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**Vegetable Crops Calendar**


**Commercial Vegetables**

Controlling Vertebrate Pests in Vegetables

Insects are usually our primary concern in protecting vegetables from pests. But many species of wildlife are fond of foraging on vegetable crops. Birds and rodents feed on seeds at the time of planting. Fruits and melons are attacked by rats, raccoons, coyotes, and birds. The leaves and stems of many vegetables are eaten by rabbits and deer. Pocket gophers ("sandy-mounders") and pine voles will feed on root and tuber crops. Commodity crops like corn, peanuts, and soybeans are eaten by deer, raccoons, and hogs. In this article, I will attempt to give you some useful suggestions. This is by no means a comprehensive list of solutions to nuisance vertebrate situations.

Deer and rabbits are browsers on numerous plants. The simplest solution is not to plant those species that deer and rabbits prefer to eat. Plants like Indian hawthorn, roses, hibiscus, yews, etc. are deer candy and should be avoided as landscape plants in deer country. For the vegetable producer, plant selection is often limited to highly palatable species, so other solutions such as exclusion and repellents are needed.

Exclusion is a good, permanent solution; but it can be difficult and is often expensive. Rabbit fences only have to be 2-3 feet tall and can be made of inexpensive wire fencing. Deer fences made of wire need to be 8 feet tall (6 feet tall if the fence is installed at about a 60° angle). Solid fences, such as wood privacy fences, only need to be 6 feet tall because deer will not willingly jump over a barrier if they can't see the other side. The bottom of woven wire fences should be held firmly to the ground, with stakes if need be. Wooden fences in contact with the ground should be made with pressure treated lumber to reduce termite damage.

Electric fences can be very useful for keeping deer, hogs, raccoons, bear, and coyotes out of fields or gardens. An excellent overview of electric fence design is available in the chapter on deer in the "Prevention and Control of Wildlife Damage Handbook" produced by the University of Nebraska. This excellent reference on all kinds of wildlife problems can be ordered through the Internet for $40.00 for the book or CD-ROM or $60.00 for both at http://www.ianr.unl.edu/pubs/hand.

Chemical repellents. There are numerous chemicals that will act to repel nuisance wildlife. The advantages of chemical repellents to reduce nuisance wildlife damage are that they are often simple to use and may be the only option to discourage wildlife feeding on valuable plants. The disadvantages of the use of chemical repellents are that it is only a temporary solution and may be expensive over a long period. Below is a list of the active ingredients used in animal repellents. Many of these compounds cannot be used on vegetables. Always read the entire label to be sure the repellent is approved for use on human and animal food plants. This will save you money, protect plants, and protect the environment. Many of these ingredients have other functions in the yard or garden. Look for these compounds in the list of active ingredients on any repellent you are considering. Remember to always follow the label directions when using any pesticide. It is a violation of the Federal Insecticide, Fungicide, and Rodenticide Act to use any pesticide for any purpose not listed on the label.

Ammonia soaps of higher fatty acids are used to repel deer and rabbits from fruit trees, vegetables, field crops, and ornamental plants. These are the deodorant soaps. Soap sprays are used or bars of soap may be hung in trees or over plants to be protected.

Capsaicin is the highly concentrated extract derived from hot peppers. Hot pepper animal repellent is used to deter deer, rabbits, and rodents from feeding on ornamental, fruit, and nut trees and shrubs. Only use on fruit trees during the dormant season.
Check individual labels to see if the product is registered for use around vegetables. Some labels say not to use it on edible portions of food plants.

Captan (a fungicide). When captan is used to protect seeds from fungi, it also appears to deter birds from feeding on the planted seeds.

Castor oil. Used as a soil treatment, by itself or mixed with Capsaicin, to repel moles, voles, gophers, and armadillos. Some labels say “Not for use on human or animal food plants.” Check label on any product you use.

Dog hair mulch. This has been used to discourage cottontail and marsh rabbits from feeding in our demonstration gardens for up to six weeks. When we tried it to repel feral domestic or European rabbits it did not work. Dog hair is sometimes available free from dog groomers. The hair should be from a dog that has not been shampooped recently for best effect.

Dried blood meal is primarily used as a slow release nitrogen fertilizer, but it has been used as a folk remedy rabbit repellent in gardens.

Methyl Nonyl Ketone is used as a repellant for nuisance wildlife and stray cats and dogs, as an anti-cribbing agent for horses, and as a pet training aid.

Naphthalene (moth balls) is primarily used as a repellent for clothes moths and is an ingredient in repellents used for rabbits, squirrels, bats, birds and, when mixed with sulfur, snakes. It is of limited use in open areas like gardens. In Florida’s heat it also dissipates quickly and has to be continually replaced.

