Crop Management practices for reducing the use of OMRI listed organic pesticides

Eero Ruuttila
Scaling Up Program

UCONN
COLLEGE OF AGRICULTURE, HEALTH AND NATURAL RESOURCES
EXTENSION

The USDA's National Organic Program (NOP) requires certified organic growers to take a "bio-intensive" IPM approach to pest management. This approach:

- Emphasizes preventative strategies adopted in the planning of cropping systems to minimize pests before they become a problem
- Utilizes living organisms and cultural practices to manage or prevent pests whenever practical
- And employs the least toxic and least ecologically disruptive tactics when measures are needed to control an outbreak

Preventative, cultural, & physical methods must be the first choice for insect and disease control. When not effective a botanical, biological, or synthetic substance on the National List may be used if documented on the organic farm plan. A cropping plan needs to show biological or cultural practices such as crop rotation, diversification, habitat management, beneficial organism releases, sanitation, and the timing of cultural practices before resorting to the limited use of permitted pest control substances.

OMRI approved/NOP compliance

OMRI = Organic Materials Review Institute

www.omri.org

NOP = National Organic Program

Note that you must submit your handling plan to your certifying agency prior to use and keep detailed documentation about application.

Plant Positive approach instead of a Pest Control mindset.

“We need to begin studying the natural systems of agriculture from the point of view of aiding and abetting and enhancing the positive factors rather than our present focus on killing the negative factors”

-- Eliot Coleman “Plant Positive: A new Approach to Pest Management”

“The argument goes like this: when a grower pays attention to the biology, physical structure, & mineral balance of the soil, he [she] can grow healthy plants that are naturally resistant to diseases and insect problems…does it mean that their presence is solely due to poor practices by the grower?

What I know is that certain insect pests and plant diseases appear in our market garden every year and can cause cause major damage if we do not take preventative measures. Managing pests and diseases is crucial to the success of our market gardening operation.”

-- Jean-Martin Fortier

“the market gardener”

Cultural and Preventative Controls

- Balance plant nutrients
- Attract and host beneficial insects
- Use Crop rotations of both cash & cover crops
- Practice good sanitation in fields as well as inside season extension, packing, and storage facilities
- Select resistant varieties to your advantage
- Utilize living mulches, inter-planted crops & trap crops

Physical and Mechanical Controls

Include:

- Row covers
- Solarization techniques
- Plastic and straw mulches
- Traps, lures, & repellants
- Electric fences
- Flaming

Biological or Chemical Control

Includes the following material applications as approved by OMRI listings:

- Imported predatory insects
- Microbials or microbially derived products (B.T., spinosad)
- Mineral (sodium bicarbonate)
- Botanicals (pyrethrum)
- Oils (petroleum)
- Synthetics (ammonium salts)
- Elements (Sulphur)
- Inorganic chemicals (hydrogen peroxide)

There are many resources available to the certified organic grower.

Attending grower-oriented conferences or going to twilight farm tours is a good way to observe and learn from the successes and challenges from more experienced growers in your region as well as learn Best Management recommendations from Extension personnel.

RESOURCE GUIDE FOR ORGANIC INSECT AND DISEASE MANAGEMENT

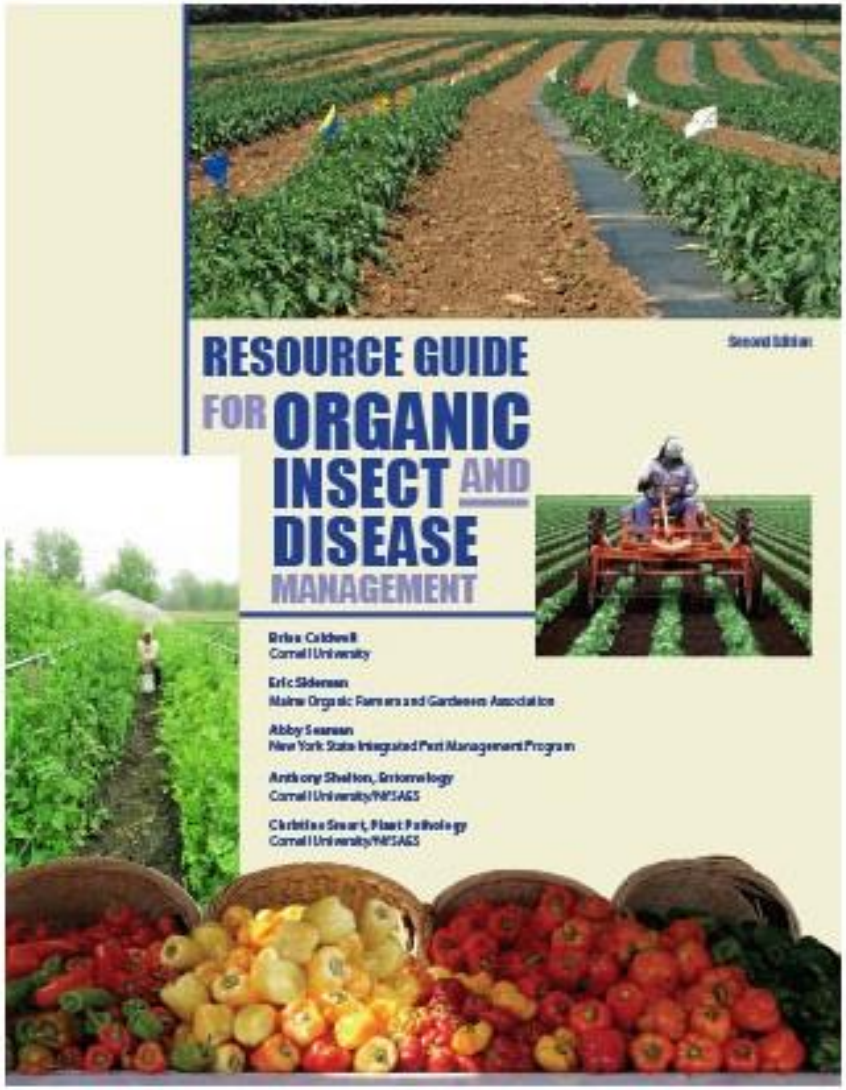
SECOND EDITION NOW AVAILABLE

Download a pdf version of the Resource Guide for Organic Insect and Disease Management - second edition

