UMASS EXTENSION

VEGETABLE IPM MESSAGE

JULY 26, 2001 VOLUME 12, NUMBER 11

CROP CONDITIONS

A week of hot weather has been great for growing most crops, as long as they have had enough water. Water has been getting short in many fields, but rain is covering much of the state today and may revive crops and save growers some irrigation work. Harvest of field tomatoes and peppers is beginning, along with ongoing harvest of sweet corn, summer squash, lettuce, greens, and other main season crops.

Join us for the twilight meeting at Ward's Berry Farm, Sharon MA, July 31. See last week's newsletter for details.

FERTIGATION, CONTINUED: WATER PROBLEMS

See July 19 issue of this newsletter, for the first part of this article. Join us at the July 31 Twilight meeting to see the Trickle Irrigation Demonstration Trailer!

There is a potential for certain fertilizer materials to react with chemicals in irrigation water. If the water pH is below 7.0, there is little potential for problems, but at pH 8.0 and above, the risk is high. At levels above 40 to 50 ppm, calcium and magnesium are likely to react with phosphorus, if present in the fertilizer, causing precipitation of phosphates. If fertilizer-containing calcium is added to water with concentrations of bicarbonates above 2 meq/liter, calcium carbonate may precipitate. Sulfates in fertilizers can react with calcium in the water resulting in the precipitation of gypsum. These precipitates can clog emitters. Phosphorus- and sulfate-containing fertilizers, if needed should be applied before planting because there is no concern about these leaching. Nitrogen is the element that is most appropriate for injection into trickle irrigation water. Calcium nitrate has the potential to cause clogging if the water pH and bicarbonate levels are high as noted above. If calcium nitrate causes clogging, potassium nitrate or urea can be used as an alternative N source.

Water testing labs can analyze water for pH, calcium, magnesium and bicarbonates. You can also perform a simple test: Mix fertilizer into a container of irrigation water at the same concentration it will be after injection into the trickle system. Cover the mixture to exclude dust and let it sit for at least the length of time it will be in the system before it reaches the soil. If the water becomes cloudy or a precipitate collects on the bottom of the container, you can expect this to happen in the irrigation system with the likelihood of clogging. If it is necessary to lower the water pH, acid can be injected into the irrigation water. This requires special handling precautions and special injection equipment. Be sure to carefully follow directions to avoid personal injury or damage to crops or equipment.

--J. Howell

PEPPER

European corn borer flight is just beginning : see sweet corn. Insecticides are needed *one week after* captures reache 7 moths per week. Where **pepper maggot** is historically a problem on your farm, apply one spray of Dimethoate or Orthene for control of adults, which have been active in Southern New England for the past two

weeks. Cherry peppers are a favorite host and the stings where flies deposited eggs show up as small dimples. Scout cherry peppers as an indicator of activity in other varieties. Research in Connecticut has showed that border sprays of pepper fields can give adequate control, and perimeter plantings of cherry peppers can retain nearly all maggot fly activity to the border. Check CT phone hotline (860-870-6954) for updates on this and other pests in Connecticut. This is an occasional pest at scattered locations in Massachusetts.

--R. Hazzard, J. Boucher (UConn Extension)

SNAP BEANS

Mexican bean beetle is causing damage in snap beans. The coppery brown, spotted adults, that look like large ladybeetles, produce yellow-orange egg masses, which hatch into bright yellow, spiny oval larvae. Treat when defoliation exceeds 20% in prebloom or 10% during podding, and reapply in 7-10 days if needed. See *New England Vegetable Management Guide* for recommended materials.

A beneficial insect, ***Pediobius foveolatus,*** is now commercially available for Mexican bean beetle control. This small, non-stinging, parasitic wasp attacks and kills Mexican bean beetle larvae. The parasite does not over winter here, but provides season-long control of the beetles. This wasp has been tested in snap beans and soybeans in New Jersey and Maryland. A single release, timed so that wasps can attack bean beetle larvae, can provide control. Now is the time! Wasps reproduce in the field and are still present when the second generation hatches out. To pronounce Pediobius, say "pee-dee-oh-bee-us". To purchase Pediobius contact any of these suppliers:

ARBICO, 800 -827-2847 (AZ), http://www.arbico.com/

The Beneficial Insect Company (NC), 336-973-8490
http://bugfarm.com/

Rincon Vitova (CA), 800-248-2847
http://www.rinconvitova.com/

The Green Spot (NH), 603-943-8925

For more information on Pediobius, you can contact: Carol Holko, Maryland Department of Agriculture, Plant Protection and Weed Management Section, 410-841-5920.

