



VOLUME 19, NO. 4  
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## ASK THE MASTER GARDENER: TOMATO HORNWORM

**Trish Grenfell**  
Placer County  
Master Gardener

**Question:** Upon returning from my vacation, I found one of my tomato plants totally decimated – no leaves, just partial fruit and the leaf skeletons remaining. My neighbor let me know that he had picked off several hornworms while I was away, but the damage was already done. What is a hornworm and how can I keep them off my other tomato plants?

**Answer:** The quick and dirty answer is to do what your neighbor did: watch for missing leaves or fruit with munching scars, locate the culprit(s) (which can be difficult since they camouflage so well), and hand pick or snip off with shears. *This means patrolling your plants on a regular basis.*

However, there are other strategies. The tomato hornworm (*Manduca quinquemaculata*) is a caterpillar, the larval stage of the sphinx moth. The moths overwinter in the soil as the pupae (cocoons), so tilling by hand or discing will destroy most of the active larvae building cocoons or the cocoons themselves.



If the pupae (cocoons) aren't destroyed, the moths will emerge in late spring and begin the cycle of laying their eggs, which hatch in four to five days as a hornworm. The eggs, which will be round and a greenish-white color, will be laid on the underside of leaves and are laid singly. If

you see these next year, remove and dispose of the leaf.

The plants provide a food supply and in four weeks the caterpillars are full-size. At this stage of the cycle, the caterpillar makes its way into the soil to pupate (build cocoons) and the cycle continues.

According to the University of California Integrated Pest Management website, "There are several important naturally occurring parasites that help control hornworms in tomatoes. Hornworm eggs are attacked by *Trichogramma* parasites and the larvae by *Hyposoter exiguae*."

Should you find a hornworm with white egg sacs covering its back, leave it. These are the egg sacs of the parasitic wasp *Braconid* and you want the eggs to hatch. These are natural predators that not only will defend your garden from this hornworm, but many other garden pests.

Conserve natural enemies by avoiding disruptive pesticides and providing plants that attract beneficial insects.

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THE CURIOUS GARDENER

...A QUARTERLY NEWSLETTER PUBLISHED BY THE UNIVERSITY OF CALIFORNIA COOPERATIVE EXTENSION AND THE UC MASTER GARDENERS OF PLACER AND NEVADA COUNTIES

# CONTROLLING RODENTS: BAITS, HOW THEY WORK, DANGERS INVOLVED

**Lynn Lorenson**  
Nevada County  
Master Gardener

**T**oxic baits use different poisons or chemicals. Label directions must be followed exactly to avoid violating federal law. Baits are divided into two classes: anticoagulants and non-anticoagulants.

Poison baits from the past such as arsenic are no longer registered for use. Current baits are more effective and are formulated in ways that make for safer use.

## Anticoagulant Baits

Blood-thinner types of baits for homeowner use kill after multiple feedings by causing internal hemorrhaging.

The US EPA has removed the most toxic anticoagulants that kill in a single feeding for use by the consumer. Consumer products may no longer contain the most toxic and persistent pesticide active ingredients, the second-generation anticoagulants: **broadifacoum, difenacoum and difethialone**. These products are now only available for use in the home & landscape by professional pest control operators.

Warfrin was one of the first anticoagulants used in rodent baits. The exclusive use of this chemical resulted in Norway rats and some mice developing a resistance. Five other anticoagulant baits are registered for use. Choose one of these for greater effectiveness. **These baits are among the safest for use where the rodent may be consumed by pets or wildlife.** Consuming one carcass will not

cause blood thinning in the scavenger.

## Non-Anticoagulant Baits

Non-anticoagulant baits use different modes of action. They are more toxic to humans and wildlife. These baits kill in a single feeding. The animal stops eating and dies within hours or up to two days.

The chemical Bromethalin causes nervous system depression and death from asphyxia. Cholecalciferol results in hyperkalemia, an excess of calcium in the blood, that causes fatal cardiac arrhythmia.

Strychnine alkaloid has long been used for rodent control. It is especially effective for pocket gophers. **It may only be used under ground.** This neurotoxin blocks neural transmission. Death is from asphyxia from respiratory paralysis.

Zinc phosphide causes phosphene gas to be released in the stomach followed by convulsions and death from asphyxia. There is more potential for secondary kills of pets and wildlife when using these acute baits, especially if the scavenger eats the stomach contents.

Refer to UC Pest Notes for habitat modifications & wildlife impacts before using baits. Check with the county Agricultural Commissioner for any questions. Toxic baits that are sold for homeowner use must be in tamper proof stations to protect children.