Putrefied whole egg solids are used in repellents to deter deer and elk from browsing on ornamental plants and non-bearing fruit trees. Some labels say “Not for use on human or animal food plants”. Check label on any product you use.

Ro-Pel or Bitrex (Benzyldiethyl [(2,6 xylyl carbamoyl) methyl] ammonium saccharide and Thymol) is an extremely bitter substance that is a very effective feeding deterrent of rabbits, deer, some rodents, raccoons, opossums, birds, etc., on ornamental plants, garbage bags, and any situation where the animal will bite or chew a surface. It is not for use on human food plants. This product is not permitted on certified organic produce.

Thiram (a fungicide) has been used in repellents for deer, rabbits, dogs and cats, and moles.

Urine (e.g., human, coyote, fox, lion). The smell of predators has been used for millennia to repel garden pests. Deer are repelled by human urine only in areas where they are hunted. In suburban areas, deer are not repelled by human or dog odor because they are around it all the time.

Ziram (a fungicide) has been used as an ingredient in repellents for deer and rabbits.

Frightening devices. The scare crow is the classic example of a startle device. The current arsenal of products meant to scare nuisance birds and mammals is formidable. Models of owls, hawks, cats, snakes, and humans are available. These models are only effective if they are moved often. A rabbit soon learns that a plastic hawk that never flies from its perch is not much of a threat. Kites and balloons with startling eye patterns move with the wind to give the appearance of life. Reflective mylar streamers move and undulate like snakes in the weakest breeze. Alarms, flashing lights, recorded bird distress calls, propane cannons (automatic gas exploders), and pyrotechnics like shellcrackers, fireworks, and whistle bombs are available. They are most effective when used in a random, unpredictable pattern. Some systems use motion detectors to activate the startle device when the nuisance animal approaches. This makes the system much more effective. Devices that produce a constant sound or light are rarely effective for long. Animals will adapt to a constant sound, whether audible or ultrasonic, as long as the attractive conditions persist.

Ultrasonic devices often fail to repel nuisance animals because they generally produce a constant sound and due to the limitations of ultrasonic waves themselves. Ultrasonic waves, like light, do not go around or through objects but are reflected; and this creates shadows. Animals learn the location of these sound shadows and utilize these areas. Another problem with ultrasound devices is that our pets, especially dogs, can hear these frequencies even if we cannot. The use of some ultrasonic pest repellers has been linked to hearing loss in pet dogs.

Raccoons and coyotes that are causing damage to fruit and melon crops can be live trapped or shot. Steel leg-hold and body-gripping traps are illegal in Florida without special permits from the Florida Fish and Wildlife Conservation Commission. The use of snares on private property is legal. If you plan on shooting depredating wildlife at night with anything other than naturally available light, you
need a Gun and Light Permit from the Florida Fish and Wildlife Conservation Commission. Light from a permanent security light on a pole would be legal; but a flashlight, headlight, spotlight, or light from a vehicle would be illegal. One farmer I heard about made almost as much selling the raccoons he trapped for meat as he made on his watermelon crop. If you plan to sell any part of nuisance fur-bearing animals, you have to have a Trapping License. If you are just protecting your crop on your property and will not be selling any animal parts (fur, meat, skulls, etc.), no licenses are needed. Electric fences can also be effective at keeping large and medium-sized animals out of crops and gardens.

Roof rats (a.k.a. fruit rats or citrus rats) are pests in citrus (except lemons and limes), mangos, papayas, lychees, tomatoes, melons, grapes and other fruits as well as a serious pest of sugar cane. Roof rats are controlled by trapping and use of poison baits held in tamper-proof bait stations. By law, all rat poisons must be kept and used in areas inaccessible to children, pets, livestock, and wildlife or kept in tamper-proof bait stations. Tying blocks of rat poison in the branches of trees is illegal. Isolated fruit trees can be protected with rodent guards around the trunks. Elimination of harborage sites, like improperly stored construction materials and farm machinery, and mowing to prevent areas from becoming overgrown will decrease rodent populations and increase the success of predators like hawks, owls, snakes, foxes, bobcats, and even domestic dogs and cats.

Hispid Cotton Rats are hamster-sized native rodents with salt-&-pepper colored fur and a medium long tail (3-4 inches). They fill the ecological niche of the meadow vole here in the Southeast. I tell people to think of a cotton rat as a long-tailed bunny. They feed on grasses and herbaceous plants. Cotton rats are a pest in sugar cane and occasionally cause some damage in truck crops, like green beans, peas, young sweet corn, etc. They can be controlled by many of the same methods used for rabbits. Keeping edges of fields and between rows mowed will help by reducing cover and increasing predation success of hawks, owls, and other natural predators.

