Wisconsin Fruit News

Invasive Insects Supplemental – Feb 7, 2016

In This Issue:

Thank you to everyone who has already taken part in our end-of-season survey! These results will help us tailor the newsletter to your preferences for next season.

If you have not yet completely the brief (5-10 minutes) anonymous survey, please click the link above to access it online.

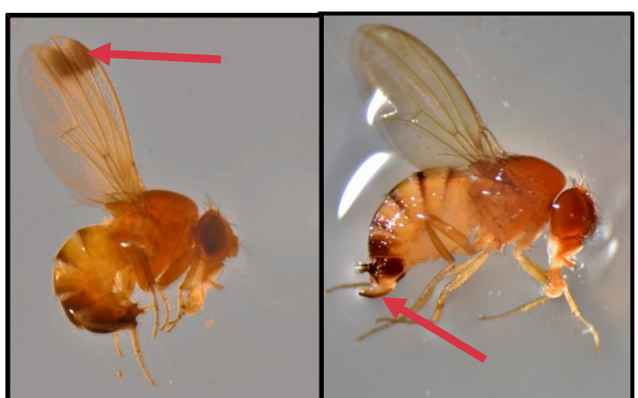
Spotted Wing Drosophila

Spotted wing drosophila: end-of-season update

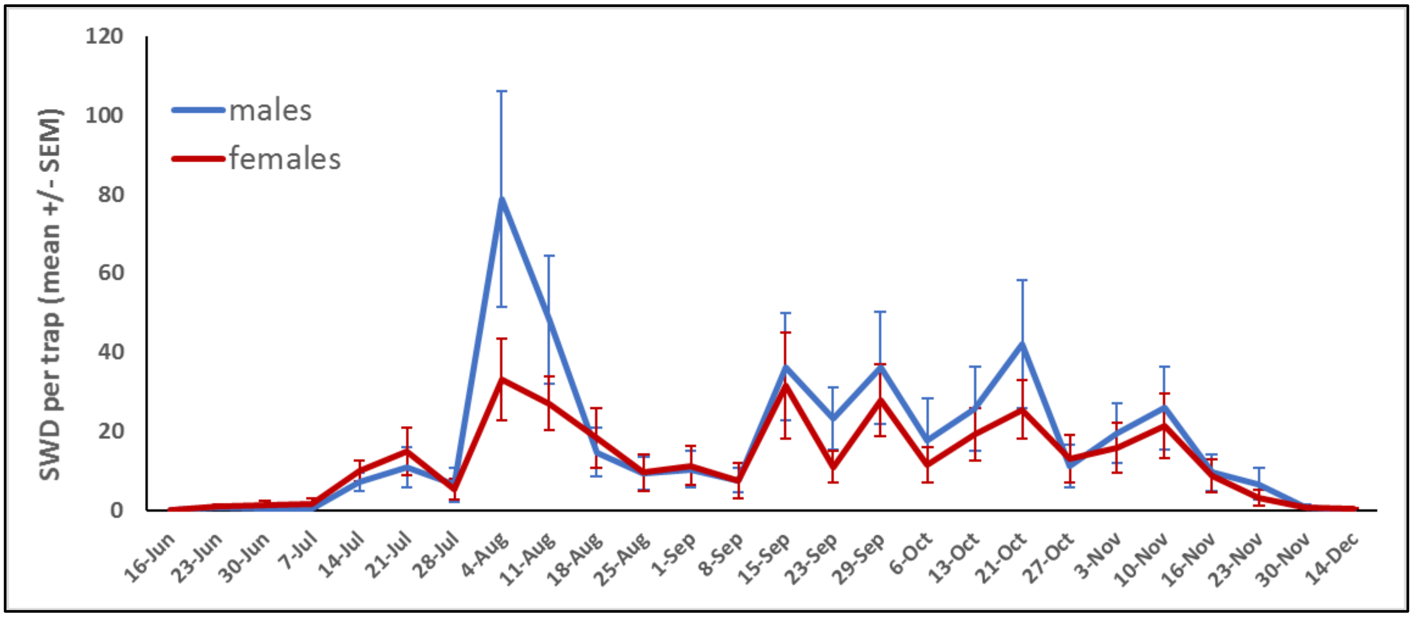
By: Christelle Guédot and Janet van Zoeren