The US EPA now requires consumer rodenticides to be formulated in a block or paste rather than in a pellet form.

Failure of baits to control rodents can result from too short of an exposure, improper placement, bait stations too far apart, the control area too small, spoiled bait, or an abundance of good food and habitat. Follow the label *exactly* for safe and effective use.

## Hit Them on All Fronts

Baits should be part of a integrated approach that include habitat modification, exclusion, traps and biological control. Feral cats are not the best choice. All cats have a negative impact on the bird population especially ground nesting species like quail. A better choice is a rat terrier breed of dog.

Hawks, owls and snakes can keep animal pest populations down. They will NOT eliminate them all. A predator's choice is to hunt where there is an abundance of food. Encourage owls and hawks by installing nest boxes and perches. In Nevada County, nesting boxes are available at the NC Resource Conservation District office.

## References

*UC Pest Notes*  
<http://www.ipm.ucdavis.edu/PMG/PESTNOTES/pn7433.html>

*Overview of Controls, Why they Work & How they Function Toxicants.*  
K. Fagerstone. USDA/APHIS/WS/NWRC

*NCRCD nest boxes: (530) 272-3417 ex. 104 or ncrcd.org*

# BULLETIN BOARD



## Fall Plant Sale

The Nevada County Master Gardeners will hold:

Annual Fall Plant Sale

Saturday, October 13th

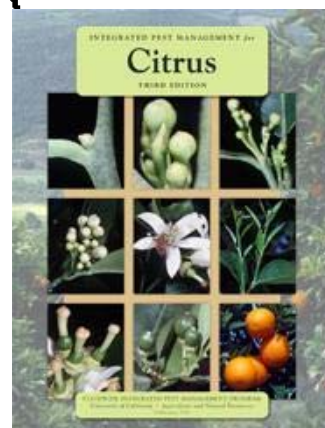
9am to Noon

at their Demonstration Garden (1036 W. Main, Grass Valley—on NID grounds).

## 19th Annual Mountain Mandarin Festival

November 16, 17 and 18  
@  
Gold Country Fairgrounds in Auburn

[www.mandarinfestival.com](http://www.mandarinfestival.com)



Just Released!!  
Integrated Pest Management for Citrus  
3rd edition

[anrcatalog.ucdavis.edu](http://anrcatalog.ucdavis.edu)

## Sierra College Community Education

- Build A Greenhouse, October 20th, 2012, from 9am to Noon, Nevada County
- Establishing a Small Vineyard, October 23 and 25, 6pm-9pm, Secret Ravine
- Growing Citrus in the Foothills, November 3rd and 10th, 9am-1pm, Rocklin

# NATURAL HERBICIDES: ARE THEY EFFECTIVE???

**Cheryl Wilen**  
UC IPM Advisor  
South Coast Area

The public's increasing demand for safe "green" products has resulted in many new environmentally friendly herbicides for controlling weeds in the garden and landscape. Information on the efficacy of these new products is limited. However, environmental awareness groups and public agencies are promoting them as a way to reduce the use of herbicides that have a greater potential to contaminate surface waters.

Retailers are beginning to more widely stock these "natural" herbicides, most of which contain essential oils or other natural plant extracts targeting weeds.

The majority of these "green" weed-control products are botanically based oils (e.g., clove oil, eugenol, and *d*-limonene), soaps (e.g., pelargonic acid), or acetic acid that control weeds by destroying the leaf cuticle or causing cell leakage that rapidly leads to death.

Unfortunately, because these herbicides kill only green parts of the plant they contact, they don't provide long-term control of weeds with extensive root systems or underground storage structures such as rhizomes, tubers, or bulbs. Thus many treated plants are able to recover. (In contrast, some conventional herbicides such as glyphosate or 2,4-D are translocated to roots or underground storage structures to kill larger plants and perennial weeds.)

These types of herbicides are applied after the weeds have emerged (postemergent) and have

little or no soil residual activity. They don't control weed seedlings that germinate after application. They kill the plants by breaking down plant membranes and are considered contact or burndown herbicides. These herbicides are very fast acting, but to be most effective they must contact all or most of the aboveground plant tissue. It is especially important to spray the growing points, or else the plant will regrow. Grasses and perennial weeds are difficult to control for an extended period of time, because they have some or all of their growing points below ground.

However, in some cases, especially where annual weeds are small, these products may be appropriate. These herbicides are best used on small weeds and annual weeds or for controlling weeds in cracks and, in some cases, edging. They can be used for spot spraying, but care must be taken that the spray or drift doesn't contact desirable plants or else leaf spotting or death will occur.

