August, 2001

Note: The information provided on products/pesticide use below, is from other states and thus the products may have no current Hawaii registration. Always read the label before making any product/pesticide applications. Due to environmental effects the effectiveness of particular products may also vary across locations.

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1.0. Spintor and Success on DBM in Hawaii
Dr. John McHugh provided the following information concerning the use of these pesticides for DBM management in Hawaii: It's worth pointing out that because Spintor 2SC has the same active ingredient as Success (spinosad) that crucifer/cole crop farmers on the Diamondback Moth/Success Insecticide Resistance Management program in Hawaii (Oahu, Maui, Kamuela) should not be using it in their spray programs.” (John McHugh, e-mail July 23, 2001).

Background on the new insecticides for caterpillar management (from Arizona):
Several newly introduced insecticides demonstrate different pathways into lepidopterous pests with varying modes of action to cause insect mortality. Avaunt* (indoxacarb - Dupont) acts on the nervous system of beet armyworm and cabbage looper after ingestion or contacting the larvae. Proclaim* (emamectin-benzoate - Syngenta) is also a neurotoxin but is ingested by the worm when in penetrates and moves from to bottom of the leaf surface. Success* (spinosad - DowAgroSciences) is similar to Proclaim in being a neurotoxin and moving translaminarily in the leaf tissues. Confirm* (tebufenozide -
formerly Rohm and Haas and now DowAgroSciences) is an ingested insect growth regulator that disrupts the larval molting process. Giving consideration to the chemical’s characteristics, pest development and feeding behavior, and growth patterns and susceptibility of the crop to the pests, these new insecticides fit into use patterns to optimize efficacy and economics to manage worm pests. Application timing for each chemical could be recommended for the stand establishment period, pre-heading/vegetative growth period, and heading to harvest period. (Kai Umeda, Univ. Arizona, Maricopa County, Vegetable Newsletter, vol 8, issue 8, August 10, 2001).

2.0. BIRD CONTROL IN CROPS.

Birds such as meadow larks, horned larks, sparrows, blackbirds, starlings, doves, and grackles attack newly seeded and emerging vegetable crops causing major crop damage resulting in significant economic losses. Some common bird control practices include: 1) exclusion by installing netting to protect highly valuable crops; 2) auditory or visual frightening devices such as distress, alarm calls, propane exploding cannons, scarecrows and shiny reflective materials; 3) cultural practices to reduce attractive weeds and insects or other roosting sites; 4) shooting may be effective but most birds are protected by the Migratory Bird Treaty Act and depredation permits from the U.S. Fish and Wildlife Service are required; 5) chemical repellents and toxicants have not been fully researched nor registered for use on vegetable crops. Creating habitats for large predatory birds may deter the smaller pest birds that invade crops. Hanging shiny mylar ribbons on sprinkler heads and having "bird patrols" with shotguns pacing back and forth through fields are common practices that are expensive and manpower consuming. Birds habituating to the various repellent practices make it extremely difficult to exclude the various species from seedling fields (Kai Umeda, ed., Arizona Maricopa County Vegetable Newsletter, vol. 8, issue 7 July 13, 2001).

3.0. "POLLUTANT" DISCHARGE FOR AQUATIC WEED CONTROL.

The U.S. 9th Circuit Court of Appeals found that the application of an aquatic herbicide according to the EPA approved label by an Oregon irrigation district constituted the discharge of a pollutant from a point source into waters of the United States (http://laws.lp.findlaw.com/getcase/9th/case/9935373&exact=1). Following the EPA approved label did not eliminate the irrigation district’s obligation to obtain a National Pollution Discharge Elimination System (NPDES) permit under the Clean Water Act. (Kai Umeda, ed., Arizona Maricopa County Vegetable Newsletter, vol. 8, issue 7 July 13, 2001).

4.0. Sweet Corn Rust (Sally Miller)

Several growers observed common rust on sweet corn last week, so now is the time to begin scouting fields for rust. University of Illinois fungicide recommendations for rust control http://www.aces.uiuc.edu/~ipm/fruits/corn/mgtrec.html#/rust are summarized below.

Fungicide applications:

Quadris: Apply 6.2 - 9.2 fl. oz/A; repeat at 7-14 day intervals.

Quadris cannot be applied more than two times before alternating with a fungicide with a different mode of action, and no more than six applications of Quadris or other strobilurin fungicides can be made in one season. 7 day preharvest interval.
OR

Tilt: Apply 2-4 fl. oz./A; repeat on 7-14 day intervals. Do not apply more than 16 fl. oz/A per season. 14 day preharvest interval.

OR

Dithane, Manzate, Penncozeb, or Manex II: Apply 1.5 lb/A for dry formulations, or 2.5 pt/A for flowable formulations. Repeat on 7 day intervals. Do not feed treated forage to livestock. 7 day preharvest interval.

