Potato: The potato crop slowly continues to grow throughout the state. I think it is fair to say almost the entire crop has initiated tubers. At this time in the growing season, day length is such that the crop will initiate stolons and set tubers within 10 or so days of emergence. The canopy of the potatoes in Central Wisconsin has nearly closed for potatoes planted prior to May 15. With that said, I could only find two tubers over 1 cm in diameter on Tuesday of this week outside of the Superiors. The lack of sunshine seems to be slowing crop development in many fields.

The second side dress nitrogen has been applied to many fields in conjunction with the onset of tuber initiation. Some heavy rains have fallen in the Northern part of Central WI and Northern growing areas so some supplemental fertilizer applications may be justified if rainfall events exceeded 3”. We have seen some crops expressing symptoms similar to fertilizer burn in some potato fields. There have also been reports of Sencor damage on varieties that are more sensitive. This may be in response to conditions that potentially favored the uptake of herbicides as indicated by good to excellent weed control in many fields.

Cool conditions are good for promoting tuber growth and development. More sunshine would help enhance crop growth. If lows continue reaching into 50 and 60°F and highs remain below 85°F, then we have good potential for high yield, high gravity, and a good quality crop. The wet conditions and temps near or below could be causing some brown center, but I have yet to see any at this point in the season. Irrigation management designed to provide uniform water should avoid hollow heart development and recovery from brown center if it has indeed occurred.

Fresh Market Vegetables: We have heard a number of concerns about symptoms synonymous with growth regulator exposure in peppers. The actual cause of these symptoms has been difficult to diagnose. Be cautious in characterizing this damage as due to exposure to herbicides. We do know that growth regulating herbicide can cause this type of damage. However, if weeds
within the field do not express similar symptoms, other vegetable crops that were produced in the same greenhouse are not expressing the same symptoms, or there is little likelihood the crop has been exposed to growth regulators then we have to start searching for other potential causes.

In the photo to the left, it is easy to see the cupping of the new leaves, bubbling of the leaf surface, and the distorted growth along the leaf margins. This would quickly lead one to deduce that this crop had been exposed to growth regulating herbicides. However, upon closer examination you can see chlorotic spots located on the leaf surface (arrows). Growth regulating herbicides simply do not cause this type of damage. However, this is symptomatic of contact injury from multiple sources. In fact this field had been treated with foliar fertilizer program twice.

The photo to the right is from the same pepper plant. This leaf was twisted and had a bubbling appearance similar to growth regulating herbicide damage. However, notice the tears in the leaf margin, the hole in the leaf and the light colored regions of the leaf tissue. Again, these are not symptoms caused by growth regulating herbicides. What makes this leaf unique is that it was an older leaf outside of the growing point. Virus can sometimes cause damage similar to the first photo, but virus damage is almost always restricted to the newest leaves and the growing point and not on the older leaf tissue. This particular sample tested negative for the following viruses: TSWV (tomato spotted wilt virus), TMV (tobacco mosaic virus), CMV (cucumber mosaic virus), and INSV (impatiens necrotic spot virus). This is also true for growth regulating herbicides. My suspicion is the initial foliar fertilizer application
caused this damage to this leaf and the second application is contributing to the damage in the first leaf.

We all recognize that fertilizers applied to foliage can cause the type of burn seen in the photos. We also know that foliar fertilizers can cause slight twisting of leaves and stems as they stimulate growth regulator responses in the leaves. Furthermore, some foliar fertilizers are formulated with growth regulators (auxins, gibberellic acid, cytokinin, etc…). The conditions this spring have been conducive to the development of these types of symptoms especially on peppers. Plants were held in greenhouses two to three weeks longer than normal due to cold April and May. Within days of transplanting (May 28 to May 31 for many farms), crops were exposed to hot or sunny conditions that exceed 90 F for several days. Some foliar fertilizers were actually applied in this window. The result is the crops, especially pepper are expressing damage as if they had been exposed to growth regulating herbicides.

The symptom on the pepper leaf in the photo to the left has been witnessed repeatedly over the past several years. Peppers seem particularly sensitive to foliar fertilizer burn and the tearing of the leaf margins has been consistently occurring over this time frame. We hypothesize that pepper is particularly sensitive to injury from foliar fertilizers relative to other crops. That is not to say we don’t see foliar fertilizer burn on many different vegetable crops, but pepper are expressing symptoms this spring while other vegetable crops appear perfectly healthy.