## Increasing the Odds

Ways to improve efficacy when using these types of herbicides include:

- ✦ Good spray coverage;
- ✦ Application in warm weather (75° to 80°F);
- ✦ If using concentrates, addition of surfactants that improve weed control;
- ✦ Treatment when weeds are small; and
- ✦ Repeat applications for larger weeds, in most instances.

## Corn Gluten Meal

Another common natural herbicide is corn gluten meal (CGM). While the previously listed herbicides are postemergent types, CGM is sold as preemergent herbicide.

Although being widely touted as an effective herbicide that will control seedlings as they germinate, we have conducted numerous tests with this product and haven't been able to get results that justify its use as an effective preemergent herbicide. For example, there were no differences in the time needed to remove weeds from plots treated with CGM than from plants that were handweeded or from plots that were not subjected to any other treatment.

So the question is: Are natural herbicides safe and effective? If used as part of an integrated pest management program, the contact herbicides fit very well.

Users should know that they won't get the same kind of long-term weed control as products containing glyphosate (e.g., Roundup). The user should also be aware that many of the plant based or "natural" products can cause skin irritation or eye or lung problems.

Eye protection and gloves as well as any other label requirements should be worn when using these natural herbicides, even if they are listed as exempt products. **Note that some of the acetic acid products can be quite hazardous to handle.**

# CROP ROTATION IN THE HOME VEGETABLE GARDEN

**Margaret Teague**  
Nevada County  
Master Gardener

Have you ever planted tomatoes (or any other vegetable) in the same location year after year then wondered why the quantity and quality of your yield declines with each passing year? Or, why the insect damage to your vegetable plants seems to get worse each year? If so, it is likely because disease organisms and insects are building up in your soil due to not rotating crops.

Practicing crop rotation, instead of repeatedly planting the same vegetable in an area, may help you to reduce disease and insects thereby improving your yield. Crop rotation is practiced by changing the location or bed within your garden in which you plant a particular vegetable or vegetables of the same family from season to season.

Crop rotation is effective because many plant disease organisms that attack and thrive in some plants families but not others, are soil borne. These diseases may persist and build up in the soil for several years because a susceptible host is present season after season. Also, insect populations and resulting plant damage may increase because the insects thrive on or prefer plants of a particular family.

For example, problems such as nematodes and verticillium wilt can increase in severity when crops in the same family or susceptible crops are repeatedly planted in the same location. Changing the location where you plant vegetables of a family each year, as well as, planting VFN (Verticillium, Fusarium, Nematode)

resistant plant varieties, when available, will help to reduce the severity of problems. This practice will also encourage a wider variety of beneficial microbes and insects in your garden which should help you to reduce problems caused by diseases and soil pests. The result will be a more trouble-free and productive garden, giving you more time to enjoy it.

Another reason for rotating crops is to improve nutrition. Because vegetables in the same family use many of the same nutrients, repeatedly plant the same vegetables or related vegetables in the same family can potentially cause nutrient deficiencies. Crop rotation will help you avoid such nutrient deficiencies in your soil.

Managing crop rotation need not be difficult. One method you may wish to try is to make a list of the vegetables you wish to grow each season then divide the list into families and the season during which you will grow them.

The families of vegetables commonly grown in Nevada and Placer Counties are:

*Amaryllidaceae* (onion)  
*Chenopodiaceae* (goosefoot)  
*Compositae* (lettuce)  
*Cruciferae* (mustard)  
*Cucurbitaceae* (cucumber)  
*Gramineae* (grasses including corn)  
*Leguminosae* (legume or pea)  
*Solanaceae* (nightshade)  
*Umbelliferae* (parsley).

The common vegetables in each family are:

***Amaryllidaceae*  
(Onion Family)**

chives  
garlic  
leek  
onion  
Shallots

***Chenopodiaceae*  
(Goosefoot Family)**

beet  
chard  
spinach

***Compositae*  
(Composite Family)**

endive  
globe artichoke  
Jerusalem artichoke  
lettuce

***Cruciferae*  
(Mustard Family)**

broccoli  
Brussels sprouts  
cabbage  
cauliflower  
Chinese cabbage  
kale  
kohlrabi  
mustard greens  
radish  
turnip

***Cucurbitaceae*  
(Gourd Family)**

cucumber  
melon  
pumpkin  
squash

***Gramineae*  
(Grass Family)**

corn

(continued on Page 6)

(continued from Page 5)

**Leguminosae  
(Legume or Pea Family)**

beans  
peas

**Solanaceae  
(Nightshade Family)**

eggplant  
tomato  
pepper  
potato

**Umbelliferae  
(Parsley Family)**

carrot  
celery  
parsley  
parsnip

Once you have your list by families and seasons, draw a map of your garden and divide it into areas.

