Vegetable Crop Update

A newsletter for commercial potato and vegetable growers prepared by the University of Wisconsin-Madison vegetable research and extension specialists

No. 7 – June 8, 2013

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Calendar of Events

July 23– UW-Hancock Ag Research Station Field Day, Hancock, WI (tentative agenda begins at noon)
Aug 22 – UWEX-Langlade County Airport Research Station Field Day, Antigo, WI

Vegetable Disease Update – Amanda J. Gevens, Assistant Professor & Extension Vegetable Plant Pathologist, UW-Madison, Dept. of Plant Pathology, 608-890-3072 (office), Email: gevens@wisc.edu. Vegetable Path Webpage: http://www.plantpath.wisc.edu/wivegdis/

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

P-Day of ≥ 300 indicates threshold for early blight risk and triggers preventative application of fungicide. DSV of ≥ 18 indicates threshold for late blight risk and triggers preventative application of fungicide. Red text in table below indicates threshold has been met. NA indicates that information is not yet available as emergence has yet to occur. **http://www.plantpath.wisc.edu/wivegdis/contents_pages/pday_sevval_2013.html**

Location	Planted	50% Emergence	P-Day Cumulative	DSV Cumulative	Calculation Date
Antigo Area	Early 5/13	6/4	NA	NA	NA
	Mid 5/22	NA	NA	NA	NA
	Late NA	NA	NA	NA	NA
Grand Marsh Area	Early 4/15	5/10	132	31	6/6/13
	Mid 5/1	5/21	97	31	6/6/13
	Late 5/15	6/5	6	4	6/6/13
Hancock Area	Early 4/20	5/15	150	28	6/6/13
	Mid 5/5	5/23	89	26	6/6/13
	Late 5/15	6/5	6	4	6/6/13
Plover Area	Early 4/22	5/17	111	28	6/3/13
	Mid 5/7	5/30	51	14	6/6/13
	Late 5/24	6/5	9	5	6/6/13

DSVs and Late Blight: From in-potato-field weather stations here in Wisconsin, we have far exceeded initial threshold for Blitecast (with DSVs at or just under 30) in roughly half of monitored locations. Early- and mid-plantings in Grand Marsh and Hancock, and early plantings in the Plover area are at 26-31. Accumulation of DSVs has been significant in the Grand Marsh area over the past 3 days. This indicates that weather conditions have been very favorable for late blight. A look at the 72-hour outlook for Blitecast (from remotely sensed NOAA data),

indicates that accumulation will likely slow down a bit. Early next week should bring clear, warm, and dry conditions which are not disease promotive.

Late blight status in the U.S. No reports of late blight in Wisconsin at this time. There has been a report of late blight in tomato in Dickson County Tennessee this week. To date this production year, late blight has been reported in in FL on tomato and potato (primarily of the US-23 clonal lineage), and in TN on tomato (clonal lineage not yet known). 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.

Basil downy mildew: Weather conditions have been very favorable for 'water mold' pathogens and we know basil downy mildew to be seedborne. I have received a few calls/emails on this disease this past week. *Peronospora belbahrii*, the fungus-like causal agent of basil downy mildew (picture below from 2011 case), causes yellowing of leaves, often some dark brown irregular spotting, and cupping/gnarling of leaves often downward. The undersides of leaves may be covered with dark brown-gray pathogen sporulation. If you are purchasing transplants, be watchful for these symptoms.

Basil downy mildew has made recent headlines nationally as a new disease in North America as well as Europe. First reported in FL in 2007, basil downy mildew was later found in field and greenhouse in Canada, Argentina, and in over a dozen US states as of 2011. The case was confirmed in Wisconsin in 2010 and in each subsequent year.

The basil downy mildew pathogen can be transmitted on seed, infected plant parts, and the wind. This particular downy mildew can infect both ornamental and basil varieties grown as herbs. It is suspected that basil downy mildew has moved geographically on contaminated seed or leaves. The spores of basil downy mildew are produced on leaf underside prolifically and can be aerially dispersed long distances.