TOMATO

Tomato disease forecasting (TOM-CAST) is finally up and running for the weather station at the research farm in South Deerfield. Many thanks to Joe Bergman of the UMass Psychology Dept who has helped bring this system back together! TOM-CAST measures the risk of early blight development, and gives growers an objective basis for scheduling fungicide applications. Based on leaf wetness and temperature, each day gets a Disease Severity Value rating, with 0 representing no risk of early blight and 4 indicating extremely high risk. Most days in the past two weeks were rated 0, 1 or 2 (*see table below)*. **Fungicide applications are recommended when cumulative DSV's reach 15**. It took 14 days to reach this threshold. Thus, for early blight control, a two-week fungicide schedule should be adequate. However, if bacterial diseases are present, weekly applications of copper products are needed.

No late blight has been reported in the region. **Bacterial canker** and **bacterial speck** have been reported to be present and spreading in at least one tomato field. Theses diseases can spread rapidly and bring plants down if not controlled. Most of the tactics to control bacterial diseases are preventative (from clean, seed to greenhouse practices, to crop rotation); at this point in the season, copper applications can only reduce the rate of spread. Tomato diseases can be difficult to identify. Take a minute to contact the Disease Diagnostic Lab (413-545-1045) to arrange for an accurate diagnosis, and make sure you are using materials that are appropriate for your disease situation!

TABLE 1

DSV VALUES, JULY 12 – 24, 2001
SOUTH DEERFIELD RESEARCH FARM

Date	DSV's/Day		Date	DSV's/Day
11-Jul	2		19-Jul	1
12-Jul	1		20-Jul	1
13-Jul	0		21-Jul	1
14-Jul	1		22-Jul	2
15-Jul	1		23-Jul	0
16-Jul	1		24-Jul	1
17-Jul	0		Total for past 14 days	15
18-Jul	1		Days to reach 15 DSV	14

CUCURBITS

Scout for **powdery mildew** in all vine crops, especially searching lower, older leaves for symptoms. Powdery mildew has been observed in summer squash and zucchini, and was reported from one pumpkin field in the southeast this week . Search at least 50 leaves, both upper and lower surfaces, in groups of 5 leaves in 10 locations throughout the field. Look for light green to yellow blotches on the upper surface, or a white to gray, powdery covering on the upper or lower leaf surfaces. These powdery areas most often start on the underside of the leaf, often as small as a quarter. Fungicide applications for powdery mildew should begin at the first appearance of the disease. The last week of July and first two weeks of August are typically the time when powdery mildew shows up in pumpkin and winter squash.

At the same time, look for aphids. **Melon aphid**, dark green or nearly black, is the most common species in vine crops. Count % of leaves with >10 aphids per leaf. Threshold for treatment: if 20% of leaves have more than 10 aphids. Beneficial insects generally keep aphids under the level where they cause direct damage. (see article below on viruses and aphids). However, if they exceed the threshold, apply an appropriate insecticide (see *New England Vegetable Management Guide* for recommended materials.)

PREVENTING DEER DAMAGE

If you have had deer damage in vine crops in the past, or are using a field where you might expect deer damage, **now is the time to get electric fencing in place –before deer start feeding!** Deer populations in Massachusetts are increasing by 15% per year, finding favorable habitat throughout the state. Normal adult deer will eat anywhere between 6 and 10 pounds of food per day during the growing season, typically selecting weeds and broad-leaved plants, not grass. This places most planted crops at risk to damage from deer. Some of the crops most susceptible to damage are pumpkins, squash, beans, peas, lettuce, strawberries, and most other fruits and the plants that bear them, including grapevines. There is no provision in state law or regulation for compensation to landowners for deer damage. Thus, it is to the benefit of landowners to try to prevent crop damage by deer before a significant problem develops.

Damage caused by deer is usually easy to identify. Deer tracks are the familiar cloven-hoof type. Because deer do not have upper incisors, they tear plants when they browse them, rather than making a clean cut like a woodchuck or rabbit. Deer will also gnaw pumpkins and squash, leaving tooth marks in the fruits that can eventually rot.

