UMASS EXTENSION

Vegetable Notes

For Vegetable Farmers in Massachusetts

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CROP CONDITIONS

Two contrasting weather patterns are creating very different growing conditions in the state. In the Southeast, Northeast and much of Worcester county, as well as in the Berkshires and parts of Hampden County, conditions are slightly to very dry except for a few spots where the thunderstorms hit. Some growers have been running irrigation to keep crops in good shape. In Hampshire and Franklin Counties, in the Connecticut River Valley, this week brought one or two intense drenching storms of 3-6 inches that left fields soaked and low lying areas full of standing water. The heavy, fast rainfall dug trenches and moved soil around at every opportunity, and in some fields crops were lost from standing in the water. Heat and humidity are high everywhere, and heat loving crops are doing very well. Corn is ripening quickly. Spraying in corn has eased up temporarily for growers who are watching the flights and counts: see corn section for more detail. Overall, as one grower put it, "everything's growing nice."

--R. Hazzard

DOWNY MILDEW AND POWDERY MILDEW IN CUCURBITS

The nearest source of downy mildew is southern New Jersey; no new reports of downy mildew have come in from any closer locations. If you see symptoms which you believe may be downy mildew, please contact the Disease Diagnostic Lab, 413-577-1827.

The following forecast is from the North Carolina State University Cucurbit Downy Mildew Forecast website:

"**Forecast Summary: Tuesday, July 19**

The weather pattern over the eastern US will remain fairly static over the next two days. High pressure will remain in place over the southeast. The front sweeping in towards the northern Mid-Atlantic is expected to become washed out and will only provide a slight reduction in surface moisture. Otherwise, expect very warm temperatures and only sparse, isolated storms for the next few days.

The Forecast:

Tuesday and Wednesday: Strongly Moderate Risk to cucurbits in southern Florida from the southern Florida sources. Weakly Moderate Risk to cucurbits in eastern MD, DE, and NJ from the NJ and DE sources. Moderate Risk to cucurbits in western North Carolina from the Canton, NC source. Weakly Moderate Risk to cucurbits in eastern North Carolina from the Duplin County, NC source. Weakly Moderate Risk to cucurbits in eastern Georgia from the Mershon, GA source. Low Risk otherwise."

(NOTE: The 'low risk otherwise' refers to all of New York and New England!) However, Powdery Mildew has been observed at some locations. So -- scout cucurbit crops for both of these diseases. Scout vine crops by looking at 25-50 full grown or older leaves in the canopy. Look at the underside of the leaf where the first PM shows up as small round white fuzzy growth. If you wait till it's easy to find PM on the tops of the leaves, it will be too late to bring it under control. Of all the vine crops on the farm, zucchini usually shows symptoms first.

--R. Hazzard

HOT LINKS TO AG AND LANDSCAPE NEWSLETTERS AND WEBSITES

Below please find direct web links to Pest Messages and Management Updates from UMass Extension's Agriculture and Landscape Program. These messsages provide horticultural professionals and growers throughout Massachusetts the information necessary to manage the current insects, diseases, weeds and cultural problems occurring in the field and landscape. Management strategies are included. Also listed is contact information for the UMass Soil and Plant Tissue Testing and Plant Diagnostic Laboratories.

- **For Cranberry Growers:**
  www.umass.edu/cranberry/news/ipmmessage/ipmmess.shtml
- **For Vegetable Growers:**
  www.umassvegetable.org/alerts/pest/index.html
- **For Greenhouse Growers:**
  www.negreenhouseupdate.info
- **For Landscape Professionals and Nursery Growers:**
  www.umassgreeninfo.org/landscape_message/landscape_message.html
- **For Turf Managers and Golf Course Superintendents:**
  www.umassturf.org/mangement_updates/2005.html

- **For Tree Fruit Growers:**
www.umass.edu/fruitadvisor/healthy_fruit/index.html
- **For Small Fruit Growers:**
www.umass.edu/fruitadvisor/berrynotes/index.html
- **UMass Plant Diagnostic Laboratories:**
www.umass.edu/agland/services/plant_diagnosis.html
- **UMass Soil and Plant Tissue Testing Laboratory:**
www.umass.edu/agland/services/soil_testing.html
- **UMass Pesticide Education Programs:**
www.umass.edu/umext/programs/agro/pesticide_education/RECERTIF/recertification.hml

--UMass Extension Agriculture and Landscape Program

DOES SPRAYING FOR APHIDS CONTROL VIRUS? WHEN SHOULD I SPRAY FOR APHIDS?

