



UTAH PESTS News

Utah Plant Pest Diagnostic Laboratory and USU Extension

Vol. 1, Summer 2007

Common and Native Flowering Plants Attractive to Native Bees and Beneficial Insects

Elevated concern for the loss of honeybee populations due to Colony Collapse Disorder and associated stresses caused by loss of habitat and other factors leave us to ponder how humans can improve the habitat and food resources for the numerous species of native bees and beneficial insects in Utah.

A major resource required by native pollinators and beneficial insects is an abundant and quality source of flower nectar and pollen. High quality nectar serves as an excellent carbohydrate source while pollen can provide supplemental protein when prey are scarce, and supports reproduction and development of progeny (e.g., native bees provision their young with pollen and sometimes nectar).

By planting common and native flowering plants that produce high quality nectar and pollen in urban landscapes and agricultural areas, populations of native bees and beneficial insects will

be enhanced, which will in turn enhance crop production and reduce the need for chemicals to manage insect pests. The table on page 2 provides recommendations for plants attractive to native bees.



Native bees such as the blue orchard bee (top) are also very attracted to flowering herbs such as cilantro (bottom), basil, and mint.

-Diane Alston

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NEW UTAH PESTS FACT SHEETS

The following can be found on our Web site:

Hobo Spiders

Peach Twig Borer

Sod Webworms

White Grubs

Yellowjackets, Hornets, and Paper Wasps

LAB IN TRANSITION

The UPPDL loses yet another excellent diagnostician. Julie Jenkins, our Plant Pathology Diagnostician, will no longer be with the lab, but instead will be enjoying time with her family. We wish her well. In the meantime, we are in the process of looking for a replacement.

www.utahpests.usu.edu

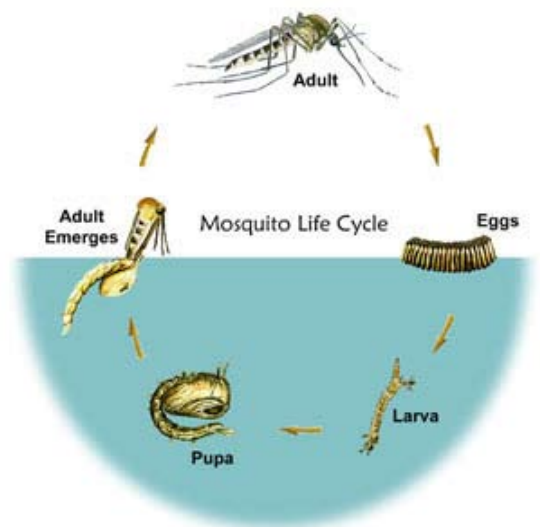
Reduce Your Risk of West Nile Virus in 2007

West Nile Virus (WNV) is a relatively new disease in the United States, but has made a significant impact to Utahns in a short amount of time. First detected in New York in 1999, WNV quickly spread throughout the United States, Canada, and Mexico in less than four years. Horses and humans have been particularly affected by WNV. In 2006, more than 150 people were diagnosed with moderate or severe symptoms in Utah, and five people died as a result of secondary complications to WNV.

Although most people (80%) infected with WNV will never display any symptoms, everybody should be aware of how to reduce the risk of an infection. In general, female mosquitoes like to lay eggs in stagnant water; reducing standing water will help reduce

potential sources for mosquito production.

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Plants Attractive to Native Bees and Beneficials, continued from page 1

Table of Plants Attractive to Native Bees and Beneficial Insects, obtained from the USDA ARS Bee Biology and Systematics Laboratory in Logan, UT.