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 is a cost-effective remedy to deer damage. Portable units that can be put up and taken down in half a day can protect many small fields. Larger farmers and orchards may want to invest in permanent fences, but even here using solar chargers and having clear perimeters can reduce costs.

For small fields of a few acres or less, portable fences either of regular electric wire or a product called "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

Excerpted from fact sheet **Preventing Deer Damage** by:
John E. McDonald, Jr., formerly of MA Div. of Fisheries & Wildlife, and Craig S. Hollingsworth, Univ. of MA

For copy of entire fact sheet contact 413-545-3696 or our website, www.umassvegetable.org

TABLE 2: EXAMPLES OF VIRUS DISEASES THAT OCCUR IN MASSACHUSETTS

HOST/VIRUS	VECTOR, OR OTHERWISE	PERSISTENT (P) OR NONPERSISTENT (N)
Beans		
Bean Common Mosaic Virus (BCMV)	Aphids, seed-borne	N
Bean Yellow Mosaic Virus (BYMV)	Aphids	P
Tobacco Ring Spot	Nematodes	P
Tomato Ring Spot Virus	Nematodes	P
Cucurbits		
Cucumber Mosaic Virus (CMV)	Aphids, cucumber beetle	N
Watermelon Mosaic Virus (WMV)	Aphids	N
Papaya Ringspot Virus (PRSV-W)	Aphids	N
Zucchini Yellow Mosaic Virus (ZYMV)	Aphids	N
Tobacco Ring Spot	Nematodes	P
Tomato Ring Spot Virus	Nematodes	P
Turnip Mosaic Virus	Aphids	N
Peppers		
Cucumber Mosaic Virus (CMV)	Aphids	N
Tobacco & Tomato Mosaic Virus (TMV, TomMV)	Mechanical	N
Tomato Spotted Wilt Virus (TSWV)	Thrips	P
Tobacco Ring Spot	Nematodes	P
Tomato Ring Spot Virus	Nematodes	P
Potato		
Potato Leafroll Virus (PLRV)	Aphids	P
Potato Virus S (PVS)	Aphids	N
Potato Virus A (PVA)	Aphids	N
Potato Virus X (PVX)	Aphids, mechanical	N
Tobacco Ring Spot Virus	Nematodes	P
Tomato Ring Spot Virus	Nematodes	P
Tomato Ring Spot Virus	Nematodes	P
Corn		
Maize Dwarf Mosaic Virus (MDMV)	Aphids	semi-persistent
Tobacco Ring Spot	Nematodes	P
Tomato		
Cucumber Mosaic Virus (CMV)	Aphids	N
Tobacco & Tomato Mosaic Virus (TMV, TomMV)	Mechanical	N
Tomato Spotted Wilt Virus (TSWV)	Thrips	P
Tobacco Ring Spot	Nematodes	P
Tomato Ring Spot Virus	Nematodes	P
Brassica (cabbage family)		
Tobacco Ring Spot	Nematodes	P
Turnip Mosaic Virus	Aphids	N
Ornamentals		
Tomato spotted wilt virus (TSWV)	Thrips, cuttings	P
Tobacco mosaic virus (TMV)	Mechanical	N
Cucumber mosaic virus (CMV)	Aphids	N
Tomato Ring Spot Virus	Nematodes	P
Fruits		
Tomato ringspot virus (TMRSV)	Nematodes, grafting	
Tomato Ring Spot Virus	Nematodes	P

Table Prepared by: Dr. Robert Wick, Plant Pathologist, University of Massachusetts, Amherst.

DOES SPRAYING FOR APHIDS CONTROL VIRUS?

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. 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 (see Table 2). 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 (see Table 2). 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 which 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. Beneficial insects such as ladybeetles, lacewings, and parasitic wasps often keep numbers low enough to prevent direct damage. Scouting across the field gives an estimate of current numbers and whether populations are growing. 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, Dave Ferro & Ruth Hazzard

NEW PETTING FARM/ZOO RECOMMENDATIONS

Nationally, several recent outbreaks of enteric illness associated with farm animals have highlighted the importance of safety whenever contact between animals and the public is permitted. The Massachusetts Department of Public Health (MDPH) has recently released "Recommendations for Petting Zoos, Petting Farms, Animal Fairs, and Other Events where Contact between Animals and the Public is Permitted". The purpose of these recommendations is to decrease human exposures to rabies and to other illnesses transmitted from animals to people.