I was recently talking with a vegetable grower who mentioned that he thought it was about time to start spraying for aphids. I asked if they were starting to build up in the field. He didn't know, but said he wanted to use preventive treatments to control aphids so they would not bring a virus disease into his crop. We checked plants randomly throughout the field and found no aphids. The grower decided not to spray at that time. This saved him a few hours of time, the cost of material and equipment operating costs. It only took us about ten minutes to check the field.

This is not an uncommon situation. At this point in the season, aphids are showing up in many crops, and growers are concerned about whether and when to spray. Many growers feel they must have a rigorous spraying program for aphids to protect their crops from virus diseases. All too often this practice is not effective in preventing the occurrence of virus diseases, but it is expensive and time consuming.

I think it would be helpful to briefly review some of the basics of how viruses are spread. Virus diseases require a living host, and when the host plant dies, any virus within the host plant cannot survive. (An exception is tomato/tobacco mosaic, which can survive in dead host tissue.) For the most part, viruses survive the winter in certain perennial weeds. During the growing season, viruses can be transmitted from perennials to a susceptible vegetable crop.

Most vegetable virus diseases that are important in New England are spread by insects. Cucumber beetles, thrips, leafhoppers, and nematodes can spread certain viruses, but aphids are the most important vectors (carriers). Viruses can be classified as persistent and nonpersistent. This is related to the manner in which they are spread by insects and is important in choosing an appropriate management strategy.

An insect must feed for a minimum of ten minutes to an hour to pick up a **persistent** virus from an infected host. The virus must then undergo a dormant period of at least 12 hours within the insect before it can be transmitted to another plant. Aphids will remain infective (able to vector a virus) for at least a week and maybe throughout their life. A good insect management program including pesticides can be very helpful in dealing with **persistent** virus diseases.

Aphids pick up **nonpersistent** viruses by merely probing (exploring) an infected leaf. This happens rapidly--within seconds or minutes. A dormant period is not required and the aphid can immediately transmit the virus by probing another plant. Aphids remain infective with **nonpersistent** viruses for a short time (minutes).

Systemic materials are generally the most effective insecticides available for aphid control. Systemic insecticides are taken into the plant and become present in the plant juices. Aphids feed by sucking juices from the plant, and when they do so they also ingest some of the insecticide. However, when probing a leaf an aphid is not feeding and does not ingest plant juices or insecticide. In fact, the presence of an insecticide may actually stimulate probing and cause aphids to move from plant to plant in an effort to fine a suitable feeding site. This can increase the spread of **nonpersistent viruses**.

Nonpersistent viruses are very difficult to manage. We have no pesticide that kills viruses and, as we have seen, insecticides may actually make matters worse. Eradication of perennial weeds around fields can reduce the source of the virus. The green peach aphid is not the only aphid that transmits viruses, but it is important because it is a universal vector. *Prunus* species (peaches, cherries etc) are attractive to green peach aphids. Removal of wild *prunus* such as wild cherry trees from around fields can make the area less attractive to green peach aphids.

Reflective mulch such as aluminum foil on paper have been used successfully to repel aphids and can be effective in reducing virus problems. However this material is expensive and tears easily when laying. Some of the light colored plastic mulches may be worth a try. Row covers such as Remay can keep aphids off a crop, but they are generally used during the cool days of spring whereas aphids are most active during warm weather.

