Vegetable Crop Update

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

Division of Extension
University of Wisconsin-Madison

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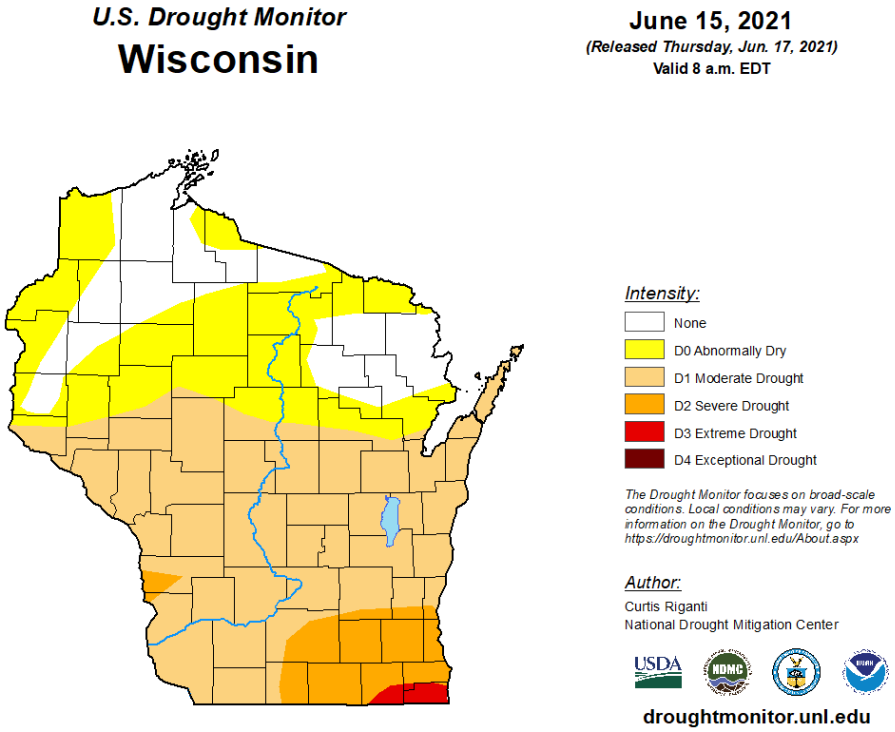
Calendar of Events

July 21, 2021 – UW-Hancock Ag Research Station Field Day (1-4:30PM)
July 22, 2021 – UW-Extension Langlade Co. Airport Ag Research Station Field Day
November 30-December 2, 2021 – Midwest Food Producers Assoc. Processing Crops Conference, Kalahari Convention Center
February 8-10, 2022 – UW-Madison Div. of Extension & WPVGA Grower Education Conference, Holiday Inn, Stevens Point, WI

Yi Wang, Assistant Professor & Extension Potato and Vegetable Production Specialist, UW-Madison, Dept. of Horticulture, 608-265-4781, Email: wang52@wisc.edu.

The U.S. drought monitor website updated on June 15th showed that the primary potato and vegetable production region of Wisconsin was under moderate drought conditions. And the drought in the southeastern part of the state was even more severe.



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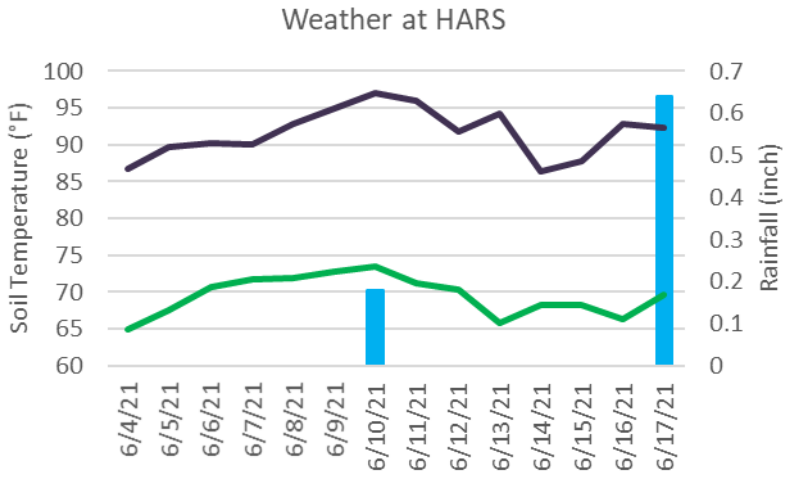