OR

Bravo or Terranil: Apply 3/4 - 2 pt/A for flowable formulations and 5/8 to 1.5 lb/A for dry formulations. Repeat at 4 - 7 day intervals. Do not feed treated forage to livestock or apply fungicide to sweet corn to be processed. 14 days preharvest interval.

According to Dr. Jerald Pataky, University of Illinois pathologist and sweet corn specialist:
Fungicide applications should begin whenever rust is seen on lower leaves (6 pustules per leaf threshold -- but that really means ANY rust) if wet conditions are expected (rain or dew); plants are still in the whorl stage; and the hybrid has a moderate to susceptible reaction to rust. Hybrids with moderately resistant reactions can tolerate a slightly higher threshold (about 1 to 5% severity).

Fungicide applications usually are not of much value after "row tassel" (tassels apparent as you look down the rows of plants), because: rust has a 7-day latent period, most infection occurs in whorls where moisture collects, and sweet corn is only 4 weeks away from harvest anyway. (Robert J. Precheur, ed., Ohio, VegNet Newsletter, Vol. 8, No. 21. July 13, 2001 Ohio State University Extension Vegetable Crops).

5.0. Fertigation- fertilizer management

APPLYING FERTILIZER THROUGH TRICKLE IRRIGATION

Fertigation is the injection of chemical fertilizer into irrigation water. This is typically done to apply nitrogen (N) and sometimes potassium (K) in place of conventional side-dressing. Nitrogen and potassium are available in liquid or soluble solid forms and can be applied through a drip system. Phosphorus, if needed, should be applied at the beginning of the season. By using a fertilizer injector, trickle irrigation can be used effectively to apply N during irrigation to crops. The need for supplemental N can be determined using the preside-dress soil nitrate test (PSNT) as it is with other application methods. If used, samples for the PSNT should be taken from under the plastic. The best way is to use a soil sampler, which will punch a small hole in the plastic and remove a core of soil. Be sure to avoid cutting the irrigation tape when sampling under plastic. For more information on the PSNT, see the June 14, 2001 Vegetable IPM Message.

With conventional topdressing or side-dressing, it is common to apply all the N in one or two applications. With trickle irrigation, it is convenient to apply small amounts of N weekly or even daily, which is desirable from a nitrogen management standpoint. For example, if you want to apply about 50 lbs N per acre, you can inject a little over 7 lbs N per acre per week for seven weeks, or about 1 lb per day if you prefer. Small weekly
applications provide for more efficient crop use of N than one or two larger applications. Daily application offers little advantage over weekly application, but may be necessary if the injector cannot inject a week’s worth of N during the appropriate irrigation run time. To do this, dissolve the desired amount of fertilizer for the area to be covered at one time in a bucket or barrel. In the example above, mix 7 lbs of N for each acre to be covered at one time in water. Use enough water so that it will take about 20 to 40 minutes to complete the injection. If injection occurs more rapidly, the application may not be uniform. On the other hand, a longer injection time may result in excess water being applied. To prevent leaching, the irrigation system should not be run longer than necessary to effectively wet the root zone of the crop. This will distribute the material throughout the rooting area. Excess water will leach some of the N below the root zone. If there is not enough time to inject all the fertilizer needed for the week in one injection, then smaller, daily injections are preferable. Before injecting fertilizer, the entire system should be filled with water and at full operating pressure. When all the fertilizer has been injected, the system should be run long enough to flush all fertilizer from the lines. If fertilizer is left in the lines, clogging may occur due to chemical precipitates or growth of bacterial slimes.

Application uniformity is affected by field topography. Water gains pressure going down hill and loses it going uphill. There is a gain or loss of 1 lb per square inch for each 2.4 ft of change in elevation. There is also pressure loss due to friction. This loss is greater in small pipes than larger ones. If possible, the system should be set up so that water runs down hill to roughly offset friction loss. It is difficult to achieve even application of water and fertilizer in fields with knolls and dips. Back flow preventors must be used so injected materials cannot flow back into the water source if the pump shuts off. Water should be filtered after fertilizer injection to remove any undissolved particles.

Calcium nitrate is the most popular source of N for injection. However, it is important to use the greenhouse grade, which dissolves readily, or buy the material already in the liquid form. Field grade granular calcium nitrate is usually coated with wax to alleviate caking in the bag. It is difficult to dissolve in water and may clog emitters. Watch next week’s issue for a discussion on water problems that may occur in fertigation. John Howell (Ruth Hazzard, ed., Vegetable IPM Newsletter, University of Massachusetts, Agroecology Program, Volume 12, Number 10, July 19, 2001).