HOW TO ORDER

A limited number of copies are available from the NYSAES online bookstore for $20 + shipping

The ISBN number is 0-9676507-8-X.
Published: 2013



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ONION THRIPS (*Thrips tabaci)* and **WESTERN FLOWER THRIPS** (*Frankliniella occidentalis*)

Thrips are small insects whose adults and larvae are similar in appearance except that adults have narrow wings that are fringed with hairs and have few or no veins when viewed with a hand lens or microscope **(Photo 2.9)**. Both adults and larvae are very small (1/16" long) and slender. Adults are light brown, while larvae are a creamy white. Onion thrips most often reproduce without mating, and many generations can be produced during a season. They prefer to feed on tender inner leaves, damaging cells with their unique mouthparts that lacerate the plant's epidermis rather than piercing it. They subsequently consume the leaked plant juices. Leaves develop silvery blotches or streaks often marked with black spots of fecal matter **(Photo 1.2)**. There are two species of thrips that attack onions: onion thrips and western flower thrips. Onion thrips are an important pest in most onion-producing areas. Western flower thrips can be a serious pest of onions in southern areas and an occasional pest of onions in the north. Both species feed on many kinds of field crops and vegetables. They overwinter as adults or larvae in plant debris or in soil.

Thrips are weak fliers, only able to fly from plant to plant; they can, however, be blown long distances by wind. Light thrips infestations tend to delay plant growth and retard maturity. Heavy infestations may destroy an entire planting. Leaves may become curled, crinkled, and twisted; growth may stop, and plants may die. Damage is more severe under hot conditions because more generations are produced in warm weather, and plants may be under stress and susceptible to infestation. Due to their small size, rainfall is a major mortality factor to thrips, so outbreaks are more likely under hot, dry conditions than under cool, wet conditions. Some varieties of onions have demonstrated some level of tolerance to thrips. Check seed catalogs for the latest developments.

Cultural Controls:
Refrain from using broad-spectrum pesticides, and encourage habitats for natural enemies. Natural enemies include predaceous mites, minute pirate bugs, and lacewings.

1. If thrips are a regular problem, identifying more tolerant varieties can alleviate losses.
2. Inspect transplants for thrips infestation, especially those brought from warmer climates.
3. Rotation away from crops that thrips will attack is difficult. Onion thrips can easily move from one crop to another, an important consideration when planning crop arrangement. Onion thrips feed on many crops including oats, wheat, barley and alfalfa. They also feed on flowering plants and many vegetable crops, such as cabbage and tomatoes.
4. Sanitation, including plowing under onion debris, is important.
5. Overhead irrigation and heavy rain provide some suppression of thrips populations by washing them off plants.

Straw mulch has been shown to reduce populations of thrips and may increase yield and onion size. Reflective silver mulches can also be useful (see: http://mysare.sare.org/mySARE/ProjectReport.aspx?do=search).

Materials Approved for Organic Production:

1. Because low numbers of thrips can be tolerated, IPM practices recommend various economic thresholds. A common one is an average of 3 thrips per green leaf. When scouting, sample about 50 plants from at least 10 different locations in the field, and

then calculate the average per leaf. If the number exceeds the threshold, consider treating, especially if the weather is predicted to be hot and dry.

2. In bulbing onions, foliar applications of spinosad (Entrust) have shown good reduction in onion thrips (Nault, 2004-2006 unpublished data), although the SpinTor (rather than the Entrust) formulation was tested.
3. Neem (azadirachtin-based) products (Aza-Direct) have shown variable results. One trial (Nault, 2009, unpublished data) showed fair results with a mixture of Neemix and Trilogy.
4. In a laboratory study, Kaolin clay (Surround) has been shown to significantly reduce the number of egg-laying and feeding adults. Kaolin clay requires reapplication during the season, especially after rains.
5. Insecticidal Soap (Safer's) and JMS Stylet oil have been mentioned in some fact sheets as materials used for thrips, but published efficacy studies were not found.

Photo 2.9 Onion thrips greatly magnified.

Photo 2.10 Onion thrips damage.

Management Practices

IPM Concepts

The practice of integrated pest management involves the application of several principles which are described below.

- Who needs economic thresholds?

IPM Tactics

IPM programs integrate a diversity of tactics or tools to provide effective pest suppression while minimizing economic, ecological and human health risks. IPM tactics are described below.

Cultural Controls

Cultural controls involve the manipulation of the pest's biological and physical environment to make it less suitable. Examples include crop rotations, sanitation, and irrigation and water management.

Biological Control

Biological control is the use of living organisms such as parasitoids (parasites), predators or pathogens to suppress a pest population. Ladybeetles are common examples of predators employed in biological control. Bacteria such as *Bacillus thuringiensis* (Bt) is a well-known insect pathogen employed in many IPM programs.

Use of Resistant Cultivars

This tactic involves the use of plant cultivars which have inherited characteristics that defend the plants against pest attack. The use of resistant cultivars is an important step in plant pathogen, nematode and insect pest management.

