Vegetable Crop Update

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

UW Extension

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In This Issue

Calendar of Events

July 13 – UW-Rhinelander Ag Research Station, Potato Tour, 10AM-2PM
July 24 – UW-Hancock Ag Research Station, Field Day, 12:30-4:00PM
August 2 – UW-Langlade County Ag Res Station Field Day Antigo, 1:00PM

Vegetable Crop Update – A.J. Bussan, Department of Horticulture, UW-Madison, Phone: 608-225-6842, E-mail: ajbussan@wisc.edu.

Potatoes: Reports of multiple varieties indicate tubers are approaching 4 oz in size across Central WI. Potatoes planted the last week of May on muck soils and in Northern WI have already tuberized and had dime sized tubers last week. Canopy is healthy to date and have begun to flower presenting fields of white to purple flowers throughout the Central part of the state.

Minimum temperatures have been warm in response to high day time temperatures. In the lower WI River Valley, there have been over 6 days with low temperatures greater than 70ºF. There have been 6 nights with lows over 62ºF since May 28. As low temperatures begin to approach 70ºF, soil temperatures warm up. Warm soil temperatures decrease potato tuber bulking resulting in lower specific gravity. Warm soil temperatures also tend to increase defects in chip and processing potatoes.

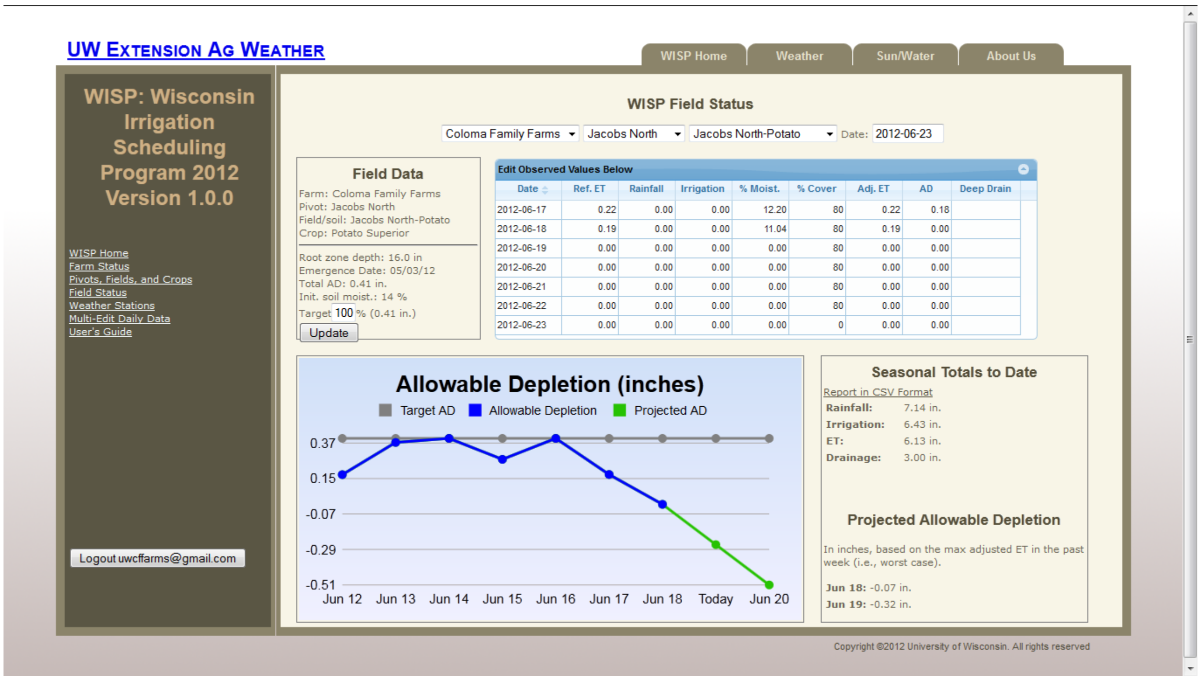
Recent rains will help keep the hills cool in Central and Northern parts of the state, but the forecast is for continued warm conditions. Healthy crop canopy is critical for shading soils and preventing soil warming. Adequate irrigation can help minimize drought stress and prevent dual stress conditions that can lead to greater losses in crop quality. Furthermore, adequate soil moisture will be important for preventing common scab disease and other disorders.