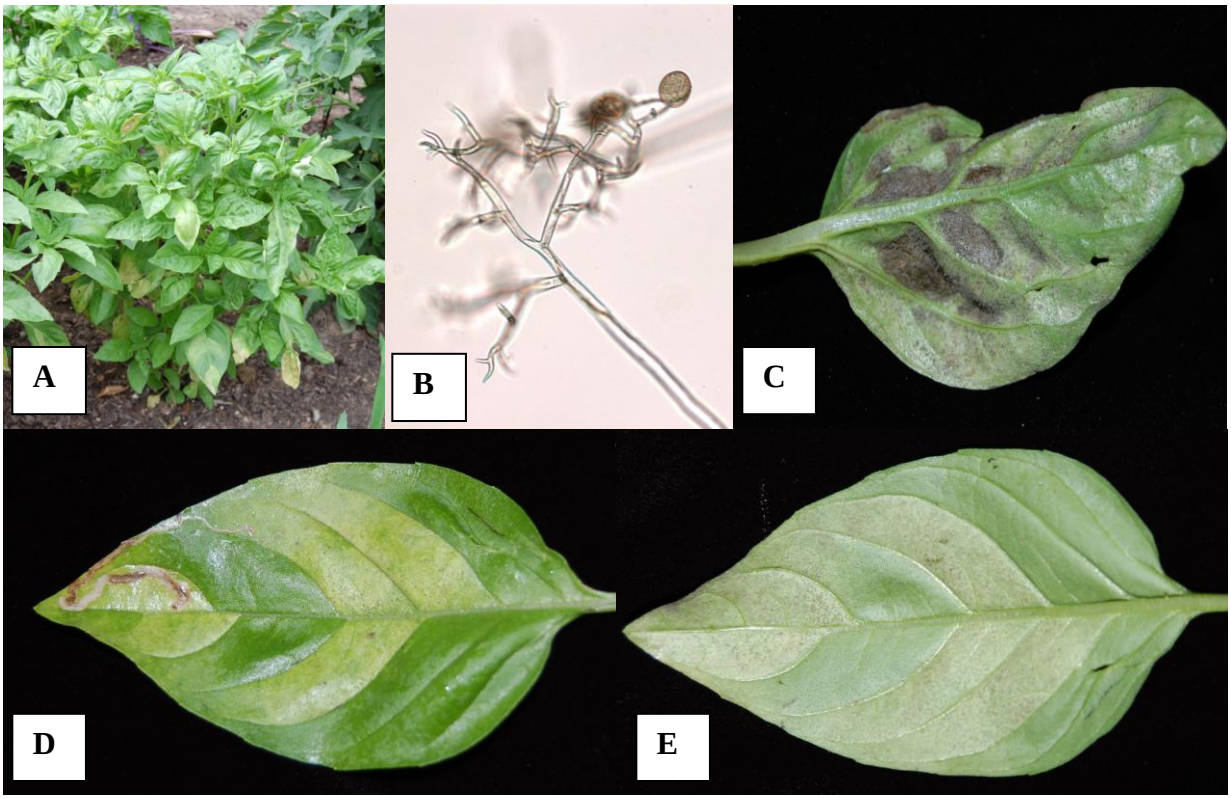
The management of basil downy mildew includes planting uninfested or 'clean' basil seed, selecting resistant or tolerant varieties, and applying fungicides when environmental conditions favor disease. Minimizing leaf wetness and humidity will aid in downy mildew management as the pathogen is favored by moist conditions. Increasing plant spacing and encouraging air flow between rows can greatly limit disease development. It is known that sweet basil varieties are more susceptible than other basil species. The table below indicated relative susceptibility of typical varieties (from Dr. Meg McGrath, Cornell).

Basil varieties susceptible to downy mildew		
Aroma 2	Italian Large Leaf	Superbo
Genovese	Magical Micheal	Queenette
Genoveser Martina	Mariden	Poppy Joe's
Nufar	Opal Purple Variegated	
Basil varieties tolerant to downy mildew		
Amethyst Imp	Mrs. Burns Lemon	Lemona
Red Rubin	Red Leaf	Lime
Sweet Adin	Lemon	
Lemon standard	Lemon Mrs. Burns	
Basil varieties resistant to downy mildew		
Spice	Blue Spice	Blue Spice Fil