Spotted wing drosophila (SWD), since its introduction into Wisconsin in 2010, has quickly become public enemy number one for many small fruit crop growers. For this reason, it has been the subject of a lot of recent research in the Guédot lab, as well as across the U.S., and has been the focus of a number of newsletter articles this past summer. Because we have already provided information about SWD identification (see pictures to the right), monitoring, and management previously this summer, this article will mainly discuss our most recent phenological findings: comparing infestations this summer with previous summers, comparing populations in raspberry cropland with populations in the surrounding woodlands, and discussing our findings funded by WBGA on linking degree days with first occurrence of SWD. For links to more information about SWD from previous newsletter articles, please see the links on the following page.

Overall, the seasonal pattern of infestation this summer was similar to that of previous summers in Wisconsin, although beginning earlier. Our first trap catch in Dane County was two weeks earlier in 2016 than in 2015 (June 23rd instead of July 8th). Interestingly, the first trap catch for Wisconsin in 2016 came from Matt Stasiak at the UW Peninsular Research Station in Door county, from a tart cherry orchard on June 8th. Similarly to last summer, there was an initial high peak infestation, followed by fluctuating increases and decreases in SWD numbers through mid-November, probably following adult emergence from different generations. In 2015, the last SWD of the season was caught on December 30th; in 2016, we caught our last SWD fly on December 14th. Interestingly, this past summer there was a trend toward more males than females SWD captured throughout the summer, in contrast to previous summers when the trend was toward more females caught.