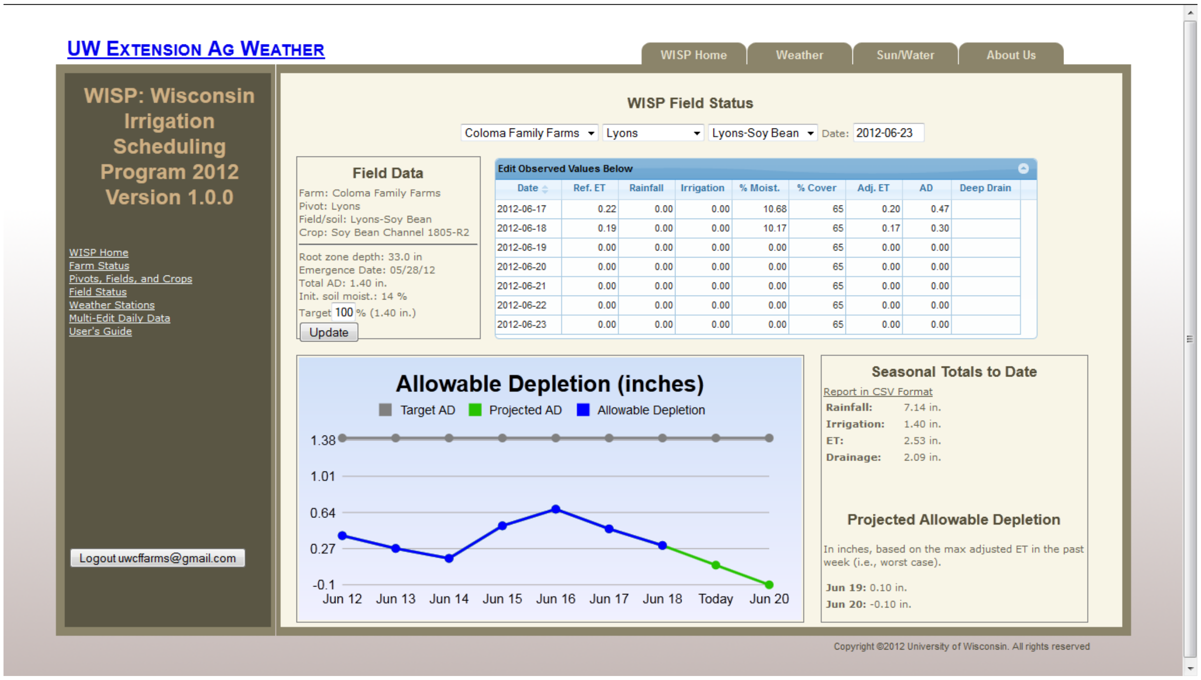
Irrigation: A new tool is available through UW Extension Cooperative Extension Service and UW-Madison CALS for scheduling irrigation. We are currently working through the bugs in the irrigation tool and to help support this process we are working with multiple farms to enter fields into the tool and have begun monitoring AD level, irrigation, and precipitation.

Following this article are the data for irrigated soybean and irrigated potato from Coloma Farms, Coloma, WI. We have yet to enter the precipitation data for the past 2 days so the project AD balance is trending negative. Over the course of the summer we will share irrigation data for different crops so folks could use this as a reference. We could also provide access to the data from the Hancock Ag Research Station for those that are interested in tracking the system more closely.

Notice the difference in the management approaches for the two crops. Potatoes are well into early tuber bulking and are quite sensitive to drought stress at this stage of crop development. In addition, the AD balance is much lower for potato than other crops due to the limited rooting depth. As a result the Allowable Depletion (AD) level is being managed close to field capacity. In contrast, soybeans are still in the vegetative stage of crop development. Soybeans have been managed drier as the crop benefits from slightly drier soil management at this stage of development to promote root development and healthy root system overall. In addition, the crop has not closed canopy so adjusted ET is slightly lower than potential ET. As a result the soybean crop has received 75% less irrigation than the potato crop.

The irrigation tool can be accessed on-line at http://wisp.cals.wisc.edu/. We are still working through some issues within the system and therefore are working with farms in monitoring available depletion level. We welcome any feedback folks have in how the tool is working.