Direct damage from aphids: Besides spreading virus diseases, aphids in high numbers can cause economic damage by their feeding activities. Leaf curling and yellowing or deposits of honeydew on leaves or fruit can affect crop quality or yield. For this reason it is important to manage aphids even if virus is not a concern. However, beneficial insects such as ladybeetles, lacewings, and parasitic wasps

often keep numbers low enough to prevent direct damage. Early sprays targeting aphids may actually result in further aphid outbreaks, because the natural enemies that keep them in check have been killed.

Scouting across the field gives you an estimate of current numbers. If aphids are present, check back in a few days to see if the numbers are increasing or decreasing. Note which natural enemies are present. Check undersides of leaves, including lower and mid level leaves. The following thresholds can be used to determine if insecticides are needed (sampling routine in parenthesis):

--**Pumpkin and winter squash**: 20% of leaves have more than 10 aphids (based on 50 leaves).

--**Pepper**: 10 per leaf (based on 4 leaves per plant, 25 plants).

--**Tomato:** 6 per leaf (based on 2 leaves per plant, 25 plants).

--**Potato:** 4 to 10 per leaf (based on 25-50 compound leaves; higher threshold near harvest).

--**Sweet corn**: 50% of plants with >50 aphids at emerging tassel (based on 100 plants).

When spraying for aphids, whenever possible select a systemic insecticide or one which will conserve natural enemies.

--John Howell, Rob Wick, Ruth Hazzard

SWEET CORN UPDATE

Corn is ripening fast. The more tasty varieties are ripening now and selling well. The last sweet corn plantings have emerged rapidly.

European corn borer captures show the first emergence of second generation of moths, mainly the E II (New York) strain. This flight has begun only in the warmer parts of the state: Hadley, Whately. Dighton counts are also high. However many other sites are at 0. Infestation levels in corn entering the pretassel stage or with green tassels just showing out of the whorl are very low, below threshold nearly everywhere and often just plain zero. The last of the first generation borers are done.

Corn earworm remains at zero or one in many locations. Where ECB is <7 moths and CEW is 1 or less, sprays are not needed on silk. Where ECB>7 and/or CEW=2 moths per week, weekly or six day spray schedules are needed on silk.

In the Southeast, Seekonk reported captures at one per night since Saturday, but Coventry RI reported CEW capture of 0. Two inland locations 'south of the Pike' as well as one in Hadley reported captures of 3 or 4 per week, warranting a five to six day spray schedule (see table). At these levels of CEW, synthetic pyrethroids such as Baythroid, Warrior or Capture will give excellent control, as will Spintor or Larvin. It is critical to get good coverage of silk, where eggs are laid and where the newly hatched larvae crawl rapidly into

Fall armyworm trap captures were zero at all locations scouted. No fall armyworm caterpillars were found in field scouting.

SWEET CORN TRAP COUNTS 7-15 TO 7-20

LOCATION	DATE	ECB ZI	ECB EII	%Infest*	CEW
Berkshires, W. MA/ Champlain Valley					
Westeminster, VT	7-20	0	4		0
Brandon, VT	7-20	0	0	0	0
Pittsfield, MA	7-20	0	1		0
CT River Valley					
Old Deerfield	7-20	3	3	0	0
Whatley	7-20	6	3	6	0
Hadley	7-20	0	16	0	3
N. Hadley	7-20	3	18	0	0
Feeding Hills	7-20	5	1	0	3
C.& E. MA					
Dracut	7-20	4	5		0
Still River	7-20	2	1		0
Concord	7-20	0	0	10	0
Lancaster	7-20	0	1	15	0
Tyngsboro	7-20	1	0	0	1
Northbridge	7-20	4	0	0	4
Leicester	7-20	0	2	2	0
Monson	7-20	1	0	8	1
Dighton	7-20	4	20		-
Seekonk	7-20	--	--		4**
R.I.					
Coventry	7-20	8	12		0

** % infestation with ECB in unsprayed pretassel corn*
*** Avg 1/night since 7/16*

--R.Hazzard, A.Duphily, B.Hunsdorfer, J.Mussoni

CORN EARWORM THRESHOLDS

Moths/Night	Moths/Week	Spray Interval
0 - 0.2	0 - 1.4	no spray
0.2 -0.5	1.4 - 3.5	6 days
0.5 - 1 days	3.5 – 7	5 days
1.0 - 13.0	7 – 91	4 days
Over 13	Over 91	3 days

PEPPER UPDATE

In the Connecticut River Valley north of the Holyoke Range, pepper growers should note that the threshold of >7 ECB moths per week (total E+Z) has been reached at

several locations. This several days is earlier than usual (typically we reach that level in the last week of July), which is not too surprising given the heat of the past six weeks. Sprays for ECB in peppers should begin one week after the threshold of 7 moths/week is reached: that means next week, the last week of July.