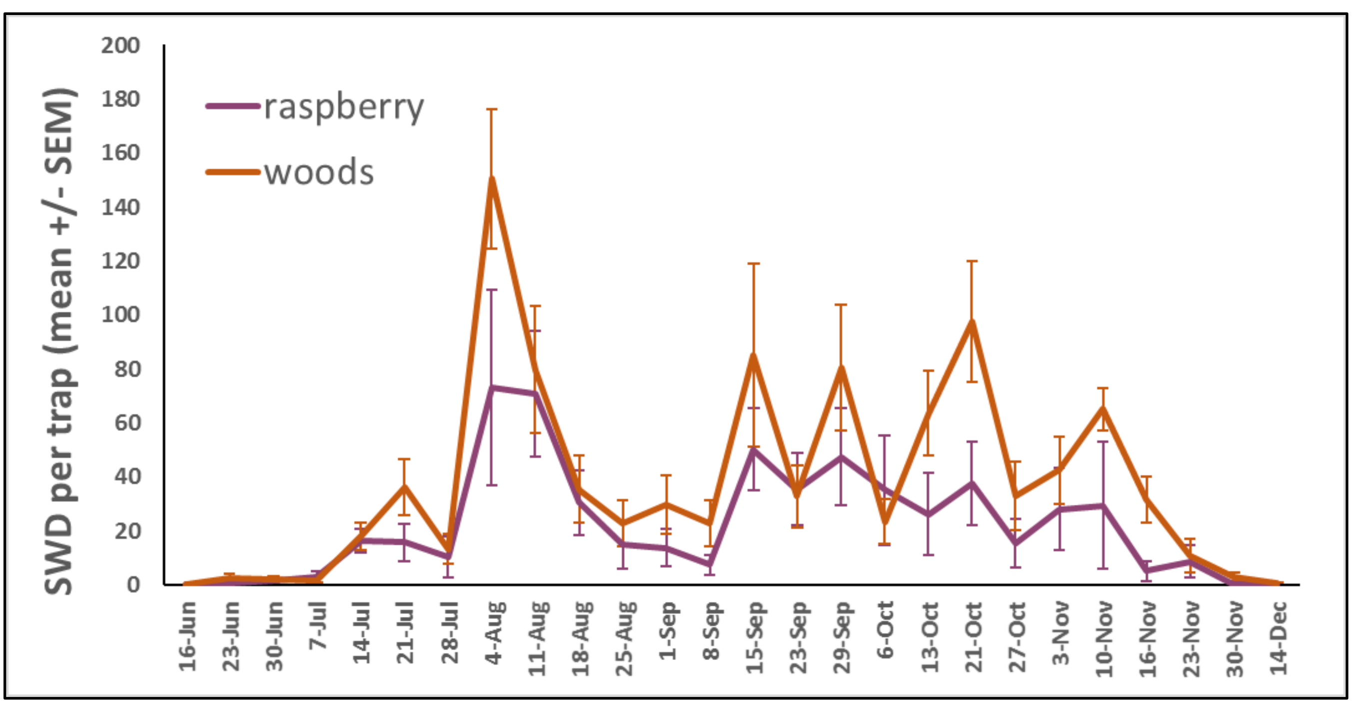


Spotted wing drosophila: male on left and female on right.

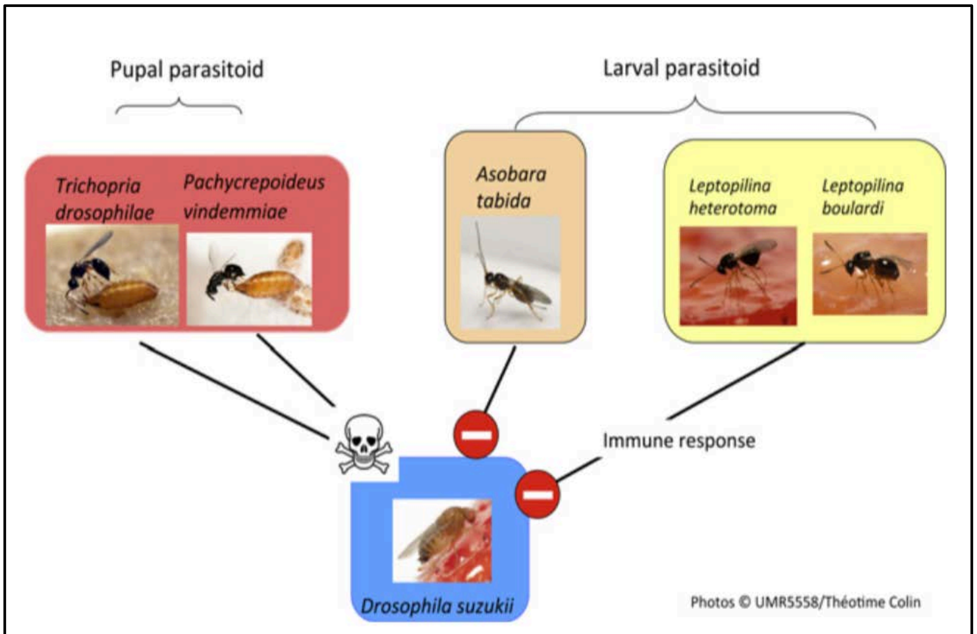


In 2016, we obtained some funding from WBGA to test SWD first occurrence based on degree day models from the West Coast. We found that the models we tested did not help us predict first occurrence in Wisconsin. As we reported in an early newsletter last summer (SWD in raspberries), the presence of SWD earlier this season in Door county, when we had reached about 398 GDD, did not match our expectations or our observations in Dane county (no fly detected by 612 GDD). Degree day accumulation models seem to still have limited capabilities in predicting phenology (i.e. first detection, different generations, and last detection) and further work should be conducted to refine the models to more accurately represent WI populations in our local climate and provide growers with the most appropriate tools to predict population phenology in their specific areas (Wiman et al. 2014 Plos One e106909).