Behavioral Modification

Behavioral modification tactics involve the use of visual, chemical or auditory stimuli to influence or disrupt normal pest behavior. Examples range from the old-fashion scarecrow to the modern uses of sex pheromone mating disruption for insect pest management.

Physical and Mechanical Controls

Physical controls involve the use of physical barriers against the pest or the manipulation of heat or air gas composition to kill the pest. Mechanical control includes the use of manual labor or of machinery to remove or kill the pest organisms.

Upcoming IPM Events

New Vegetable Pest and Disease Workshop. Febuary 7th (Torrington) and Febuary 14th (Vernon). For more information and to register click here.

Safe and Effective use of Organic Pesticides. Febuary 19, 2015, East Windsor. For more information and to register click here.

Perennial Plant Conference: March 5, 2015, Storrs, CT. Click here for more information and to register.

Tree Fruit, Berry & Grape Plant Nutrition Short Course on March 17-18th at Maneeley's Conference Center in South Windsor. For more information and to register click here.

Garden Conference: March 19, 2015. Storrs, CT. Click here for more information and to register.

Save the date: Biological Control Conference: June 18, 2015. Storrs, CT. More details to come.

IPM News

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Identification of Cole Crop Pests

Pest Name	Moth	Caterpillar
Imported Cabbage Worm	The imported cabbageworm (ICW) adult is the familiar white butterfly often seen fluttering around cole crops and weeds during the spring and summer. The ICW survives New England winters as a chrysalis and is usually the most common and the first of the three species you may encounter each season. (link all pictures in this paper to the cole crop worms photo folder)	ICW larvae are slow-moving, velvety-green and eventually grow to a length of 1 1/4 inches. Larger ICW caterpillars have a thin, yellow line that runs lengthwise down the center of their backs.
Return to article: Cole Crop "Worms" (Caterpillar Pests)		
Cabbage Looper	The cabbage looper (CL) are smaller, with dull coloration, and are less likely to be seen, as they primarily fly at night. CL moths arrive from the southern wintering sites on storm fronts, have up to three generations, and usually do	CL larvae are smooth, light-green caterpillars, with two white lines running the length of their backs and one narrower, white line on each side. They have no legs in the middle portion

UConn Extension and Department of Plant Science and Landscape Architecture

Crop Talk

Commercial Vegetable and Fruit Crops Newsletter

Volume 10, Issue 2 — April 2014

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Calendar of Events

April 14th - One-on-One Agriculture Advising Session, Litchfield, CT. For more information call 860-885-2821 or email Sharon.narotsky@uconn.edu

April 16th - One-on-One Agriculture Advising Session, Rockville, CT. For more information call 860-885-2821 or email Sharon.narotsky@uconn.edu

April 29 - Sprayer Calibration Workshop for Fruit, at 1 PM at Lyman Orchards in Middlefield, CT. For more information call 860-570-9067 or candace.bartholomew@uconn.edu or 860-486-6449 or email mary.concklin@uconn.edu

April 30 - Sprayer Calibration Workshop for Vegetables, at 1 PM at Lyman Orchards in Middlefield, CT. For more information call 860-570-9067 or email candace.bartholomew@uconn.edu or 860-870-6933 or email jude.boucher@uconn.edu

November 5-6 - Northeast Greenhouse Conference and Expo, Springfield, MA. For more information visit www.negreenhouse.org

CONGRATULATIONS AWARD WINNERS

Above: Stacia Monahan, from Stone Gardens Farm in Shelton, receives CT Outstanding Young Farmer award from Ag Commissioner Steve Reviczky at Ag Day at the Capital on March 19, 2014. Below: Rick Holmberg of Holmberg Orchards receives the Century Farm Award.

UMass Extension

Vegetable Program

Publications

Vegetable Notes

- Pest Alerts
- Subscribe to Newsletter

Guides

- New England Vegetable Management Guide
- Northeast Vegetable and Strawberry Pest Identification Guide
- Cucurbit Disease Scouting & Management Guide
- Sweet Corn IPM Scouting Guide & Record Keeping

Vegetable Notes Newsletters

Search by Keyword | **Search by Month** - Any - | **Search by Year** -Year | Apply

Vegetable Notes 2015 Vol. 27:1

January 15 2015 Vegetable Notes

In This Issue:

Crop Conditions
Seed Health: Hot Water Seed Treatment and Germination Testing
Tips for Managing Downy Mildew of Basil in 2015
Avipel: Special Local Need for Control of Bird Damage to Sweet Corn Seedlings
Mass ROPS Rebate Program is Up and Running
2014 Farm Bill Risk Management Program Changes That May Affect You
Upcoming Events

Vegetable Notes 2014 Vol. 26:25

December 11, 2014 Vegetable Notes

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Mustard as a Biofumigant Cover Crop
Using Organic Fertilizers for Greenhouse Plants
Getting Started Using Natural Enemies in Greenhouses
About the FSMA Proposed Supplemental Rule for Produce Safety
News
Upcoming Events

how this occurs and how important contaminated seed is as a source of primary inoculum.