Weather over the last two weeks have been dry and hot across the state. At Hancock, max soil temperatures were above 90°F almost all the time. There was a small rain event (0.18'') on June 10th, and a 0.64'' rain event on June 17th. But those rain events were not able to rewet the overall dry soil profile as expected. Our Russet Burbank have 90% canopy closure, Snowden at 80%, Colomba and Soraya at about 70%. Those varieties were planted on April 19th. Tuber growth ranges between hooking and 1'' big. Across the state, potato and vegetable crops are doing good, thanks to irrigation. Growers needed to constantly run their pivots in order to catch up with the high daily evapotranspiration (ET). Irrigation event at 0.3'' to 0.5'' were common. Some folks were concerned about their soil that don't have full canopy cover yet to go through cycles of wetness right after irrigation, and then completely drying up after a full day of low humidity and high temperature. Fresh market varieties grown in those soils have started to show scab issues.

Earliest planted varieties in the Central Sands are about 2'' big. Some plants that suffered from frost damage over the Memorial Day weekend sent up new growth after 5-10 days, and therefore a delay of tuber initiation and tuber bulking were observed. However, according to individual growers, those frost damages were sporadic and showed pocket patterns across fields, which should not cause any widespread concerns.

Generally speaking, it has been a normal year with average to decent vegetable crop growth so far. More worries may rise if the drought conditions persist and high ET days continue during the peak tuber bulking stages.

Amanda Gevens, Chair, Professor & Extension Vegetable Pathologist, UW-Madison, Dept. of Plant Pathology, 608-575-3029, Email: gevens@wisc.edu.

Potato Disease Modelling and Management of Early Blight and Late Blight

Current P-Day (Early Blight) and Disease Severity Value (Late Blight) Accumulations. Many thanks to Ben Bradford, UW-Madison Entomology; Stephen Jordan, UW-Madison Plant Pathology; and our grower collaborator weather station hosts for supporting this disease management effort. A Potato Physiological Day or P-Day value of ≥300 indicates the threshold for early blight risk and triggers preventative fungicide application. A Disease Severity Value or DSV of ≥18 indicates the threshold for late blight risk and triggers preventative fungicide application. Red text in table indicates threshold has been met or surpassed. TBD indicates that data are To Be Determined as time progresses. Weather data used in these calculations comes from weather stations that are placed in potato fields in each of the four locations. Data are available in graphical and raw formats for each weather station at: https://vegpath.plantpath.wisc.edu/dsv/

Location	Planting Date		50% Emergence Date	Disease Severity Values (DSVs) 6/19	Potato Physiological Days (P-Days) 6/19
Grand Marsh	**Early**	April 2	May 10	**18**	254
	Mid	April 10	May 15	**18**	244
	Late	May 1	May 23	12	182
Hancock	**Early**	April 5	May 12	8	250
	Mid	April 15	May 15	8	242
	Late	May 5	May 23	2	179
Plover	**Early**	April 7	May 12	16	247
	Mid	April 20	May 20	13	201
	Late	May 7	May 30	8	139
Antigo	**Early**	April 26	May 28	0	161
	Mid	May 10	June 5	0	123
	Late	May 20	June 13	0	54

The earliest planted potato fields of the Grand Marsh area have reached the threshold for Disease Severity Values (18) and should be preventatively treated for late blight management. **Late blight** continues to emerge sporadically in Wisconsin with annual occurrence. The disease hasn't yet appeared in the US this season (usablight.org), however, when environmental conditions are favorable the pathogen can become active and quickly cause crop destruction. For more information on this disease: https://vegpath.plantpath.wisc.edu/resources/potato-late-blight/

Page 236 in the 2021 Commercial Vegetable Production in Wisconsin Guide (A3422 Extension Document) provides current fungicide details. For a quick look at a printable listing, click below. While posted in 2019, it is still relevant in 2021. The column "Activity of the Fungicides" is particularly useful when considering selection of these water mold/oomycete-specific fungicides. https://vegpath.plantpath.wisc.edu/wp-content/uploads/sites/210/2019/06/2019-Potato-Late-Blight-Fungicides.pdf

P-Days are still under threshold at Grand Marsh and will likely reach 300 within the coming week.