In comparing the traps placed in raspberry crops with those in nearby woodlands, there were more SWD trapped in the woods than in the raspberries (see graph below). At first this may seem counter-intuitive, but we have seen similar data from Emma Pelton who worked in our lab (Pelton et al. 2016 Journal of Pest Science DOI 10.1007/s10340-016-0733-z). As Emma mentioned it is important to take into account the presence of many wild hosts available to SWD in those woods, including honeysuckle, buckthorn, wild brambles, and pokeweed, among others. This is a major concern in SWD management, because even if growers were able to eliminate all SWD within their crops, there would still be the potential for a continual reservoir of SWD in the surrounding landscape, ready to move in and infest the crop.



In 2017, a new graduate student, Matthew Kamiyama, started working in our lab to assess the impact of SWD on tart cherries in Door County. Matt will also work on identifying naturally-occurring biological control agents of SWD in both tart cherry and raspberry. Biological control agents or natural enemies may include predators (insects who directly feed on the pest) and parasitoids (insects who lay eggs on the pest and the larva of the parasitoid proceeds to eat the pest from the inside therefore killing it in the process – chilling!), including pupal and larval parasitoids, such as those depicted on the figure at left. These parasitoids were assessed in Europe for their potential to kill SWD pupae and larvae and only the two pupal parasitoids were successful in this study (Chabert et al. 2012 Biological Control 63:40-47).



Chabert et al. 2012 Biological Control 63:40-47.

Note: the Immune response mentioned in the figure refers to the ability of SWD to encapsulate, and thus isolate and starve, the larval parasitoid egg, protecting itself from it.

More research needs to be conducted to assess potential natural enemies in the laboratory and to assess their impact in the field on wild SWD populations. We do not currently know if our native natural enemies parasitize SWD in the upper Midwest, and Matt's research will help us answer this question in Wisconsin fruit crops.

On the research side, we hope you enjoyed the presentation from Ben Jaffe at the WFFVC in the Wisconsin Dells. I am sorry I missed the conference and I hope the conference as a whole and the berry track were well attended and informative for all of you. As always, we appreciate your feedback and suggestions for improving the berry track.

In summary, SWD continues to be a major threat to the raspberry, cherry, and strawberry industries in Wisconsin, and there is no silver bullet solution. However, we are doing our best to learn as much as possible about the life history of SWD, and to develop novel and hopefully increasingly effective management techniques. To learn more about monitoring and control techniques for SWD, see the following articles from previous issues of our newsletter:

- SWD in raspberries, including chemical controls
- SWD in cherries, including chemical controls
- SWD in grapes, including chemical controls
- Susceptible / resistance of raspberry varieties to SWD
- Exclusion barriers as a management option for SWD

Please stay tuned, as we will continue to keep you updated of the most recent research developments taking place in our lab and across the country.