6.0. FERTIGATION: WATER PROBLEMS

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
(Ruth Hazzard, ed., Vegetable IPM Newsletter, University of Massachusetts, Agroecology
Program, JULY 26, 2001 VOLUME 12, NUMBER 11).

7.0. Postharvest handling of watermelon and muskmelon
(Chris Gunter)

Watermelons are typically harvested at full maturity, since they do not
continue to develop color and sugars after being cut from the vine. There are a few methods to determine when a watermelon is
mature. First, check the ground spot, or the side of the melon that
rests on the ground. This spot should turn from white to creamy
yellow. Also, look at the tendril that is growing on the vine nearest
to the developing fruit. This tendril should be wilted or drying out. If
one of the melons is cut open to check maturity, the seeds should
be hard and the gelatinous covering (called the aril) will be absent.

High quality fruit will be uniform in size and symmetrical with no
scars, sunburn, surface abrasions, or bruising. Though many
watermelons are shipped without precooling, these melons must be
utilized promptly because quality declines rapidly without cooling.
If precooling is an option, melons stored at 50-59F should last about
14 days and if stored at 45-50F they should last up to 21 days.
Watermelon, however is sensitive to chilling injury at these lower
temperatures and extended holding at these temperatures is not
advised.

Muskmelons should be harvested at the firm ripe stage (3/4 to full
slip) when vine separation occurs with light pressure. Typically they
will have a deep uniform green at maturity and turn a light yellow at
full ripeness. Also, raised netting is another indicator of maturity. As
with watermelon, the fruit surface should be free of scars, sunburn,
and surface defects. Melons may be cooled using either forced-air
cooling or hydrocooling methods. Muskmelons held at 36-41F will
last up to 21 days, though eating quality suffers if melons are held
for long periods at lower temperatures (Dan Egel, ed. Purdue Univ.
Vegetable Crops Hotline Newsletter, No. 395, July 26, 2001).
8.0. Purple Blotch of Onion

During late June and early July, purple blotch of onion was observed in several onion fields in central Illinois. This disease attacks onions, garlic, and leeks. The disease, caused by the fungus Alternaria porri, occurs throughout the world but is most severe in areas with hot, humid climates.

Symptoms: Symptoms first appear on leaves as small (1/8 inch in diameter), water-soaked lesions that quickly develop white centers. As lesions enlarge, they become zonate and brown to purple. The lesion margin is often a shade of red or purple and is surrounded by a yellow zone that extends upward and downward for some distance. In moist weather, the surface of the lesion may be covered with brown to dark gray fruiting structures of the fungus. After a few large lesions form in a leaf, they may coalesce and girdle the leaf, and tissues distal to the lesions will die. Similar lesions may form on seed stalks and floral parts of seed onions; as a result, seeds do not develop or are shriveled.

Control: Crop rotation of 3-4 years with unrelated crops and practices that reduce hours of leaf wetness, i.e., good field drainage and reduced plant density, reduce the threat of the disease. Applications of the fungicides chlorothalonil (Bravo), iprodione (Rovral), mancozeb (Dithane), Maneb, or Quadris are effective in reducing disease severity. However, use of a single fungicide throughout the growing season is not recommended. Because onion leaves are increasingly susceptible to A. porri as they age and leaves that emerge close to bulb maturity are more susceptible to the pathogen, purple blotch may be difficult to control as bulbs approach maturity. Label recommendations must be closely followed. By M. Babadoost (Illinois Fruit & Vegetable Newsletter, Volume 7, No. 12, July 25, 2001).

9.0. More and More Phytophthora Diseases

Phytophthora diseases caused by Phytophthora capsici have become very serious threats to vegetable production in Illinois. In addition to the previous reports on the incidence of Phytophthora diseases in squash and zucchini fields, severe Phytophthora foliar blight and fruit rot were observed in cucumber, watermelon, melon, pumpkin, pepper, and eggplant fields during last week. Phytophthora blight, along with anthracnose, caused more than 50% yield losses in some cucumber fields. The US-EPA has approved a specific exemption under section 18 for the use of Acrobat MZ, manufactured by BASF Cooperation, for control of Phytophthora diseases of cucurbit crops in central Illinois. Application of Acrobat MZ in a pumpkin field with Phytophthora damping-off has prevented further spread of the disease. By: M. Babadoost (Illinois Fruit & Vegetable Newsletter, Volume 7, No. 12, July 25, 2001).

10.0. New growers Auction in North Carolina! (press release)

Growers and Buyers Needed to Open New Piedmont NC Produce Auction

Growers and buyers of fruits, vegetables, herbs, bedding plants, ornamentals, and other specialty crops are needed to indicate their interest in the opening of a new regional produce auction to be located in either Granville or Person County in the northern Piedmont of North Carolina.
The auction system is a dynamic marketing system being explored to offer a way for existing horticultural crop growers as well as tobacco growers who want to diversify, a chance to sell a given quantity of a crop at one time, trying to minimize the seeking of additional markets by the grower.

