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Calendar of Events:

July 10, 2025 – UW Hancock Agricultural Research Station Field Day
December 2-4, 2025 – Midwest Food Producers Assoc. Processing Crops Conference, Kalahari Convention Center
January 12-13, 2026 – Wisconsin Agribusiness Classic, Kalahari Convention Center
February 3-5, 2026 – UW-Madison Div. of Extension & WPVGA Grower Education Conference & Industry Show, Stevens Point, WI

Jed Colquhoun, Professor and Extension Specialist, Department of Plant and Agroecosystem Sciences, UW-Madison.

Lorox DF Special Local Need label approved for Wisconsin carrot production. The Wisconsin Department of Agriculture, Trade and Consumer Protection (DATCP) has approved a Special Local Need (24c) label for Wisconsin carrot production. This label is similar to the one that expired at the end of 2024 and is specific to Wisconsin carrots only. The label outlines allowable uses of Lorox DF based on soil texture, organic matter, depth to groundwater and proximity to wells. The new Special Local Need label expires on 12/31/2029.

The label is posted on the DATCP special pesticide registrations web site: <https://datcp.wi.gov/Documents/SpecialUses.pdf>. Please keep in mind that the Special Local Need label needs to be in the possession of the user at the time of application.

Many thanks to DATCP and TKI NovaSource for supporting this request.

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This week, we will discuss nitrate-N in irrigation water. We all know that the EPA's maximum contaminant level for nitrate set to protect against blue-baby syndrome is 10 ppm. I must point out here that this 10 ppm is just the N portion of the nitrate ion ($\text{NO}_3\text{-N}$). The molar mass of nitrate is $14 + 16 \times 3 = 62$ g/mol, and the N portion is 14 g/mol, accounting for $14/62 = 22.6\%$ of the whole nitrate molecule. So if we report nitrate concentration as the total mass of NO_3^- , $10 \text{ ppm} / (22.6\%) = 44.3 \text{ ppm}$ is the EPA limit.

We can convert between the two measurements using the formulas below:

- Nitrate = Nitrate-N $\times$ 4.43
- Nitrate-N = Nitrate $\times$ 0.226

To recap, the EPA's clean drinking water standard is 10 ppm of nitrate-N or 44.3 ppm of nitrate. Reporting the nitrate-N concentration (10 ppm) in irrigation water is more common in the US, and Europeans often seem to

prefer reporting the total mass of nitrate (44.3 ppm). **However, many policy documents do not accurately clarify which measurement they are discussing, and we should pay attention to the difference!**

Nitrate-N is commonly found at some level in irrigation water, and it could be another credit to be included in crops' total N input. With each inch of irrigation water containing one ppm of nitrate-N, 0.23 lb N/acre will be available. The table below shows how much nitrogen is added with different amounts of irrigation water containing varied nitrate-N concentrations.

Crop available nitrogen in irrigation water									
Water Applied (inches)	Nitrate-N concentration (ppm)								
	5	10	15	20	25	30	35	40	45
	lb of N added per acre								
6	7	14	20	27	34	41	48	54	61
9	10	20	30	41	51	61	72	82	92
12	14	27	41	54	68	81	95	109	122
15	17	34	51	68	85	102	119	136	153
20	23	45	68	91	114	136	159	182	204
25	28	57	85	114	142	170	199	227	255

Nitrogen in irrigation water applied during the rapid crop N uptake period will be as useful to help achieve crop's yield potential as the same amount of N fertilizer. For potatoes, early in the season, plants need N to develop a strong canopy and rooting system, with about 60% of the seasonal total N requirement taken up by 75 days after planting. The most rapid increase in N uptake occurs between tuber initiation and early tuber bulking, when the plant is actively setting tubers and requires a lot of N for growth. Nitrogen demand is the highest during mid- to late tuber bulking, typically about 5 lb N/acre/day. Nitrogen uptake slows down as the plant matures and tuber skin sets. Therefore, irrigation nitrate-N could be considered an additional N input to the crops during tuber initiation and tuber bulking to enhance yield, but late in the season after crops have already taken up most of their N needs, irrigation nitrate-N will be of limited value.

Kranz et al. (2023) from the University of Nebraska–Lincoln recommended that, due to the uncertainty of precipitation patterns in the field season, N contained in 80% of the 5-year average irrigation depth should be used when estimating N contribution from irrigation water for a specific year. For example, if the irrigation water is tested to contain 10 ppm of nitrate-N, the 5-year average irrigation application depth is 15 inches per year, 80% of that will be $15 \times 0.8 = 12$ inches. The nitrogen available from irrigation will be $0.23 \times 12 \text{ (inches)} \times 10 \text{ (ppm)} = 28 \text{ lb N/acre}$.

