

Production

Fervor for Cover Crops

SARE (Sustainable Agriculture Research and Education) recently announced the results of their yearly cover crop survey. SARE and CTIC (Conservation Technology Information Center) have been partnering with other organizations since 2012 to conduct this national survey of farmers on their experience with cover crops.

This year's survey was conducted in March 2016 and over 2,000 farmers across the country participated. The survey results showed that growers:

- Have enthusiasm for cover crops.
- Found (for four years in a row) a yield boost in corn and soybeans following cover crops.
- Agree that cover crops are especially important in reducing yield variability during extreme weather events.
- Found that their profit improved as a result of using a cover crop.

The majority of farmers reported that the most important benefits of cover crops are reduced erosion, improved overall soil health, and increased soil organic matter. Profitability, resilience, and yield benefits were also recognized by the farmers as important, however, the most highlighted impacts were those of long-term soil health.

For the survey summary or to download the full survey, click the following link (or search the internet for):

[Cover Crop Surveys sare.org](http://CoverCropSurveys.sare.org)



Cereal rye was the top cover crop planted by survey respondents.

Diseases

Curly Top Virus Update

This year curly top virus (caused by Beet Curly Top Virus or BCTV) is widespread in Northern Utah and evident throughout the state. Many farms and gardens have lost tomato plants due to this virus. Beans, peppers, beets, Swiss chard, spinach, and cucurbits are other potential hosts. Once plants are infected with BCTV, there is no cure.



Tomato plants infected with BCTV show symptoms of yellow upward curling leaves, stunted growth, and sometimes purple veins on the underside of leaves and prematurely ripening fruit.



A bean plant infected with BCTV (right) shows yellowing and stunted growth.

For more information on BCTV, see pgs. 145-146, 150-151, 159-161, 164 of the 2016 Vegetable Production and Pest Management Guide:

<http://utahpests.usu.edu/IPM/files/uploads/Publications/UT-veg-guide-2016.pdf>

For additional information on BCTV, search the internet for (or click the following links):

APS Beet Curly Top: America's First Serious Disease of Sugar Beets
Utah Pests Curly Top of Tomatoes
Vegetable IPM Advisory Jul 12, 2016

Potyvirus Confirmed: Possible Bean Common Mosaic Virus

What appears to be Bean common mosaic virus (BCMV) was seen in Salt Lake county. Plant samples were tested and confirmed positive for potyvirus which is the causal agent of BCMV, Bean yellow mosaic virus and other plant viruses. Further testing would be required to confirm the specific virus.



A bean plant found in Salt Lake county tested positive for potyvirus and appears to be infected with BCMV.

Description:

BCMV infects beans and has two main types of symptoms: common mosaic and common mosaic necrosis. Either type of symptom can appear depending on the particular virus. Some bean cultivars have a gene (dominant I gene) that makes them resistant to the common mosaic virus, but hypersensitive to the mosaic necrosis virus.

Symptoms:

Common mosaic symptoms cause dark green and light green-yellow mosaic patterns that develop on the trifoliolate leaves. Infected leaves often exhibit light green-yellow interveinal areas while the veins remain dark green. Leaf puckering, distortion, blistering, and downward curling or rolling may accompany leaf discoloration. Plants that are infected at a young age can become stunted and distorted.



BCMV has many symptoms. This common bean infected with the virus exhibits a yellow mosaic pattern on its leaves.

Common mosaic necrosis symptoms only develop in cultivars that possess the dominant I gene and start as small, red-brown spots on the trifoliolate or primary leaves. These initial symptoms begin to show shortly after infection via an aphid vector. The veins surrounding the initial spots become brown-black and necrosis spreads through the veins causing wilting and death (necrosis) of the meristem and young leaves. Infected plants eventually die. Cross sections of infected stems and bean pods show a red-brown streaking of the vascular tissue.



Cross section of a BCMV infected bean; note the red-brown streaking of the vascular tissue.

Common mosaic necrosis virus in bean cultivars that lack the dominant I gene show symptoms similar to common mosaic virus symptoms. Other viruses can cause necrosis symptoms in common beans. Necrosis alone is not a positive diagnosis of common mosaic necrosis virus and other diagnostic tests will be needed.