The auction will be held in a simple open-air pole barn facility that will be built by a landowner, or it may be run in an existing tobacco warehouse during the first year of operation. The pole barn structure will have no refrigeration facility to hold produce because it will arrive at the auction and leave in the buyer's truck in a short time. Perishable produce that requires refrigeration will be the responsibility of the grower and/or buyer. The auction will probably start at 4 P.M. to allow distant growers time to harvest produce in the morning and have enough time to drive to the auction. Initially, the auction will run one day a week during the spring, and increasing to two or three days a week as the growing season unfolds.

The auction is expected to draw growers and buyers across NC, VA, and surrounding states. The majority of the buyers will include specialty and organic grocery stores, upscale roadside market owners, produce wholesalers, farmers market vendors, specialty restaurant chefs, nurseries, garden centers, etc.

A small fee will be charged to each grower selling at the auction, which will cover bookkeeping and maintenance costs and to hire an auctioneer. The produce auction concept was introduced by Carl Cantaluppi, Area Horticulture Agent with the North Carolina Cooperative Extension Service in Granville and Person Counties. Cantaluppi learned of the auction method by seeing it successfully done in Ohio and Pennsylvania and held a preliminary meeting last December to introduce the concept to growers. Managers of the auctions were on the program, as well as potential buyers who were interested in buying at a North Carolina auction.

Cantaluppi sees the auction as a marketing method that would encourage more regional production of horticultural products and would draw buyers from a wide geographic area to come to the auction to select only the highest quality produce and plants for their retail sales operations. Each grower will be given a number that will permanently identify himself with his produce. Buyers will come to know each grower by his number and will learn what kind of quality that grower sells.

The auction method brings the buyer to the grower, ensuring a sale. This eliminates the need for a manager to contact buyers off the premises (as in a cooperative), forming verbal contracts that are not guaranteed, that many times lead to unsold produce.

Growers and buyers are now urgently needed to respond to this article to indicate their interest and willingness to participate in this produce auction by contacting Carl Cantaluppi, Granville County Extension Center, P.O. Box 926, Oxford, NC 27565. You may call him at 919-603-1350 or e-mail him at carl_cantaluppi@ncsu.edu

Cantaluppi would like to get a core group of 40-50 growers and buyers to start the auction for the first year and to grow in future years. Growers should contact their buyers to explain the auction concept to them and ask them to contact Cantaluppi so that a list of growers and buyers can be assembled. If enough interest is generated, Cantaluppi will then contact the growers and buyers from the list and invite them to a meeting this winter to decide where the auction will be held and discuss the rules and regulations. He is very excited about the concept and hopes to see the auction start next year (Spring 2002), as it will be a tremendous marketing boon to growers and buyers. He welcomes any questions by contacting him at the above address (Carl Cantaluppi, No. Carolina State Univ. e-mail, July 26, 2001).
11.0. DOES SPRAYING FOR APHIDS CONTROL VIRUSES?

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 find 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).