We recognize many factors contribute to crop injury and identifying what is the true culprit is a difficult and challenging task. This spring in particular, we are seeing injury symptoms on pepper across many different fresh market vegetable farms. In many cases it appears highly unlikely that herbicide is causing the damage and all tests for virus have come back negative. We know this because: 1) no other plants (weeds or other crops) express any symptoms consistent with growth regulating herbicides, 2) other crops grown in the same greenhouse appear healthy and asymptomatic, and 3) there is no apparent exposure of the crop to growth regulating herbicides as determined through numerous questions about sprayers, soil media, source of compost, storage of pesticides, pesticides on the farm, etc…. Through this process, several county agents have identified cases where herbicides did cause damage by using these keys in diagnosing the problem.

Monitor these crops over the next 10 to 14 days. They should recover quickly from damage if in fact foliar fertilizers are the culprit. If they do not recover we need to spend more time asking questions to identify the cause of damage. This is our current best bet with regard to symptoms we are seeing in pepper fields across the state.
Vegetable Insect Update  Russell L. Groves, Vegetable Entomologist, Applied Insect Ecologist, UW-Madison, Department of Entomology, 608-262-3229 (office), (608) 698-2434 (cell), or e-mail: groves@entomology.wisc.edu.

Vegetable Entomology Webpage:  http://www.entomology.wisc.edu/vegento

Potato  – Adult Colorado potato beetle (CPB) colonization is concluding. In the Central Sands, adult beetles are still mating and laying eggs while there are now several early to mid-stage larvae from the early egg deposition. Growers and scouts should continue to pay close attention to fields which received at-plant systemic insecticides. Full rates of the neonicotinoids (e.g. Platinum, Belay, AdmirePro) should continue to be effective in controlling these larval populations if no product insensitivity (resistance) is established or developing. The performance of the at-plant neonicotinoids continues to ‘slip’ in many field locations throughout the Central Sands. This ‘early breaking’ may (out of necessity) require an additional application of a foliar insecticide to achieve adequate first generation control. The vegetable entomology laboratory continues to perform topical assays of adult CPB populations collected in Wisconsin to measure neonicotinoid resistance. Selected populations of adult beetles continue to possess elevated LD$_{50}$ values. Early assays on selected populations of overwintered, adult CPB continue to confirm developing resistance as measured resistance ratios are approaching 40 fold.

If in-field populations of larvae continue to persist and survive in plant terminals, it is important to consider foliar applications to minimize the threat of a problematic second generation. Materials for use at this time include spinetoram (Radiant) abamectin (Agri-Mek, Abba, Temprano). Although novaluron (Rimon) is an excellent, early-season option for control of immature CPB, its use at this time is not recommended as the majority of the larvae are advancing into later instars which are a greater challenge for this compound.

Potato leafhopper  Adult potato leafhopper (PLH) populations remain stable averaging 0.6 adults / sweep at the Arlington Agricultural Experiment Station in southern Wisconsin. The prevailing weather patterns over the last week have not been conducive to rapid population increase. Economic thresholds for this pest are exceeded when greater than one or more adults per sweep are observed. Forecast moderating temperatures over the coming weekend and into early next week may increase the likelihood for development of this insect and scouting should continue.

Onions - In 2010, onion growers experienced moderate to, in some cases, low populations of onion thrips. Again in 2011, we are beginning the year with above average precipitation and moderate temperatures. In the late spring, many indicators suggest that several insect pests are 7-10 days behind normal development. In many fields, few onion thrips have been recorded on emerging direct-seeded or transplant onion crops. In the coming weeks, populations can be expected to increase as temperatures are forecast to increase and thresholds may be reached or exceeded. Recall, established economic thresholds for onions thrips are reached when > 1 immature thrips / leaf are exceeded. Few highly effective products are available for onion thrips control. Although registered products span six insecticide classes, control with many of these products has been mediocre to poor (e.g., many pyrethroids, carbamates and the neonicotinoid, Assail). Only a few effective insecticides have been recently registered on onion in Wisconsin, including Radiant, Movento, Lannate, and Agri-Mek, all of which have provided good control of
onion thrips. Onion fields should be scouted for onion thrips before a decision is made to spray the field. In many cases, infestations will begin along an edge or edges of the field. When this occurs, many thrips may be seen along edges and much fewer or none in other parts of the field. If possible, only spray the infested edges rather than the entire field. Wait to spray the entire field when the average number of thrips sampled throughout the entire field reaches threshold.