Symptoms. Early symptoms can easily be mistaken for a nutritional deficiency. Infected leaves develop diffuse, but vein-delimited yellowing on the top of the leaf and a characteristic fuzzy, dark gray growth on the underside of the leaves, which may be mistaken for soil splashed onto the leaf under-surface, however, close inspection with a hand lens will show the sporangia. More photographs of the signs and symptoms are available at: http://vegetablemdonline.ppath.cornell.edu/NewsArticles/BasilDowny.html

Fig. 1. Basil downy mildew symptoms on the top and bottom of leaf. Photo: R. Wick, UMass

Management Recommendations for 2015

Purchase seed or transplants from reliable sources

We know that the pathogen may be seed borne, but the mechanisms involved are not well known and testing is difficult. Since *Peronospora belbahrii* requires a living host, it cannot be grown in a lab culture, making it more difficult to test for presence of the pathogen on or in seed. It is possible to test seed for the presence of pathogen DNA, but this test only tells you if sporangia of the pathogen were present, not whether those sporangia are viable and infective, potentially leading to false positives. Seed testing of any pathogen is only a proxy, since you can't test all of your seed, only a small portion of it. Any sample you submit for testing may not be wholly representative of the seed lot, leading to false negatives. Therefore, our recommendation is to buy seed from a trusted source. Talk to your seed supplier about how the seed was produced, if it has been tested, and also if the variety exhibits any resistance to the pathogen.

Plan to plant and harvest early

The pathogen tends to arrive in MA around mid-July. Again, last year the disease occurred earlier (June 22) because of the early, widespread distribution of infected plants from nurseries further south. Keep track of where the disease is being found via pest alerts in Veg Notes and via the basil downy mildew monitoring program (Google Docs spreadsheet) that Meg McGrath at Cornell University has put together and maintains, accessible here: http://vegetablemdonline.ppath.cornell.edu/NewsArticles/BasilDowny.html

Do whatever you can to reduce humidity and leaf wetness

In the greenhouse:

- Heat and vent greenhouses–especially when warm days are followed by cool nights–to reduce relative humidity, prevent dew formation and condensation, and reduce the leaf wetness period
- Use fans to improve air flow in greenhouses
- Water in the morning, or use sub/drip-irrigation rather than overhead

In the field:

- Plant in well-drained sites with good air circulation
- Orient rows parallel to the prevailing winds
- Control weeds

- Increase plant spacing
- Harvest/prune so as to improve airflow through/around plants if practical

Relative susceptibility of basil cultivars

- Field trials conducted in southern New Jersey in 2009 determined that all sweet basil (*Ocimum basilicum*) cultivars such as 'Genovese,' 'Italian large leaf,' 'Poppy Joe' and 'Nufar' are very susceptible to downy mildew. The least susceptible basils included the lemon and spice types such as *O. x citriodorum* and *O. americanum*, cultivars , 'Lemon Std', 'Lemon', 'Lime', 'Spice', 'Blue Spice' and 'Blue Spice Fil'. There are no cultivars with resistance to basil downy mildew.
- Efforts to breed new basil varieties with resistance to downy mildew are ongoing at Rutgers University, where researchers Rob Pyne and Andy Wyenandt continue to make crosses and evaluate breeding lines in the field. Rob and Andy are excited about some recent breakthroughs they have made and look forward to having stable breeding lines with good resistance and classic, sweet basil flavor within the next few seasons.
- There is at least one new commercially available variety with "intermediate" resistance being sold by Johnny's Seeds called 'Eleonora'. The variety is a cross of Thai basil and sweet basil. Thai basil has a higher disease tolerance, while sweet basil has the more generally desirable flavor, though some of that spicier Thai basil flavor does carryover in this cross. 'Eleonora' also has flatter leaves and a more open habit which will reduce disease favorability of the environment right around the plant and contribute to disease tolerance.
- Resistant varieties are one important piece of the puzzle, but will need to be used as part of an integrated management plan incorporating cultural practices and chemical controls to effectively manage this disease.

Chemical control

- Pay close attention to labels. Basil is a minor crop and is not always found on pesticide labels, and there are differences in registrations for use in field versus greenhouse production.
- Research trials have shown that the phosphite fungicides (eg. K-Phite, Prophyt, Fungi-phite) are among the most effective chemical controls. Other effective materials include mandipropamid (eg. Revus), cyazofamid (eg. Ranman), and fluopicolide (eg. Presidio). Azoxystrobin (eg. Quadris). These can be used in the field but not in the greenhouse.
- OMRI-approved products labeled for basil downy mildew include MilStop, OxiDate, Actinovate, Regalia, Trilogy and Double Nickel LC. There is not strong efficacy data for these materials and they should be used as part of an integrated plan. Be sure to make applications preventatively (scout under leaves, follow pest alerts) and keep up regular sprays.
- This year the UMass Extension Vegetable team evaluated 4 different copper products alone and in rotation with Regalia and saw no differences from the untreated control for any of the products. Copper products may be more effective in a year in which disease pressure is not so high, and if the first spray is made as soon as the plants are moved outdoors. We hope to repeat this study in 2015. ***Please note that no coppers are currently labeled–the purpose of these experiments was to demonstrate efficacy and get some of these more effective materials labeled for the crop and the disease.

A 2014 Vegetable Program trial showed that Ranman significantly reduced severity and slowed spread of disease, but still did not lead to marketable yields. Photo: S. Scheufele, UMass

- It is the grower's responsibility to read and follow label instructions and be sure that a product is registered for use in the greenhouse. The label is the law and any recommendations made here are superseded by the label.

–Susan B. Scheufele, Robert L. Wick and M. Bess Dicklow, UMass Extension; thanks to Rob Pyne and Andy Wyenandt at Rutgers University, and Margaret T. McGrath, Cornell University.

