VEGETABLE CROPS HOTLINE

A newsletter for commercial vegetable growers prepared by the Purdue University Cooperative Extension Service

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http://www.entm.purdue.edu/entomology/ext/targets/newslett.htm

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WELCOME ABOARD - *(Peter Hirst and Chris Gunter)* - We are pleased to announce that Dr. Jennifer Dennis has accepted the position of assistant professor of specialty crops marketing and will be joining us in June. Although it took longer than we initially anticipated to fill this position, the wait has been worth it and we're really pleased and excited to have Jennifer joining our team. I'd like to thank those of you in the industry that participated in the interview process and gave feedback on the candidates.

CUCURBIT SEEDLING DISEASES - *(Dan Egel)* - In addition to scouting for the usual cucurbit diseases described below, I would like to have growers look for Fusarium wilt of watermelon in their greenhouses. Last season I confirmed Fusarium wilt in transplants in several area greenhouses. Look for wilted seedlings randomly scattered around the greenhouse (Figure 1). I would like to further investigate to determine where this disease is coming from. Below I describe the usual suspects.

Figure 1. Watermelon seedlings with Fusarium wilt are usually scattered randomly through the greenhouse (yellow arrows). (Photo by Dan Egel)

Gummy stem blight - The stems of infected seedlings are often dark brown and look water soaked at the point where the seed leaves (cotyledons) are attached to the stem. Stems of such seedlings remain green at the soil line. Gummy stem blight may be brought into a greenhouse on contaminated transplants or seeds. This disease may also occur in a greenhouse that was not properly cleaned up from a previous occurrence of the disease.

Anthracnose - This disease causes sunken lesions to occur on the stem. Lesions on true leaves often have sharp or angular margins. Anthracnose may occur in a transplant facility in the same manner as gummy stem blight (See above).

Bacterial fruit blotch - The first symptom observed in this disease is likely to be a watersoaked lesion on the underside of the seed leaves. This lesion will quickly spread to the entire seed leaf and to the true leaf. On true leaves lesions are small, dark brown, and often surrounded by a band of yellow tissue. Bacterial fruit blotch, like gummy stem blight and anthracnose, may be brought into a transplant facility on transplants or seeds.

Damping-off - Seedlings affected with damping-off fungi look brown and watersoaked at the soil line. Such seedlings quickly wilt and collapse. The roots may appear brown. This type of disease may be caused by one of several soil fungi. These fungi are not seed borne and may survive in soil or plant debris on transplant trays or greenhouse floors.

Remember that diseases such as gummy stem blight, anthracnose and bacterial fruit blotch will occur in one or a few clusters in the greenhouse. Damping-off will likely occur on trays that are less well drained. Problems that occur on most of the seedlings in the greenhouse or along a wall or walk way are likely due to environmental conditions such as cold or wind.

Growers who have confirmed serious seed borne problems in their transplants face a decision about whether to set such seedlings in the field or not. Growers who choose to plant such seedlings should remove all trays with infected seedlings and all the surrounding trays. The remaining seedlings may be sprayed the appropriate fungicide or bactericide. Be certain to check the label for proper rates and usage.

If apparently healthy seedlings from a greenhouse with gummy stem blight are set in the field, do not wait until vine touch to spray the plants. For the first 20-30 days in the field, spray every 7-10 days with a mancozeb (e.g., Dithane, Manzate. Penncozeb), chlorothalonil (e.g., Bravo, Equus, Echo) or strobilurin (e.g, Quadris) product. If after 20-30 days the plants look healthy, use the MELCAST system of spraying. For bacterial problems use copper hydroxide applications, perhaps in combination with a mancozeb product.

Descriptions of watermelon and muskmelon diseases are well described in the Purdue CES publication *Diseases and Pests of Muskmelon and Watermelon* (BP-44). It is available through the Media Distribution Center by calling 1-888-EXT-INFO.

Fusarium Wilt of Watermelon - *(Dan Egel)* - It happens every year. While Memorial Day weekend may mean the Indianapolis 500 to race fans, to watermelon growers it often means the start of Fusarium wilt of watermelon season. This year brings a

Fusarium wilt of watermelon. (Photo by Dan Egel)

new twist to watermelon growers who combat Fusarium wilt. Greenhouse experiments I performed this winter indicate that a new race of Fusarium wilt is present in at least two southern Indiana watermelon fields.