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

Location	Planted	50% Emergence	P-Day Cumulative	DSV Cumulative	Calculation Date
Antigo Area	Early 5/1	5/30	122	3	6/18
	Mid 5/10	6/6	84	3	6/18
	Late 6/1	NA	NA	NA	NA
Grand Marsh Area	Early 4/3	5/8	282	8	6/18
	Mid 4/15	5/16	235	8	6/18
	Late 4/30	NA	179	7	6/18
Hancock Area	Early 4/1	5/1	344	11	6/18
	Mid 4/15	5/10	287	5	6/18
	Late 5/1	5/17	244	5	6/18
Plover Area	Early 4/3	5/17	295	7	6/18
	Mid 4/19	5/18	230	7	6/18
	Late 5/1	5/27	167	3	6/18

(NA indicates that information is not yet available as emergence has yet to occur)

P-Days and Early Blight: Earliest planted potato fields have P-Days of 282 in Grand Marsh (6/18), 344 in Hancock (6/18), 295 in Plover (6/18), and 122 in Antigo (6/18). Mid-planted fields are 235, 287, 230, and 84, consecutively on 6/18. Preventative fungicides for early blight control should be applied in Southern and Central Wisconsin on early planted potato fields. We are also approaching an accumulated P-Day value of 300 in mid planted Central Wisconsin potatoes. **The first early blight lesions were confirmed on lower canopy potato leaves at the Hancock Agricultural Research Station late last week**. An accumulation of 300 P-Day values indicates a time at which early blight is favored and first infection may occur.

DSVs and Late Blight: As of June 19, we had little DSV accumulation at all sites with emerged potatoes. The highest DSV accumulation was calculated for earliest planted fields in the Hancock area (DSV 11 on 6/18). The dry weather has been helpful in limiting periods of leaf wetness which are necessary in promoting the development of the late blight pathogen, *Phytophthora infestans*. An accumulated DSV of 18 indicates time to initiate fungicide applications for late blight control.

There are no reports of late blight in Wisconsin at this time. This past week there were several new PA counties reporting late blight, in addition to reports in FL, NC, VA, and NY. To date, late blight has been reported in CA, FL, NC, NJ, NY, PA, and VA. 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.

Cucurbit Downy Mildew: has not been identified in Wisconsin at this time in commercial fields, home gardens, or our sentinel monitoring plots. Currently, several states have reported cucurbit downy mildew across a wide range of cucurbit hosts including summer squash, zucchini, melon, and cucumber in FL, GA, SC, NC, MD, NJ, and just this past week in DE (cucumber), AL (cantaloupe & cucumber), and central OH (Wayne County, cucumber). No forecasted risk of movement of spores from southern and eastern states to Wisconsin at this time. However, risk for northeastern OH and eastern seaboard states is low to moderate. The website: http://cdm.ipmpipe.org/ offers up to date reports of cucurbit downy mildew and disease forecasting information.

For further information on any fungicides that may be mentioned in this newsletter, please see the 2012 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

Vegetable Insect Update – Russell L. Groves, Assistant 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.

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Colorado potato beetle (CPB) - In the Central Sands, adult colonization from overwintering has effectively ended and only a few new egg masses are being laid at most locations. In-field populations of 2nd and 3rd instar larvae are very prevalent at most locations, and it is very important to follow up with foliar applications to get control of this first generation and lessen the impact of the second generation of CPB. As noted in previous newsletters, these applications can consistent of the following insecticide options to include: abamectin (Agri-Mek, Abba, Reaper, Athena, etc.), chlorantraniliprole (Voliam Xpress), novaluron (Rimon), rynaxypyr (Coragen), spinosad (Blackhawk, Entrust, SpinTor), or spinetoram (Radiant). In the coming week, we recommend that any of the former products be used as a series of two, successive foliar applications, spaced 7-10 days, but should not exceed the season total maximum active ingredient specified on the label.

Potato leafhopper – Adult potato leafhoppers (PLH) populations remain quite high at several locations, continually arriving on the strong southerly winds in advance of frontal systems that have moved across the state again this week. Adult and nymphal populations are steadily increasing in untreated potato at the Arlington Agricultural Experiment Station with sweep net counts now exceeding 6.5 adults / sweep. Numbers are especially problematic in commercial fields where an at-plant, systemic neonicotinoid insecticide was not used. At the Hancock Agricultural Experiment Station, populations are again increasing and average 3.5 adults / sweep in our untreated control plots. Recall that recommended treatment thresholds are 1 adult per sweep with a net or 15 nymphs on the undersides of 50 potato leaves. The at-plant systemics should still be effective in controlling these insects, especially any nymphs emerging from eggs. Consult the Vegetable Entomology webpage for more details on selected methods of insecticidal control to limit potato leafhopper (http://www.entomology.wisc.edu/vegento/ci/pests.html).