Brown Marmorated Stink Bug

Brown marmorated stink bug end-of-season update

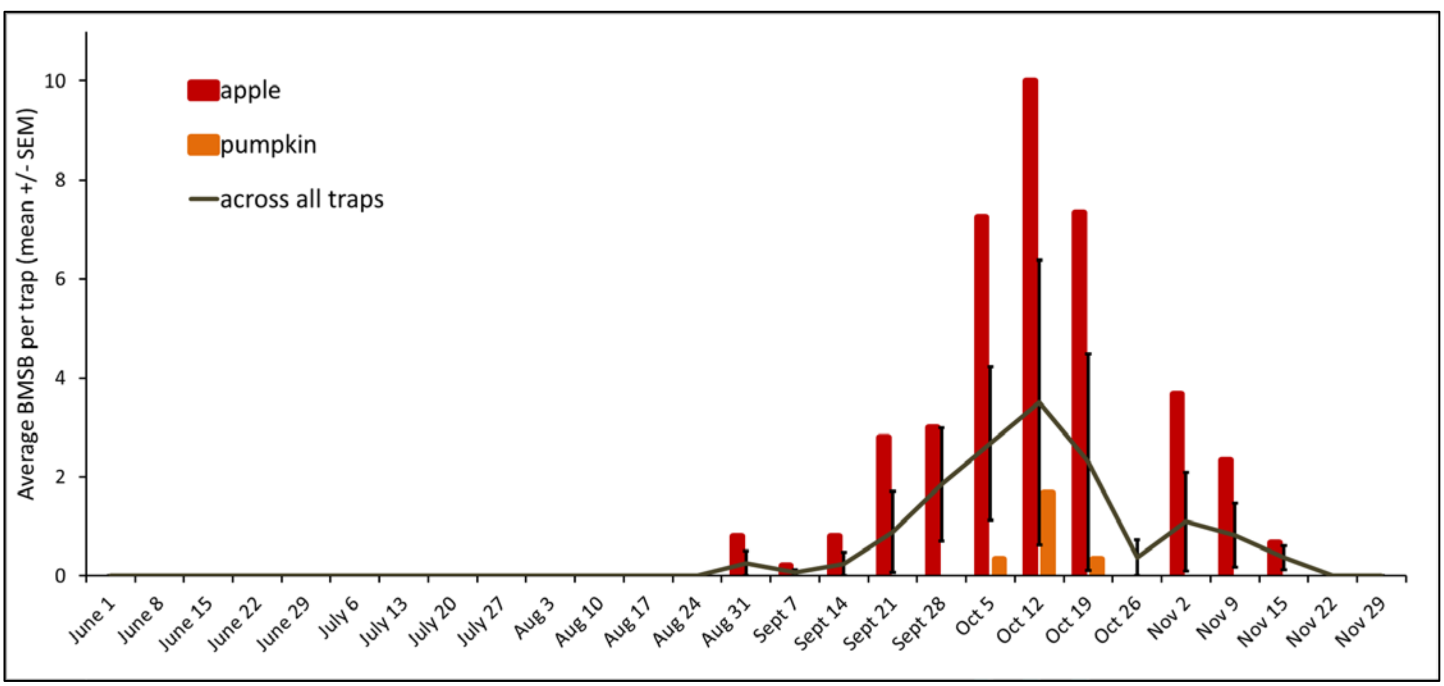
By: Christelle Guédot and Janet van Zoeren

The invasive insect pest, the brown marmorated stink bug (BMSB), has been seen in urban areas of Wisconsin since 2010, and has now, for the first time in Wisconsin, been trapped in agricultural crops. Following a pattern seen across the east coast and in Michigan, it is, unfortunately, predicted that BMSB damage will increase dramatically in the coming years, across a large variety of crops but especially in apples. In order to better advise everyone growing crops susceptible to BMSB about how to protect their crops in the coming years, it is first important to understand the current status of BMSB in the state, then to consider how to monitor on your own farm, and finally to discuss some management practices that you can implement.

Brown marmorated stink bug is similar in appearance to several native stink bugs, although much more damaging to fruit crops and disruptive to home owners (see picture at right). Accurate identification of BMSB has been covered in previous issues of this newsletter, and will not be addressed again here.

A third-instar nymph and adult BMSB female. Photo by John Joutras.

To date our traps have only caught BMSB in Dane and Rock Counties, although it has been confirmed in 14 counties around the Madison/Milwaukee and Green Bay regions. Our average trap catches throughout the summer are presented in the graph below, with the average number of BMSB caught in all traps (urban, woodland, apple, pumpkin, and corn) represented by the black line, the average number caught in apple by red bars, and the average number caught in pumpkin by orange bars. There were no BMSB caught in any traps in woodlands or corn sites. Numbers in urban sites were lower than in apples, but higher than in pumpkin.