--John Howell, Rob Wick, Dave Ferro & Ruth Hazzard

**TABLE 2: EXAMPLES OF VIRUS DISEASES THAT OCCUR IN MASS.**

<table>
<thead>
<tr>
<th>HOST/VIRUS</th>
<th>VECTOR,</th>
<th>PERSISTENT (P) OR</th>
<th>OR OTHERWISE</th>
<th>NONPERSISTENT (N)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beans</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Bean Common Mosaic Virus (BCMV)</td>
<td>Aphids, seed-borne</td>
<td>N</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bean Yellow Mosaic Virus (BYMV)</td>
<td>Aphids</td>
<td>P</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tobacco Ring Spot Virus</td>
<td>Nematodes</td>
<td>P</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tomato Ring Spot Virus</td>
<td>Nematodes</td>
<td>P</td>
<td></td>
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<tr>
<td>Cucurbits</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cucumber Mosaic Virus (CMV)</td>
<td>Aphids, cucumber beetle</td>
<td>N</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Watermelon Mosaic Virus (WMV)</td>
<td>Aphids</td>
<td>N</td>
<td></td>
<td></td>
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<tr>
<td>Papaya Ringspot Virus (PRSV-W)</td>
<td>Aphids</td>
<td>N</td>
<td></td>
<td></td>
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<tr>
<td>Zucchini Yellow Mosaic Virus (ZYMV)</td>
<td>Aphids</td>
<td>N</td>
<td></td>
<td></td>
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<tr>
<td>Tobacco Ring Spot</td>
<td>Nematodes</td>
<td>P</td>
<td></td>
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<tr>
<td>Tomato Ring Spot Virus</td>
<td>Nematodes</td>
<td>P</td>
<td></td>
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<tr>
<td>Turnip Mosaic Virus</td>
<td>Aphids</td>
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<td>Peppers</td>
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<tr>
<td>Cucumber Mosaic Virus (CMV)</td>
<td>Aphids</td>
<td>N</td>
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<td></td>
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<tr>
<td>Tobacco &amp; Tomato Mosaic Virus (TMV, TomMV)</td>
<td>Mechanical</td>
<td>N</td>
<td></td>
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<tr>
<td>Tomato Spotted Wilt Virus (TSWV)</td>
<td>Thrips</td>
<td>P</td>
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<tr>
<td>Tobacco Ring Spot</td>
<td>Nematodes</td>
<td>P</td>
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<tr>
<td>Tomato Ring Spot Virus</td>
<td>Nematodes</td>
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<td>Potato</td>
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<tr>
<td>Potato Leafroll Virus (PLRV)</td>
<td>Aphids</td>
<td>P</td>
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<tr>
<td>Potato Virus S (PVS)</td>
<td>Aphids</td>
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<td>Potato Virus A (PVA)</td>
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<tr>
<td>Potato Virus X (PVX)</td>
<td>Aphids, mechanical</td>
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<td>Tobacco Ring Spot Virus</td>
<td>Nematodes</td>
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<tr>
<td>Tomato Ring Spot Virus</td>
<td>Nematodes</td>
<td>P</td>
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</tr>
</tbody>
</table>
Tomato Ring Spot Virus                  Nematodes                               P
Maize Dwarf Mosaic Virus (MDMV) Aphids              semi-persistent
Tobacco Ring Spot                  Nematodes                               P
Tomato
Cucumber Mosaic Virus (CMV)              Aphids                                  N
Tomato & 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)                        Aphids                                  N
Tomato 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. (Ruth Hazzard, ed., Vegetable IPM Newsletter, University of Massachusetts, Agroecology Program, JULY 26, 2001 VOLUME 12, NUMBER 11).

12.0. FIELD TOMATO DISEASES
(adapted from Cornell and Ohio Extension)

The most common field tomato diseases in Vermont are early blight (Alternaria) and Septoria leaf spot. There is a significant amount of both these fungal diseases this year. Bacterial diseases are also showing up to a lesser degree, and there is an unconfirmed report of late blight on tomato in southern Vermont, possibly carried over from a potato crop infected last year.

Early blight shows up in almost all fields to some extent. Early blight is promoted by the stress of heavy fruit set and hot conditions; nitrogen deficiency makes it worse. Bronze-colored lesions start on the lower leaves and move up the plant. Look closely at the spots to see concentric rings within the lesion. Wet conditions (rain, dew or overhead irrigation) favor fungal spread.

Septoria leaf spot is also showing up in more and more fields. The spots are small with a gray or brown edge. Septoria spots are usually more rounded than spots caused by bacterial diseases. Septoria can also be better controlled with fungicides than bacterial diseases. Alternating sprays of Bravo with Quadris can provide good control of both early blight and Septoria. Organic growers should use copper to help control the disease. Remember that you are protecting healthy tissue. As the plant grows, new tissue is exposed that will need protection, so spray regularly, and before there is significant crop injury if you want good results.

Bacterial canker symptoms include stunting, wilting, development of open stem cankers and fruit lesions. When stems are split open there is a thin, reddish-brown discoloration of the vascular tissue, especially at the base of the plant. Spots on fruit are relatively small, usually surrounded by a white halo ("bird's-eye" spots). Canker bacteria may also invade internal
fruit tissues, causing a yellow to brown breakdown. Rogue out and destroy individual plants that exhibit these symptoms. Copper sprays can be used to limit the spread of disease when the incidence is low.

Bacterial speck is being reported throughout eastern NY. Look for small black spots scattered on leaves and stems. Spots on the leaves usually have a yellow ring around them and leaves with a lot of spots usually turn yellow and fall off. This disease is seed born and when wet weather comes along, the disease can really get going. Fruit will have tiny black specks on them and not be marketable. Splashing water from heavy rains will spread the disease easily. When the leaves are wet, bacterial speck is easily spread by tractors or people as well. Try to stay out of the tomatoes when the plants are wet from rain or dew. Copper sprays with a fungicide will slow the disease but not stop it. Avoid high pressure spraying as this will also help spread the disease. Late blight symptoms are large, black lesions the size of a half dollar with a white ring around the edge, on the leaves and stems. Often there is white fuzzy growth on the leaf undersides. Wet conditions and moderate temperatures (60 to 80 F) increase the threat. Growers with a history of late blight in the farm should be on a weekly schedule of protective fungicide in order to keep new plant growth protected, the disease will knock down a field quickly. (VERMONT VEGETABLE AND BERRY NEWS - August 1, 2001, Compiled by Vern Grubinger, University of Vermont Extension).