Onion Thrips – Populations of onion thrips are now very quickly increasing towards established treatment thresholds. Dry conditions over much of southern and central Wisconsin in the last week, coupled with very warm day and nighttime temperatures, have influenced rapid population growth. Above average temperatures are again forecast for much of the region and these temperatures will undoubtedly drive onion thrips populations very quickly over the coming week. Success in managing season-long populations of onion thrips relies almost exclusively on the use of insecticides. Recall the four important components to achieve effective control: (1) an effective insecticide, (2) an effective method of application, (3) appropriate timing of the insecticide, and (4) the application sequence of insecticide products over the course of the season. 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. Otherwise, wait to spray the entire field when the average number of thrips sampled throughout the entire field reaches a threshold. Proposed sequences of insecticides used to manage onion thrips infestations are shown in **Table 1**. Sequences and products selected for these examples are based on results from small-plot onion trials in Wisconsin.

Table 1. Sequence of insecticides to apply for onion thrips control in Wisconsin onion fields. Two applications of each product should be considered and timing should be based on an appropriate action threshold.

Application #	Product	Action threshold/ Timing of spray to consider
1	Movento	1 thrips larvae per leaf
2	Movento	7 to 10 days after 1st Movento spray [1]
3	Agri-Mek	1 thrips larvae per leaf
4	Agri-Mek	1 thrips larvae per leaf
5	Radiant	3 thrips larvae per leaf
6	Radiant	3 thrips larvae per leaf
7	Lannate	1 thrips larva per leaf
8	Lannate	1 thrips larva per leaf

[1] If the thrips population is reduced to a low level (e.g., below 1 thrips per leaf) after the first Movento spray and does not reach threshold again until 3 weeks later, consider avoiding another application of Movento. If this scenario occurs, the second application of Movento would likely be used against the next generation of thrips. Based on insecticide resistance management principles, such a case should be avoided if possible. The recommendation would be to continue the sequence with the next product, which would be Agri-Mek or Radiant.

Striped cucumber beetles - are now becoming a serious pest of cucurbits in many areas of the state. Adult beetles over winter in protected areas under dense grass, near buildings, in fence rows, and in woodlots. They become active early in the spring and then feed on the blossoms of several alternate host species, including wild cucumber, hawthorns and dandelions, until cucumber, squash, or melon seedlings emerge or transplants are set out in fields. Cucumber beetles then migrate to the cucurbits and feed on the young seedlings. In addition to direct damage on plants, cucumber beetles are vectors of bacterial wilt (caused by the bacterium *Erwinia tracheiphila*). While foliage-feeding adult cucumber beetles can injure the crop, especially seedlings, the transmission of bacterial wilt disease is even more serious because bacterial wilt will kill the plant. IPM practices crucial for successfully managing beetles and bacterial wilt of cucurbits include 1) the exclusion of early-season beetles with row covers, 2) elimination of sources of bacterial wilt inoculum via clean culture and sanitation, 3) planting tolerant or resistant varieties, and 4) optimal application timing of reduced-risk insecticides (e.g. at-plant, systemic neonicotinoids) to repel and kill colonizing beetles. Proper selection of insecticides with appropriate application timings and methods can minimize damage to pollinators and optimize fruit set. Direct control of the insect vector (carrier) is the most effective form of disease control. Insect control should include practices that are not directly harmful to domestic or wild pollinator species of bees. Pest control products that contain the active ingredient carbaryl should be avoided when attempting to control cucumber beetles while conserving pollinators.