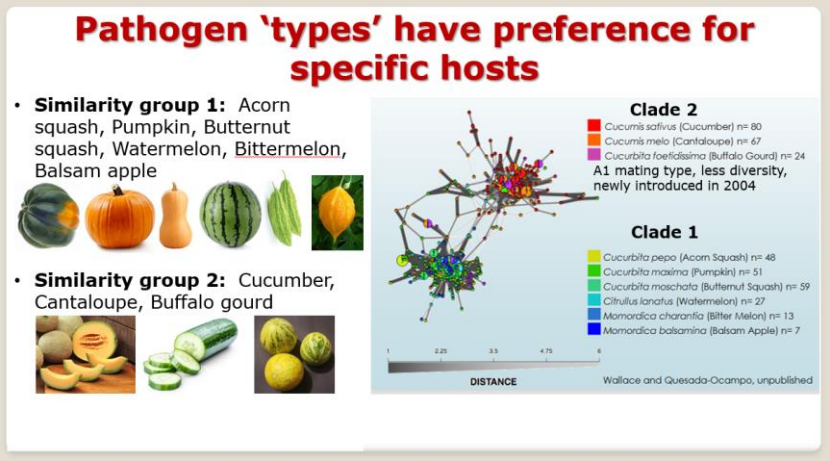
Over the next week or so, most early planted southern and central Wisconsin potato fields will begin routine treatment for late blight and early blight diseases. Considerations for building these complex programs are typically made in advance of the planting season, however, responsiveness to crop disease in time is critical to best use fungicide resources judiciously. Data from our Wisconsin potato disease trials, including our early blight fungicide study, are available at the UW Vegetable Pathology website to support decision-making: https://vegpath.plantpath.wisc.edu/field-trials/

Fungicide details can be found in the 2021 Commercial Vegetable Production in Wisconsin Guide, Extension Document A3422: https://cdn.shopify.com/s/files/1/0145/8808/4272/files/A3422-2021.pdf

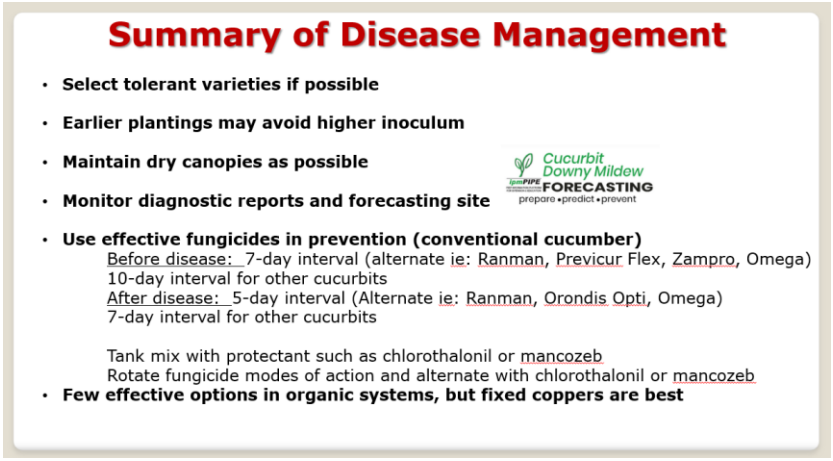
Cucurbit Downy Mildew Management

Downy mildew is now on our local risk radar in Wisconsin with confirmation of the disease on cucumber in the Great Lakes Region in Ontario Canada in mid-June 2021. Pathogen spores were also detected in traps in Allegan County Michigan at the end of May (https://www.canr.msu.edu/news/cucurbit-downy-mildew-spores-identified-in-air-samples-allegan-county) which suggests wider spread movement of the pathogen across the region. Across the US, cucurbit downy mildew has been confirmed in NJ (cucumber), NC (cucumber), MS (cantaloupe and cucumber), GA (cantaloupe and cucumber), SC (cucumber), and Florida (cantaloupe, watermelon, butternut squash, cucumber, yellow squash). https://cdm.ipmpipe.org/

The cucumber strain (since 2004, relatively 'newer' Clade 2) of the cucurbit downy mildew pathogen can also infect melon. Due to fungicide resistance within the downy mildew pathogen population, especially in Clade 2, selection of fungicides is important.



Management of cucurbit downy mildew requires preventative fungicide applications as commercial cultivars are generally susceptible to current strains (Clades) of the pathogen.