A bean plant showing symptoms of black root necrosis (left) and leaves showing primary leaf necrosis (right) caused by BCMV.

Causal Agent and Spread:

The causal agent of BCMV belongs to the potyvirus group. The virus spreads through infected seed, between production areas and between seasons. Primary vectors are aphids. Pollen and mechanical transmission may also vector the virus.

Management:

The most important control method is to use certified and/or resistant varieties or cultivars of bean that have the dominant I gene or other BCMV resistant genes. Virus-free seeds will also reduce the incidence of BCMV.

In bean varieties that are not resistant, the disease can be minimized by planting fields in isolated areas that are not close to areas with extensive bean production.

For more information on BCMV, search the internet for (or click the following links):

[Cornell Vegetable MD Virus Diseases of Snap and Dry Beans](#)
[UC Davis IPM Bean Common Mosaic Virus](#)
[Michigan State Bean Common Mosaic Virus](#)
[Texas A&M Bean Common Mosaic Virus](#)

Insects

Squash Bugs: the Tough Guys



Gerald Holmes, California Polytechnic State University at San Luis Obispo, Bugwood.org

A squash bug adult ovipositing eggs on a squash leaf.

If you are struggling with squash bugs, remember that they are the most consistent insect pest of squash and pumpkins and are the most difficult to control. Early detection and control of squash bug nymphs is key. Adults are very difficult to kill so it is important to apply foliar insecticides (if insecticides become necessary) to the nymphs when an average of one egg mass per plant is present. Mark found egg masses with a flag and check every day or two to see when they hatch. When several egg masses are hatching, begin application. Several applications may be needed as eggs are laid and hatch over an extended period of time.

(commercial) bifenthrin (Brigade[®]), zeta-cypermethrin (Mustang[®]), lambda-cyhalothrin (Warrior[®])

(homeowner) carbaryl (Garden Tech Sevin), pyrethrins (Monterey Bug Buster-^{OB}, Garden Tech Worry Free^B), acetamiprid (Ortho Flower Fruit and Vegetable), pyrethrins + sulfur (Natria Disease and Mite Control^B, Ortho Insect Mite and Disease 3 in 1^B)

All brands are registered trademarks. Examples of brands may not be all-inclusive, but are meant to provide examples of products registered for use in Utah. The availability of products changes over time. Always check the label for registered uses, application and safety information, and protection and pre-harvest intervals.

Cabbage White Butterfly (Imported Cabbageworm)

Damage:

The imported cabbageworm or cabbage white butterfly prefers broccoli, cabbage, and cauliflower, but will feed on all cole crops. Larvae feed on outer leaves, resulting in round

holes. Frass (excrement) can stain or discolor broccoli and cauliflower heads. As crop heads develop, cabbageworms feed on outside leaves and bore into heads, resulting in unmarketable produce.

Management:

CULTURAL

- Plant cabbage as an early crop. Harvest before cabbageworm populations build to damaging levels.
- Plant resistant varieties to lessen cabbageworm damage. Resistant varieties include: 'Mammoth', 'Red Rock', 'Chieftan Savoy', and 'Savoy Perfection Drumhead'.
- Harvest as early as possible and destroy or plow under plant residues.
- Rotate crops and distance susceptible hosts from current and previous susceptible crop plantings.
- Use row covers to exclude butterflies from laying eggs on host plants. Remove covers during flowering for pollination.



Imported cabbageworm adult.

BIOLOGICAL

Natural enemies can be a major contributor to reductions in cabbageworm populations. Trichogramma wasps and tachinid flies parasitize cabbageworm eggs, pupae, and larvae. Commercially purchased Trichogramma can be released at peak flight of cabbageworm as an effective form of control. Bacillus thuringiensis var. kurstaki (Bt) and spinosad (e.g. Entrust) are especially effective when applied to young caterpillars of imported cabbageworm.

CHEMICAL

If 2 or more medium sized larvae are found per 10 leaves at the button stage, two sprays will be needed:

- 1) a spray at button stage and 2) a clean-up spray 7-10 days before harvest.