Family	Genus	Common Name
Apiaceae	<i>Tanacetum</i>	tansy
Asteraceae	<i>Achillea</i>	yarrow
	<i>Centaurea</i>	bachelor's button, corn flower (use single-flowered varieties)
	<i>Chrysothamnus</i>	rabbitbrush
	<i>Gaillardia</i>	blanket flower (use single-flowered varieties)
	<i>Helianthus</i>	sunflower
	<i>Rudbeckia</i>	black-eyed susan
	<i>Solidago</i>	goldenrod
	<i>Tithonia</i>	Mexican sunflower
Berberidaceae	<i>Mahonia</i>	mahonia, Oregon-grape
Caprifoliaceae	<i>Symphoricarpos</i>	snowberry
Crassulaceae	<i>Sedum</i>	sedum, stonecrop
Cucurbitaceae	<i>Cucurbita</i>	squash, gourd, pumpkin
Ericaceae	<i>Vaccinium</i>	blueberry, cranberry, huckleberry (needs acidic soils)
Fabaceae	<i>Baptisia</i>	false indigo
	<i>Cercis</i>	redbud
	<i>Hedysarum</i>	sweetvetch
	<i>Lespedeza</i>	bush clover
	<i>Lupinus</i>	lupine
Grossulariaceae	<i>Ribes</i>	currant and gooseberry
Hydrophyllaceae	<i>Phacelia</i>	bluebells, scorpionweed
Lamiaceae	<i>Mentha</i>	mint
	<i>Nepeta</i>	catmint
	<i>Perovskia</i>	Russian sage, filigran
Lythraceae	<i>Cuphea</i>	false heather
Malvaceae	<i>Sphaeralcea</i>	globemallow
Rosaceae	<i>Chamaebatiaria</i>	fern bush

Additional information on suitable plants and native bee research can be found on the [USDA Bee Biology and systematics Laboratory Web site](#).

[Click here](#) for additional information on alternative pollinators to the honeybee.



Globe mallow, *Sphaeralcea* species



Yarrow, *Achillea* species

Reduced Risk Pesticide Options for Homeowners

We all get the various homeowner questions—"what product do you recommend for killing aphids on my trees?" or "is it OK to go ahead and use the DDT that's in my garage?" OK—maybe not that second question, but our goal as educators is to advise the public on the options available to them for various problems. With homeowner pesticide use soaring above 100 million pounds/year, many people are looking for alternatives to the conventional, broad-spectrum chemicals. As part of a successful IPM program, homeowners now have more and more options for reduced-risk pesticides. We've compiled a list on page 4 as a reference.

There are also two handy Web sites devoted to home pesticide products: <http://www.homeusepesticide.org/>, and <http://householdproducts.nlm.nih.gov/>.

The most important information we can give homeowners is to *read the product label*. Two products may have the same active ingredient, but at different percentages, which would mean different mixing rates. The label also includes information on pesticide safety: proper application and handling techniques, storage, and disposal.

-Marion Murray



Featured Picture of the Quarter

This syrphid fly is a beneficial predator. Its larvae feed on aphids and other soft-bodied insects. Adults feed only on pollen, nectar, and honeydew. Adults are marked with yellow or white bands. They emerge from their overwintered pupae in spring and lay eggs on leaves and stems of plants infested with prey. Larvae feed for 7 to 10 days, then drop to the soil to pupate. There are 3 to 7 overlapping generations each year.

One syrphid fly larva can consume almost 400 aphids!

-Photo by Marion Murray

Calendar of Insect, Disease, and IPM-Related Events

July 12-13, Utah Farm Bureau Federation Midyear Convention, St. George, UT

July 16-19, American Society for Horticultural Science Annual Conference, Scottsdale, AZ, www.ashs.org/conferences.html

July 28-August 1, International Society of Arboriculture Conference, Honolulu, HI

August 12-17, 11th International Workshop on Fire Blight, Portland, OR, <http://oregonstate.edu/conferences/fireblight2007/>

September 18-20, Restoring the West Conference: Sagebrush Steppe, Utah State University, Logan, UT, <http://www.restorethewest.org/>

October 5-8, 2007 ASLA Annual Meeting & EXPO, San Francisco, CA, www.asla.org/nonmembers/meetings.html

October 7-9, Western Plant Health Association Annual Meeting, Tuscon, AZ, <http://www.healthyplants.org/events.htm>

January 8-10, 2008, Western Disease Conference, Portland, OR

March 24-26, 2009, 6th Annual IPM conference, Portland, OR

Table of Reduced-Risk Home-Use Landscape Plant Pesticides Available in Utah garden centers, farm stores, and box stores. (Not all-inclusive.) Those with an asterisk (*) are used as fungicides.