Because of the unique attributes of the new clades, I have summarized unique preventative fungicide programs based on crop groupings. These recommendations are summarizations of

work done by many outstanding research and extension professionals including: Drs. Mary Hausbeck at Michigan State University, Sally Miller at Ohio State University, and Lina Quesada Ocampo at North Carolina State University.

Fungicide Programs for Cucumber (Clade 2) DM

If program is initiated **before** disease onset: adhere to a **7-day** interval.
If program is initiated **after** disease onset: adhere to a **5-day** interval.

Recommendations based on multiple years of field research by Hausbeck, Michigan State Univ. & Quesada Ocampo at NCSU

SE U.S. and MI (2014) have noted resistance in the downy mildew pathogen to several fungicides

Bold indicates best in MI

Use of highest labeled rate of products is recommended	
Previcur Flex 6SC (2 day PHI), GH	propamocarb hydrochloride 28
Elumin SC (2 day PHI)	ethaboxam 22
Ranman 3.6SC (0 day PHI)	cyazofamid 21
Gavel 75WG (5 day PHI), GH	mancozeb M3 + zoxamide 22
Orondis Opti (0 day PHI)	oxathiapiprolin 49/chlorothalonil M5
Orondis Ultra (0 day PHI)	oxathiapiprolin 49/mandipropamid 40
Omega 500F (7 day PHI)	fluazinam 29
Zampro 4.4SC (day PHI)	ametoctradin 45/dimethomorph 40
Zing! SC (0 day PHI)	zoxamide 22 + chlorothalonil M05
Alternate products and mix each with either: Dithane (mancozeb) 3 lb 5 day PHI, M3, GH; or Bravo (chlorothalonil) 2 pt 0 day PHI, M5	

Fungicide Programs for Pumpkin (Clade 1) DM

If program is initiated **before** disease onset: adhere to a **10-day** interval.
If program is initiated **after** disease onset: adhere to a **7-day** interval.

Recommendations based on multiple years of field research by Hausbeck, Michigan State Univ. & Quesada Ocampo at NCSU

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Elumin SC (2 day PHI)	ethaboxam 22
Ranman 3.6SC (0 day PHI)	cyazofamid 21
Gavel 75WG (5 day PHI), GH	mancozeb M3 + zoxamide 22
Presidio 4FL (2 day PHI)	fluopicolide 43
Tanos 50WG (3 day PHI)	famoxadone 11 + cymoxanil 27
Zampro 4.4SC (0 day PHI)	ametoctradin 45 + dimethomorph 40
Orondis Opti (0 day PHI)	oxathiapiprolin 49/chlorothalonil M5
Orondis Ultra (0 day PHI)	oxathiapiprolin 49/mandipropamid 40
Omega 500F (7 day PHI)	fluazinam 29
Zing! SC (0 day PHI)	zoxamide 22 + chlorothalonil M05
Alternate products and mix each with either: Dithane (mancozeb) 3 lb 5 day PHI, M3, GH; or Bravo (chlorothalonil) 2 pt 0 day PHI, M5	

Basil Downy Mildew

Basil downy mildew is caused by a unique downy mildew pathogen and is not the same pathogen causing downy mildew on cucurbits, onions, or other specialty crops. The disease was confirmed in Kenosha County Wisconsin on June 10, 2021. The disease was found on a potted plant from a retail location. https://basil.agpestmonitor.org/map/

Recommendations for commercial growers (greenhouse and field). from Dr. Meg McGrath, Cornell University, Long Island Horticultural Research & Extension Center. 3059 Sound Ave., Riverhead, NY, 11901-1098. Mtm3@cornell.edu. Phone: 631-727-3595 ext 20.

1. Select resistant varieties. Devotion, Obsession, Passion, and Thunderstruck are available from VanDrunen Specialty Seeds (some as organic seed). Prospera is being marketed by Siegers and Johnny's Selected Seeds (organic). Amazel is being sold as cuttings primarily for producing plants for the home garden market because its seed is sterile. Eleonora, Emma and Everleaf (aka Basil Pesto Party) have limited level of resistance. To minimize selection pressure on the pathogen to overcome host resistance and to achieve acceptable control, all resistant varieties need to be used with other management practices, in particular fungicides, due to very low tolerance for symptoms in herbs especially when used fresh.

