasive Bermuda grass in organic vegetables.** Jennifer Taylor, Lola's Organic Farm, Glenwood, GA.
  https://projects.sare.org/project-reports/fs13-267/

- **Modified method for roller-crimper no till system in the Southeast Coastal Plain.** Mary Connor, Three Sisters Farm in SC. Occultation (silage tarp) to enhance weed and cover crop control.
  https://projects.sare.org/project-reports/fs16-288/

- **Financial analysis of growing no till organic field corn and wheat using cover crops for weed suppression.**
  Virginia farmer Joel Thomas Yowell shares successes and lessons learned.
  https://projects.sare.org/project-reports/fs08-231/

Other Select Resources

- **Weed Management Resources and videos from eOrganic**
  https://eorganic.org/node/2551

- **Cover Crops for Weed Management in Row Crops**, by Rachel Atwell, Chris Reberg-Horton, and Andrew Price, 2016. Conventional and organic systems.
  https://southern.sare.org/resources/cover-crops-for-weed-management-in-row-crops/

- **Weed Management on Organic Farms**, by Denise Finney and Nancy Creamer, 2008.
  https://content.ces.ncsu.edu/weed-management-on-organic-farms

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