In a recent study conducted by my team, we found that the nitrate-N concentration in irrigation water is consistent throughout the growing season, but it may vary across different seasons. We recommend collecting well water samples at the beginning of the irrigation season and testing them for nitrate-N concentrations to estimate potential N input from irrigation. Additionally, testing the irrigation water for nitrate-N concentration each year will be a good practice.

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

Vegetable Entomology Webpage: <https://vegento.russell.wisc.edu/>

Timing of reduced-risk insecticides –

(<https://uwmadison.app.box.com/s/ib2zz6rvgrb40fj7x8uaychin3o8d8pp>)

Accurate timing of reduced-risk insecticides involves scouting and monitoring pests, applying the compound at the right time (when pests are in their most susceptible stages), and using appropriate application methods. These considerations are critical components of an effective Integrated Pest Management (IPM) program, and is one that also considers supplementary cultural practices, biological controls, and other mechanical controls in addition to insecticide use.

Over successive years at the Hancock Agricultural Research Station, we investigated how the timing of *Calanthe* (ledprona) applications would influence the performance of the new technology for the control of the Colorado potato beetle. Specifically, these studies were designed to demonstrate how the timing of initial *Calanthe* applications and associated successive, weekly applications targeting different larval stages would influence efficacy of the treatments.

All treatments, except the untreated control, included *Calanthe* (ledprona) applied weekly at 16 fl oz/ac, though treatments differed in the timing of the initial application (**Table 1**). For example, treatment #2 was initiated at adult colonization, treatment #3 was initiated at 10% egg hatch, treatment #4 was initiated at 50% egg hatch, and finally treatment #5 was initiated one week later when plots were infested with 1st and 2nd instar larvae. All treatments were applied weekly once initiated with the final application on June 25.

Table 1. Treatment details

Trt No	Trt Type	Trt Name	Rate Amt	Rate Unit	Appl Description
1	CHK	Untreated			
2	INSE	Calantha	16	FL OZ/A	Start @ adult colonization
3	INSE	Calantha	16	FL OZ/A	Start @ 10% egg hatch
4	INSE	Calantha	16	FL OZ/A	Start @ 50% egg hatch
5	INSE	Calantha	16	FL OZ/A	Start 7 days after 50% egg hatch

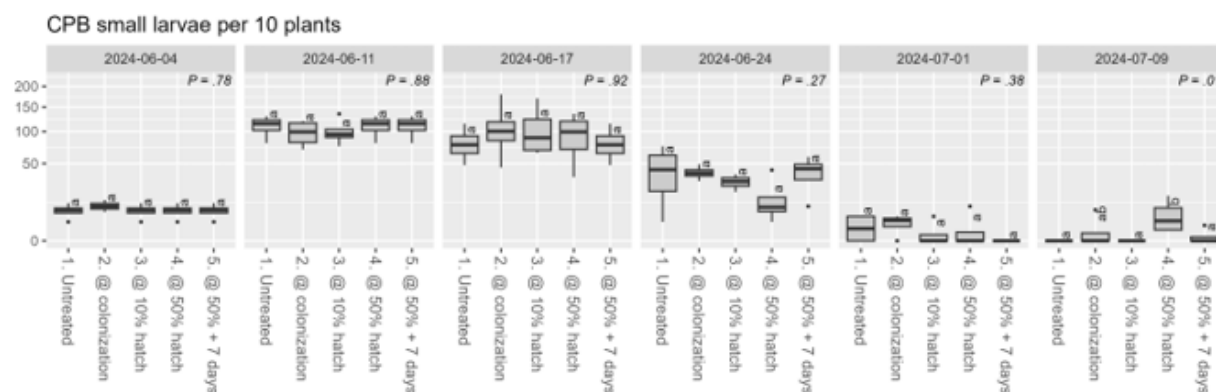
Appl. date codes: A=May 29 (adult colonization), B=Jun 4 (10% egg hatch), C=Jun 11 (50% egg hatch), D=Jun 18, E=Jun 25.