13.0. Phosphorus issues and concerns

You may have heard the acronym “TMDL” being discussed recently. TMDL stands for “Total Maximum Daily Load,” which is the amount of a pollutant that a water body can assimilate without exceeding water quality standards. TMDLs will be implemented throughout Florida during the next few years. Implementation refers to any combination of regulatory, non-regulatory, or incentive-based actions that attain the necessary reduction in pollutant loading. One of the potential pollutants being considered for TMDLs in South Florida is phosphorus. Phosphorus is a primary plant nutrient involved in vital plant biochemical reactions. In the 1990s about 2 million tons per year of P fertilizer was applied to cropland in the United States. Phosphorus is also added to feed to improve animal performance. Much of this P ends up in manure that is applied to land near the animal feeding operation. Thus, concentrated animal feeding operations may become enriched in P because it is imported in the feed, but the manure is not exported out.

Phosphorus build-up in soils has been recognized nationwide through agronomic soil testing, especially where animal manure has been repeatedly applied. The P concentration in manured croplands far exceeds that needed for optimum crop production. Since P can be a pollutant if it moves off site, there are concerns about the number of soils testing high or very high in P, especially if they are close to important surface water bodies. More than 60% of soils tested by the University of Florida Extension Soil Testing Lab have been rated “high” in phosphorus.

Phosphorus that moves from agricultural fields to surface water can enrich the water with P and cause eutrophication. In natural water bodies, lack of P usually limits the growth of algae, so P enrichment can stimulate growth. Excessive algae settle to the bottom when they die, the water body gradually fills with organic sediment, and oxygen in the water is depleted. The results of P enrichment can be increased water purification cost, periodic fish kills, change of fish species, increase in aquatic weeds, and reduced water depths. Unfortunately, there are no clear guidelines regarding the total or dissolved P concentration in runoff that will induce eutrophication.
Phosphorus in soil can exist in natural minerals, commercial fertilizers, organic wastes, or plant residues. The two main ways that P can be transported off site are surface runoff (erosion) of soil and organic particles containing solid P compounds, and leaching of water-soluble P. Surface runoff is considered the most important P transport mechanism in most states, while leaching is important in soils with large accumulations of P or in soils that do not have the capacity to hold P. Can soil testing be used to determine the amount of P that might move off site? The soil test methods used today were developed for agronomic purposes, so controversy exists about using them for environmental assessment. Research has been underway for several years to develop true environmental P soil tests. Can sandy soils hold phosphorus? In Florida, some soils are much better than others at holding P. The key to a sandy soil’s ability to hold P and prevent it from leaching is related to coatings on sand grains. A soil containing sand grains that are coated with iron or aluminum compounds has a much greater capacity to hold P than a soil containing non-coated (also referred to as “stripped”) sands. The type of sand that a particular soil contains can be qualitatively identified by soil color. Coated sand grains usually have a red, orange, or brown tint, while stripped sands are white. In addition, country soil surveys contain soil classification information that indicates whether specific soil series have been identified as having coated or non-coated sand grains.

Practices to minimize soil and organic matter erosion should be implemented to prevent movement of particulate P off site. A cursory evaluation of soil color can indicate presence or absence of coated sand grains. If P fertilizer has been applied to a field on a regular basis, increases in an agronomic P soil test with time would indicate that the soil has some ability to hold the fertilizer. Soils that test high or very high in P should not receive P fertilizer, and P should be judiciously used on soils that have been identified to have low P-holding capacity. Original Source: Thomas Obreza, Citrus & Vegetable Magazine, May 2001 (Hendry County Cooperative Extension Office, Southwest Florida Vegetable Newsletter, May / June 2001)

14.0. Natural Pesticides

The discovery and commercialization of natural product pesticides has accelerated dramatically. From 1960-65, about 600 novel natural products were identified; from 1990-95, more than 5,000 natural products were identified that had biological activity. There are two primary reasons for the increase: improvements in computer analysis of chemical structure and the development of automated screening systems. Theoretically, it is possible to screen 100,000 botanical samples per day; the need for human activity in the system slows the process to about 20,000 samples in an eight-hour shift.