Vermont Vegetable and Berry News – February 17, 2015
compiled by Vern Grubinger, University of Vermont Extension
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www.uvm.edu/vtvegandberry

REPORTS FROM THE FIELD

(Shelburne/South Burlington) Despite the warm Nov/Dec this stretch of well-below normal temperatures is going to make for interesting regrowth under the hoops. The kale, surprisingly, looks good. We will see how this coldest weather yet treats them. The spinach is more troubling looking. I am confident that any damaged leaves will just be removed and the plants will eventually regrow well, but it's hard to tell at this point. I have a lot more visual freeze damage than in years past. I am still not working beds yet. Usually I plant a new round of kale, lettuce, cilantro, escarole and other crops in a week! Not going to happen this year with these temperatures. Luckily we had a bountiful Nov. and Dec., and even beginning of January before things got so cold. I have been wondering what greenhouses in Massachusetts look like with all the snow. When I lived in Michigan, some areas of the state near the lake would get an accumulation of 4 to 6 feet of snow, and the hoophouses did just fine as long as the snow load was evenly spread out, so I have been curious to know how farms with greenhouses are handling the snow load. We are definitely appreciating the longer days, and even though it was still quite cold, the sun in the last few days was able to warm up the houses enough to slough off the 3 to 6 inches of snow that had built up on the houses after that freak sleet/rain we had (even though air temperatures were only about 3 degrees!). The sleet had created a nice ice layer on the houses

2015

- Feb. 17 — Reports from the field
- Jan. 26 — Reports from the field, VVBGA talks posted, 8-week veg course, NAP insurance
- Jan. 7 — Reports from the field, Practical Food Safety Woskhops, technical tips

2014

- Dec. 16 - VVBGA Annual Meeting, VVBGA Post-Harvest Handling conference
- Nov 24 — Reports from the field, Practical Produce Safety workshops, VVBGA meeting dates
- Nov 5 — Reports from the field, FDA listening session on FSMA, technical tips, VVBGA meeting dates
- Sept 29 — Reports from the field, crops storage workshops, FSMA revisions summary
- Sept 15 —Winter squash harvest tips, test garlic seed, onion harvest tips, manure survey, farm safety program
- Sept 2 — Reports from the field, plant diagnostic clinic update
- Aug 18 — Reports from the field, SWD info, plant diagnostic clinic update
- Aug. 4— Reports from the field, Get ready for late blight, salt test for SWD infestation
- July 18 — Reports from the field, SWD info, plant diagnostic clinic update
- July 1 — Reports from the field, SWD info, plant diagnostic clinic update, upcoming workshops
- June 16 — Reports from the field, plant diagnostic clinic update
- June 3 — Reports from the field, plant diagnistic clinic update, basil downy mildew samples wanted
- May 20 — Reports from the field, beginning farmer support, upcoming meetings
- May 6 — Vegetable and berry farms in Census, mummyberry management, seedcorn maggot, wash water study
- Apr. 15 — Reports from the field, when to remove strawberry mulch, crop insurance survey
- Mar. 17 — Reports from the field, farm energy info, crop insurance survey, upcoming events
- Feb. 19 — Reports from the field, greenhouse furnace maintenance, upcoming events
- Jan. 30 — Reports from the field, nutrient content and availability of organic fertilizers, leafy greens wash water video
- Jan. 14 — Reports from the field, stay tuned for food safety workshops, petition to keep the soil in organic

2013

- Dec. 23 — Evaluate the newsletter, VVBGA annual meeting, join the VVBGA
- Dec. 10 — Reports from the field
- Nov. 14 — Reports from the field
- Nov. 3 — FSMA webinar, NEVFC, mulching strawberries, wait to prune blues, sanitizing stakes, floricane removal
- Oct. 15 — Reports from the field, webinar on FSMA, floodplain survey
- Oct. 1 — Reports from the field, update from the plant diagnostic clinic
- Sept. 16 — Reports from the field, update from the plant diagnostic clinic, upcoming events
- Aug. 13 — FSMA session Aug 20th, reports from the field, updates from the Plant Diagnostic Clinic
- July 23 — Reports from the field, Updates from the Plant Diagnostic Clinic
- July 11 — Pest and flood update, reports from the field
- June 18 — Reports from the field
- June 3 — Reports from the field
- May 21 — Reports from the field, plant diagnostic clinic update, plan ahead to use Trichogramma on ECB
- May 6 — Reports from the field
- April 15 — Reports from the field, mummyberry update, plant diagnostic clinic update
- April 3 — Reports from the field, strawberry mulch removal, blueberry pruning links

Managing Farm Habitat for Wild Pollinators

Summary

Managing farm habitat for wild pollinators

Coordinator: Scott Black, The Xerces Society for Invertebrate Conservation, Portland, OR
Stakeholders: U.S. organic producers interested in wild bee conservation and pollination services

Wild pollinators can provide important pollination services for many food crops. Wild bees in particular can significantly augment—and sometimes even replace--pollination services provided by the European honey bee. For some crops wild bees are even more effective pollinators than their honey bee cousins. By understanding the landscape and conservation needs of wild bees and other native pollinators, organic farmers can manage wild pollinator habitat and enhance pollination services on their farms.

The Xerces Society's native pollinator toolkit is a valuable and informative handbook for organic farmers and others who want to understand native pollinator conservation.

The Xerces Society for Invertebrate Conservation has developed a comprehensive toolkit for native pollinator conservation on organic farms: Organic Farming for Bees - Conservation of Native Crop Pollinators in Organic Farming Systems, partially funded by OFRF. The toolkit provides materials designed to help organic farmers conserve native pollinators and take advantage of the crop pollination services they can provide. In addition, a workshop curriculum complements these resources and provides training on native pollinator conservation on organic farms.