Small larvae were most numerous on June 11 and June 17, declining on June 24 through July 1, with significant differences present only on July 9 well after peak populations (**Table 2**). Large larvae peaked on June 17 and 24, declining on July 1 through July 9, with significantly fewer in the earliest application timings (treatments 2-4), which had each received 3, 2, and 1 application, respectively, by June 17 (**Table 3**). Defoliation patterns mirrored large larvae counts, with significantly higher defoliation in treatments 1 (untreated control) and 5 on June 17 (neither having received any applications by this date). Defoliation in treatments 2, 3, and 4, initiated at colonization, 10% egg hatch, and 50% egg hatch, were similar through the end of the experiment suggesting an initial application timing at 50% egg hatch works well for controlling first-generation Colorado potato beetle when three weekly applications are included (**Table 4**). Treatment #5, initiated one week after 50% egg hatch, resulted in defoliation up to 15%, which recovered somewhat but remained significantly higher than treatments initiated at 50% egg hatch or earlier. Results clearly demonstrate how the timing of applications can greatly influence the efficacy of this new dsRNA based tool.

Table 2. Colorado potato beetle small larvae per 10 plants

Trt	Treatment	04-Jun Mean $\pm$ SE	11-Jun Mean $\pm$ SE	17-Jun Mean $\pm$ SE	24-Jun Mean $\pm$ SE	01-Jul Mean $\pm$ SE	09-Jul Mean $\pm$ SE
No.	Description						
1	Untreated	7.75 $\pm$ 1.84 a	110.00 $\pm$ 10.80 a	79.50 $\pm$ 14.06 a	41.25 $\pm$ 15.75 a	2.50 $\pm$ 1.44 a	0.00 $\pm$ 0.00 a
2	5x7-day @ colonization	10.25 $\pm$ 1.49 a	97.50 $\pm$ 11.99 a	106.50 $\pm$ 27.77 a	39.00 $\pm$ 3.94 a	3.00 $\pm$ 1.08 a	2.00 $\pm$ 2.00 ab
3	4x7-day @ 10% hatch	7.75 $\pm$ 1.84 a	100.00 $\pm$ 12.58 a	103.75 $\pm$ 24.27 a	29.00 $\pm$ 3.63 a	1.25 $\pm$ 1.25 a	0.00 $\pm$ 0.00 a
4	3x7-day @ 50% hatch	7.75 $\pm$ 1.84 a	110.00 $\pm$ 10.80 a	92.25 $\pm$ 21.97 a	16.00 $\pm$ 8.80 a	2.50 $\pm$ 2.50 a	6.50 $\pm$ 3.77 b
5	2x7-day @ 50% + 7 days	7.75 $\pm$ 1.84 a	110.00 $\pm$ 10.80 a	79.50 $\pm$ 14.06 a	39.00 $\pm$ 10.38 a	0.00 $\pm$ 0.00 a	0.50 $\pm$ 0.50 a
		P = .78 (ns)	P = .88 (ns)	P = .92 (ns)	P = .27 (ns)	P = .38 (ns)	P = .01

Means followed by same letter code(s) are not significantly different (Tukey's HSD, $\alpha=0.05$). Treatment main effect p-values are shown in table footer (ANOVA). DAA = days after first application (May 29, adult colonization). Trt 3 was initiated on Jun 4 (10% egg hatch), Trt 4 on Jun 11, and Trt 5 on Jun 18.



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Potato early blight management is most successful when addressed preventatively.

<https://vegpath.plantpath.wisc.edu/diseases/potato-early-blight/> Cultivars vary in their susceptibility to this primarily foliar fungal disease caused by *Alternaria solani*, but all are susceptible. When the weather remains relatively warm and dry, early blight onset is slowed and progress is hampered. Irrigation timing, when feasible to manage, can help to manage the length of leaf wetness. A list of fungicides for consideration once a foliar fungicide program is initiated (based on disease model tool of P-Day 300 or other indicator) is provided, below, and per the potato early blight management sections of the A3422. Please note that this list is not comprehensive nor does it provide a specific recommendation. We do have substantial resistance in our *Alternaria* population in Wisconsin to QoI fungicides including azoxystrobin. Early season treatments with azoxystrobin, however, have demonstrated management of other diseases including Rhizoctonia (in-furrow application) and black dot (in-furrow, at-first-hilling, and row-touch applications).



Early blight is a common fungal disease of solanaceous crops (tomatoes, potatoes, peppers, eggplants) caused by *Alternaria solani*. Symptoms first appear as circular dark-brown spots on leaves and stems that can later develop concentric, target-like rings, often surrounded by yellow margins. Lesions are sometimes limited by veins, giving an ‘angular’ appearance. Early foliar symptoms often appear near the base of the plant, spreading up to higher leaves as the disease progresses. On tubers, lesions appear as dark, sunken, cork-like spots with raised margins, although tuber symptoms are less frequently seen in the Midwestern U.S. Photo on left, courtesy of Dr. Gerald Holmes.