While not a preferred approach for home gardeners that may have just one or a few basil plants, fungicides can limit basil downy mildew. Applying fungicides frequently and starting before first symptoms are considered necessary to control downy mildew effectively. Few fungicides are currently labeled for this new disease. Actinovate AG and OxiDate are OMRI-listed fungicide labeled for use on herbs and for suppressing foliar diseases including downy mildew. OxiDate is labeled for use outdoors and in greenhouses. The Actinovate label does not have a statement prohibiting use in greenhouses. There are two phosphorous acid fungicides, ProPhyt and K-Phite, that have downy mildew under herbs on the current label. These fungicides were effective in fungicide efficacy experiments with applications started before or after initial symptoms were found. Greenhouse use is not prohibited. Quadris is labeled for use on basil but not specifically for downy mildew; but has been shown to be effective for this downy mildew. Greenhouse use is not permitted with Quadris. Other fungicides are expected to be labeled for basil downy mildew in the future.

To determine when to initiate a fungicide program and also when it is warranted to consider harvesting early to avoid losses to downy mildew, growers should regularly inspect their plants for symptoms. The cucurbit downy mildew forecasting web site (http://cdm.ipmpipe.org) might be useful for predicting when conditions are favorable for basil downy mildew since both pathogens have similar requirements for wind dispersal long distances (e.g. overcast skies) and subsequent infection (e.g. wet leaves). Summer is not a time to forget about this disease: unlike most other downy mildew pathogens, e.g. the ones affecting lettuce and cruciferous crops, which stop developing in summer, the basil downy mildew pathogen seems to develop best under moderate to warm temperatures while also tolerating cool temperatures.

Basil crops should be disked under or otherwise destroyed as soon as possible after last harvest, or when abandoned because of disease, to eliminate this source of inoculum. Further details on registered fungicides for WI vegetables can be found in the Univ. of WI Commercial Vegetable Production in WI Guide A3422, http://learningstore.uwex.edu/assets/pdfs/A3422.PDF.



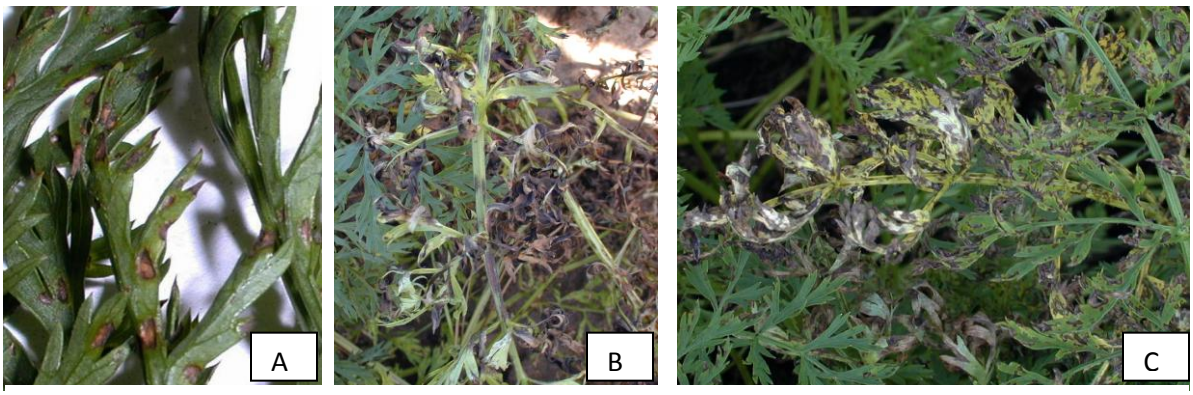
Basil downy mildew symptoms and signs. **A**. Basil plant exhibiting symptoms of leaf yellowing consistent with downy mildew (2011). **B.** Branched sporangiophores (spore tree) and sporangia (spore) of basil downy mildew under 200X magnification. **C.** Underside of leaf exhibiting signs (dark gray, 'dirty' spores) and symptoms (brown, dead sections of leaf) of basil downy mildew**. D.** Topside of leaf (note yellowing or chlorosis) with angular (vein confined) lesions. **E**. Underside of leaf (note patches of gray-purple fuzzy pathogen sporulation) with angular pattern.

Carrots: Carrot emergence ranges from about 20 May to current, depending on planting dates. We're surveying several fields in Central WI to keep tabs on first symptoms of foliar disease. Earliest symptoms are often seen on oldest of leaves. Alternaria and Cercospora leaf and petiole blights of carrot are very common here in Wisconsin. Further information is provided below on how to identify the two diseases. However, it is important to keep an eye on leaf blights in carrot as they can spread rapidly when conditions are warm and periods of leaf wetness increase.