The introduction of new materials in the market is also encouraging. Spinosads, azoxystrobins, and avermectins became leading products shortly after their introduction. It seems like yesterday that we entomologists were bemoaning the fact that no new chemistries for pest management were being discovered. Other new products are
hitting the market each year. Promising new nematicides, insecticides, and fungicides are expected on the market within the next few years. Original Source: The Georgia Pest Management Newsletter, June 2001 (Hendry County Cooperative Extension Office, Southwest Florida Vegetable Newsletter, May / June 2001)

15.0. Postharvest management of greenhouse European baby Cucumbers

Postharvest Handling Considerations for Greenhouse-Grown Beit Alpha Cucumbers

There is potential to produce the new Beit Alpha-type cucumbers under protected culture in Florida. These miniature cucumbers were developed in Israel and are similar to the Dutch greenhouse types, in that they have a thin skin and are seedless, but are significantly smaller, with ideal size ranging from about 5 to 7 inches (12.5 to 17.5 cm) in length and 3/4 to 1 1/4 inches (22 to 29 mm) in diameter. Tests conducted at the Florida-Israeli Protected Agriculture Project in Gainesville and at the North Florida Research & Education Center-Suwannee Valley in Live Oak have shown that these cucumbers yield well under a wide range of ambient temperatures found in greenhouses (Shaw, et al, 2001).

In order to successfully introduce a new specialty crop like Beit Alphas, consideration must be given to developing market demand and understanding postharvest handling parameters. Important aspects of developing market demand include consumer preferences (e.g., color, size, flavor) and buyer preferences (e.g., package size and weight). Key postharvest information is lacking that would allow commercial growers to successfully ship Beit Alphas to desired markets. Desirable quality parameters include firm texture, shiny, dark-green skin color, and freedom from shrivel, and mechanical injuries (abrasions, cuts, bruises). Therefore, shippers must know optimal storage conditions and cooling method, mechanical properties (resistance to compression, vibration), packaging types and threshold susceptibility to ethylene exposure. Other postharvest treatments, such as coatings, hot water immersion, and controlled/modified atmosphere storage, may also significantly extend product quality.

Recent observations of Beit Alphas at retail level showed preventable quality losses, indicating the need for information on proper handling of this new crop. Slicing-type cucumbers can be safely stored at 50 to 55oF (10 to 13oC) for 10 to 14 days, depending on cultivar (Hardenburg, et al., 1986). To minimize moisture loss and shrivel, field-grown slicing cucumbers are usually coated with wax, while Dutch greenhouse-grown types are shrink-wrapped with plastic film.

This spring we performed preliminary postharvest tests with Beit Alpha cucumbers from both research sites and a commercial greenhouse operation. Panelists in our sensory evaluations commented that the flavor was excellent. At harvest, small-diameter fruits (3/4 inch; 22 mm) were consistently firmer (from 1 to 2 Newtons) and had a noticeably crisper texture than larger-diameter fruits (1 1/4 inch; 29 mm). This indicates that smaller cucumbers may be less susceptible to mechanical injuries during handling and shipping. ‘Sarig’ cucumbers stored at 50F (10C) and 95% relative humidity maintained high quality for more than 14 days (Fig. 2). After 5 days storage, uncovered cucumbers lost about 50% more fresh weight than those loosely covered with plastic film. Both ‘Sarig’ and ‘Alexander’ cultivars developed chilling-injury symptoms after 7 days storage at 45.5F.
(7.5°C) or 41°F (5°C). Other tests are currently underway to determine the effectiveness of waxes and shipping containers including hinged, rigid containers (clamshells). Crops grown under protected culture can become inoculated by decay pathogens. Sources of inoculum include nearby cull piles - diseased plants and fruits should never be discarded near the greenhouse (Fig. 3). In these tests, sclerotinia rot (Sclerotinia sclerotiorum) appeared on sound, ‘Sarig’ cucumbers following 7 days storage at 50°F (10°C) (Fig. 4). Although considered a minor problem in field production of cucurbits, the growth of this aggressive rot during cold storage shows the need for preventative control measures in the greenhouse.

Cross-contamination of fresh produce by human pathogens is also a serious threat to consumers, with reliable estimates in the U.S.A. indicating that a small, but increasing percent of foodborne illness is attributable to consumption of fresh produce. Production of vegetables in greenhouse structures holds potential for reducing the risk of foodborne illness by isolating the plants from potential environmental contamination. Employees should be instructed in proper hand washing and other sanitary techniques to avoid cross-contamination during harvest and handling.