Diseases managed	Active ingredient	Rate and fungicide name	Days to harvest	Comments
Early blight (<i>Alternaria solani</i>) and brown spot (<i>Alternaria alternata</i>)	azoxystrobin	6.0-15.5 fl oz Aframe, Equation, Quadris, Satori, Willowood Azoxy 2SC	14	Group 11 fungicide. Follow resistance management guidelines. <i>Note that much of the pathogen populations in Alternaria genus have resistance to Group 11 fungicides.</i>
	azoxystrobin + difenoconazole	8-14 fl oz Quadris Top	14	Follow resistance management guidelines.
	azoxystrobin + <i>Reynoutria sachalinensis</i> extract	7.4-18.4 fl oz AzterKnot	14	Group 11 fungicide. Follow resistance management guidelines.
	boscalid	2.5-4.5 Endura WDG	10	For control of early blight only. Endura belongs to

				Group 7 fungicide category. Do not exceed 2 sequential applications before alternating to a different mode of action. Do not exceed 20.5 oz/a/season.
	boscalid + mefentrifluconazole	18.5-20 fl oz Endura Pro	10	FRAC Group 3 mefentrifluconazole is unique from other Group 3 fungicides. Follow resistance management guidelines.
	cyprodinil + fludioxonil	11-14 oz Alterity, Xuvia	14	Follow resistance management guidelines.
	difenoconazole	5.5-7 fl oz Top MP	14	Follow resistance management guidelines.
	difenoconazole + tea tree oil	4-8.5 fl oz Regev	14	Follow resistance management guidelines.
	fluazinam + difenoconazole	12.5-14.5 fl oz Orbus	14	See label for fungicide resistance management guidelines.
	fluopyram	6.5 fl oz Velum Prime	7	Use preventatively. Do not apply more than 43.6 fl oz/a/season. Do not make more than 2 sequential applications of any Group 7 or 9 fungicide before rotating with another mode of action.
	fluopyram + penflufen	13 fl oz Velum Rise	In furrow; one application per year	
	fluopyram + prothioconazole	10 fl oz Luna Pro	14	
	fluopyram + pyrimethanil	Early blight: 11.2 fl oz Luna Tranquility	7	
	fluxapyroxad + pyraclostrobin	4-8 fl oz Priaxor	7	Make no more than 3 applications/a/season. Apply no more than 24 fl oz/a/season.
	iprodione	1-2 pt Meteor, Nevado 4F, Rovral	14	Use high specified rate under high disease pressure circumstances. Do not apply in less

				than 10 gal carrier water/acre.
	mefentrifluconazole	3-5 fl oz Provysol	7	Do not apply more than 5 fl oz (0.13 lb) per acre/application. Do not make more than 3 applications at 5 fl oz or 5 applications at 3 fl oz per acre/year.
	metconazole	2.5-4 oz Quash	1	Do not make more than 4 applications/season . Do not make more than 2 sequential applications. Do not apply more than 15 oz/a/season.
	picoxystrobin	6-12 fl oz Approach	3	Follow label for resistance management. Also for white mold.
	penthiopyrad	10-24 fl oz Vertisan	7	Do not exceed 72 fl oz/a/year. Make no more than 2 sequential applications before switching to different mode of action.
	pydiflumetofen + fludioxonil	9.2-11.4 fl oz Miravis Prime	14	Do not apply more than 2 applications/year by air. Do not apply more than 34.2 fl oz/acre/year.
	pyrimethanil	7 fl oz Scala SC	7	Follow resistance management guidelines.
Early blight and late blight (<i>Phytophthora infestans</i>)	azoxystrobin	6-15.5 fl oz Aframe, Satori, Quadris, Equation	14	Evito, Gem, Headline, Quadris, Reason, and Tanos are Group 11 fungicides. Adhere to fungicide resistance mitigation requirements when using. Note: Group 11
	azoxystrobin + chlorothalonil	1.6 pt Quadris Opti	14	
	azoxystrobin + difenoconazole	8-14 fl oz Quadris Top	14	
	cymoxanil + famoxodone	early blight: 6 oz Tanos 50DF late blight: 6-8 oz Tanos 50DF	14	