The goal of this project is to provide organic growers with sustainable pollination services through the creation and management of farm habitat that supports native bees. Specific project objectives are to educate organic growers about (1) recent research that increases our understanding of the role native bees play in crop pollination, (2) the specific habitat needs of native bees, (3) how to provide this habitat, and (4) how to reduce impacts of

Research

- OFRF Grant Research Database
- Map of OFRF Grants
- Additional Resources
- Organic FAQs

FUNDING

Category:
Education and Outreach
$8,000 Fall 2008 *(1 year)*

Grant Categories

Resources for: Conservation Programs, Education and Outreach Funding Sources
Topic: Bees and Pollinators
Region: West

Links:

Xerces Society for Invertebrae Conservation:
http://www.xerces.org/

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See map: Google Maps

Flowers Replace Insecticides in Lettuce Production

January 21, 2015 – Research generated by the USDA's Agricultural Research Service in the heart of America's Salad Bowl is showing how lettuce growers can control pests without the use of insecticides, by allowing a few flowering plants to grow among the salad greens.

Organic farmers have long known that planting sweet alyssum throughout a lettuce field effectively controls aphids, a major pest of salad crops. Sweet alyssum attracts beneficial insects including hoverflies, whose larvae each chomp down as many as 150 aphids per day.

The trade-off for this type of chemical-free pest control used to be the loss of up to 5 percent of yield, due to lettuce being displaced by the alyssum plants.

But thanks to a technique of "additive intercropping," developed by USDA researcher Dr. Eric Brennan, growers can now plant enough alyssum for pest control without displacing any lettuce, or reducing crop yield. A well-respected crop researcher, Dr. Brennan is a former OFRF grant recipient.

"I see additive intercropping as a sustainable, win-win approach for dealing with major insect pests," Brennan said. "Farmers can provide the beneficial insects with the resources they need to control aphids, without giving up any valuable lettuce-growing area."

Brennan's planting guidelines were developed over a period of nine years, on certified organic research plots, while producing romaine lettuce on a commercial scale. Additive intercropping involves planting one or two alyssum plants per every 50 lettuce plants. The alyssum are planted between regularly-spaced lettuce starts, where they thrive without crowding the lettuce, or reducing its size.

Hoverfly adults feed on alyssum's nectar and pollen, while the larvae feed on aphids and other insects.

Education

Improving organic education for all ages is a huge part of our core values at OFRF. Whether you're a kindergarten teacher, beginning organic farmer, or about to transition to organic farming, OFRF has resources to help you along the way.

2012 Organic Land Grant University Assessment

OFRF tracks and reports organic programs and activity in the U.S. land grant university system through our Organic Land Grant Assessment. The specific details on organic research, education, and extension of each of the 72 land grant institutions investigated for this report are a rich source of information for researchers, farmers and ranchers, students, policy makers, advocates, and administrators. Check out our latest version of the report, or click here for a more in depth summary.

CULTURAL INFO: Days to maturity are from direct seeding. Beans are tender annuals that prefer full sun, average fertility and well drained soils. Bush varieties do not require support but pole varieties will require varying amounts. Direct seed after all danger of frost has passed. Inoculant may be used to increase yields. Optimal soil temperature for germination is 75-95°F. Beans are particularly sensitive to cool soils and may rot at soil temperatures below 55°F. Germination is apparent within 7-10 days. Snap beans can be sown every 2 weeks for a continuous harvest all season. Store unwashed snap beans at 40°F and 90% humidity for 7-10 days; can or freeze for long term storage. Dry beans should be harvested when pods are at least 70% brown and threshed when pods are dry enough to break easily. Dry the threshed beans to approximately 10-15% moisture before storage, or allow to continue drying in breathable bags.

DISEASE & PESTS: Root Rot is caused by several different soil-borne fungi; prevent by planting into well-drained soil when temperatures have warmed. To avoid disease, only handle plants in dry conditions. Wide spacing allows more air flow between plants, helping to dry plant surfaces. Infected plants should be removed immediately.

RESISTANCE KEY: AN-Anthracnose, BCMNV-Bean Common Mosaic Necrosis Virus, BCMV-Bean Common Mosaic Virus (races indicated if known), CTV-Curly Top Virus, DM-Downy Mildew, PM-Powdery Mildew, PMV-Pod Mottle Virus, R-Rust

SEED SPECS: 70-220 (145 avg) seeds/oz. 1100-3500 (2300 avg) seeds/lb varies between varieties. Seeding rate: Bush- 900 seeds/100' (~5 lb/100'), 130M seeds/acre (~57 lbs/acre) using 8 seeds/ft, 36" row spacing. Pole- 900 seeds/100' (~ 5 lb/100'), 96M seeds/acre (~42 lbs/acre) using 4 seeds/ft, double rows 12" apart on 4' centers. M=1,000

Please see **Planting Chart** on page 100 or go to **highnowingseeds.com** for more info.

SNAP BUSH

2210 **Provider** 50 days

OP • BCMV (NY15), DM, PM, PMV • 5-6" uniform pods

The standard fresh market variety for green beans. Provider comes through every year with early, heavy yields of attractive, uniform beans. Plants are vigorous and productive with strong root systems, even under adverse conditions. Good resistance to mildew and virus. Purple seeds.

2159 **Bronco** 55 days

OP • BCMV • Durable for distribution • 5.5" pods

Prolific eye-catching glossy pods on well-adapted plants. Impressive yields of dark green beans that hold up well in shipping and at market. Widely adapted for many regions and excellent resistance to Bean Common Mosaic Virus. More refined than Provider or Strike and one of our favorite snap beans. White seeds.

2022 **Jade** 55 days

OP • BCMV (BV1, NY15), CTV, R • Heat tolerant • 6-7" long pods

Gourmet-quality long, slender, stringless green beans. Commercial yields of glossy medium green beans for fresh market sales or the garden. Large, 18-22" tall plants produce yields comparable to Provider and Strike. Pale green seed.