Squash vine borer – The appearance of this moth pest is anticipated in a week or 10 days ahead as we move into early July at locations in southern Wisconsin. Adult emergence occurs at approximately 1000 degree days (base 50F) in, a point we will approach in the next several days to come in many locations in southern and central Wisconsin. Eggs are laid individually on leaf stalks and vines. Newly hatched larva immediately bore into stems where they feed for 2 to 4 weeks. The key to squash vine borer management is controlling the borers before they enter the stem. Once inside the vine, insecticidal control is ineffective. Poor timing of sprays is the usual cause of inadequate control. Use two insecticide applications 7 days apart to control newly hatching larvae and continue to monitor for additional activity. Sprays need to penetrate the canopy to cover the vines to be completely effective. These sprays can be directed at the first 14-16” of vines near the vine union of the plant; the areas where most egg deposition occurs. The restricted use synthetic pyrethroids still remain the most effective tools for management of this key pest in squash and pumpkins. Field sanitation is also a crucial component of long-term squash vine borer management. After harvest, completely remove all vines from the field and compost this organic matter to prevent the remaining borers from completing larval development.

Vegetable Disease Update Amanda J. Gevens, Vegetable Plant Pathologist, UW-Madison, Dept. of Plant Pathology, 608-890-3072 (office), Email: gevens@wisc.edu.

Vegetable Pathology Webpage: http://www.plantpath.wisc.edu/wivegdis/

Current P-Day (Early Blight) and Severity Value (Late Blight) Accumulations

<table>
<thead>
<tr>
<th>Location</th>
<th>Planted</th>
<th>50% Emergence</th>
<th>P-Day Cumulative</th>
<th>DSV Cumulative</th>
<th>Calculation Date</th>
</tr>
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<tbody>
<tr>
<td>Antigo Area</td>
<td>Early 5/20</td>
<td>6/5</td>
<td>134</td>
<td>24</td>
<td>6/24/11</td>
</tr>
<tr>
<td></td>
<td>Mid 5/29</td>
<td>6/15</td>
<td>77</td>
<td>21</td>
<td>6/24/11</td>
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<tr>
<td></td>
<td>Late 6/5</td>
<td>6/20</td>
<td>37</td>
<td>11</td>
<td>6/24/11</td>
</tr>
<tr>
<td>Plover Area</td>
<td>Early 4/18</td>
<td>5/17</td>
<td>278</td>
<td>28</td>
<td>6/24/11</td>
</tr>
<tr>
<td></td>
<td>Mid 5/2</td>
<td>5/22</td>
<td>245</td>
<td>24</td>
<td>6/24/11</td>
</tr>
<tr>
<td></td>
<td>Late 5/16</td>
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<td>141</td>
<td>24</td>
<td>6/24/11</td>
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<tr>
<td>Hancock Area</td>
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<tr>
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<td>33</td>
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<tr>
<td></td>
<td>Late 5/18</td>
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<td>161</td>
<td>32</td>
<td>6/24/11</td>
</tr>
<tr>
<td>Grand Marsh Area</td>
<td>Early 4/12</td>
<td>5/15</td>
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<td>28</td>
<td>6/24/11</td>
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<tr>
<td></td>
<td>Mid 4/25</td>
<td>5/20</td>
<td>260</td>
<td>28</td>
<td>6/24/11</td>
</tr>
<tr>
<td></td>
<td>Late 5/15</td>
<td>6/1</td>
<td>180</td>
<td>27</td>
<td>6/24/11</td>
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</table>
**P-Days and Early Blight**: Earliest planted potato fields have P-Days ranging from 134 (Antigo) to 285 (Grand Marsh). Mid-planted fields are ranging from 77 (Antigo) to 260 (Grand Marsh). Late-planted fields have P-Days of 37 (Antigo) to 180 (Grand Marsh). An accumulated P-Day value of 300 indicates time to initiate fungicide applications for early blight control. I have not seen early blight symptoms during my potato field visits this week, but did detect the pathogen on a tomato sample from Plainfield just today. With P-Days nearing 300 and canopy closure having occurred, or is occurring, on most potatoes planted mid-May in Central Sands, the selection of fungicides with early blight control should be considered.

**DSVs and Late Blight**: All Wisconsin potato plantings, but for the late plantings in Antigo area, have DSVs exceeding 18 as of mid-day today 6/24/11. An accumulated DSV of 18 indicates time to initiate fungicide applications for late blight control. I have not seen any symptoms of late blight in my scouting and have heard of no new reports across the U.S. this past week in fields or greenhouses. The website: http://www.usablight.org/ indicates location of positive reports of late blight in the U.S. and provides further information on disease characteristics and management.