2. For greenhouse crops produced during the off-season for field production (e.g. winter), select seed that has been tested for the pathogen or steam-treated. Basil seed when submerged in water exudes a gelatinous material making the seed difficult to handle, thus hot water seed treatment is not a viable practice. Spores from affected basil growing outdoors can be moved by air currents into greenhouses through open vents.

3. Apply fungicides on a preventive schedule; alternate among chemistry:

- Greenhouse: Ranman, Revus, and phosphorous acid (phosphanate) fungicides (later recommended tank-mixed with other fungicides rather than used alone especially when conditions are favorable).
- Field: above plus Quadris.
- Greenhouse-grown plants for retail sale to consumers can also be treated with: Micora, Heritage, Segovis, and Subdue MAXX. Only Heritage and Subdue MAXX are permitted used on plants to be marketed as fresh herbs in grocery stores.

4. Make greenhouse conditions unfavorable for downy mildew development:

- Use base heating, dehumidifier, wide plant spacing, base watering, circulating fans, and lights to keep humidity below 85% in the plant canopy. Set up sensors in the plant canopy to monitor humidity to ensure implementing practices are sufficient.
- Direct greenhouse fans toward plants so that leaves move, which prevents water depositing on leaves when humidity is high. Wet leaves are favorable for infection.
- Turn lights on during the first hours of night so that there is no more than 6 hours of darkness before daytime. The pathogen makes spores when it is dark. Red light is most inhibitory. Treatment is effective only for leaves directly exposed to light.

5. Monitor plants routinely for symptoms. Put plants or detached leaves suspected of being infected but lacking spores in a closed plastic bag with wet paper towel in a dark location overnight to induce spores to form.

6. Heat treatment can be used to cure affected plants in a greenhouse. It is recommended as a rescue treatment when other practices were not adequate rather than as a routine practice. It is recommended done at first sign of downy mildew and over 3 consecutive days with 3 – 4 hours exposure to 104 – 113 F. High temperature can be achieved using solar heating on sunny, summer days by closing vents or

using a transparent IR polyethylene sheet covering. Closely monitor temperature to ensure it remains close to 113 F and does not rise higher, which can kill plants.

7. Promptly destroy unmarketable affected plants to eliminate this source of inoculum for other plantings. Do not seed another crop in a greenhouse complex, including in a separate room, until after affected plants are gone.

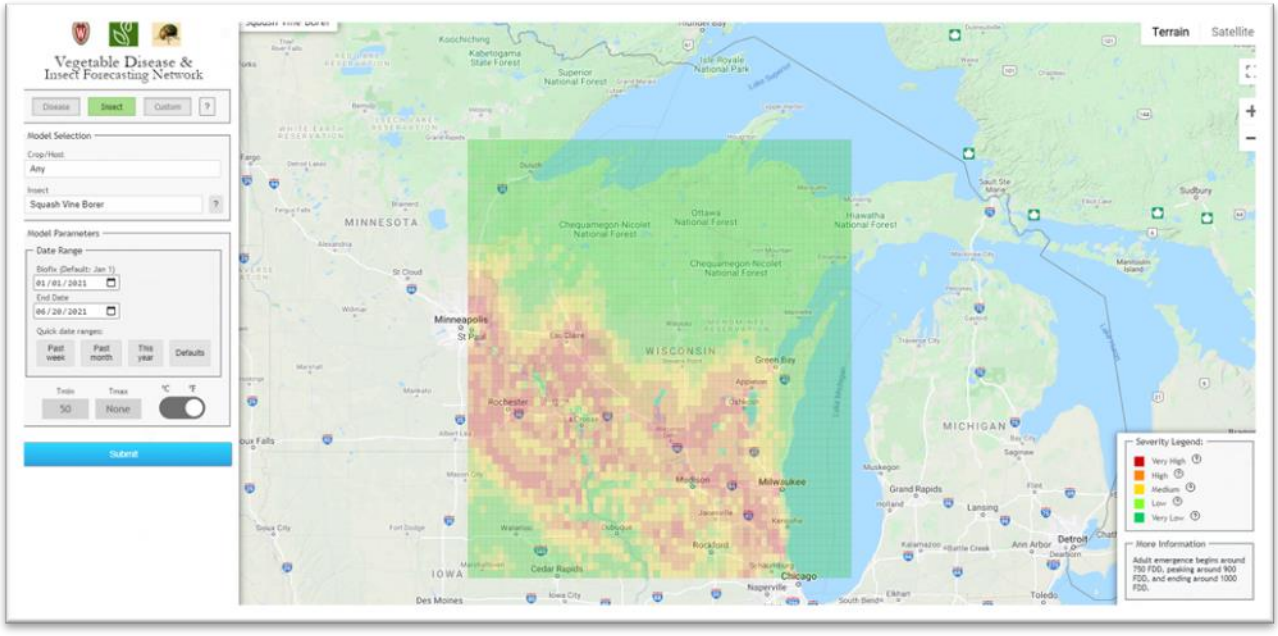
Vegetable Insect Update – Russell L. Groves, Professor and Department Chair, UW-Madison, Department of Entomology, 608-262-3229 (office), (608) 698-2434 (cell), e-mail: rgroves@wisc.edu