The Southeastern pocket gopher (a.k.a. 'sandy-mounders') and pine voles are the two burrowing native rodents that occasionally cause damage to root and tuber vegetables. Southeastern pocket gophers occur in upland habitats with deep well-drained sandy soil throughout the state. Gophers can cause some damage to carrots, beets, potatoes, yams, and various ornamental plants, but this damage is scattered. The primary food of gophers in Florida is rhizomes of bahia grass in pastures, yards, and roadsides. Pocket gophers can be excluded from small garden plots with buried fences or hedges of repellent plants like oleander or castor bean. Be aware that castor bean can become an invasive weed. Fences intended to keep out voles and pocket gophers are constructed by having a small mesh hardware cloth fence extended 2 - 3 feet below the surface and 6 inches to 1 foot above the surface. Pocket gophers can be removed by trapping with special gopher traps. If any poison is used (poison pellets, poison peanuts, burrow fumigant, or gopher gasser) to control pocket gophers, then a Permit to Poison Wildlife from the Florida Fish and Wildlife Conservation Commission is required to legally use these products. When I asked the Law Enforcement Division about why stores could sell these products, the answer came back, "It's not illegal to sell it, it is only illegal to use it (without a permit).

Pine or woodland voles are mouse-sized native rodents that live at or below the forest surface under the leaf litter. They are a forest species confined to hardwood hammocks and pine woods in north Florida and the Panhandle. Up north, they are pests in orchards in winter, feeding on the bark of apple trees under the snow. In Florida, they seldom cause problems in gardens. Small garden plots and flower beds in forested yards can be protected from vole damage with underground fences described above.

Several types of vibrating devices are sold for repelling moles, voles and gophers. These include wind-driven devices and electronic devices. These vibrations are intended to drive moles or gophers from the immediate area of the device. The effectiveness is an individual response. Consider the analogy of people who have a jet airport or train track built near their house. Some people may be driven out while others learn to adapt to the noise. Animals act the same way. An animal may be driven out or it may learn to tolerate the vibrations. Since pocket gopher mounds are often seen very close to major highways, I tend to question the effectiveness of these devices on gophers.
I hope these suggestions will help you better protect your fruit and vegetable crops in the future. You can also plant a little extra parsley for the black swallowtail butterflies and an extra row of beans on the outside of the fence for the rabbits.

*(Kern, Pinellas Co., Vegetarian 99-07)*

**Tomato Institute Program**

**September 8, 1999 - Naples**

1:50 p.m. Impact and management of TYLCV in Southwest Florida - Phil Stansly, Entomologist, SWFREC, Immokalee

2:10 p.m. Phytophthora capsici on tomato: Survival, severity, age, and variety- Pamela Roberts, Plant Pathologist, SWFREC, Immokalee

2:30 p.m. Tomato little leaf revisited - Steve Olson, Horticulturist, NFREC Quincy

2:50 p.m. The critical period of nutedge interference in tomato - Bill Stall, Weed Specialist, Hort. Science Dept., Gainesville

3:10 p.m. Farmworker Income - Fritz Roka, Economist, SWFREC, Immokalee

3:30 p.m. NAFTA, FTAA, Agenda 2000 and GATT - International trade and competitiveness issues for Florida tomato growers - John VanSickle, Economist, Food and Resource Economics Dept., Gainesville

*(Vavrina, Vegetarian 99-07)*

**Gardens In A Sack**

Have the most fun and the least fuss by growing plants in bags using a technique that is a cousin to hydroponic culture. Buy sterile potting soil, and let the bag it comes in be the container. Or mix your own potting medium in a thick plastic garbage bag.

Put a bag on a balcony, patio or vacant lot. It's portable, so the location can be temporary. Once a crop is finished, grab the sack and run. Many gardeners won't settle for just one bag but will plant several, each with a different crop.

Any flat surface in a sunny place can be the growing area. If the surface is soil, keep down competition from weeds and reduce contamination by stretching out a sheet of plastic before placing the bags flat on the ground.

Cut two slits about an inch long on the sides near the bottom of each bag for drainage. Slit the top of the bag, or make an X in the top, for growing seeds or transplants. Each bag can hold one or more plants depending on the room needed by the vegetable.
Crops such as tomatoes, peppers, cucumbers and melons usually are installed as transplants; lettuce, beans, carrots and corn often are sown directly in the bags of soil.