Class	Active Ingredient	Product Names	Example Target Pests
Neo-nicotinoid	imidacloprid	<i>Bayer Advanced</i> 12-mo. Protect and Feed <i>Bayer Advanced</i> All-in-One <i>Bayer Merit</i>	adelgids, aphids, ash borer, cutworms, lace bug, leafhoppers, scale, thrips, whiteflies
Botanical	pyrethrin	<i>Garden Safe</i> Multi-Purpose Garden Insect Killer <i>Safer</i> Tomato and Vegetable Insect Killer <i>Spectracide</i> Garden Insect Killer <i>Green Light</i> (GL) Fruit Tree Spray (with Neem)* <i>Ferti-Lome</i> Red Spider and Mite Spray <i>Natural Guard</i> Natural Insect Spray	aphids, bean leaf beetle, beetles, cankerworms, fruitworm, leafhoppers, leafminer, tent caterpillar
	neem oil	<i>Green Light</i> Neem* <i>Gree Light</i> Rose Defense* <i>Ferti-Lome</i> Triple Action Plus*	anthracnose, aphids, black spot, botrytis, lace bug, loopers, powdery mildew, scale, thrips
	other plant oils	<i>EcoSmart</i> Ecopco ACU (peanut oil; bionet.com) <i>GL</i> Home and Garden Insect Spray (thyme oil) <i>Lily Miller</i> Year-Round Pesticidal Oil (canola oil)	wide variety
	rotenone	<i>Bonide</i> Garden Dust*	anthracnose, aphids, blights, codling moth, lace bug, leafhoppers, leaf spots, mealybugs
	capsaicin	<i>Natural Guard</i> Hot Pepper Wax	aphids, cabbage looper, lace bugs, leafhoppers, scale, spider mites
Biological and More	<i>Bacillus thuringiensis</i>	<i>American</i> Thuricide <i>Ferti-Lome</i> Dipel Dust <i>Green Light</i> Bt Worm Killer <i>Safer</i> Garden Dust	cankerworm, cabbage looper, codling moth, leafrollers, sod webworm, spruce budworm, tussock moth
	spinosad	<i>Ferti-Lome</i> Borer, Bagworm, Leafminer, and Tent Caterpillar Spray <i>Natural Guard</i> Spinosad <i>Green Light</i> Lawn and Garden Spinosad	ants, borers, codling moth, fruit fly, fruit worms, leafminers, leafrollers, sod webworm, spider mites
	soap (potassium salts of fatty acids)	<i>Bonide</i> Insecticidal Soap <i>Safer</i> 3-in-1 Garden Spray <i>Safer</i> Insect Killing Soap	adelgids, aphids, leafhoppers, lace bugs, plant bugs, psyllids, rose slug, sawfly, scale, spider mites, thrips, whiteflies
	petroleum oils	<i>Bonide</i> All Seasons Hort. and Dormant Spray Oil <i>Ortho Volk</i> Spray Oil (petroleum)	adelgids, aphids, scale, insect eggs, leafhopper, plant bugs, spider mites, whiteflies
	diamotaceous earth	<i>Natural Guard</i> Crawling Insect Control	soft-bodied insects such as aphids, slugs, grasshoppers, millipedes and sow bugs
	<i>Bacillus subtilis</i>	<i>Serenade</i> Garden Disease Control*	anthracnose, bacterial and fungal blights, leaf spots, powdery mildew
	sulfur	<i>Ferti-Lome</i> Rose Flower and Vegetable Dust* <i>Hi-Yield</i> Lime Sulfur Spray* <i>Safer</i> Garden Fungicide*	anthracnose, leaf spots, powdery mildew
	salts of phosphoric acid	<i>Agri-Fos</i> Systemic Fungicide (purchase via Internet)*	bacterial blight, downy mildew, fire blight, phytophthora, pythium
IGR	halofenozide	<i>Hi-Yield</i> Kill-A-Grub	larvae of: armyworm, billbugs, cutworm, june beetle, sod webworm