2255 **Strike** 55 days

OP • BCMV (BV1, NY15) • Suitable for mechanical harvest • 5-6" pods

Strike it rich with heavy harvests ideal for processing or freezing. Stringless, smooth beans are medium green in color. Strike is known for its concentrated pod set. Widely adapted, disease-resistant variety. White seeds.

COLORED SNAP BUSH

Resistance Codes for Vegetables

CODE	TYPE	ENGLISH NAME	SCIENTIFIC NAME
ASPARAGUS			
(R)	Fungus	Rust	*Puccinia asparagi*
BEANS			
(A)	Fungus	Anthracnose	*Colletotrichum lindemuthianum*
(BB)	Bacteria	Bacterial Blight	*Xanthomonas carotae*
(BBS)	Bacteria	Bacterial Brown Spot	*Pseudomonas syringae pv. Syringae*
(BMV)	Virus	Bean Mosaic Virus	
(CTM)	Virus	Curly Top Beet Mosaic Virus	
(HB)	Bacteria	Halo Blight	*Pseudomonas savastanoi pv. phaseolicola*
(PM)	Fungus	Powdery Mildew	*Podosphaera xanthii*
(R)	Fungus	Common Rust	*Puccinia sorghi*
BROCCOLI			
(DM)	Water mold	Downy Mildew	*Peronospora parasitica*
CABBAGE			
(BR)	Fungus	Black Rot	*Didymella bryoniae*
(DM)	Water mold	Downy Mildew	*Peronospora parasitica*
(FY)	Fungus	Fusarium Yellows	*Fusarium oxysporum conglutinans*
CHINESE CABBAGE			
(CR)	Fungus	Club Root	*Plasmodiophora brassicae*
(DM)	Water mold	Downy Mildew	*Hyaloperonospora parasitica*
(FY)	Fungus	Fusarium Yellows	*Fusarium oxysporum conglutinans*
CARROTS			
(AB)	Fungus	Alternaria Blight	*Alternaria dauci*
(BB)	Bacteria	Bacterial Blight	*Xanthomonas carotae*
(C)	Fungus	Cercospora Blight	*Cercospora carotae*
(CS)	Fungus	Cavity Spot	*Pythium spp.*
(PM)	Fungus	Powdery Mildew	*Erysiphe heraclei or Leveillula taurica*
CAULIFLOWER			
(FY)	Fungus	Fusarium Yellows	*Fusarium oxysporum conglutinans*
CORN			
(MDMV)	Virus	Maize Dwarf Mosaic Virus	
(NCLB)	Fungus	Northern Corn Leaf Blight	*Exserohilum turcicum*
(R)	Fungus	Common Rust	*Puccinia sorghi*
(SCLB)	Fungus	Southern Corn Leaf Blight	*Bipolaris maydis*
(SM)	Fungus	Smut	*Ustilago zeae*
(SW)	Bacteria	Stewart's Wilt	*Pantoea stewartii*
CUCUMBER			
(A)	Fungus	Anthracnose	*Colletotrichum orbiculare*
(ALS)	Bacteria	Angular Leaf Spot	*Pseudomonas syringae pv. lachrymans*
(B)	Bacteria	Bacterial Wilt	*Erwinia tracheiphila*
(CMV)	Virus	Cucumber Mosaic Virus	
(CVYV)	Virus	Cucumber Vein Yellowing Virus	
(DM)	Water mold	Downy Mildew	*Pseudoperonospora cubensis*
(PM)	Fungus	Powdery Mildew	*Podosphaera xanthii*
(PRV)	Virus	Papaya Ringspot Virus	
(S)	Fungus	Scab	*Cladosporium cucumerinum*
(TSP)	Fungus	Target Spot	*Corynespora cassiicola*
(WMV)	Virus	Watermelon Mosaic Virus	
(ZYMV)	Virus	Zucchini Yellow Mosaic Virus	
LETTUCE			
(DM)	Water mold	Downy Mildew	*Bremia lactucae*
(LMV)	Virus	Lettuce Mosaic Virus	
(Na)	Insect	Lettuce Aphid	*Nasonovia ribisnigri*
(Rs)	Bacteria	Corky Root	*Rhizomonas suberifaciens*
(TBSV)	Virus	Tomato Bushy Stunt Virus (Lettuce Dieback Complex)	
MELON			
(DM)	Water mold	Downy Mildew	*Pseudoperonospora cubensis*
(F)	Fungus	Fusarium Wilt (Race 1)	*Fusarium oxysporum f. sp. melonis*
(F2)	Fungus	Fusarium Wilt (Races 1 & 2)	*Fusarium oxysporum f. sp. melonis*
(F3)	Fungus	Fusarium Wilt (Races 0, 1 & 2)	*Fusarium oxysporum f. sp. melonis*
(PM)	Fungus	Powdery Mildew	*Sphaerotheca fuliginea*
(WMV)	Virus	Watermelon Mosaic Virus	