For Further Information:

16.0. Powdery mildew control with mono-potassium phosphate

Abstract: A foliar spray of 1% (w/v) solution of the fertilizer mono-potassium phosphate (MKP) (KH2PO4) on the upper surfaces of lower leaves of greenhouse-grown peppers induced local and systemic control against Leveillula taurica, as compared with control plants. This protection was expressed by reduction in the leaf area covered with sporulating colonies and in conidial production on leaf tissue, 24 or 48 hr post-treatment, when MKP was applied on lower leaves of plants that had been exposed to the source of inoculum. Foliar application of MKP, initiated before or after exposure to heavily diseased plants as the source of inoculum, was effective in controlling powdery mildew. Application of MKP efficiently suppressed powdery mildew as expressed by inhibition of the development of new sporulating colonies, as well as the conidial production of the fungus on infected tissue. Microscopic examination indicated destruction of both hyphae and conidial structures on MKP-treated leaves. The efficacy of MKP in controlling powdery mildew on greenhouse-grown plants was compared with a
sterol-inhibiting systemic fungicide. Both treatments significantly inhibited powdery mildew as compared with non-treated control plants, although the fungicide-based treatment seemed to be phytotoxic to plant tissue and did not affect the yield, as compared with the fungicide treatment on leaves. These data indicate that MKP spray may be applied as an alternative practice for the control of powdery mildew in peppers. Source: Reuveni, R., G. Dor and M. Reuveni. 1998. Local and systemic control of powdery mildew (Leveillula taurica) on pepper plants by foliar spray of monopotassium phosphate. Crop Protection. 17:703-709.

17.0. Milk for powdery mildew control in zucchini (Brazil)

ABSTRACT: "Efficacy of fresh cow milk was tested in five greenhouse experiments against powdery mildew (Sphaerotheca fuliginea) on zucchini squash (Cucurbita pepo). Plants were sprayed with milk at 5, 10, 20, 30, 40, and 50%, either once or twice a week. Additional treatments were fungicides (fenarimol 0.1 ml/l or benomyl 0.1 g/l) applied once a week and water as a control treatment. Severity of the powdery mildew was visually evaluated on individual leaves at weekly intervals and scored as percentage of leaf area infected for infected leaves. A negative correlation was found between the infected leaf area per infected leaf and milk concentration sprayed on plants for the five experiments. High concentrations of milk were more effective than the conventional fungicides tested. This study demonstrated that milk is an effective alternative for the control of powdery mildew in organic agriculture." (1999 Elsevier Science Ltd. All rights reserved.

QUOTE FROM DISCUSSION SXN: "Cow milk may have more than one mode of action in controlling zucchini squash powdery mildew. Fresh milk may have a direct effect against S. fulginea due to its germinicidal properties. Milk contains several salts and amino-acids. These substances have been shown to be effective in controlling powdery mildew and other diseases. Several authors have shown that sodium bicarbonate, oxalate, dibasic or tribasic potassium phosphate, and other salts and amino-acids have been efficient in the induction of systemic resistance. Therefore milk may also indirectly affect S. fulginea by inducing systemic resistance. Milk is not a potential environmental or food contaminant, consequently it can be used in organic agriculture. Several organic growers have been spraying 5% cow milk once a week to control powdery mildew on zucchini squash and cucumber."


18.0. EPA compliance materials on the WEB

New Compliance Assistance Materials Available From the National Agriculture Compliance Assistance Center-- at its web site http://www.epa.gov/agriculture

EPA's Agriculture Division has developed three new sector notebooks that are now available both in printed version and online in PDF format:
By summarizing information on the following topics, the notebooks explain in lay terminology the major environmental issues relating to specific industry sectors:

- general industry information (economic and geographic)
- a description of industrial processes
- pollution outputs
- pollution prevention opportunities
- federal statutory and regulatory framework
- compliance history
- a description of partnerships
- bibliography and resources for further research

The online versions are available through the EPA National Agriculture Compliance Assistance Center (Ag Center): http://es.epa.gov/oeca/ag/asnb.html

19.0. Upcoming veggie and marketing Conferences

North America Direct Marketing Conference There will be a not to miss conference for farm direct marketing in Ontario, Canada January 14-20, 2002. The North American Farmers' Direct Marketing Conference and Trade Show will be held at the Sheraton Centre Hotel in Downtown Toronto. For more information check out www.nafdma.com.

Mid Atlantic Fruit & Vegetable Convention
Jan. 28-Feb 1, 2002
Hershey, PA
Bill Troxell, 717-694-3596, wt.pyga@tricountyi.net
Maureen Irvin, 717-677-4184, shap@mail.cvn.net
This is a fruit, vegetable, potato, berry production conference for three states that has a marketing component.

Mid Atlantic Direct Marketing Conference and Trade Show
Feb. 20-Feb. 23, 2002
York, PA
John Berry, 610-391-9840, jwb15@psu.edu
www.MADMC.com
www.PaFarm.com
This is a five state direct farm marketing conference. Workshops, farm market tours, concurrent educational sessions, round table discussions, trade show and "tourist" activities.

Plasticulture Conference 2002
Feb. 23-26, 2006, Double Tree Hotel, San Diego, Mission Valley, California. For information: www.plasticulture.org, pheuser@calabreseheuser.org, or call tel. 717-238-9762.