Stripe Rust of Wheat Reappears in Northern Utah

Stripe rust of wheat, also known as yellow rust (*Puccinia striiformis* f. sp. *tritici*), is a very aggressive fungal disease that can dramatically reduce grain yield and quality of susceptible cultivars when climatic conditions are suitable. It is considered one of the more damaging diseases where wheat is grown worldwide and has been observed causing losses to wheat on every continent except Antarctica.

Stripe rust is increasing in its range of occurrence within the lower 48 states. The disease was reported in Utah's Box Elder, Cache, and Weber counties in the 2005 and 2006 growing seasons. Observations of stripe rust, in both years, ranged in severity from mild damage to complete crop loss.

The disease occurs during cooler wet weather and can move rapidly from a small affected area to an entire field within a matter of days. Rate of spread depends on cultivar susceptibility, wind, temperature, and moisture. Initial infections are difficult to spot. Constantly scouting fields during early spring when moisture is prevalent will increase the odds of detecting the disease before it gets out of hand. Infections can occur anytime during the plants' development, and spores can be blown in from adjacent or distant fields with rain showers. Hence, sudden occurrences of the disease are often seen, when only a week before fields appeared to be unaffected.

A single spore, called a urediniospore, of the pathogen is microscopic but en masse appear yellow to slightly orange. If a person were to walk through a severely infected field, their clothing and shoes would appear yellow, covered with inoculum.

SYMPTOMS

Lesions appear on wheat leaves primarily but can occur on the stem and on head tissues as well. Damage to grain is consid-

ered severe when the disease is seen in head tissues, as other parts of the plant are surely infected as well. Symptoms appear as elongated lesions on leaves, appearing yellow to slightly orange in color. These lesions consist of numerous smaller lesions called uredia. Each uredium, a single spore-producing lesion, consists of thousands of urediniospores that can be spread by wind to inoculate healthy wheat plants in adjacent or distant fields.

Primary infections in fields can be spotted as an odd oval to circular area that is off color. Upon closer inspection, a scout will observe the lesions on leaves and their severity will depend upon the cultivar's degree of susceptibility as well as temperature, moisture conditions, and how long the infection has been there.

The fungus reduces a plant's vigor by utilizing the host's water and nutrients for its own purposes: growth and sporulation. The fungus survives from one season to the next on volunteer wheat plants. No known grass, other than wheat, can serve as a host to the pathogen.

CONTROL

Depending upon the timing of infection, crop developmental stage, prevailing weather outlook, and cultivar susceptibility, a grower may choose to use a fungicide to prevent further damage to their grain crop. Fungicides containing the active ingredient propiconazole are recom-



Stripe rust lesions are elongate and extend linearly along the axis of the leaf.

mended to control stripe rust. Fungicides with this active ingredient have a curative eradication action. A slight to mild yellowing of the sprayed wheat can occur but green-up usually follows in a few days. Care should be taken to follow labeled instructions regarding the stage of crop development and when the fungicides can no longer be applied. Generally, these fungicides cannot be applied at, during, or after head emergence.

Previous years' disease severity, changing weather patterns, wheat cultivar, prevalent races of the pathogen, and control of volunteer wheat all influence the likelihood of the disease occurring in any given year. Seeing that stripe rust has occurred in the last two years, growers and agents should keep a sharp eye on wheat fields in 2007.