--R.Hazzard

ASIAN SOYBEAN RUST – WHAT TO LOOK FOR

You may have been hearing a lot about Asian soybean rust (SBR). Although NH is not considered to be a state with potential for serious losses due to SBR, we do have acreage planted to forage soybeans and to edible (edamame) soybeans. SBR is potentially devastating, causing severe crop losses in unprotected fields. When and if SBR does make it to MA, it is important that the 'front line' (growers, scouts, and crop consultants) know something about it. Since it is an introduced disease, it is important to map the spread of the disease, as well as the hosts. SBR has already been confirmed this year (2005) in Alabama, Florida and Georgia.

A little background information: In November 2004, the USDA's Animal and Plant Health Inspection Service confirmed the presence of SBR on soybean leaf samples taken from a Louisiana State University research farm. It was the first instance of SBR found in the United States. The identified fungus, *Phakopsora pachyrhizi*, is the more aggressive of the two fungal species known to cause SBR (the 2nd has not yet been found in the US). All soybean cultivars grown in the US are thought to be highly susceptible. Although *P. pachyrhizi* is capable of infecting more than 90 species of legumes, many more may be infected.

Symptoms: Lesions first appear as very tiny yellow, irregularly shaped spots which later turn brown or reddish as the disease progresses. Lesions are usually confined to the veins or close to the veins. Spores primarily form on the underside of the leaf. SBR causes premature defoliation resulting in fewer seeds per pod, fewer filled pods per plant, early maturity and yield losses. The early stages of the disease may be confused with several other diseases common on soybean. In later stages of the disease, the key diagnostic feature of soybean rust is the presence of eggshaped pustules that are filled with cream to tan colored spores.

What to do if you find it: If SBR moves into MA, there are some extra precautions that you will need to take.

If you suspect rust in a field:

- Take note of when and where you see it (date, field).
- Put on disposable spray suits, change and wash before moving to the next field. (Rust spores can adhere easily to clothing and boots.)
- **PLEASE** collect samples. Collect 20-30 leaves with distinct lesions; place them in a plastic bag, then in a mailing box and immediately ship to:

Rob Wick 109, Fernald Hall,
UMass Amherst, MA 01003 (413) 545-1045

Rob will verify if this is SBR (or one of the other soybean diseases), and confirm it with the Regional Plant Diagnostic Center and USDA. (This is to determine the strain of rust, which will help in developing future management programs.). Hopefully, we won't see this disease in MA. Growers on the vegetable mailing list received a copy of the Soybean Pest Alert, which has some nice photos, with this newsletter. If you didn't receive a copy and would like one, they can be downloaded from:

http://www.aphis.usda.gov/lpa/issues/sbr/Soybean_Rust_22.pdf.

Additional information can be found at the following web sites:

Pest Management Network:
http://www.plantmanagementnetwork.org/infocenter/topic/soybeanrust/

USDA soybean rust information site:
http://www.usda.gov/soybeanrust/index.shtml

USDA-APHIS (identifying soybean rust)
http://www.aphis.usda.gov/lpa/issues/sbr/SBR_IDcard_11-04.pdf

USDA-APHIS (symptoms on soybean & other legumes)
http://www.usda.gov/soybeanrust/downloads/soybean_rust_symptoms.pdf