Alternaria leaf blight of carrot is caused by the fungus *Alternaria dauci*. The pathogen typically attacks leaf margins creating oblong or irregularly shaped lesions resulting in chlorosis and necrosis of the leaf tissues (pictures below). Complete foliar decline and death can occur if left unmanaged. The pathogen prefers older or weak foliage, particularly most mature leaves and of plants that may not be appropriately fertilized. Spores (conidia) will be continually produced on carrot foliage, so management of the pathogen in its earliest stages is critical. The pathogen overwinters in carrot debris or on wild carrot species, or can be seedborne. Spread in field occurs by wind and splash rain dispersal of spores.

Cercospora leaf blight of carrot is caused by the fungus *Cercospora carotae*. Spores (conidia) will be continually produced on carrot foliage, so management of the pathogen in its earliest stages is critical. The pathogen overwinters in carrot debris or on wild carrot species, or can be

seedborne. Typically, Cercospora leaf blight is seen earlier in the season than Alternaria leaf blight and is often on younger leaves. Symptoms are distinct from Alternaria in that lesions are much more concise, with orange to tan circular or elliptical lesions on petioles and leaflets (pictures below). While Alternaria tends to favor leaf margins, Cercospora can be found anywhere on the leaf. Spread in field occurs by wind and splash rain dispersal of spores.



Alternaria and Cercospora leaf blights of carrot. A. Symptoms of Cercospora leaf blight. B. Symptoms of Alternaria leaf blight. C. Combined symptoms of Alternaria and Cercospora leaf blight. (Photos courtesy of: Dr. Walt Stevenson, UW-Plant Pathology Emeritus Professor)

Management of foliar leaf blights of carrot:

Resistant varieties include: Bolero, Calgary, Canterbury, Carson, Cheyenne, Commanche, Goliath, Halfback, and Sirocco. **Moderately resistant varieties include**: Canada, Danvers 126, Enterprise, Indiana, Nandrin, Nevis, Prospector, Recoleta, SugarSnax 54, and 713087. **Susceptible varieties include:** Early Gold, Fontana, Gold King, Heritage, Lucky B, Prodigy, Protégé, PY-60, Sunrise, Yellowstone, and 80494. (W. Stevenson)

Fungicides can effectively manage foliar blights in carrot when appropriate products are selected and applied in a timely manner. A disease forecasting model, TOMCAST, has been developed for use in WI to trigger follow up fungicide sprays after 1% level of infection has been established. Further information on this forecasting model can be found in the UW BioIPM Manual for Carrots, link below. TOMCAST values are being generated for current and 72-hr forecast weather and will be made available at the UW-Vegetable Pathology website.

http://ipcm.wisc.edu/download/pubsBIOIPM/Bio_IPM_Carrot_web.pdf

In recent years, fungicide programs containing a protectant of chlorothalonil (Bravo, Echo, Equus, Initiate, and others) alternated with a reduced risk site-specific fungicide such as azoxystrobin (Quadris) have been adopted with success. A typical program, depending on initiation date, may include up to 5 fungicide applications. In 2011, my program evaluated several fungicide regimes for control of foliar blights of carrot. The report can be accessed at:

http://www.plantpath.wisc.edu/wivegdis/pdf/2011/Carrot%20Foliar%20Blight%20Gevens%202011.pdf

***Cucurbit Downy Mildew*:** has not been identified in Wisconsin at this time in commercial fields, home gardens, or our sentinel monitoring plots. FL, GA, and NC have reported cucurbit downy mildew this season across squash and cucumber hosts. I will be keeping tabs on disease reports in the region and will provide updates in this newsletter. No forecasted risk of movement of spores from states reporting detects to Wisconsin at this time. The website: http://cdm.ipmpipe.org/ offers up to date reports of cucurbit downy mildew and disease forecasting information.

The 2013 A3422 Commercial Vegetable Production in Wisconsin guide is available for purchase through the UW Extension Learning Store website: http://learningstore.uwex.edu/Commercial-Vegetable-Production-in-Wisconsin2013-P540.aspx

A pdf of the document can be downloaded or is available at the following direct link: http://learningstore.uwex.edu/Assets/pdfs/A3422.pdf

Vegetable Insect Update – Russell L. Groves, Associate Professor and Applied Insect Ecologist, UW-Madison, Department of Entomology, 608-262-3229 (office), (608) 698-2434 (cell), or e-mail: groves@entomology.wisc.edu.