	fenamidone	5.5-8.2 fl oz Reason 50 SC	14	fungicides are no longer optimal for early blight control due to high levels of pathogen resistance in the populations. Group 11 fungicides are good late blight preventatives when pressure is low.
	fluoxastrobin	2-3.8 fl oz Aftershock, Evito 480 SC	7	
	pyraclostrobin	<i>early blight</i> : 6-9 fl oz Headline SC, EC <i>late blight</i> : 6-12 fl oz headline SC, EC	3	
	pyraclostrobin + metiram	2.9 lb Cabrio Plus	3	
	<i>Bacillus mycoides</i> isolate J	1-4.5 oz LifeGard WG	0	Maximum level of protection is induced within the plant at 3-5 days post application. Protection can last up to 18 days.
RATES SUBJECT TO CHANGE DUE TO RE-REGISTRATION, see details: https://vegpath.plantpath.wisc.edu/2025/04/22/vegetable-crop-update-apr-22-2025/	chlorothalonil	1-1.5 pt Bravo Weather Stik, Echo 720, Equus 720 1.5-2.25 pt Bravo Zn, Equus 500 Zn 0.875-1.25 lb Echo 90DF, Echo Zn 0.9-1.36 lb Bravo Ultrex 82.5WDG, Equus DF	7	Note seasonal use limitations on label and in WI DATCP Special Registrations for only Bravo products.
	chlorothalonil + cymoxanil	2 pt Ariston	14	Apply preventatively when triggered by disease modeling tools.
	copper hydroxide	0.66-2.66 pt Champ Formula 2 0.67-2.67 pt Kocide 4.5LF 1.3-5.3 pt Kocide LF 0.5-1.75 Kocide 3000 0.75-3 lb Kocide 2000DF 1-4 lb Champion 77WP, Kocide 101, DF	0	Gives fair control of early blight and good control of late blight when applied preventatively.
	cymoxanil	3.2 oz Curzate 60DF	14	Do not use Curzate alone. Always mix with another registered fungicide such as mancozeb or chlorothalonil. Do not apply more than 7 sprays/season. After 3 to four

				applications of Curzate, switch to another mode of action before applying any additional Curzate. High heat can reduce length of curative fungicide activity period from 3 days to 1 day.
	mancozeb	0.4-1.6 qt Dithane F45 4F 0.5-2.0 lb Dithane M4, Penncozeb 80WP, Penncozeb 75DF 1-2 lb Dithane 75DF Rainshield NT, Koverall, Manzate 200 75DF	3	Do not exceed total of 11.2 lb/ai/a of EBDC per growing season. EBDCs include maneb, mancozeb, and metiram.
	mancozeb + chlorothalonil	1.2-1.8 lb Elixir	7	Also controls black dot. Do not apply more than 18 lb product/acre/crop.
	mancozeb + mefenoxam	2.5 lb Ridomil Gold MZ WG	3	Do not make more than 4 applications per year. Mefenoxam component can manage late blight and oomycete water rots when pathogen is susceptible. Generally, most US-23 clonal lineage types are still controllable with mefenoxam.
	mandipropamid + difenoconazole	5.5-7 fl oz Revus Top	14	Make no more than 2 consecutive applications before switching to a non-Group 40/3 fungicide. Do not exceed 28 fl oz/a Revus Top per season. The addition of a spreading or penetrating type adjuvant such as a non-ionic surfactant is recommended.

	mefentrifluconazole + pyraclostrobin	5-10 fl oz Veltyma	7	Follow label for resistance management strategies. Also registered for black dot.
	metiram	1.5-2 lb Polyram 80DF	14	Do not exceed 14 lb/a Polyram 80DF per season.
	trifloxystrobin	<i>early blight</i> : 2.9-3.8 fl oz Gem 500 SC <i>late blight</i> : 3.8 fl oz Gem 500 SC tank mixed with protectant fungicide	7	Follow resistance management strategies on fungicide label.
	triphenyltin hydroxide (TPTH) plus mancozeb or metiram	3 fl oz Super Tin 4L (<i>restricted use fungicide</i>) 1.87 oz Super Tin 80WP (<i>restricted use fungicide</i>) Plus one of the following: 1.5 lb Dithane M45 80WP, 75DF, WSP, or 1.2 qt Manex F4 or 1.5 lb Penncozeb 80WP, 75DF or 1.5 lb Polyram 80DF	7	Combining TPTH with maneb, mancozeb, or metiram reduces foliage injury while providing improved control of early blight. Following use allowances for EBDCs previously outlined.
	zoxamide + chlorothalonil	32-34 fl oz Zing!	7	Do not make more than 2 sequential applications before alternating to another mode of action.
	zoxamide + mancozeb	1.5-2 lb Gavel 75DF	3	Begin treatment before the onset of late blight. This product contains mancozeb, an EBDC. Follow allowances previously outlined. Do not make more than 6 applications per season or exceed 12.0 lb/acre of Gavel 75DF.

<https://cropsandsoils.extension.wisc.edu/articles/2025-commercial-vegetable-production-in-wisconsin-a3422/>