--Adapted from a contribution by Cheryl Smith, UNHCE Plant Health Specialist

FUNGICIDES FOR PHYTOPHTHORA BLIGHT MANAGEMENT

While not considered sufficiently effective to be the sole practice for managing Phytophthora blight in pepper, tomato, eggplant, and cucurbit crops, applying fungicides can be valuable. And in 2005 NY growers have a new product. Acrobat 50WP (dimethomorph) is now registered. This is the fungicide that was available for use to manage Phytophthora blight in cucurbit crops in NY in 2000, 2001, and 2002 under emergency exemption from registration requirements (FIFRA Section 18). Other fungicides available for this disease are phosphorous acid fungicides (Phostrol and Fosphite), Gavel and OxiDate. Acrobat is registered for use on pepper, eggplant, and cucurbits for Phytophthora blight and on tomato for late blight. Applications of at 6.4 oz/A should begin when plants are 4 to 6 inches tall and before symptoms have been observed. Tank mix with a broad-spectrum fungicide containing copper, chlorothalonil, maneb or mancozeb. Use a 5-10 day spray interval, depending on favorability of conditions and whether symptoms are present, for a seasonal maximum of 5 applications. The re-entry interval (REI) is 12 hrs. and there is a 4-day

pre-harvest interval (PHI).

New phosphorous acid fungicides are more effective than Aliette. They have a 4 hr REI. Phostrol is labeled for up to 7 applications at 2.5-5 pt/A on a 7-14 day interval. Fosphite is labeled for up to 6 applications at 2-6 pt/A on a 14-28 day interval. Phostrol is not labeled for use on eggplant. ProPhyt is another phosphorous acid fungicide registered for use on these crops, but since Phytophthora blight is not specified on the label, it cannot legally be used in NY for this disease. Gavel 75DF became available for use in 2004 in NY. Gavel contains mancozeb and zoxamide, a new active ingredient that specifically targets Phytophthora and related fungi. Gavel can be used on cucumber, melon, summer squash, and watermelon but not on pumpkin. Gavel is labeled for use at 1.5 - 2.0 lb/A every 7 to 10 days or when conditions are favorable for disease for a maximum of 8 applications. Applicators need the FIFRA 2(ee) Recommendation in their possession when Gavel is used for Phytophthora blight. OxiDate (hydrogen dioxide) is labeled for use on pepper, tomato, and cucurbits beginning at planting. This material provides a quick kill of contacted spores with no residual activity. It is important to realize that none of the fungicides and experimental materials tested to date for this disease in university efficacy studies have worked sufficiently well that they could be relied on as the principal management practice for this disease. It is essential to also use cultural practices. Manage soil moisture to avoid saturated conditions which favor disease onset: subsoil between rows before the crop vines over, do not over irrigate, and make sure water will be able to drain out of the field. Scout fields for symptoms routinely, especially after major rainstorms. Include any areas where water did not drain well and near the end of irrigation pipe. When symptoms are localized in a small area of a field, disking the area is worthwhile. Begin with a border of healthy-appearing crop around the affected area.

Additional information on symptoms and management can be found at the Vegetable MDOnline website:
http://vegetablemdonline.ppath.cornell.edu/factsheets/Cucurbit_Phytoph2.htm
OR
http://vegetablemdonline.ppath.cornell.edu/NewsArticles/Phytophthora2001

--Meg McGrath
Long Island Hort Research
& Extension Center, Riverhead

PREVENTING DEER DAMAGE

The population of deer in Massachusetts continues to grow, and damage on vegetable and fruit crops can be serious. They can be very damaging in vine crops, and now that the fall pumpkins and winter squash are forming fruit, it is critical to take action to prevent damage if you are in a high deer area. Temporary electric fencing can be an effective barrier but should be installed before deer begin feeding in a field. Repellents are another option. Views on the efficacy of repellents and fences vary! One grower I have spoken with finds that applying fish emulsion to his squash crops around the time he expects deer to arrive serves as a repellent. Others questions their cost-effectiveness. If you are certified organic and selecting a repellent, check with your certifier on what is allowed. See articles below.