The first BMSB was caught relatively late in the summer – on August 31st near Janesville. Numbers rose through October 12th, which was the peak of population abundance, and then fell off again until the last trap catch on November 22nd. By far the greatest numbers of BMSB were caught in traps in apple orchards – at most there were 29 BMSB in a single trap in an orchard - while there were up to ten in urban traps, and only five at the most in a single pumpkin trap. We do not have any assessment of damage to apples due to BMSB, in part because BMSB damage symptoms cannot be reliably distinguished from those of native species of stink bugs.

Given that BMSB is now present in apple orchards in Dane County, and in coming years will be more prevalent and will spread to other counties, now is the time to develop and implement a monitoring and management plan for BMSB. This will be especially important for apple growers to implement next summer, but will likely be important for other crop growers to consider for coming years. Because BMSB often flies into the orchard from surrounding woodlots and urban areas in the spring, traps generally begin catching bugs earlier and at higher densities on the margins of orchards than in the middle. It is recommended to place one black pyramid trap baited with a commercial lure (both are available online) approximately every 70 ft. along the edge of the orchard. The commercial lures tend to be attractive at shorter distances and thus BMSB need to be in the vicinity to be attracted.

It is also important to be ready with an integrated pest management plan, which can be put into play immediately if BMSB are found to be present in your crops. As with most pests, chemical management is the most effective control method. However, there are simple techniques that can reduce the amount of insecticide that will need to be applied, by increasing the effectiveness of your sprays.

Because BMSB prefer edges of orchards and fields, an insecticide applied only to the outer few rows (perimeter spray) can still maintain approximately 85% of the effectiveness of an insecticide applied throughout the orchard. To make it even more effective, a lure, similar to that used for monitoring, can be placed every few trees along the edge of the crop, increasing the likelihood of BMSB to settle along this edge instead of entering the orchard. Another control strategy which may help reduce the prevalence of the pest, although somewhat time consuming, is to encircle the trunk of each tree along the outer edge of the orchard with a sticky substance, such as tanglefoot.

Some insecticides with proven efficacy against BMSB are detailed in the following table. This is certainly not an exhaustive list, as there are other insecticides available including some mixed formulations. Additionally, these insecticides are registered for use on apple; if you grow another crop, be sure to check the spray guides or check the label to be sure these chemistries are registered on your crop. It is always necessary to read the label, even for the insecticides listed here, to be sure you are using the most up-to-date information.

Class (IRAC)	Trade name	Active ingredient	REI	PHI (days)	Rate (per	Comments
Carbamates (1A)	**Lannate SP** **highly effective**	Methomyl	72 hours	14 days	0.5-1 lbs.	Max of 5 lbs./acre/year, Max of 5 applications/year.
Pyrethroids / Pyrethrins (3A)	**Danitol 2.4EC** **highly effective**	Fenpropathrin	24hrs	14	16 – 21⅓ fl. oz.	Max of 42⅔ fl. oz./acre/year. Max 2 applications/season.

	Warrior II 2CS **highly effective**	Lambda-cyhalothrin	24hrs	21	1.28 – 2.56 fl. oz.	Max of 12.8 oz./acre/year.
Neonicotinoids (4A)	Assail 30 SG	Acetamiprid	12 hrs.	7	4 – 8 oz.	Max of 32 oz./acre/year. Max 4 applications/season.
	Actara 25 WG **highly effective**	Thiamethoxam	12hrs	14 - 33 (depends on rate)	4.5 – 5.5 fl. oz.	Max of 16.5 fl. oz/acre/year.

Thank you WAGA for partially funding the monitoring of BMSB in Wisconsin in 2016. Finally, stay tuned to this newsletter and other pest alert information next summer, to keep up to date with this invasive pest's movements.

Calendar of Events

UPCOMING EVENTS:

March 10-12, 2017 – Midwest School for Beginning Apple Growers
9:00-4:30 daily, University of Wisconsin-Madison, Madison, WI

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