-Kent Evans

Hobo Spider Sightings in Utah

The hobo spider was first detected in the United States in the 1930s and was restricted to the Pacific Northwest for many years. But eventually the hobo spider was detected in Utah in 1990 and since has been reported in about half of all counties (Box Elder, Cache, Davis, Morgan, Salt Lake, San Juan, Sanpete, Summit, Tooele, Utah, Wasatch, and Weber). Several hobo spiders have already been submitted to the Utah Plant Pest Diagnostic Laboratory in 2007. This time of year, most specimens are captured indoors, particularly in basements.

The hobo spider is a member of the funnel-web spider family Agelenidae. Members of this spider family typically have long legs and are considered swift runners compared to other spiders. Unlike other spiders, the hobo spider is a poor climber and is generally seen on the floor. As with many spiders, identification of the hobo spider is very difficult and requires a trained eye. With the passing of Alan Roe in 2006, the UPPDL lost an expert in spider identification. But we do have other entomologists in the UPPDL and Biology Department who are available for spider diagnostics.

Hobo spiders can cause a painful bite resulting in a necrotic lesion. Although the hobo spider is not more aggressive than other spiders, they will attempt to bite in defense. Sometimes hobo spiders deliver a “dry” bite and no ill effects are suffered. However a full envenomation will often cause burning, swelling and blistering of the skin. A severe bite can take several weeks to several months to heal and will most likely leave a scar.

To reduce the risk of getting a spider bite, prevent spiders from entering the home. Seal cracks, crevices, or other openings

Welcome to Our New Insect Diagnostician!

It is my pleasure to introduce the newest member of the Utah Plant Pest Diagnostic Laboratory, Ryan Davis. Ryan recently accepted the Insect Diagnostician position and will begin working June 1.

Ryan grew up in Pennsylvania and attended The Pennsylvania State University. He received his



around buildings and other structures. Cleaning debris, such as weeds or wood piles, around the perimeter of a building

will also discourage spiders from accidental introduction indoors. Traps can be useful for detecting and controlling hobo spider in the home. Consider using commercial sticky traps designed for rodent or insect control.

Traps should be placed along baseboards or in other areas where the spiders are seen.

To find out more about the biology, life cycle, and other control options for hobo spiders, visit our Web site. We have recently revised the [hobo spider fact sheet](#). Do not hesitate to send spider samples to your local county extension office or the UPPDL for confirmation.

-Erin Hodgson



Hobo spiders build prey-catching funnels along foundation cracks or wood piles.

We are all excited to have Ryan become a member of the lab. Feel free to stop by the UPPDL in Logan to introduce yourself and get acquainted with our newest team member.

-Erin Hodgson

Here are ways to reduce your risk:

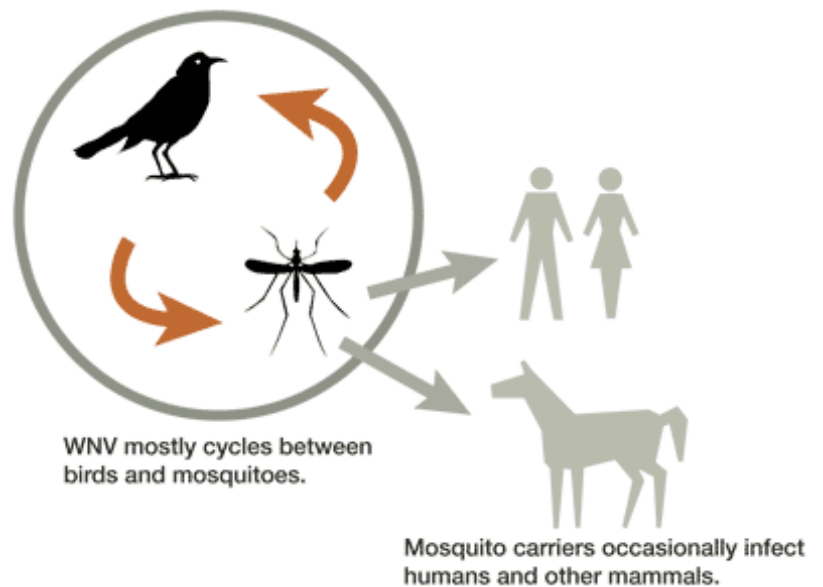
- Eliminate small pools of water (e.g., wheelbarrows, tires).
- Keep containers clean and dry when not in use (e.g., watering cans).
- Allow drainage in outdoor containers so standing water is reduced (e.g., garbage cans).
- Keep water fresh and properly chlorinated (e.g., ornamental ponds, pet bowls, pools).