Seed Maggots - The emergence and flights of the second generation of seed corn maggot flies is now (again) underway at several locations in southern Wisconsin and is approaching several sites in central and northern Wisconsin (**Fig. 1**). Recall that this insect has a base temperature of 39^{o}F and the emergence of adult fly populations are expected at accumulated degree days of 200 and 600 degree days (**Fig. 2**). In central Wisconsin, several locations have reached, or just exceeded this value. Adult flies will become very active at this time and begin to lay eggs at the base of susceptible (young) plants, where larvae tunnel into underground portions.

As reported previously, the first three generations of onion maggots will occur when totals of 680 degree days (spring), 1950 degree days (summer), and 3230 degree days (fall) respectively, have been reached using a slightly different base temperature of 40^{o}F (**Fig. 2**). The map illustrates that the first generation peak of egg-laying adults is centered along the iso-line from Antigo to Wausau and westwards towards the Chippewa Valley. As onions mature, they are less susceptible to onion maggot infestation unless they are damaged by cultivation equipment. Soil applications of Lorsban can be used to control onion maggot in dry bulb onions and the new Farmore DI 400 and 500 seed treatment formulations are available to minimize damage. The preventative soil insecticide applications are recommended for the control of the first generation larvae if you have previously documented damage from the previous year's crop which exceeds 5 to 10%. Foliar insecticide applications should be avoided since they are generally ineffective on adult populations as they irregularly move in and out of fields.

First generation populations of adult cabbage maggots have been active over the past two weeks in southern and central Wisconsin as the DD-accumulations for this insect pest arise at 300, 1476, and 2652 with a base temperature of 43^{o}F (**Fig. 2**). Recall that this first peak often coincides with the timing of blooming lilacs, an event which has recently passed across much of southern Wisconsin.

Aster Leafhoppers – Low levels of migrating populations of the Aster leafhopper (ALH) continue to be observed in some southern Wisconsin locations. Migrant leafhoppers continue to

be quite low and very few have been noted in central portions of the state. Levels of AYp (infectivity) within the migrating leafhoppers are usually low (0-3%) and insect numbers are influenced by these spring weather patterns in the migration pathway.

Potato leafhopper – Adult potato leafhopper (PLH) have begun to immigrate into southern and central Wisconsin, arriving over the last couple weeks on similar (weather) systems for ALH. Populations of adults are low and sweep net counts at the Arlington Agricultural Experiment Station are less than 0.1 adults / sweep. Recall, however, that these insects have a broad host range attacking alfalfa, snap beans, and potatoes, to name only a few. They feed with sucking mouthparts similar to mosquitoes and remove plant sap directly from the phloem and cause damage by injection of a salivary toxin that causes cell disruption. Once populations have been observed, fields should be scouted regularly using standard sweep net sampling. Recommended treatment thresholds are 1 adult per sweep with a net or 15 nymphs on the undersides of 50 potato leaves.

Potato – Overwintering Colorado potato beetle (CPB) adults have been emerging over the past few weeks in the Central Sands region, but rates of colonization are slow. Adults are now colonizing fields along field edges close to their overwintering sites and likely near previously planted potato. Pay close attention to these colonizing populations to see if the at-plant systemic neonicotinoids remain effective. At the current time, we should be experiencing high concentrations of the neonicotinoids in newly emerging plants which 'should' provide very good control of early season adult beetles and any newly hatched larvae. Perimeter foliar applications with the reduced-risk product, novaluron (Rimon®), could likely begin by next week. This material has the unique activity of targeting not only eggs, but early instar larvae. In fact, it has been shown that adult female CPB that ingest novaluron-treated foliage will lay eggs that are non-viable. As a result, in the coming week we should consider this 1st generation application to ensure good control. A second and third application will likely be necessary in 7-10 days following the initial application to provide more complete control of the 1st generation.