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Ruark Extension Web site: http://www.soils.wisc.edu/extension/
Ruark Lab Web site: http://www.soils.wisc.edu/~ruark/

Self-diagnosing nutrient deficiencies in vegetable crops: Visual observations of nutrient deficiencies in vegetable crops are common, and can range in severity from no impact on yield to complete crop failure. The first step in diagnosing nutrient deficiencies comes from actively scouting your field, greenhouse, or hoop house throughout the growing season. The first symptom to look for is leaf discoloration, typically a yellowing, purpling, or bleaching of the leaves. It is important to note where on the plant the deficiency symptom is occurring. Nitrogen (N), phosphorus (P), potassium (K), and magnesium (Mg) are the only essential plant nutrients that express deficiencies on the lower or older leaves. This is because these nutrients are mobile in the plant and if supply in the soil runs out, the plant will move these nutrients from older leaves to new leaves to maintain growth. Deficiency in non-mobile nutrients (S, Ca, B, Zn, Cu, Fe, Mn, and Mo) will be expressed in young or newer leaves. However, if deficiencies are severe, they will be express throughout the plant. Stunted plant growth is a common nutrient deficiency symptom, but can be the symptom of most nutrient deficiencies.

Some nutrient deficiencies are somewhat easy to self-diagnose. Deficiencies of N, P, and K are the most commonly identifiable as they are expressed on lower leaves. N deficiency will cause yellowing to start along veins and will appear throughout the leaf, while K deficiency will be expressed first on the leaf margin or edge, often accompanied by brown leaf tissue (dead tissue cells). P deficiency is expressed as a purpling or graying of the leaf tissue. In general, N and K deficiency turn plants lighter and P deficiency turns plant darker. It is also important to note that each type of vegetable will express deficiencies differently. That is why I would always recommend submitting a plant and soil sample to a soil test lab for confirmation of a potential deficiency. Remember to also collect plant and soil samples from healthy looking plants for a comparison. If you just submit a plant tissue sample of a potentially deficient plant, it will be compared to a "database" to indicate if nutrient concentrations in the plant are sufficient or deficient. However, the robustness of these datasets can be questionable. They may not reflect all varieties or may have not been updated for many decades. Having a comparison with a healthy plant will provide another piece of data for you to base your decisions. You should be aware that "databases" of nutrient deficiencies can vary from lab-to-lab, or company-to-company. There is no statewide standard for recommendations based on leaf tissue samples (as opposed to soil samples, which there are statewide standards). Comparison to a database also reflects specific sampling periods. If you are not sampling near the time periods in Table 1, then it would be more beneficial to collect health plant samples as well. Soil samples are also beneficial as they will let you know if the nutrient is also deficient in the soil, and thus addition of the nutrient would be beneficial. If the nutrient is in adequate concentration in the soil, then other factors are causing the deficiency, often water stress, heat stress, or soil compaction.

The plant diagnosis philosophy described here reflects a system where optimum nutrients have already been applied and any additional applications would reflect a "rescue" application. Using plant tissue sampling to guide in-season applications of nutrients as part of a prescribed nutrient management plan (i.e. less than optimum nutrient rates have been applied, and the remaining nutrient application amounts are based on plant tissue concentrations) is not recommended unless you have accrued your own database or experiences.

Table 1. Plant tissue sampling recommendations for vegetable crops in Wisconsin

Crop	**Stage of Growth**	**Plant Part**	**# of plants to sample**
Asparagus	Mature fern	Fern 17-35 inches up	20
Beet, red	Mid-season	Youngest mature leaves	20
Broccoli	Heading	Youngest mature leaves	20
Brussels sprouts	Heading	Youngest mature leaves	20
Cabbage	Mid-season	Wrapper leaves	20
Carrot	Mid-season	Youngest mature leaves	20
Cauliflower	Mid-season	Youngest mature leaves	20
Celery	Mid-season	Youngest mature leaves	20
Cucumber	Prior to or at early fruit development	Youngest mature leaves	20
Ginseng	Mid-season	Youngest mature leaves	35
Lettuce	Mid-season	Wrapper leaves	20
Melon	Prior to or at early fruit development	Newest fully developed leaf	25
Muskmelon	Prior to or at early fruit development	Newest fully developed leaf	25
Onion	Mid-season	Tops, no white portion	20
Pepper	Prior to or at early fruit development	Petiole and leaflet	40
Pumpkin	Prior to or at early fruit development	Newest fully developed leaf	25
Spinach	Mid-season	Newest fully developed leaf	25
Squash	Prior to or at early fruit development	Newest fully developed leaf	25
Tomato	Mid-season	Newest fully developed leaf	40
Watermelon	Prior to or at early fruit development	Newest fully developed leaf	25