Female mosquito laying her eggs in stagnant water.

About 20% of people infected with WNV display mild or moderate symptoms similar to the flu. To date, there are no vaccines to prevent WNV or any medicines to cure an infected person. Less than 1% of humans infected with WNV will experience severe symptoms that require hospitalization. People over the age of 50 or immuno-compromised people are a higher risk of developing serious complications or fatalities. Severe symptoms include extreme headache, tremors, disorientation, coma, paralysis, encephalitis, and meningitis. If you experience moderate or severe symptoms, consult a physician. Screening for WNV antibodies is the only way to confirm an infection.

According to Sammie Dickson, Ph.D. (Salt Lake City Mosquito Abatement District), *Culex tarsalis* and *C. pipiens* are the two most common mosquito species responsible for transmitting WNV in Utah. *Culex tarsalis* is the most abundant and virulent mosquito, meaning a female mosquito is very likely to transmit the virus while taking a blood meal. *Culex tarsalis* prefers to feed on birds and small mammals in rural areas, but will move into residential neighborhoods too; this species is the most common vector to humans and horses in Utah. *Culex pipiens* is the second most common mosquito to vector WNV in Utah. Although not as abundant or virulent as *C. tarsalis*, it is more widespread in urbanized areas (towns with >20,000 people). Because *C. pipiens* is more commonly found where people live, this mosquito is likely increasing the transmission rates to humans by amplifying WNV in birds and mammals.



There are several things people can do to further reduce the risk of getting WNV. Keep mosquitoes from coming into the home by repairing screens and sealing windows. Wear long sleeved shirts and pants when outside in areas with biting mosquitoes. Avoid being outdoors when mosquitoes are especially active; *Culex* mosquitoes prefer to take blood meals between dusk and dawn. Mosquito repellent may be the best way to prevent bites and subsequent WNV infections. Depending on your level of outdoor activity, there are many different kinds of repellents available. Choose a repellent you and your family will use consistently. Products approved by the EPA (Environmental Protection Agency) include:

- DEET is the most common mosquito repellent product because it is effective and available in several concentrations. DEET can be applied to the skin, however should not be sprayed directly onto the face.
- Picaridin is a relatively new product available in Utah. It provides an alternative to people who are sensitive to DEET products. Picaridin is nearly odorless and can be applied directly to the skin.
- Permethrin is a highly effective repellent and is generally used for long periods of outdoor activity or in more remote locations. Permethrin should not be applied directly to the skin, but can be used on clothing, shoes, and camping equipment.

For more information, see the Utah Pests Fact Sheet, [West Nile virus in Utah](#). Or visit the Utah Department of Health for current WNV details (<http://www.health.utah.gov> or 801.538.6191). To learn more about horse vaccinations, contact the USU Vet Extension (<http://extension.usu.edu/equine> or 435.797.1880). If you want to report dead birds, call 801.476.2470.