There are three known races of Fusarium wilt of watermelon in the world. Races 0 and 1 have been known to the United States for some time. Since 1985, race 2 has been found in Texas, Oklahoma, Florida, Maryland and Delaware. Now race 2 is known to be in Indiana.

This spring and summer, I would like to sample several watermelon fields to determine how wide spread race 2 is in Indiana. I won't be able to get to all watermelon fields this summer, however, if you suspect you may have race 2 of Fusarium wilt of watermelon, please contact me.

A watermelon grower might begin to suspect race 2 is present in a commercial watermelon field the same way we (Ray Martyn, Hari Ramasubramaniam and myself) became suspicious that race 2 was present in southern Indiana. We began to notice that varieties of watermelon that have good resistance to race 0 and 1 of Fusarium wilt were wilting in large numbers in commercial fields. On page 57 of the 2004 version of the *Midwest Vegetable Production Guide*, <www.entm.purdue.edu/entomology/ext/targets/ID/index.htm> several watermelon varieties are listed along with a Fusarium wilt resistance scale. If watermelon varieties with ratings of 7 or 9 wilt in large quantities, one might begin to suspect the presence of race 2. Currently, there are no commercial watermelon varieties with resistance to race 2.

Most growers observe the symptoms of Fusarium wilt of watermelon as a single leaf or vine wilting while the rest of the plant appears, at least temporarily, to be healthy. Eventually, entire plants begin to wilt and then die in scattered clumps around a field. Fusarium wilt is usually more severe on sandy ridges than lower areas of the field. If the stem of an affected plant is cut open, watermelon growers may notice the usually light green cross section of the stem has become brown in color. Fusarium wilt of watermelon does not affect muskmelons or cucumbers.

New Farm Assessment Guides from Purdue - *(Brent Ladd)* - New assessment guides for agricultural field practices and soil quality monitoring provide producers with a non-threatening and confidential manner of participating in water quality protection on their own land. Using these guides, producers can gain insights about improving and fine tuning their farming operation.

Field assessment for water resource protection - A new publication from Purdue University titled "Field Assessment for Water Resource Protection" is useful for watershed and conservation projects. The field assessment method is farmer driven and provides a quick, easy-to-do, and confidential approach that will lead to better decision making. Recommendations and the most up to date information are included. Topics covered include Nutrient Management, Soil Conservation, Pest Management, Drainage & Irrigation Management, and Areas Adjacent to Fields.

On-farm soil monitoring for water resource protection - Monitoring soil quality can help producers track changes and make improvements based on their own soil assessments. The farmer tested soil monitoring method in the new publication titled "*On-Farm Soil Monitoring for Water Resource Protection*" covers five soil quality indicators that affect field productivity and environmental quality. This type of monitoring can take

as little as 20 minutes per field site on an annual basis, yet provides quick feedback on how field practice changes are affecting soil and water quality.

Producers can obtain copies by calling toll-free 1-888-EXT-INFO and asking for Media Distribution (there is a $1.50 shipping charge for each copy). The publications can also be viewed and printed at this web site <www.ecn.purdue.edu/safewater/field>. A 17 minute how-to video, *On-Farm Soil Monitoring V-WQ-43*, is available online in streaming format at <www.ecn.purdue.edu/safewater/field> and can be ordered in VHS tape format for $10 by calling 1-888-EXT-INFO.

An Online Soybean Pest Management Survey - *(Frankie Lam and Chuck Mansfield)* - Some of our vegetable and melon growers might rotate crops with corn and soybeans for pest management and soil fertility. If you have pest problems in soybeans during the past season, this is a great chance for you to provide information to government agents on soybean pest management. The following article was also published by the authors in the March issue of *Pest&Crop* newsletter at Purdue University.

An online soybean pest survey has been developed from discussion at a two-day Pest Management Strategic Plan (PMSP) meeting held at Bowling Green, Kentucky in August 2003. Representatives included are soybean producers, commodity group representatives, industry representatives, and extension personnel from Kentucky, Tennessee, Illinois, and Indiana. A PMSP is a document outlining pest problems, including disease, insect, weed, and others, and identifies the important tools, such as cultural and chemical tactics, needed to manage them.

The region comprised of western Kentucky, western Tennessee, southern Indiana, and southern Illinois has some unique production and pest management issues. This region lies in a transitional zone between southern and northern production areas, but it is uniquely different from either in many respects. For example, major pests from both areas may be present, but the severity of infestations may fluctuate based on environmental conditions. The purpose of this survey is to gather producer, industry, and extension input on critical pest issues relative to soybean production in this region of the country. This information will be used by the United States Department of Agriculture (USDA) and the Environmental Protection Agency (EPA) in making decisions about pesticide registration issues and prioritization for the funding of extension and land grant or government research projects. You can access this survey at: <www.sripmc.org/KY/SoybeanPMSPSurvey/>.