Diseases that can be transmitted from animals to people are called zoonotic diseases. Zoonotic diseases include enteric, or diarrheal illnesses caused by organisms such as E. coli 0157:H7, salmonella and cryptosporidium. Rabies, catscratch disease and psittacosis are also examples of zoonotic diseases. Certain groups of people may be more susceptible to these illnesses. These groups include infants, children, pregnant women and those with a weakened immune system.

One of the most important measures to prevent the transmission of zoonotic diseases to people is providing adequate hand washing facilities anywhere contact between animals and the public is permitted. Additionally, eating and drinking in animal areas should not be allowed, and visitors to animals' events or farms should NEVER be allowed to sample animal feed or drink raw milk.

Animals should be closely monitored for signs of illness, and human contact with animals should always be supervised.

To view a complete copy of these new recommendations, go to the MDPH web site at www.state.ma.us/dph/

--Massachusetts Department of Food & Agriculture: Farm & Market Report, Vol.78, No. 7, July 2001.

SWEET CORN

It was another week of **low trap counts** and **low field activity** for **corn earworm, fall armyworm and European corn borer**. Flights were below threshold in many areas, and pretassel corn was below 15% infestation. **Corn earworm** was at a high of 5 moths per week in Rochester, calling for a five-day spray schedule on silk. Two other sites – one in the southern Connecticut River Valley and one in central Mass. -- logged captures of 2 moths per week (6-day schedule recommended). However, nearby farms caught none. It's great to have your own trap in these times when there is a lot of silking corn out there! Watch for weather events such as storms moving in from the south, which could bring a rapid influx of corn earworm moths. Currently, New Jersey is reporting 0 captures in the north and <2 per week in the south of the state.

See the website http://www.ento.psu.edu/vegetable/sweetcorn/default.html for a regional map of sweet corn pest captures for the mid-Atlantic states. **Fall armyworm** captures were zero at reporting sites. This should mean low activity in whorl and pretassel stage corn. **European corn borer** second flight is *just* beginning. Most sites logged no captures, but our "early warning" sites such as Hadley along the Connecticut River showed the first captures of the new flight. Similarly, the Southeast and far western Mass. are showing some new flight. Growers should begin weekly sprays on silk once captures reach 5 moths per week.

Sap beetles were reported in some fields. Beetles are black, with two reddish orange spots on each wing. These beetles often infest ears with previous damage from worms or birds, or ears with open tips. The larvae, which are small, white and maggot-like, can be found near the tip. Sap beetles are most attracted to decaying fruit or vegetable matter. Avoid making piles of culled corn or vegetables from the stand in fields on your farm, as these will encourage buildup of sap beetles. Beetles overwinter in crop residue.

TABLE 3. SWEET CORN TRAP CAPTURES AND SCOUTING DATA JULY 20-26

Town	Date	ECB Z1	ECB E2	TOTAL ECB	CEW	% PT
Berkshire Region						
N. Bennington, VT	July 19	8	0	8	0	--
Stephentown, MA	July 23	1	0	1	0	--
Conn. River Valley North to South						
Plainfield, NH	July 25	0	0	0	0	6%
South Deerfield	July 26	0	0	0	0	--
Hadley	July 24	7	0	7	0	--
Amherst	July 23	0	0	0	0	8%
Southwick	July 24	0	0	0	2	--
East/Central MA, North to South						
Dracut	July 25	0	0	0	1	--
Stow	July 25	1	1	2	0	2.5%
Bolton	July 25	0	1	1	2	--
Sutton	July 25	1	0	1	0	--
Millis	July 23	0	0	0	0	--
Hopkinton	July 23	0	0	0	0	--
Seekonk	July 25	0	4	4	3	--
Swansea	July 25	0	3	3	0	--
Rochester	July 24	0	16	16	5	--
Rehobeth	July 25	1	7	8	3	--
Little Compton, RI	July 24	1	1	2	0	--

--Data provided by D. Riggs, M Yates, R. Pestle, A. Rodgers, R. Cook, P Westgate & R. Hazzard. Many thanks!

Vegetable IPM Message, Ruth Hazzard, Editor. The Vegetable IPM Message is published weekly from May to September and includes contributions from the UMass Extension Vegetable Program faculty and staff, growers, and private IPM consultants.

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