-Erin Hodgson

Useful Web Sites and Publications

WEB SITES

- <http://safelawns.org/>: a new organization dedicated to organic lawn care
- <http://www.ir4.rutgers.edu/Biopesticides/LabelDatabase/index.cfm>; and http://www.attra.org/attra-pub/biorationals/biorationals_main_srch.php: two new databases that provide biopesticides by state and crop type
- Pestsense: <http://pep.wsu.edu/pest-sense> and Hortsense: <http://pep.wsu.edu/hortsense>: two Web sites from Washington State University about pesticide safety and home gardening
- <http://www.howtogoorganic.com>: information, directories, etc., on switching to organic production

PUBLICATIONS AVAILABLE

- “Utilizing Pesticide Mode of Action to Prevent Resistance” (<http://www.ipm.uiuc.edu/education/action.html>) are three color-coded decision-making guides to help growers rotate pesticide classes.
- “Handbook of Forage and Rangeland Insects,” ESA Press, is an excellent new reference with photos, maps, and keys: <http://www.shopapress.org/haoffoandrai.html>
- Michigan State University now offers pocket-sized scouting guides for insects, diseases, and weeds: <http://ipm.msu.edu/pdf/pocketGuidesLandsc07.pdf>
- Oregon State University’s IPM Resource Guide: <http://extension.oregonstate.edu/catalog/pdf/em/em8898.pdf>
- “Vegetable Diseases,” Academic Press/APS, is a full-color reference guide for hundreds of diseases: <http://www.shopapress.org/vedicocha.html>

In the National News

NEW ACTIVE INGREDIENT GETS REDUCED-RISK STATUS

DuPont’s new active ingredient chlorantraniliprole (E2Y45) received reduced-risk status in April 2007 for use on apple, lettuce, peach, pear, tomato, and turf. This new anthranilamide may be a reduced risk alternative to Guthion and phosmet for codling moth control, and because it works differently from existing insecticides, it will be very useful for resistance management strategies.

ORGANIC PESTICIDE UPDATE

Ecosmart, a patented botanical, organic pesticide, goes on sale soon in many Wal-Mart stores. Brands include Flying Insect, Ant & Roach, and Wasp & Hornet Killers. They sell for less than \$4 each and are environmentally friendly.

Ecosmart products are made of non-toxic plant oils that kill as fast as conventional pesticides. Oils are derived from thyme, clove, peanuts, and other plants. These ingredients kill insects by blocking the octopamine receptor—a neurotransmitter unique to insects. In effect, the chemicals paralyze insect nervous systems causing death in seconds. These plant oils are found in other products, as well, including Green Light products and others.

Ecosmart’s products are exempt from EPA pesticide registration because they contain ingredients that pose minimal risk to humans or the environment.

BIOLOGICAL WHITEFLY CONTROL?

The silverleaf whitefly, *Bemisia argentifolii*, feeds on plants from over 60 different families and occurs almost worldwide. It vectors viruses, causes irregular fruit ripening, stippled leaves, and sometimes death. It is very difficult to control due to resistance to many pesticides.

A new fungal species was discovered feeding on whiteflies in 2001, named *Isaria propawskii*. Researchers at Agricultural Research Service in Texas recently showed that it kills both larval and adult stages of silverleaf whitefly. Because this fungus can survive in hot and dry conditions and is persistent even without the host, its use as a biological control for whitefly seems probable.

SILICON MAY PROTECT GREENHOUSE PLANTS

A variety of research studies suggest that the addition of silicon in potting mixes boosts yields and protects greenhouse plants from toxicity and fungal diseases, possibly reducing the need for pesticides.

X-ray analysis of a variety of bedding plants shows that some of them—such as New Guinea impatiens, marigold and zinnia—accumulate silicon in significant concentrations in unique cells in their leaves. The next step is to determine which crops put nutrients where they are most useful to the plant.

NEW BACTERIUM LETHAL TO SEVERAL PESTS

Agricultural Research Service scientists discovered a bacterium from soils in central Maryland that is toxic to Colorado potato beetle, gypsy moth, small hive beetle, corn rootworm, diamondback moth, and tobacco hornworm.