(commercial) carbaryl (Sevin), methomyl (Lannate^R), malathion (Fyfanon), beta-cyfluthrin (Baythroid XL^R), spinosad (Entrust^{OB}), *Bacillus thuringiensis* (Dipel^{OB}), *Beauveria bassiana* (Botanigard^B), *Chromobacterium subtsugae* (Grandevo^{OB})

(homeowner) carbaryl (Garden Tech Sevin), cyfluthrin (Bayer Vegetable and Garden Insect Spray), pyrethrins (Monterey Bug Buster-O^{OB}), spinosad (Monterey Garden Insect Spray^{OB}), pyrethrins & insecticidal soap (Safer Brand Yard & Garden Insect Killer^{OB})

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Imported cabbageworm eggs (top) and larva (bottom).

For more information on imported cabbageworm, see pgs. 39, and 43-48 of the 2016 Vegetable Production and Pest Management Guide:

<http://utahpests.usu.edu/IPM/files/uploads/Publications/UT-veg-guide-2016.pdf>

For additional information on Imported Cabbageworm, search the internet for (or click the following links):

UC Davis IPM Imported Cabbageworm
 Cornell University Imported Cabbageworm
 Oregon State University Cabbage White Butterfly
 Pacific Northwest Handbook Imported Cabbageworm

Aphids

Aphids are small soft-bodied insects. There are several common vegetable aphids that come in a myriad of colors and may cover themselves in a woolly, cottony, or waxy substance. Many plants that are infested with aphids will begin to show curling leaves that provide protection for the aphids as they feed.

Common Vegetable Aphids:

Common vegetable aphids include cabbage aphid, green peach aphid, melon (cotton) aphid, and potato aphid.



Cabbage aphid (top left), green peach aphid (top right), light and dark green forms of melon aphid (bottom left), pink and green forms of potato aphid (bottom right).

Hosts:

Several vegetable crops are hosts to aphids including cole crops, mustard family plants, legumes, pepper, spinach, cucurbits, tomato, carrot, lettuce, legumes, corn, potato, and many others.

Damage:

Although aphids do not generally kill mature plants, they can cause damage by feeding with their piercing-sucking mouthparts. Their feeding can cause yellowing leaves, curling leaves, gall formations, and sometimes their honeydew exudate will turn black with the growth of a sooty mold fungus. Aphids may also transmit viruses from plant to plant.

Vegetable crops that are often associated with aphid-transmitted diseases are cucumber, squash, melon, bean, pumpkin, potato, lettuce, beet, chard, and bok choy. These viruses will result in mottling, yellowing, or curling of leaves and stunted plant growth. It is difficult to control these viruses by controlling aphids, as even low populations can transmit the virus within a few minutes.

Management:

It is important to choose nonchemical control options when managing aphid populations. Fortunately, there are many natural predators of aphids and a number of other ways to keep them in check.

- Encourage natural enemies such as: lady beetle, lacewing, big-eyed bug, damsel bug, aphid midge, aphid parasites, syrphid fly, parasitic wasp, mealybug destroyer, soldier beetle, braconid wasp, rove beetle, and predatory thrips.
- Be patient as predator populations take time to build up and may not begin to do so until the aphid population grows significantly.



David Riley, University of Georgia, Bugwood.org



David Cappaiert, Bugwood.org

Ladybug larva feeding on green peach aphids on a pepper plant (top) and lacewing larva with aphid prey (bottom).

- Control nearby ant populations that may protect aphids.
- Check surrounding areas for sources of aphids such as weeds. Check transplants before planting and remove any aphid populations that are present.
- If aphids are localized on a few leaves or shoots, and if it is practical to do so, prune out and dispose of these sections.
- Avoid over-applications of soluble Nitrogen that tends to favor aphid reproduction.
- Use silver-colored mulches to reduce the transmission of aphid-borne viruses in summer squash, melon, and other susceptible vegetables. This is especially effective at reducing invading aphid populations on seedlings and small plants.
- Physically remove aphids from sturdy plants by knocking them off with a strong spray of water. Do this early in the day to allow plants to dry and avoid fungal diseases.
- If sprays are needed, try insecticidal soaps that cover the insects and suffocate them. This only works when the product is sprayed directly on the insect (you may need to uncurl leaves to do this).