**Potato White Mold**: Very wet conditions, such as those experienced in most of WI this past week, can favor white mold, caused by the soilborne pathogen *Sclerotinia sclerotiorum*. Dense potato crop canopies can trap warm air and moisture, favoring disease development. While this pathogen has a broad host range which includes beans, vegetable crops, and cole crops, crop rotations to corn and small grains can aid in limiting pathogen build up in the soil. White mold symptoms are typically first observed a few weeks after row closure and include water soaked lesions on above-ground plant parts that are in contact with the soil. The ascospores can infect the flowers and the upper plant canopy, often at junctions. Water soaking is followed by the development of white, cottony mycelial growth which is the most characteristic sign of this pathogen. If conditions continue to favor white mold, the lesions will progress and the pathogen will form hard, dark-colored soilborne sclerotia which can survive for several years. The sclerotia, which look like mouse droppings, are sometimes seen inside infected potato stems; infrequently, they are seen at the soil surface. White mold control is achieved by integrating cultural practices such as non-host crop rotation, good weed control, providing adequate but not overexcessive fertility, and good irrigation management, with application of foliar fungicides when environmental risk and disease pressure is high. Fungicide applications at bloom have been shown to be effective in reducing infection. Effective fungicides include: fluazinam (Omega), thiophanate methyl (Topsin), boscalid (Endura), iprodione (Rovral), and famoxodone+cymoxanil (Tanos).

**Phytophthora in Cucurbits, Peppers, and Tomatoes**: Last summer, many Wisconsin producers battled Phytophthora crown and fruit rot in vegetable crops. This potentially aggressive disease, caused by the soilborne water mold *Phytophthora capsici*, can infect a broad range of crops including summer squash, zucchini, winter squash, pumpkins, melons, cucumbers, peppers, tomatoes, and eggplant. Over the past few years, reports of this pathogen have also been made on snap and lima beans in commercial fields in the Midwest and Mid-Atlantic regions of the U.S. Symptoms of Phytophthora include water-soaking of lower stem or crown of a plant resulting in complete wilting of plants, and water-soaking on fruit often associated with white talcum-like pathogen sporulation on surfaces (see pictures below). Breakdown of plant tissues by this pathogen can be rapid and can occur on fruit post-harvest.
avoid Phytophthora, the following measures should be taken: do not plant susceptible crops on fields with recent history of this disease, provide good drainage (raised beds are beneficial), avoid planting in low-lying areas of fields, practice good irrigation management to avoid standing water and extended periods of leaf wetness, apply effective protectant fungicides when conditions favor infection in known infested fields. Coming off of such a wet week, it is critical that growers of susceptible crops scout their vegetable fields for Phytophthora. Roguing of infected plants from the production field when disease is identified early can aid in limiting spread of disease. Do not allow infected fruit to sporulate and persist in production fields. Culls can continue to provide inoculum for remaining plants. Because Phytophthora is soilborne, soil from infested fields remaining on equipment should be removed prior to moving to a new or ‘clean’ field. Every effort should be made to avoid introducing this pathogen into uninfested fields.

Fungicides can be effective in managing Phytophthora when environmental conditions favor disease. The keys to making fungicides work best for you are: 1) select most effective fungicides with no known resistance in your field/area, 2) make a thorough application particularly if fruit are to be protected and are beneath a dense foliar canopy, and 3) make frequent applications when conditions favor disease and crop growth is rapid.

There are reports of Phytophthora capsici resistance to the fungicide mefenoxam (active ingredient in Ridomil Gold, Ultra Flourish) in other vegetable-producing states. My program tested several isolates of Phytophthora capsici from Wisconsin production fields in 2010 and determined that all were still sensitive to mefenoxam. This means that use of mefenoxam will likely control Phytophthora in that field. Fungicides with activity against Phytophthora crown and fruit rot include: Ranman (cyazofamid), Forum (dimethomorph), Tanos (fanoxadone + cymoxanil), Presidio (fluopicolide), Aliette (fosetyl-al), Revus (mandipropamid), and Gavel (zoxamide + mancozeb). If you have any questions on symptoms, control, or fungicide resistance, please contact your county agent, crop consultant, the diagnostic clinic, or myself at UW-Plant Pathology.

For further information on any fungicides that may be mentioned in this newsletter, please see the 2011 Commercial Vegetable Production in Wisconsin Guide A3422. An online pdf can be found at the link below or a hard copy can be ordered through the UWEX Learning Store.

http://learningstore.uwex.edu/assets/pdfs/A3422.PDF
Phytophthora crown and fruit rot pictures include A: disease cycle on cucumber, B: symptoms on winter squash fruit, C: wilting symptom on winter squash plants, and D: fruit rot and sporulation on cucumber fruit.