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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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.

Irrigation Management (reprinted from email alert sent earlier today): Later this week the weather is to turn incredibly hot. For many parts of the state from the Illinois border all the way to Hwy 29 we have seen little precipitation unlike our fellow residents from the far Northern reaches of the state. ET at Hancock and Arlington has averaged 0.2" per day over the past week.

Air temperatures > 90 F and sunny days will lead to ET typically 0.25 to 0.27" per day. These hot air temperatures will increase energy demand across the state and may limit the time that irrigation systems will be allowed to operate.

Try to irrigate to near field capacity for all crops to prepare for the oncoming warm temperatures, especially potatoes, snap beans within days of flowering or with pin beans, and peas where you are trying to finish the crop. Deep rooted crops such as corn, sweet corn, soybean, or alfalfa may have to rely on soil moisture reserves during the heat stress so irrigation water can be applied to shallow rooted crops with higher sensitivity to heat and drought stress depending on how you have split fields under your pivots. Also remember that irrigation efficiency can be improved when irrigating outside the heat of the day.

Fresh market farmers and gardeners in Southern and Central parts of the state need to irrigate fields and gardens as well. Multiple vegetables from lettuce to tomatoes will benefit a great deal from irrigation at the current time. Soil moisture has been depleted even on the best soils and the heat will cause substantial stress in the coming days. Prioritize irrigation on higher value vegetable crops. Sweet corn will benefit from irrigation, but not as much as other crops. Winter squash and pumpkin do not need irrigation as much as other vegetable either and can be watered when the conditions are less stressful or soil moisture status is in good shape for other crops. Make sure to monitor how much irrigation water has been applied so you do not apply to much water. Also remember, the best time of day to sprinkler irrigate is in the morning so the canopy is wet at the same time as dew would normally occur. This way the sun can dry the canopy and prevent a number of foliar diseases.

Make sure to keep yourself and your staff hydrated as well and stay safe.

Potatoes: The potato crop emerged by May 10 and tubers had set in many potatoes by the last week of May. As such, the crop has been emerged for between 50 and 60 days even though the current date is only June 26. This crop is more advanced at this stage of the growing season than any other year of the previous decade.

Even the most advanced crops over the previous decade have only been emerged 40 days by this time of the year. Potato crops emerged 40 days on June 25 typically only grow for 110 days. This year's growing season will result in potato growth period of 120 to 130 days (from emergence through vine kill) for much of the storage crop.

The extra growing season length allows for extended period of potato tuber bulking. The crop has entered the late bulking stage of development, yet 45 to 50 days of rapid bulking potential remain in indeterminate crops such as Russet Burbank, Snowden, Bannock Russet, and other varieties. Determinate varieties also have extended bulking season length of 10 to 20 days.

Longer bulking season has increased yield potential and will affect other quality attributes such as tuber size profiles, solids, and other quality attributes. This is direct result of increased energy resulting from warm spring temperatures and long daylengths. To meet this potential, favorable growing season conditions need to continue and water and nutrients must be applied in adequate supply.

Research from Western states with longer growing seasons indicate potato crops use between 1.5 and 3 lbs of nitrogen per day during the late bulking stage of development. This is consistent with Wisconsin research. More information is provided below on how to determine whether current crop nutrient status is adequate to meet crop nutrient demands.

Water management over the next few weeks will be critical as warm temperatures, especially at night, can adversely affect tuber bulking, decreasing yield, size, gravities, and potential sugars. Preventing drought stress during periods of heat stress will be crucial to maintaining yield and quality near the maximum potential.

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Using petioles to guide July nitrogen applications on rapidly developing potato varieties: Some growers are noting that potato plant development state has been accelerated this year, relative to the typical growth stage observed between 45 to 55 days after emergence (DAE). The question has been posed, "Does the optimal petiole nitrate concentration based on current DAE apply if the growth stage is advanced?” Altering the interpretation of your petiole nitrate concentrations will depend on your management goals. For indeterminate varieties, if you would like to harvest sooner, then managing petiole nitrates toward the lower end of the optimum range, or for the next DAE category (e.g. you are 50 DAE, so you use the 60 DAE optimum nitrate concentration range) may be appropriate. The goal here is to capture an economic advantage by harvesting early and not apply excess N to keep vegetative growth going. If you plan on harvesting at a similar time to previous years with an indeterminate variety, managing petiole nitrate concentrations at or above the optimum rate would be appropriate, as would managing at a lower DAE level. Since the growth stage is advanced and tuber yields look to be high, the plant has likely taken up a lot of N at this point in the season, and the concern would be that lack of extra N during the month of July would hinder the maximizing of yields. The current guidelines for N application on potato are yield specific. For example, N application for yields between 350 and 450 cwt would be 180 lb/ac on sandy soils, but N rates for yields 550 to 650 cwt would be 250 lb/ac. If yields are expected to exceed this yield range, then additional N can be beneficial. However, it would be important to consider how much N has already been applied. Since there has been little rainfall that would promote nitrate leaching, extra N applied as insurance may still be in the soil profile and extra N would not be needed. Managing petiole nitrates at the high end of optimum, or at an optimum rate at a lower DAE category, would ensure that you will apply N when needed during the month of July. It would be recommended to keep N applications to less than 30 lb-N/ac per liquid application or 40 lb-N/ac per dry application to keep nitrogen use efficiency high. In this growing season, utilizing petiole nitrate samples can be quite beneficial for both ensuring adequate N is applied and avoiding unnecessary applications of N.