Dividing into four equal areas works well because you can easily rotate so that the same family is not planted in an area until the fourth year.

For example, vegetable families can be planted in areas as follows:

**Spring 2013**

Area 1: *Solanaceae* (nightshades, i.e., tomatoes and peppers)  
Area 2: *Leguminosae* (legumes, including peas)  
Area 3: *Cucurbitaceae* (cucurbits)  
Area 4: *Gramineae* (corn)

**Fall 2013**

Area 1: *Amaryllidaceae* (onions)  
Area 2: *Cruciferae* (mustard)  
Area 3: *Umbelliferae* (parsley)  
Area 4: *Compositae* (lettuce)

**Spring 2014**

Area 1: *Gramineae* (corn)  
Area 2: *Solanaceae* (nightshades)  
Area 3: *Leguminosae* (legumes)  
Area 4: *Cucurbitaceae* (cucurbits)

**Fall 2014**

Area 1: *Compositae* (lettuce)  
Area 2: *Amaryllidaceae* (onions)  
Area 3: *Cruciferae* (mustard)  
Area 4: *Umbelliferae* (parsley)

If you continue rotating in this manner, the same family of vegetables will not be repeated in an area until 2017.

To further improve your rotation plan and extend the period of time before vegetables of the same family are planted in the same area, you may wish to add to your rotation, a cover crop such as alfalfa, clover, and/or vetch. Adding these cover crops will fix nitrogen in your soil as well as add organic matter to it when you work the cover crop into the soil.

By following a rotation plan you should experience improved yield and quality as well as a reduction in pests.

**References**

UC Master Gardener Program, "Crop Rotation," [http://ucanr.org/sites/sacmg/Crop\\_Rotation/](http://ucanr.org/sites/sacmg/Crop_Rotation/)

UC Master Gardener Program, "Vegetables & Sustainable – The Garden Web", [ucanr.org/sites/gardenweb/Vegetables/?uid=6&ds=462](http://ucanr.org/sites/gardenweb/Vegetables/?uid=6&ds=462)

"Using Crop Rotation in Home Vegetable Garden", Doug Higgins & Kristin Krokowski, University of Wisconsin Extension, Waukesha County, XHT1210, <http://hort.uwex.edu>



**The 2013 Placer County Master Gardener Calendar is here!!!** We are busting gardening myths all throughout the year!

- For **first-time gardeners** wondering where to start, it includes a "What to Plant" list every month.
- For **novice gardeners**, the Master Gardener Hotline number and the University of California Integrated Pest Management website are listed each month as resources.
- For the **avid gardener**, reminders of important gardening tasks to be performed each month are included.

For **all gardeners**, the articles, references, and "In Season at the Market" section provide a wealth of practical, research-based garden information specifically for our region!

Find out where to buy here:  
<http://pcmg.ucanr.org>



# FALL 2012 CALENDAR



## OCTOBER

Saturday, October 6th from 10am-Noon at NC Master Gardener Garden (1036 W. Main, GV):  
***Pruning and Seasonal Prep for Ornamentals/Landscape Trees and Shrubs***

Saturday, October 13th from 9am-11am at PC Master Gardener Garden (11477 E Ave. Auburn):  
***Composting and Vermiculture***

Saturday, October 13th from 9am-Noon at NC Master Gardener Garden (1036 W. Main, GV):  
***FALL PLANT SALE!!!!***

Sunday, October 14th from 10am to 5pm at local farms throughout Placer County:  
***Placer Farm and Barn Open House, visit [www.placerfarmandbarntour.com](http://www.placerfarmandbarntour.com)***

Saturday, October 20th from 10am-Noon at NC Master Gardener Garden (1036 W. Main, GV):  
***Bare Root Planting***

## NOVEMBER

Saturday, November 3rd from 10am-Noon at NC Master Gardener Garden (1036 W. Main, GV):  
***Plan and Plant a Home Orchard***

Saturday, November 10th from 10am-Noon at NC Master Gardener Garden (1036 W. Main, GV):  
***Composting***

Friday, Saturday, Sunday, November 16-18 at Gold Country Fairgrounds (Auburn):  
***Visit the Placer County Master Gardeners at the Mountain Mandarin Festival***

Saturday, November 17th from 10am-Noon at NC Master Gardener Garden (1036 W. Main, GV):  
***Pruning Backyard Fruit Trees***

**For More Information, call Placer MG Hotline (530)889-7388 or  
Nevada Co MG Hotline (530) 273-0919**





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