Water and fertilizer tell most of the rest of the story. Gardeners who water by hand should check daily to see if the growing medium needs moisture.

However, bag culture lends itself to the more carefree system of drip irrigation. Kits, available from garden centers, are quick and easy to install. Place an emitter at each bag and the watering is accomplished by turning on the faucet. Better yet, set a computerized timer on the faucet and escape for the weekend, worry-free.

During the less stressful months, plan to water about twice a week for 20 minutes at a stretch. When plants are large, and during hot, dry weather, set the system to turn on every day or two. Monitor results and fine-tune the schedule as needed.

To keep them growing vigorously, plants in bags will need regular doses of fertilizer. Check to see that soil is moist, then soak individual sacks twice a week with half-strength solution of 20-20-20. Make maintenance easier by supplying fertilizer through the drip irrigation system.

Fertilizer tablets and other concentrated products made for this purpose can be found at garden centers. Follow manufacturers' instructions.

Vigorous plants may need vertical support. Maximize use of space by finding ways to hold cucumbers, tomatoes and other vining crops up off the ground. Bag culture is so easy that this may be the most time-consuming task connected with it.

Expect the usual pests, except that nematodes and other soilborne organisms should not be a problem. To reduce threatening infestations, follow pest control suggestions in the University of Florida Vegetable Gardening Guide SP 103.

When one crop finishes, be ready with the next. Bags of soil can be used again. Sift out old stems and roots and replant. A clean bag of soil can produce several harvests before the soil becomes contaminated and it is time to add it to the in-ground garden or the compost pile.

(MacCubbin, Orange Co., Vegetarian 99-07)

Biological Stimulation of Plant Growth of Vegetables in Florida.

Back in March, the Vegetarian reported on the chemical stimulation of plant growth with cytokinins, auxins or gibberellins commonly present in products called biostimulants. Recently however, several biological preparations designed to suppress soil borne disease such as Gliocladium virens (SoilGard), Trichoderma harzianum (RootShield), and Bacillus subtilus (Kodiak), have been shown to measurably increase plant growth as well. Apparently, colonization of the target plant's root system by the biological initiates a cascade of biochemical pathways (e.g., phytoalexins, pathogenesis proteins, lignification, salicylic acid, vitamin complexes, etc.) within the plant thereby activating a state of systemic acquired resistance (SAR) or induced systemic resistance (ISR).

The increase in host plant biochemical activity seemingly impacts some aspect(s) of plant growth regulation as evidenced by growth promotion in the greenhouse (Fig. 1).

**Fig. 1. Pepper Growth Enhancement from Treatment with a Bacterium**

![Graph](image1)

LSD = 0.05, Transplants at six weeks after seeding.

**Fig. 2. G. virens effect on tomato plant in-field dry weight 30 DAP**

![Graph](image2)

Data sig. p < 0.08
and improved stand establishment in the field (Fig. 2). Field research in this area is relatively new so the volume of available yield data is fairly small, however results from our work (Vegetarian 98 - 11) and that of Datnoff (Proc. Tomato Inst., 1998) with several different biologicals is encouraging. In fact, plant growth enhancement by PGPR (plant growth promoting rhizobacteria) is not new. Joe Kloepper (Auburn University) has been working in this area for years and has developed a very nice electronic newsletter on PGPR’s which can be found at: http://www.ag.auburn.edu/pgpr/editorletter.html

Further field research is necessary on systemic acquired resistance (SAR) but if the effects are real, the question then arises, "why apply manmade chemicals to induce plant growth and yield responses when mother nature can do it for you, and do it more consistently and continuously?" But don't count the snake oils out yet! French researchers have recently found that extracts of Ascophyl/um nodosum, the seaweed of choice in many biostimulant products, may also invoke SAR-like responses in plants. Lizzi (Phytoma, 1998) has shown both foliar sprays and soil drenches of A. nodosum can retard the spread of Phytophthora capsici in pepper. Furthermore, we have preliminary data that indicates this same seaweed extract promotes root growth in watermelon transplants compared to the control.

Surely more research is needed before these biological and chemical routes of plant growth enhancement in vegetables can be honed into a best management practice. However, results from all sectors are encouraging enough to warrant further research. As our understanding increases of how these aspects of plant growth regulation fit together we will be better able to serve agriculture through the proper manipulation of this diverse complex of approaches.