Table 6.3. Optimum petiole NO_3-N levels for several potato varieties at different growth stages.

	Dry weight basis			Sap basis		
Stage of growth (days after emergence)	**Norkota Norland Atlantic Kennebec**	**Shepody R.Burbank Snowden**	**Onaway Superior**	**Norkota Norland Atlantic Kennebec**	**Shepody R.Burbank Snowden**	**Onaway Superior**
	—————% NO_3-N—————			—————ppm NO_3-N —————		
30	2.5–2.8	2.0–2.3	2.3–2.5	1900–2100	1600–1800	1800–1900
40	2.3–2.5	1.7–2.2	2.0–2.3	1800–2000	1600–1700	1600–1800
50	1.8–2.3	1.2–1.6	1.5–1.9	1400–1800	1000–1300	1200–1500
60	1.3–1.9	0.8–1.1	0.9–1.2	1100–1500	700–900	500–1000
70	0.8–1.1	0.5–0.8	0.4–0.6	700–900	500–700	400–600

Vegetable Disease Update – Amanda J. Gevens, Vegetable Plant Pathologist, UW-Madison, Dept. of Plant Pathology, 608-890-3072 (office), Email: gevens@wisc.edu.
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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	179	9	6/25
	Mid 5/10	6/6	141	9	6/25
	Late 6/1	6/16	74	9	6/25
Grand Marsh Area	Early 4/3	5/8	332	9	6/25
	Mid 4/15	5/16	286	9	6/25
	Late 4/30	NA	230	8	6/25
Hancock Area	Early 4/1	5/1	387	12	6/25
	Mid 4/15	5/10	329	6	6/25
	Late 5/1	5/17	286	6	6/25
Plover Area	Early 4/3	5/17	345	10	6/25
	Mid 4/19	5/18	280	10	6/25
	Late 5/1	5/27	217	6	6/25

P-Days and Early Blight: Earliest planted potato fields have P-Days of 332 in Grand Marsh (6/25), 387 in Hancock (6/25), 345 in Plover (6/25), and 179 in Antigo (6/25). Mid-planted fields are 286, 329, 280, and 141, consecutively on 6/25. 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. An accumulation of 300 P-Day values indicates a time at which early blight is favored and first infection may occur.

In my field scouting today, early blight lesions were hard to come by even in my untreated control plots at the Hancock Agricultural Research Station. Lesions observed were very small at approximately half the diameter of a pencil eraser. I saw no early blight in potatoes at the Langlade County Airport Research Station. Fields have dried out well since the storms of June 18-20 that brought 2-6 inches of rainfall to the Antigo area.

DSVs and Late Blight: As of June 25, we have had slow and steady accumulation of DSVs at all sites. The largest increases in DSV accumulation occurred in the Antigo. The highest DSV accumulation was calculated for earliest planted fields in the Hancock area (DSV 12 on 6/25). 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 (Berk & Snyder Cos.), in addition to reports in CT (New Haven Co.), NJ (Salem Co.), NY (Suffolk Co.), and VA (Chesterfield Co.). To date this production year, 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, DE, AL, OH, and PA. The newest reports within the past 7 days have been primarily on cucumber in the northeastern states and cantaloupe and cucumber in the southeastern states. Rainfall from Tropical Storm Debby is creating disease-promoting conditions in the panhandle of FL and throughout the southeastern states at this time. No forecasted risk of movement of spores from southern and eastern states to Wisconsin at this time. However, risk for eastern seaboard states is moderate. The website: http://cdm.ipmpipe.org/ offers up to date reports of cucurbit downy mildew and disease forecasting information.

Irrigation and Disease Management in Potato: The appropriate amount and timing of water application are critical for maintaining ideal root zone moisture for optimal growth, tuber quality, and disease control. Below, I highlight key potato diseases which need to be considered when planning overhead irrigation during the mid- to late-growing season timeframe.