This survey was developed through the Kentucky Pest Management Center (KPMC). The Center is a grant-funded program in the UK Entomology Department. They develop Crop Profiles and Pest Management Strategic Plan documents for commodities in Kentucky and the region. These documents were designed as a method for producers and those with first-hand or hands-on knowledge to provide input on what pest management tools are most critical for the production of the commodities.

This online survey has been developed to allow convenient, fast method of input for soybean producers and others to document the pest problems they face in their fields. This is a wonderful opportunity to collectively provide information to the USDA and EPA on current troublesome pests and the potential impact of emerging pests. We encourage those involved with soybean production in this region (producers, industry, and extension) to take 10-20 minutes to provide your input on these critical pest management issues. More information can be found at <www.uky.edu/Agriculture/KPMC/newsupdate.htm>.

Spraying Insecticides Regularly had Greater Number of Aphids on Pumpkins - *(Frankie Lam, Dan Egel, and Chris Gunter)* - In the past two summers studies conducted by the authors for the management of disease, insect, and weed on pumpkins at Southwest Purdue Agricultural Center indicated that weekly foliar spray of insecticides from early through mid-season had a significantly greater number of aphids (Figure 1) than other treatments with low insecticide input. The

Figure 1. Aphid colony on the underside of a melon leaf. (Photo by F. Lam)

results suggested that controlling the primary pests, cucumber beetles and squash bug, by applying insecticides on a regular schedule might increase the chance for the outbreak of aphids (Figures 2 and 3). A modified study will be conducted in our Center this summer and we will further investigate the above hypothesis.

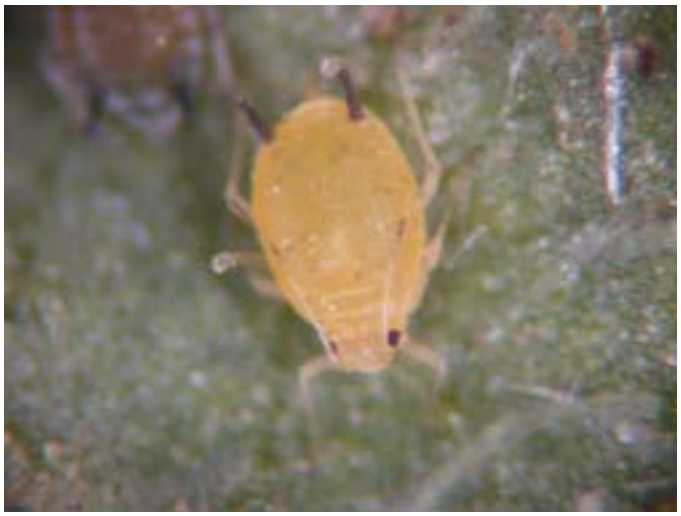

Figure 2. Wingless melon aphid. (Photo by F. Lam)

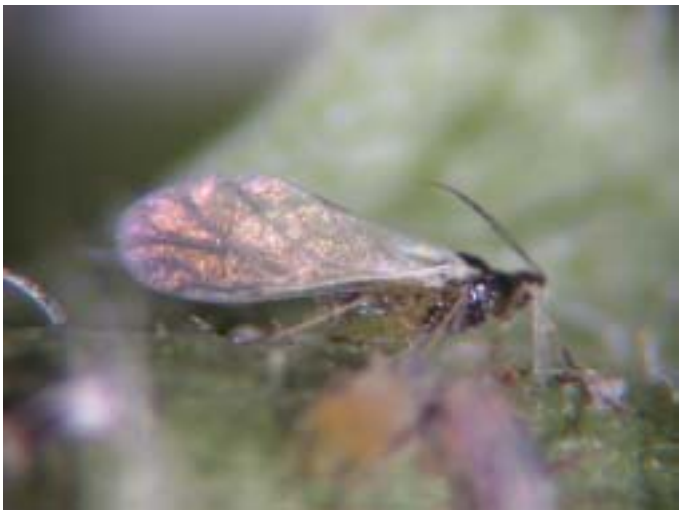

Figure 3. Winged melon aphid. (Photo by F. Lam)

Three categories of insecticides inputs were conducted in the 2003 study: 1) Low input - setting the thresholds at two times higher than the economic thresholds, 2) IPM input - spraying when the numbers of pests reached or exceeded the economic thresholds, and 3) High input - Spraying weekly at planting to the end of July. As a result in 2003, no insecticides were applied on the low insecticide input treatments, one application was sprayed on the IPM input treatments in the early-season, and six applications were sprayed on the high input treatments including one application for the control of aphids.