Deer Fencing

Fencing, the construction of a barrier between the crop and the deer, is the most effective long-term solution to deer damage. The basics of fencing apply to both electric and non-electric fencing. It is important to understand that deer can easily jump a fence 10 feet high, but much prefer not to. Deer prefer to go under or through a fence than to jump it if at all possible. Thus, the bottom wire of an electric fence should be no more than 10 or 12 inches off the ground and non-electric fences should either have an even lower bottom wire (about 6 inches) or be of mesh construction.

Fence maintenance is critical in both applications. If a tree falls on the fence or a hole is cut in the fence, the fence should be repaired immediately. Once deer have gotten inside and discovered the crop, it will be harder to keep them out, even with an electric fence. No gaps should exist in the fence, access must be provided through gates that are closed at all times. Fences should have a clear perimeter, at least 5 or 6 feet on the outside of the fence, so deer have to cross an opening before encountering the fence. This also enhances visibility of the fence to the deer. Deer will blunder into a fence placed tight to a wooded edge and can actually damage or take down sections of a fence simply because they do not see it very well, especially smooth wire designs. Having a clear border will increase the effectiveness of the fence and aid in maintenance.

Electric Fencing

Electric fencing need not be a tremendously costly remedy to deer damage. Many small fields can be protected by portable units that can be put up and taken down in half a day. Larger farmers and orchards may want to invest in permanent fences, but even here costs can be reduced by using solar chargers and having clear perimeters. For small fields of a few acres or less, portable fences either of regular electric wire or tape ("Hot Tape") will provide relief from deer. Hot tape is a wide, colored tape with several wires embedded inside. It enhances protection by being very visible to deer, even at night, while providing an electric shock on contact. As few as two strands of electric wire can be used to protect crops if it is put up immediately after planting, it is baited initially (explanation to follow), it

is always "hot", and is maintained properly (e.g., do not let weeds or grass grow up into the fence). The effect that being shocked by an electric fence has on deer behavior and their subsequent avoidance of the fence allows a landowner to use a lower fence than in the non-electric case. Baiting the fence is quite simple but enhances the deterrent powers dramatically. Deer are extremely well-insulated over most of their body with fur. Couple that with their tendency to go under or through a fence, where they are most likely to contact the fence with their back or neck and it is easy to see how deer can penetrate an electric fence and not be shocked too badly. Baiting the fence, usually with a metal tab smeared with peanut butter, will make the deer contact the fence with it's nose and tongue, wet parts that will conduct the electricity quite well. This first contact and the resulting shock on sensitive parts will educate a deer to respect the fence for quite some time. Obviously, the fence must be off to apply the tabs and bait, but turn it on immediately upon finishing. Space the tabs about 30 feet apart and keep the fence baited for several weeks after the fence is installed. When the deer have become acquainted with the fence the baits can be removed if desired. However, deer will occasionally test a fence that has shocked them and new deer may enter the area so keeping the fence baited is not a bad idea. Most important is to keep the fence hot at all times. Deer will try to go under or through the fence, thus keep the bottom wire 10 to 12 inches above the ground. In a two-wire fence, the second wire can be at a height of 30 to 36 inches above the ground. A three-wire fence can have strands at 12, 24, and 40 inches. Keep in mind that adult deer are about 36 inches at the shoulder. Fence posts do not need to be as stout as with the non-electric fence. Fiberglass posts driven into the ground at 30 to 40 foot intervals, close enough to keep the fence from sagging are adequate. It is the electric shock that provides the deterrent here, not the strength of the fence. Electric fence supplies can be found at farm supply centers or through fencing specialty companies. Three fencing specialists in the Northeast are:

- **Wellscroft Farm** 167 Sunset Hill- Chesham Harrisville, NH 03450 (603) 827-3464
- **Kiwi Fence Systems** 1145 E. Roy Furman Hwy. Waynesburg, PA 15370 (724) 627-5640
- **Walnut Grove Farm** 50 Cartland Rd. Lee, NH 03824 (603) 659-2044