Mid-season: At tuberization, drought stress can impact tuber quality and can promote the development of common scab. However, too high of soil moisture at and prior to tuberization can promote infection and development of powdery scab. As these recommendations conflict, it is of importance to document such disease problems in each field and tailor your irrigation management to best address the disease of greatest concern. If risk of both common and powdery scab is great, consider integrating irrigation management with varietal resistance and/or pesticides. At tuber mid-bulking, drought stress has the greatest effect on yield. **Recommended irrigation threshold should be raised from tuber initiation through mid-bulking.**

Common scab disease is caused by the filamentous bacterium *Streptomyces scabies* which is soilborne and promoted by low soil moisture during tuberization and soil pH of >5.2. Symptoms range from superficial russetting to deep pitting.

Powdery scab is a disease favored by saturated soils at and prior to tuberization caused by the Plasmodiophorid, or slime mold, soilborne pathogen, *Spongospora subterranea*. Symptoms range from slightly raised bumps with intact periderm to elevated scab lesions containing numerous cystosori surrounded by broken periderm.

Late season: Drought stress during late bulking has less yield impact than stress during early or mid-bulking. High soil moisture can promote infection and development of fungal (silver scurf) and bacterial diseases (bacterial soft rot), as well as the water molds (pink rot, late blight, pythium leak) on tubers. Open lenticels are also associated with high soil moisture and pose a risk for at- and post-harvest infection of a number of fungal, bacterial, and water mold pathogens which can progress in storage. **Recommended irrigation threshold should be lowered from late-bulking to maturation.**

Silver scurf is caused by the fungus *Helminthosporium solani.* Infection can occur in field, and at-and post-harvest when conditions of high humidity (>90%) and temperatures of >45°F persist. Inoculum comes from seed and field debris. Symptoms include patchy silvering, and graying of periderm.

Bacterial soft rot is caused by the bacteria *Pectobacterium carotovorum* (formerly *Erwinia carotovora*). Bacteria is soilborne, present in debris, and on seed. Infection and progress is promoted by wet, warm, and anaerobic conditions. Symptoms include water-soaked, cream, or tan colored soft tissue; affected tissue is delineated from healthy by dark brown margins. Symptoms begin on tuber surfaces and progress to internal tissue.

Phytophthora erythroseptica is a soilborne oomycete, or water mold, causing pink rot of potatoes. Infection of roots, lower stems, and stolons most often spreads infection down into the tuber. Infection through the lenticels or wounds is also possible. The resulting symptom is water-soaked, rubbery tuber tissue that turns pink to salmon in color when exposed to the air.

Phytophthora infestans is an oomycete not known to be soilborne in Wisconsin, causing late blight on both potato foliage and tubers. Infection of tubers can occur through spread of lower stem infections or by direct infection as spores wash off of foliage and are carried in soil moisture to tubers. Symptoms include brown to rust colored, corky, firm internal tuber tissue. External symptoms are dark brown to purple in color, often sunken or shriveled in appearance, and are firm.

Pythium leak is caused by the oomycete *Pythium ultimum* which infects tubers through harvest wounds and post harvest. Excessive moisture favors this disease which has symptoms including internal gray water-soaked lesions surrounded by brown to black borders. Affected tubers expel watery fluid when squeezed.

All diseases discussed in this article, so far, affect the tubers in the soil environment. As such, they are directly impacted by the soil moisture effects of irrigation. A second effect of overhead-applied irrigation, is residual leaf wetness. Periods of leaf wetness, particularly those coupled with moderate to warm air temperatures, promote the infection, growth, reproduction, dispersal, and survival of a number of foliar potato pathogens such as early blight and late blight. **Irrigation must be timed so as to minimize the duration of leaf wetness.**

Alternaria solani is the fungus causing early blight of potato when periods of leaf wetness are extensive and temperatures are 75-84°F. Symptoms include dark brown circular ‘bull’s eye’ lesions on foliage. Lower canopy is typically first affected as conditions are most favorable. If uncontrolled, early blight can cause early defoliation of the potato crop. In Wisconsin, we rarely see early blight tuber infections.

Phytophthora infestans is an oomycete not known to be soilborne in Wisconsin, causing late blight on both potato foliage and tubers. Foliar symptoms include pale green to brown water-soaked necrotic lesions that vary in size from dime sized and circular on individual leaves, to complete defoliation of plant, if uncontrolled. Infected foliage can appear greasy and have white, fuzzy pathogen sporulation within lesions or blighted areas.

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**