Keep in mind that most plants can withstand some aphid damage. If control is necessary and nothing else is working, insecticides can be used. Choose insecticidal soaps and oils first such as horticultural oils, and plant-derived oils like neem or canola oil. These are the best choice for most situations. If more knockdown power is needed, try products that combine pyrethrins and insecticidal soaps or oils.

(commercial) oils (Biocover, Ecotec^{OB}, Glacial Spray^{OB}, Pure Spray Green^{OB}, Ultra-Pure^B), insecticidal soap (M-Pede), pyrethrins (Pyganic^{OB})

(homeowner) oils (Bayer Natria Multi-insect^B, Monterey All Natural 3 in 1 Garden Insect Spray^B), insecticidal soap (Natria^B), pyrethrins + insecticidal soap (Safer Brand Tomato & Vegetable Insect Killer^{OB}, Safer Brand Yard and Garden Insect Killer^{OB}), pyrethrins + canola oil (Earth-tone Insect Control^B, Raid Earth Options Rose and Flower Insect Spray^B, Monterey Take Down Garden Spray^B), pyrethrins (Monterey Bug Buster-^{OB}, Garden Tech Worry Free^B)

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For more information on Aphids, search the internet for (or click the following links):

[USU Fending Off Aphids](#)

[USU Aphids Those Sucking Insects](#)

[UC Davis Aphids Management Guidelines](#)



David Cappaiert, Bugwood.org

Aphid parasitoid (braconid wasp) and aphid mummy (left) and a parasitized aphid before the parasitoid emerges (right).



Scott Bauer, USDA Agricultural Research Service, Bugwood.org

A winged green peach aphid.

Beneficial Insects

Natural Help



Bradley Higbee, Paramount Farming, Bugwood.org



Bradley Higbee, Paramount Farming, Bugwood.org

Big-eyed bug adult (top) and nymph (bottom).

Big-eyed bug

Big-eyed bugs have a wide head with prominent bulging eyes that give them an extensive field of vision. They are predators of insect eggs, aphids, mites, small nymphs, small caterpillars, flea beetles, insect larvae and occasionally other predators. Encourage big-eyed bugs by avoiding the use of broad-spectrum pesticides and by properly identifying them in the garden or landscape.

Look-alike bugs include false chinch bugs and black grass bugs which are both plant feeders. These bugs are more slender and have smaller eyes when compared to a true big-eyed bug.

For more information on Big-Eyed Bugs, search the internet for (or click the following links):

[USU Beneficial True Bugs: Big-Eyed Bugs](#)

[UC Davis Natural Enemies Gallery Bigeyed Bugs](#)

University of Florida Bigeyed Bugs



Bradley Higbee, Paramount Farming, Bugwood.org

Damsel bug adult (left) and nymph (right).

Damsel Bug

Damsel bugs have slender bodies that are tan-gray in color and resemble small smooth assassin bugs or other plant bugs that feed on crops. Damsel bugs are generalist predators that feed on aphids, small caterpillars, moth eggs, corn earworm, imported cabbageworm, European corn borer, some armyworms, leafhoppers (beet and potato), small sawfly larvae, mites, tarnished plant bug nymphs, and asparagus beetle and Colorado potato beetle eggs and nymphs.

Damsel bugs are not available for commercial purchase but are very common in most gardens, landscapes and fields. Encourage their presence by avoiding the use of broad-spectrum pesticides, providing low-growing grasses and ground covers, and by properly identifying them in the garden or landscape.

Look-alikes include assassin bugs (another predatory insect), chinch bugs, and stilt bugs. Small nymphs may also resemble ants.

For more information on Damsel Bugs, search the internet for (or click the following links):

[USU Beneficial True Bugs: Damsel Bugs](#)

[University of Kentucky Damsel Bugs](#)

[UC Davis Damsel Bugs](#)

[University of Wisconsin Damsel Bugs](#)

[NC State University Damsel Bug](#)

Precautionary Statement: Utah State University Extension and its employees are not responsible for the use, misuse, or damage caused by application or misapplication of products or information mentioned in this document. All pesticides are labeled with ingredients, instructions, and risks. The pesticide applicator is legally responsible for proper use. USU makes no endorsement of the products listed herein.

Vegetable IPM Advisory

is published by Utah State University Extension

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