(Vavrina, Vegetarian 99-07)

**Vegetable Gardening**

Update Scoring Table for a Largest-Vegetable Contest

Many of you Extension workers will want to hold a contest for gardeners who grow the biggest vegetable. Fairs are the usual places to conduct such events. Two popular ones held annually in Florida are at the South Florida Fair in West Palm Beach, and the Urban Gardening Harvest Fair in Jacksonville.

Please do not confuse these contests with the record-keeping I do on the state's largest vegetables ever grown. There is no competition in the latter-just a way of recording achievements.

To conduct a contest, you will need a good set of scales. Most specimens brought in will weigh between 1 and 50 pounds, although occasionally, someone will bring in a larger pumpkin or watermelon. You can cut these into parts and weigh the parts.

First, make sure the specimen is trimmed according to the rules in the table. If not trimmed properly, you may have to trim it yourself.

Second, weigh the specimen, and convert to ounces.

Third, using the table, multiply the weight in ounces by the number of points given per ounce. The attached table is revised for 1999. It reflects Florida's biggest specimen (current) for each kind of vegetable. The table is calibrated so that different kinds may be compared, i.e. a tomato versus a pumpkin.

For example, a person brings in a tomato that weighs 2 pounds (32 ounces) while someone else has a 32 ounce summer radish. Which one wins? Just follow the table. The tomato wins because it generates 2.1 points per ounce (for a score of 67.2) as compared with the radish’s 1.7 points per ounce (for a score of 54.4).
Revised Scoring Table for Big Vegetable Contests in Florida

<table>
<thead>
<tr>
<th>Vegetable</th>
<th>Supersize (Lbs)</th>
<th>Points Per Ounce</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beet</td>
<td>8.0</td>
<td>0.8</td>
</tr>
<tr>
<td>Boniata</td>
<td>12.0</td>
<td>0.5</td>
</tr>
<tr>
<td>Broccoli</td>
<td>5.0</td>
<td>1.3</td>
</tr>
<tr>
<td>Cabbage</td>
<td>20.0</td>
<td>0.3</td>
</tr>
<tr>
<td>Calabaza</td>
<td>30</td>
<td>0.2</td>
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<tr>
<td>Carrot</td>
<td>3.0</td>
<td>2.0</td>
</tr>
<tr>
<td>Cassava</td>
<td>10.0</td>
<td>0.6</td>
</tr>
<tr>
<td>Cauliflower</td>
<td>15.0</td>
<td>0.4</td>
</tr>
<tr>
<td>Corn, sweet</td>
<td>3.0</td>
<td>2.0</td>
</tr>
<tr>
<td>Cucumber</td>
<td>4.0</td>
<td>1.6</td>
</tr>
<tr>
<td>Celery</td>
<td>4.0</td>
<td>1.6</td>
</tr>
<tr>
<td>Eggplant</td>
<td>4.5</td>
<td>1.4</td>
</tr>
<tr>
<td>Garlic</td>
<td>2.0</td>
<td>3.1</td>
</tr>
<tr>
<td>Gourds</td>
<td>30</td>
<td>0.2</td>
</tr>
<tr>
<td>Jicama</td>
<td>20</td>
<td>0.3</td>
</tr>
<tr>
<td>Kohlrabi</td>
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<td>0.3</td>
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<tr>
<td>Lettuce</td>
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<td>1.6</td>
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<td>Malanga</td>
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<td>Onion</td>
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<tr>
<td>Pepper</td>
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<tr>
<td>Potato, Irish</td>
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<td>2.1</td>
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<tr>
<td>Potato, sweet</td>
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</tr>
<tr>
<td>Pumpkin</td>
<td>300</td>
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<tr>
<td>Radish, summer</td>
<td>3.5</td>
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<td>Radish, winter</td>
<td>20</td>
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<tr>
<td>Rutabaga</td>
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<tr>
<td>Squash, summer</td>
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<tr>
<td>Squash, winter</td>
<td>60</td>
<td>0.1</td>
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<tr>
<td>Squash, Zucchini</td>
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</tr>
<tr>
<td>Tomato</td>
<td>3</td>
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<tr>
<td>Turnip</td>
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<tr>
<td>Watermelon</td>
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<td>0.1</td>
</tr>
<tr>
<td>Winter melon</td>
<td>60</td>
<td>0.1</td>
</tr>
<tr>
<td>Yam, true</td>
<td>12</td>
<td>0.5</td>
</tr>
</tbody>
</table>

(Note: For any vegetable achieving a score of 100+, check to see if it is a state record.) For contests, weigh vegetable, convert to ounces, and multiply by points/ounce. High score wins!

(Stephens, Vegetarian 99-07)

Prepared by Extension Vegetable Crops Specialists

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