During the study the numbers of cucumber beetles and egg mass of squash bug were counted directly on 10 plants in the plots, whereas the aphid populations were estimated on 10 plants by using a rating system. The rating system used to estimate the percentage of leaf area covered by aphids was: 1, 0 to 20% coverage; 2, 21-40% coverage; 3, 41-60% coverage; 4, 61-80% coverage; and 5, 81-100% coverage of the leaf surface. The results of the study are presented in Table 1, in which the data are the average of samples through the season. On those high insecticide input treatments, including treatments 3, 4, 5, 8, and 9, we had a relatively low number of cucumber beetles and squash bug egg masses, but most of these treatments, on an average, had relatively higher ratings of aphid populations. The results indicated that insecticides

Table 1. Densities of cucumber beetles, squash bug, and aphids amoung treatment on pumpkins (2003).

Treatment	No. of pesticide or control application			Cucumber beetles per plant	Squash bug egg mass per plant	Aphid rating
	Disease	Insect	Weed			
1	1	0	1 cultivation	0.47 a	2.30 a	0.31 cd
2	4	1	1 cultivation, 1 herbicide	0.41 abc	0.79 c	0.31 cd
3	9	6	1 cultivation, 1 herbicide, 1 hand hoeing	0.29 bc	0.53 cd	0.60 ab
4	9	6	1 cultivation, 1 herbicide	0.31 abc	0.21 d	0.61 a
5	9	6	1 cultivation	0.28 c	0.55 cd	0.55 abc
6	9	1	1 cultivation, 1 herbicide, 1 hand hoeing	0.48 a	0.86 c	0.36 abcd
7	9	0	1 cultivation, 1 herbicide, 1 hand hoeing	0.40 abc	2.57 a	0.21 d
8	4	6	1 cultivation, 1 herbicide, 1 hand hoeing	0.39 abc	1.53 b	0.34 abcd
9	1	6	1 cultivation, 1 herbicide, 1 hand hoeing	1.46 ab	0.65 cd	0.32 bcd

applied regularly could control the primary pests, but might result in a higher number of aphids in the mid-season. This is because the insecticides that are used to control the primary pests had harmful effects on the primary pests and the natural enemies (Figures 4 and 5), but had no harmful effect on aphids. Thus, as a

Figure 4. Mummy aphid with parasitic wasps inside the body. (Photo by F. Lam)

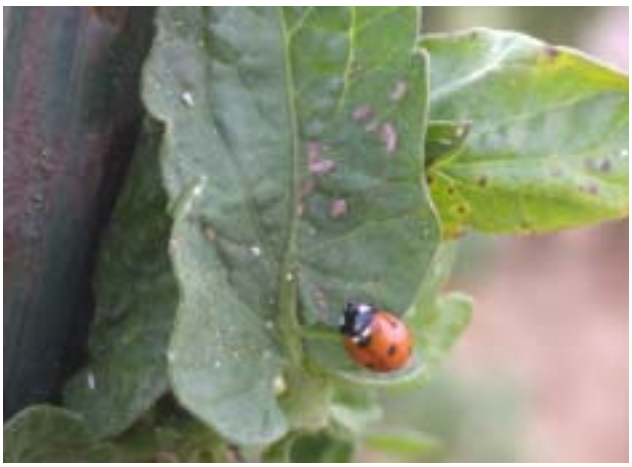

Figure 5. A sevenspotted lady beetle feeding on aphids. (Photo by F. Lam)

grower, if we do not follow the recommended economic thresholds and instead spray our fields regularly, we might increase the chance of aphid outbreak on pumpkins.

The recommended thresholds of cucumber beetles vary depending on the risk of bacterial wilt and size of the pumpkin plant. In certain locations where the more virulent strain of bacterial wilt is a problem and the plants are small, the economic threshold might be lower than five beetles per plant. We still have a lot to learn about the relationship between the squash bug and yellow vine decline on pumpkins and squash. So far, we do not recommend lowering the economic threshold of squash bug to less than one egg mass per plant. If you have further questions about the pests, please feel free to call the Southwest Purdue Agricultural Program at (812) 886-0198.