The new bacterial species (*Chromobacterium subtsugae* sp. nov) killed 50 percent of a colony of small hive beetles within five days and reduced body weights of tobacco hornworm and gypsy moth, causing reduced feeding.

Scientists say they will next work to isolate the toxin from the bacteria.

What's Eating Your Raspberries, Besides You?

There are a number of insects that commonly infest raspberry canes and fruits and can dramatically reduce the berry harvest. The most injurious insects are those that bore within the canes resulting in cane dieback and even death. The most common of the borers attacking canes in northern Utah is the raspberry horntail.

The raspberry horntail is a wood-boring wasp that will attack raspberry, blackberry, other related brambles, and roses. Injury is usually confined to first-year, vegetative canes. Horntail larvae (immature stage) are white, cylindrical with dark brown heads and a pointy tail with a spine. In northern Utah, wilting cane tips become noticeable in June and July as larvae bore through the center pith, which becomes soft. It's easy to verify the insect's presence by cutting open wilted canes to check for larvae inside. Prune and destroy infested canes when wilting becomes apparent; this will remove the larvae and reduce the population. A parasitic wasp attacks horntail larvae, and helps reduce populations, but not before some injury has occurred. The smaller parasitic larvae can be seen crawling on horntail larvae. To control horntail eggs and young larvae in the spring, treat canes with a full cover spray of insecticide when new growth begins. Carbaryl (Sevin), malathion, and permethrin are effective insecticides. A repeat application can be made 7-14 days later if populations are high. Do not treat with insecticides just before or during bloom to avoid harming pollinators.

Two other insects that attack raspberry canes are the rose stem girdler, a flat-headed beetle, and the raspberry crown borer, a clear-winged moth. Stem girdler larvae form two to five spiral grooves in the cambium (just under the bark), girdling the canes and causing wilt and death. First year canes are attacked more than fruiting canes. Girdling in first year canes produces a gall-like swelling. Larvae are white, slightly flattened and have two short, brown, toothed projections on the tail end.

Raspberry crown borers have a two-year life cycle. The first



Damage caused by rose stem girdler



Raspberry crown borer adult



Rose stem girdler larva inside pith

indication of injury is wilting and dying of foliage on first-year canes in April through June. Infested cane tips may curl into a shepherd's crook. Damaged canes become spindly, may break at ground level, and may be predisposed to winter injury. Larvae overwinter in the crown and tunnel upward the second year. Adult moths emerge in summer to fall, leaving pupal skins attached to emergence holes in canes.

Pruning is helpful to reduce infestations of all three raspberry insects. Prune canes below the insect and destroy (burn, bury at least 2 inches deep, or dispose in landfill). Remove entire cane if infested with crown borer. If infestation is substantial, pruning should be supplemented with chemical control. The insecticides listed above are effective for all species. Timing for cane girdler is the same as for the horntail. For the crown borer, first-year larvae can be killed in the fall (mid-October) as they crawl down

canes to overwinter in crowns or the following spring when they become active (April to May). Apply a full cane spray and drench to the base of plants allowing the insecticide to soak into the root zone. Treatments must be applied for at least two or more consecutive years for successful control of crown borer.

Other insect pests include the stink bug, earwig, lygus bug, and grasshoppers that may enjoy the ripening berry fruits before you can get them harvested. These insects typically suck or chew into the individual drupelets. Frequent inspections of ripening fruits and physically shaking the canes can remove these

insects, but the effect is often short-lived. Spraying with an insecticide to deter fruit-feeding insects can be effective, but you must carefully observe the preharvest or required time interval between application and picking fruits. Recommended insecticides that have low toxicity to humans include neem oil (Azatin) and spinosad (Success, Entrust). Conventional insecticides that will deter fruit-feeders include carbaryl (Sevin), malathion, permethrin, and esfenvalerate.

-Diane Alston

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