Onion Thrips – In 2013, onion growers may get a reprieve from onion thrips. This speculation is due to the cool and wet conditions experienced in April, May and now into early June. As with many pest species this spring, several indicators suggest that many insect pests are somewhat behind. Do, however, be mindful of how quickly populations of this insect can change. Recall that in 2012, Wisconsin onion growers received a full Section 3 registration for the use of abamectin (Agri-Mek 0.15EC®) against onion thrips. The revised (2011) Section 3 label can be found at: http://www.cdms.net/LDat/ld27U000.pdf. And now expected for 2013, spirotetramat (Movento®) will likely receive a Section 3 amendment to include onion thrips. This will be a very valuable addition to our arsenal of products for which we no longer require a Section 18, Emergency Exemption. As stated on the draft label, the product may be used consistent with all applicable directions, restrictions, and precautions. Movento may be applied by air or by ground at a rate of 5.0 fl oz / acre of formulated product (0.08 lbs ai/acre) and may not exceed a total of 2 applications per crop season with a 3-7 day preharvest interval (PHI). A copy of the draft label is provided (Fig. 2) and a Section 3 amendment should post in only a few weeks.

Soybean Aphid – Over the past week, scouting for the soybean aphid has been performed by Dr. David Hogg, Field and Forage Crops Entomologist in the Department of Entomology. Following are excerpts of his recent scouting report:

"(June 4) we documented colonization of VC-V1 beans by aphids at the West Madison Agricultural Research Station. We sampled 100 plants and found 13 infested with aphids. Of the infested plants, the average numbers of aphids were 0.7 winged "alate" adults (the momma aphids) and 5.3 nymphs. The range in aphid numbers was 1 to 17. This is early, but certainly not unprecedented for soybean aphid colonization – mid June is more typical, but I've seen them as early as Memorial Day. However, I can't recall a colonization density as high as this.

(June 5) we also inspected buckthorn (Rhamnus cathartica) in and around Madison (4 sites) and found soybean aphids in abundance and producing numerous alates everywhere we looked. We know from extensive survey work that the soybean aphid routinely overwinters on buckthorn along the I-80 corridor, from western Illinois (the Quad Cities) east to Toledo, Ohio. It has been a mystery as to why the soybean aphid does not appear to utilize buckthorn that is in abundance in much of Wisconsin for overwintering. Our spring survey this year indicates that these recent aphid finds on Madison buckthorn were "secondary" colonizations by migrating aphids, and not from overwintered eggs.

(June 6) we visited two sites outside Dane County – the Arlington Agricultural Research Station and buckthorn near Ripon – to gauge how widespread this phenomenon is. We found aphids on buckthorn at both locations, but not nearly the abundance we observed in Madison. Also, the colonies in both cases were incipient – an alate with her offspring nearby or young nymphs only (similar to what we saw in beans yesterday), rather than "mature" colonies producing new alates.

What's the significance of this? I'm not sure if it portends a big aphid year, or if it will turn out to mean nothing. Perhaps meteorological conditions a week or so ago resulted in migrating soybean aphids getting dumped on Madison. I think at the very least it indicates that soybean aphids are in the air, moving around, and have the potential of finding and building up populations on soybeans as soon as plants become available."