CODE	TYPE	ENGLISH NAME	SCIENTIFIC NAME
ONION			
(FBR)	Fungus	Fusarium Basal Rot	*Fusarium oxysporum f. sp. cepae*
(PR)	Fungus	Pink Root	*Phoma terrestris*
PEAS			
(F)	Fungus	Fusarium Wilt (Race 1)	*Fusarium oxysporum*
(F2)	Fungus	Fusarium Wilt (Races 1 & 2)	*Fusarium oxysporum*
(PM)	Fungus	Powdery Mildew	*Erysiphe pisi*
(PEMV)	Virus	Pea Enation Mosaic Virus	
(PLR)	Virus	Pea Leaf Roll Virus	
PEPPER			
(BLS 1-3)	Bacteria	Bacterial Leaf Spot Races 1-3	*Xanthomonas campestris pv. vesicatoria*
(BLS 1, 2)	Bacteria	Bacterial Leaf Spot Races 1 & 2	*Xanthomonas campestris pv. vesicatoria*
(PC)	Water mold	Phytophthora Root Rot	*Phytophthora capsici*
(PeMV)	Virus	Pepper Mottle Virus	
(PVY)	Virus	Potato Virus Y	
(TEV)	Virus	Tomarot Etch Virus	
(TM 0-2)	Virus	Tobamovirus Races 0-2	
(TM 0-3)	Virus	Tobamovirus Races 0-3	
(TMV)	Virus	Tobacco Mosaic Virus	
(TSWV)	Virus	Tomato Spotted Wilt Virus	
PUMPKIN			
(BR)	Fungus	Black Rot	*Didymella bryoniae*
(PM)	Fungus	Powdery Mildew	*Podosphaera xanthii*
(WMV)	Virus	Watermelon Mosaic Virus	
SPINACH			
(CMV)	Virus	Cucumber Mosaic Virus	
(Cv)	Fungus	Cladosporium Leaf Spot	*Cladosporium variabile*
(DM)	Fungus	Downy Mildew	*Peronospora farinosa f.sp. spinaciae*
SUMMER SQUASH			
(CMV)	Virus	Cucumber Mosaic Virus	
(PM)	Fungus	Powdery Mildew	*Podosphaera xanthii*
(PRV)	Virus	Papaya Ringspot Virus	
(WMV)	Virus	Watermelon Mosaic Virus	
(ZYMV)	Virus	Zucchini Yellow Mosaic Virus	
TOMATO			
(AB)	Fungus	Early Blight	*Alternaria solani*
(AS)	Fungus	Alternaria Stem Canker	*Alternaria alternata f. sp. lycopersici*
(F)	Fungus	Fusarium Wilt	*Fusarium oxysporum f. sp. lycopersici*
(FOR)	Fungus	Fusarium Crown and Root Rot	*Fusarium oxysporum f. sp. radicis-lycopersici*
(L)	Fungus	Gray Leaf Spot	*Stemphylium solani*
(LB)	Water mold	Late Blight	*Phytophthora infestans*
(LM)	Fungus	Leaf Mold	*Cladosporium fulvum*
(N)	Nematodes	Nematodes	*Meloidogyne arenaria, incognita, javanica*
(PL)	Fungus	Corky Root Rot	*Pyrenochaeta lycopersici*
(PM)	Fungus	Powdery Mildew	*Oidium lycopersicum*
(PST)	Bacteria	Bacterial Speck	*Pseudomonas syringae*
(TMV)	Virus	Tobacco Mosaic Virus	
(ToMV)	Virus	Tomato Mosaic Virus	
(TSWV)	Virus	Tomato Spotted Wilt Virus	
(TYLCV)	Virus	Tomato Yellow Leaf Curl Virus	
(V)	Fungus	Verticillium Wilt	*Verticillium albo-atrum*

Crop Rotation Planning

Crop rotation is one of the most effective tools for managing pests & maintaining soil health. Yearly maps provide a record of your past and inform future plans. Record areas of disease & insect pressure & rotate susceptible crops away from historical trouble.

Phytophthora blight (capsici)& Early blight would be soil diseases that require long rotations for susceptible crops. Insects such as flea beetles & Colorado potato beetles overwinter close to host crops and populations build quickly in the spring.

Crop rotations are ineffectual for diseases such as downy mildew & Late Blight as well as for insects that migrate into areas on storm fronts such as Potato leaf hoppers & corn ear worms

Flea beetles can be controlled by holding off planting crucifers until late in the summer

Utilizing row covers are effective in controlling flea beetles earlier in the year although weed management can be challenging

Practice good sanitation in fields including weed management (note lambsquarters)

The relatively new cross-stripe cabbage worm can be hand picked if hot spots are infrequent, otherwise a botanical spray should be used.

Know when a pest of concern is present

Agritek row covers protect vulnerable crops but do not increase temperatures underneath

Learn to identify the good guys

lady beetle eggs, larva,
& adult

Provide host plants to attract beneficials throughout your fields

Occasional “wild zones” provide protected areas for beneficials

Unconventional wide spacing and overwintered rye/hairy vetch as a living straw mulch to suppress Colorado potato beetles
Organic Farming & Research Foundation funded

Spot spraying w/spinosad early July; possible flaming of potato foliage early September

Establishing a medium red clover living mulch in tomato aisles to suppress Early blight and fallow half of tomato field

Biofumigant cover crops as part of cover cropping rotations

The use of biofumigant cover crops for pest management is in its infancy. Results are inconsistent from year to year and in different geographic regions. Different species and varieties contain different amounts of bioactive chemicals.

Studies have shown biofumigant cover crops to reduce rhizotonia (sugar beets & potatoes), verticillium wilt (potatoes), sclerotinia (lettuce) and root knot nematodes (potatoes, tomatoes) in some field trials.

However, there are many other studies where no effects are demonstrated.

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There are a number of benefits common to all crop types, soil types, climate and situation:

- Improvements to soil structure, fertility and biodiversity from the green manure effect
- Provides a good source of nutrition to following crops, recycling nutrients like nitrogen
- Encourages improved root systems and penetration (of following crop)
- Measurable yield increases in following crops
- Weed suppression, mainly of soft seeded annuals