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

Squash vine borer – (https://vegento.russell.wisc.edu/pests/squash-vine-borer/). The squash vine borer is a sporadic pest of pumpkin and squash (e.g. cucurbits). Activity of adult moths and larvae often occurs as the crop is expanding rapidly from late June until the first of August. Resulting damage can be difficult to diagnose prior to significant harm to the plant occurs. In years of heavy infestation squash vine borer can become a significant economic pest in some cucurbit crops.

Beginning in late June to early July, adult vine borers emerge from the ground as adults. In the Midwest the pest typically emerges after 1,000 growing degree-days (base 50°C) have been reached. (**Fig. 1.** Squash vine borer Degree Day accumulations using a base temperature of 50° F https://agweather.cals.wisc.edu/vdifn). Often, this degree day threshold will closely coincide with full bloom of the common roadside weed chicory (*Chicorium intybus* L.). In Wisconsin, we often observe populations in early July, however recent temperatures have been sufficiently high to hasten the development of the insects.

Figure 1. Squash vine borer population distributions, 19 June 2021. Map illustrates the risk for adult moths to lay eggs at the base of susceptible plants.



Susceptibility to squash vine borer is variable among species of cucurbits. Varieties known to be suitable hosts are pumpkins and squashes. Commonly infested cultivars are pumpkin (standard and giant),

zucchini, as well as crookneck, straight neck, acorn, patty pan, summer, banana, buttercup, and hubbard squashes.

The damage caused by squash vine borer larvae is often difficult to detect until the plant wilts and dies in late July and August. Initial signs of infestation are very difficult to detect. Scouting early and often involves searching for entrance holes and frass at the base of vine crop stems.

Squash vine borer (Melittia cucurbitae)
Photo: 'woolcarderbee' on Flikr

Advanced symptoms of squash vine borer infestation are quickly wilting plants in the heat of the day. Since wilting may be confused with other pests of vine crops (e.g. bacterial or Fusarium wilts) scouting remains critical. Infested plants may be diagnosed by splitting the base of plant stems to confirm the presence of the larvae. Fields that have been damaged in past seasons have a good chance for recurring squash vine borer infestations annually. Adults may also be easily seen flying in the garden. A careful eye can quickly distinguish the diagnostic coloration and behavior of the day flying adult moths. Currently there are no treatment thresholds for the Squash vine borer.

Squash vine borer larvae
Photo: Jeff Hahn

In Wisconsin, infestation risk can be greatly reduced by planting crops early in the season. Floating row cover placed on the crop when adults are actively laying eggs is an effective method to reduce problems. Understanding when vine borers are present is a critical component to successful management with floating row cover. Synchronizing row cover installation with peak adult activity will reduce damage to preferred host plants. Keep in mind that plants in bloom require bees to pollinate the flowers. Remove row covers daily to allow adequate access for pollination. Planting a trap crop such as summer squash can be an effective means of reducing damage in the primary crop. Trap crops should be planted early to provide a more attractive egg deposition area than less preferred cucurbit species. Trap crop residue should be destroyed before larvae exit vines to pupate, limiting next season's infestation.

Squash vine borer is very difficult to manage with chemical insecticides since older larvae are protected within the plant stem. The target life-stage for conventional chemical management is newly hatched larvae that have not yet entered the stem. Effective control requires insecticide residue to be in place before and during the egg laying period (1,000 DD50). Two to three successive applications of insecticide 5-7 days apart will adequately control most of the larval borers before entering the vines.