Non-electric Fencing

The non-electric fence does not work as a behavioral barrier to deer the way the electric fence does; thus it needs to be constructed differently. To be effective, these fences should be a minimum of 8 feet tall. There are two styles to consider: smooth wire strands or mesh. The mesh can be either woven wire or plastic mesh, both will work well. Non-electric fences usually are permanent structures. Because the wire needs to be tensioned, the fence posts must be very secure and corners constructed carefully. Here the fence itself provides the deterrent. Deer will attempt to push through a non-electric fence and are strong enough to exploit weaknesses in fence design. The result will be a break in the fence and crop damage. Many designs exist for non-electric fencing. For stranded wire, they involve gradually increasing distances between wires as the height of the fence increases. Again, this is because deer prefer to go under or through a fence and are not likely to jump through the top strands. Keep the spacing between the lowest strands (below four feet) to no more than 10 inches, with the bottom strand about six inches above the ground.

The strands above four feet can be spaced at 15 to 20 inches. Attaching streamers or flagging to the strands increases the visibility of the fence and provides an additional deterrent. Woven wire or mesh designs are used extensively at captive deer facilities to keep deer inside pens and do just as good a job keeping deer out. The woven wire designs typically have small spaces at the bottom and progressively larger spaces toward the top. Mesh construction may be easier to maintain than stranded wire and more resistant to the attempts of deer to push through. In places where appearance is a concern, heavy-duty plastic mesh, usually black in color, can be used.

Repellents

Repellents are advertised to reduce deer damage by making the target crop taste or smell unpalatable to deer. For most problems they do not work. All repellents are billed to reduce, not eliminate, deer damage. To achieve this reduction, they must be consistently applied and reapplied as directed. If applied after deer damage has occurred, repellents likely will not repel deer from something they have already eaten. Given the amount of effort required to use repellents according to instructions, fencing is almost always a better option.

--John E. McDonald, Jr., US Fish & Wildlife, and Craig Hollingsworth, University of Massachusetts

THE FACTS ABOUT DEER REPELLENTS

Understanding How Repellents Work

Repellents disrupt and reduce instances of deer feeding on plants for a short period and must then be reapplied. Repellents are most effective when used in orchards, nurseries, gardens, and on ornamental plants. Their value for row crops and forages is limited because of their expense, application restrictions, and variable results. The use of repellents can help to protect vulnerable landscapes, but they are usually expensive and require regular application. Repellents are most effective when used as part of an Integrated Pest Management (IPM) program that may include other repellents, scare devices, fencing, vegetation manage-

ment, and population control.

Repellents fall into three categories: taste, odor, and combination taste and odor. Taste-based repellents are applied directly to plants and repel deer because of their foul taste. They are most effective on dormant trees and shrubs. New growth that occurs after treatment is unprotected. Contact repellents may reduce the palatability of forage crops and should not be used on plant parts that are intended for human consumption, unless it is labeled for that use. Since taste-based repellents require actual eating of the plant material, large amounts of damage may occur by multiple numbers of deer sampling a plant and then moving on.

Odor-based repellents repel deer by their foul smell or odor. Generally, odor-based repellent products usually outperform taste-based products. Some odor-based repellents can be applied directly to plants while others can be located near plants you want to protect. Border applications of area repellents may protect large areas at a relatively low cost. Crops grown for human consumption cannot be protected by odor-based repellents when applied directly, except for a very few labeled for that purpose.

Combination odor and taste-based repellents provide the benefits of both types of repellents and allow for a range of combinations. They are becoming more available. In areas with high deer densities and browsing pressure, crops and landscapes can be damaged if only a taste- or odor-based repellent is used and many deer sample the plants. By combining odor- and taste-based active ingredients, effectiveness may be increased. Different formulations allow the user to change the repellent and keep the deer on guard by providing a change in the range of odors and tastes.

Applying a Commercial Repellent:

Application methods for commercial repellents range from machine sprayers to manual backpack sprayers to handheld sprayers purchased at department stores. For large farms and commercial operations, machine sprayers are most economically efficient. The number of applications can be reduced by using compatible repellents (there are very few) in regularly scheduled pesticide programs. Apply repellents on dry days when temperatures are above freezing and rain is not expected for a number of hours so they can dry properly. Whereas young trees should be completely treated, limiting repellent application to the terminal growth within reach of deer (6 feet above the deepest snow) can reduce the cost of treating older trees.