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

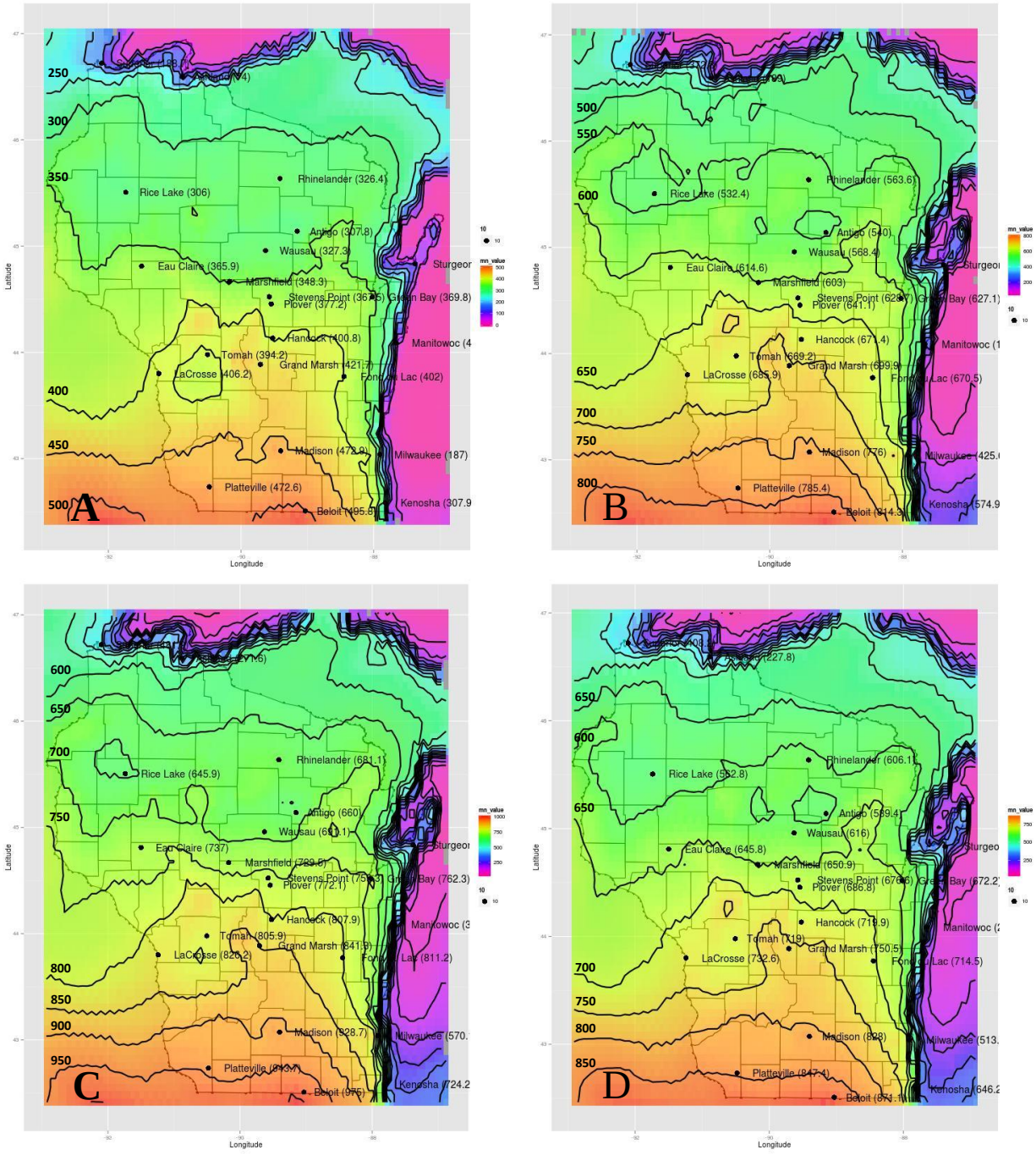


Figure 1. Estimated Degree Day (DD) accumulations using the modified sine-wave for each of four base temperatures **50** (A), **43** (B), **40** (C), and **39** (D) degrees F.

BULB VEGETABLES

Crops of Crop Subgroup 3-07A Including: Daylily (bulb), Fritillaria (bulb), Garlic (bulbs of common, great-headed, Serpent), Lily (bulb), Onion (bulbs of common, Chinese, Pearl, potato onion), Shallot (bulb), plus cultivars, varieties, and/or hybrids of these.

Crops of Crop Subgroup 3-07B Including: Chinese Chive (fresh leaves), Chive (fresh leaves), Elegans hosta, Fritillaria (leaves), Kurrat, Leek (Allium porrum, Lady's, Wild), Onion (Beltsville bunching, fresh, green, macrostem, tree [tops], Welsh [tops]), Shallot (fresh leaves), plus cultivars, varieties, and/or hybrids of these.

PEST CONTROLLED	Rate fluid ounces/Acre	Rate lb ai/Acre
Onion thrips (larvae)	5.0	0.08

Restrictions

Pre-Harvest Interval (PHI): **3 days (members of Subgroup 3-07A); 7 days (members of Subgroup 3-07B).**

Minimum interval between applications: **7 days.**

Maximum MOVENTO allowed per crop season: **10 fluid ounces/Acre (0.16 lb ai/Acre).**

For Onions, Leeks, and Chives grown for seed production, do not apply 4 months prior to bloom, during bloom or until after petal fall.

Figure 2. Draft language of a supplemental label under review with the Wisconsin, DATCP.