High Tunnel Resources - *(Liz Maynard)*

- High Tunnel Tomato Production by Lewis Jett, David Coltrain, and Jay Chism. University of Missouri Extension M 170. 28 pp. The booklet contains information on varieties (cultivars), fertilization, building a high tunnel, temperature management, intercropping, pest management and marketing and economics of high tunnel tomatoes. Each copy is $10 and can be purchased from MU Publications at (800) 292-0969 or online at <http://muextension.missouri.edu/explore/manuals/m170.htm>. Of note in this publication: ideas for intercropping; graphs showing temperatures with and without venting, shade, and rowcovers; example budgets; color pictures of tomato diseases and disorders.
- High Tunnel List-serv: An e-mail discussion group about high tunnels. Recent topics have included strawberry and tulip production. To subscribe, go to <http://listserv.ksu.edu/web?SUBED1=hightunnels&A=1> and follow instructions.
- This information is from the High Tunnels Web site at <www.hightunnels.org>, organized by University staff, students, and growers in Kansas, Nebraska and Missouri.

Sweet Corn Germination at Cool Temperatures - *(Liz Maynard)* - Early sweet corn planting will be underway soon, if it isn't already. The cool soil is less than optimal for germination. Some varieties will perform much better than others in cool soils. Generalizations about cool soil emergence have often been made based on endosperm type, that is, whether the variety is su (sugary), se (either homo- or heterozygous sugar-enhanced), or sh2 (shrunken-2 or supersweet). A recent report by Richard Hassell and others at Clemson University in S. Carolina shows that differences in emergence among varieties within an endosperm type can be large.

Hassell and colleagues tested germination of sweet corn varieties at temperatures from 52°F to 86°F under laboratory conditions. They used 9 varieties of each endosperm type and determined how long it took for 75% of the seeds to germinate. The se varieties used were all homozygous (se/se). At 52°F, only 2 su varieties, 3 se's and no sh2's germinated within 7 days. At 64°F su varieties averaged 4.5 days, se's 4.6 days, and sh2's 5.2 days to reach 75% germination. Most varieties reached their maximum germination rate at 72°F to 76°F and did not show faster germination above those temperatures. At 72°F nearly all varieties took 2 to 4 days to reach 75% germination.

These average results conform to the expectation that sh2 varieties do not germinate as quickly as su's or se's at cool soil temperatures. But the averages cover up differences between specific varieties that are important for success in the field. There was much overlap among the endosperm types. Some su's performed worse than some se's and sh2's; some se's performed worse than some su's and sh2's, and some sh2's performed better than some su's or se's.

The best-performing su was NK 99, a variety not commonly grown in this area. It germinated faster than other varieties at 52°F, and at 68°F took only 2 days to reach 75% germination. The least cold-tolerant su was Sweet G-90, which took longer than 7 days to reach 75% germination at temperatures below 64°F. Among the se's, Precious Gem germinated faster than others at 52°F, taking 6 days to 75% germination. At 76°F Precious Gem took only 2 days to 75% germination, faster than the other se's at that temperature. The least cold-tolerant se was Accord, which took longer than 7 days to 75% germination at temperatures below 60°F, and 7 days at 60°F. None of the sh2's reached 75% germination within 7 days at 52°F. The most cold-tolerant sh2 was Morning Star, which at 56°F took 5.5 days to reach 75% germination, and at 76°F took 3 days. The least cold tolerant sh2's were Silver Dollar and SCH 55146, which took longer than 7 days to reach 75% germination at temperatures below 60°F and 7 days at 60°F.

These results for specific varieties are given as examples of how germination at cool temperatures can vary within an endosperm type. The study was done with just one seed lot of each variety, so the results for specific varieties should not be considered definitive; different seed lots of the same variety can differ in their ability to germinate at cool temperatures. However, germination percentage reported on the seed packets was at least 90% for all varieties, so the seed lots represented quality typically available to producers. Other sources of information about performance of sweet corn varieties at cool temperatures include your own and others' field experience and reports from other trials, such as variety reports that include data on emergence and early vigor. The take-home message: don't make assumptions about germination ability in cool soils based on endosperm type, and use all information available to evaluate varieties for adaptation to early season plantings.

Reference: Hassell, R.L., R.J. Dufault and T.L. Philips. 2003. HortTechnology 13(1): 136-141.

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