Repellent applications are divided into two general classes based on the time of the damage: 1) winter or dormant season, and 2) summer or growing season. Dormant season damage is most common in nurseries, orchards, forest seedlings, residential landscapes, and Christmas tree crops. It is most difficult to control due to the lack of other food sources. Growing season damage is most common in field and row crops. Apply repellents before the anticipated periods of deer browsing. The objective is to make the planted material unattractive to deer, so that they feed elsewhere. Once a feeding pattern has been established, repellents are usually less effective. It is important to note that if no alternative food source is available or if deer pressure is too high, even the best-planned repellent program may fail. This is why it is essential to analyze your situation.

As a preventative measure, the first repellent application of a summer control program should take place within 2 weeks of bud break. During the growing season, repellents should be applied as necessary to protect new growth, usually every 3 to 4 weeks. For some crops, it may be possible to disrupt deer feeding simply by spraying a wide strip on the border of the planting. For dormant season protection, mid fall and early winter applications are recommended.

Considerations in Choosing a Specific Repellent:

Effectiveness and Longevity

Studies of the effectiveness of different repellents on nursery plant species and residential landscapes show large differences in all these factors (Tables 1 & 2). In general, it is unrealistic to expect more than 5 to 6 weeks of protection from any commercial repellent when you have high deer populations and browsing pressure during the dormant season. Protection may be longer when the conditions and seasonal factors are less severe.

Repellents can be effective for short-term forestry applications on seedlings that only need a few years of protection to grow out of the reach of deer. In agricultural applications, repellents may be suited to short-term crops such as strawberries or vegetables that only need protection during the growing season when other food sources are available for deer and they can be discouraged from frequently the target area.

Cost and Ease of Use

Repellents are not usually cost-effective in managing deer damage over a long period for either commercial growers or residential homeowners. Studies in New York have shown that the cost of a repellent spray program for reducing deer damage year round in orchards exceeds the cost of high-tensile deer fencing after only a few years. Money spent on repellent applications could be wasted if unusual weather conditions force deer to eat crops because of the loss of alternative foods.

Many residential homeowners are not as concerned as commercial growers about the cost factors and the use of repellents in residential landscapes is increasing. However, even residential homeowners will soon find that the long-term cost of repellents can be prohibitive and require repeated applications. Some repellents can be purchased as ready-to-use (RTU) or as a concentrate and then mixed with water for use as needed. In general, RTU products are

more expensive per ounce than concentrates. Purchasing larger quantities of either RTU products or concentrates will also reduce the per unit cost.

Ready-to-use products are easier to use than those that require mixing and are most popular with residential users. Some of the products have mixing requirements that make them difficult to use and may not appeal to some users.

WEBSITE UPDATE:

This week, the UMass Vegetable Program launched a new version of its website, *www.umassvegetable.org*. It has the same information as in the past – plus more! You will find many links to the New England Vegetable Management Guide for crop and pest management information. You will also find all the pest photos that are in the Pest ID Supplement of the Guide. Please bear with us as we smooth out some details, and look forward to more information coming soon! Many thanks to our programmer Christopher St-Amand and to Andrew Cavanagh for many hours of work to bring this about.

--Adapted from: Jonathan S. Kays, Regional Extension Specialist - Natural Resources, Maryland Cooperative Extension.Information provided by Rob Berghage and Jim Sellmer; Penn State Department of Horticulture; Ornamental Horticulture Extension Specialist; 103 Tyson Building; University Park, PA 16802;(814) 863-2571.Jim Sellmer, (Excerpted from a talk and paper by Jonathan Kays, Univ. of Maryland Extension)

Vegetable Notes, Ruth Hazzard, editor and Ben Hunsdorfer, Assistant Editor. Vegetable Notes is published weekly from May to September and at intervals during the off-season, and includes contributions from the faculty and staff of the UMass Extension Vegetable Program, other universities and USDA agencies, growers, and private IPM consultants. Authors of articles are noted; author and photographer is R. Hazzard if none is cited.

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