



## 2023 Vermont Apple Season Highlights

### Persons Reporting:

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McIntosh Phenology at

UVM Horticulture Research & Education Center, South Burlington, VT

Year	Silver Tip	Green Tip	Half Green	Inch Tight Cluster	Pink	First Bloom	Full Bloom	95% Petal Fall
2023	4/10	4/13	4/20	4/23	4/30	5/8	5/11	5/22

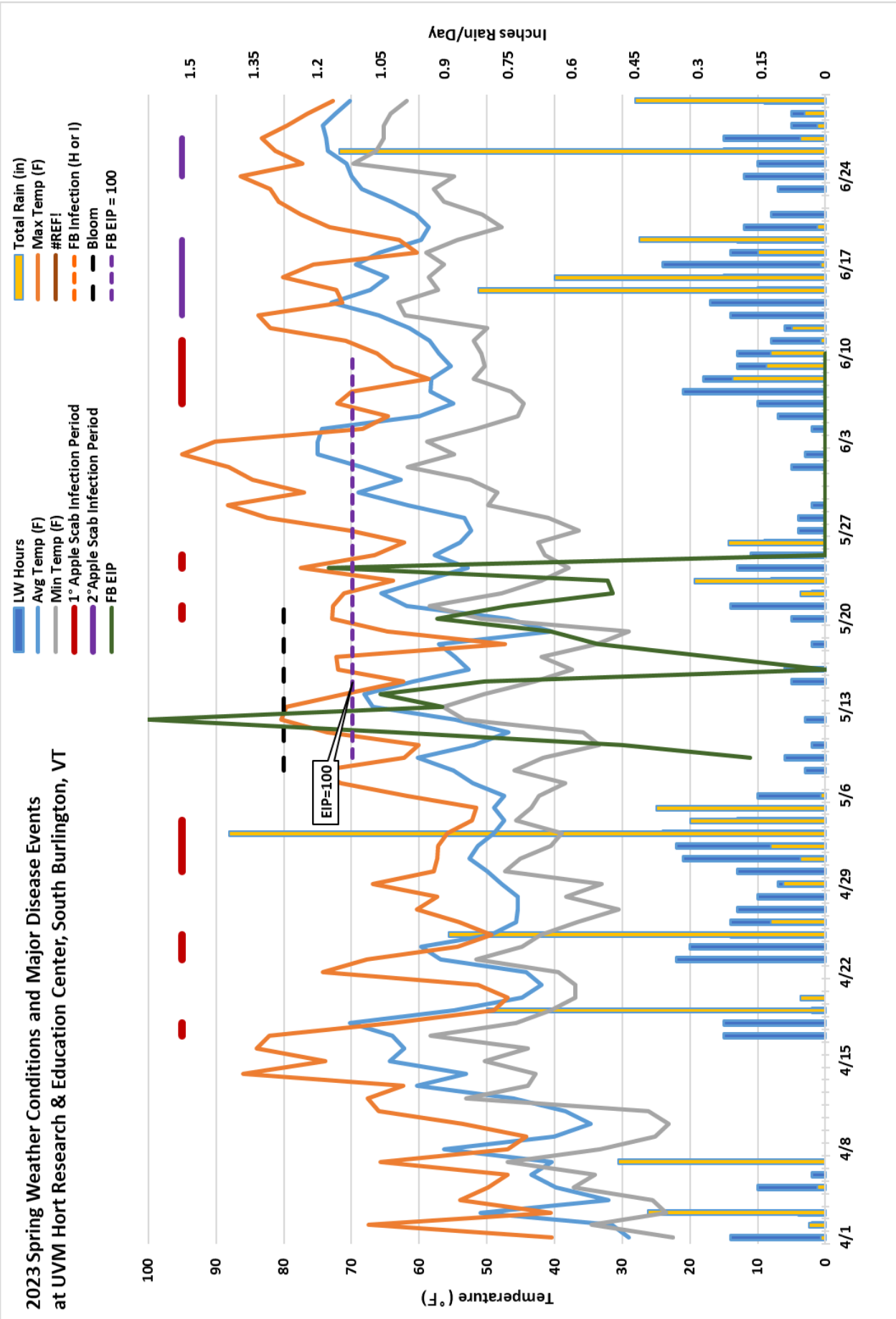
**General Weather Conditions** - *Weather data collected from Onset RX-2102 weather station at UVM Horticulture Research Center (HREC), South Burlington, VT, and at NEWA-networked stations on grower farms throughout the state.*

Acclimation conditions after 2022 harvest were generally sufficient to allow goo hardening off and no substantial early-winter cold events occurred that would be likely to cause tree injury. Winter was relatively mild, but a cold snap of -17°F in South Burlington and as low as -20°F inland killed most fruit buds on what few stone fruit trees are in the state. Late winter and into spring, temperatures rose gradually with a one warm (>50°F) day in February and two in March, and trees budded out just slightly ahead of normal- our first sprays at UVM HREC went on April 13, one week ahead of our typical Earth Day start date. Bloom started May 8 and was accompanied by dry, sunny, warm but not hot weather. Full bloom on McIntosh occurred at UVVM HREC on May 14, one day later than our 27-year average (1997-2023).

Nighttime temperatures during bloom were relatively cool, as a ‘big bubble’ high pressure system was overhead for most of the week. On Wednesday, May 17, daytime temperature maxed out at 47°F, and began to drop immediately after dusk. Overnight, temperatures dropped- most orchards saw below 32°F by midnight, when the previously breezy conditions turned calm, and did not warm above freezing until around 8:00 AM on the 18<sup>th</sup>. The freeze was variable across the state, with all orchards not immediately adjacent to Lake Champlain affected to some degree.

Later observations within orchards indicate that for most farms, there are colder sites than those where weather stations are located, especially in the hillier orchards with more dips and low spots where cold air collects.

### 2023 Spring Weather Conditions and Major Disease Events at UVM Hort Research & Education Center, South Burlington, VT



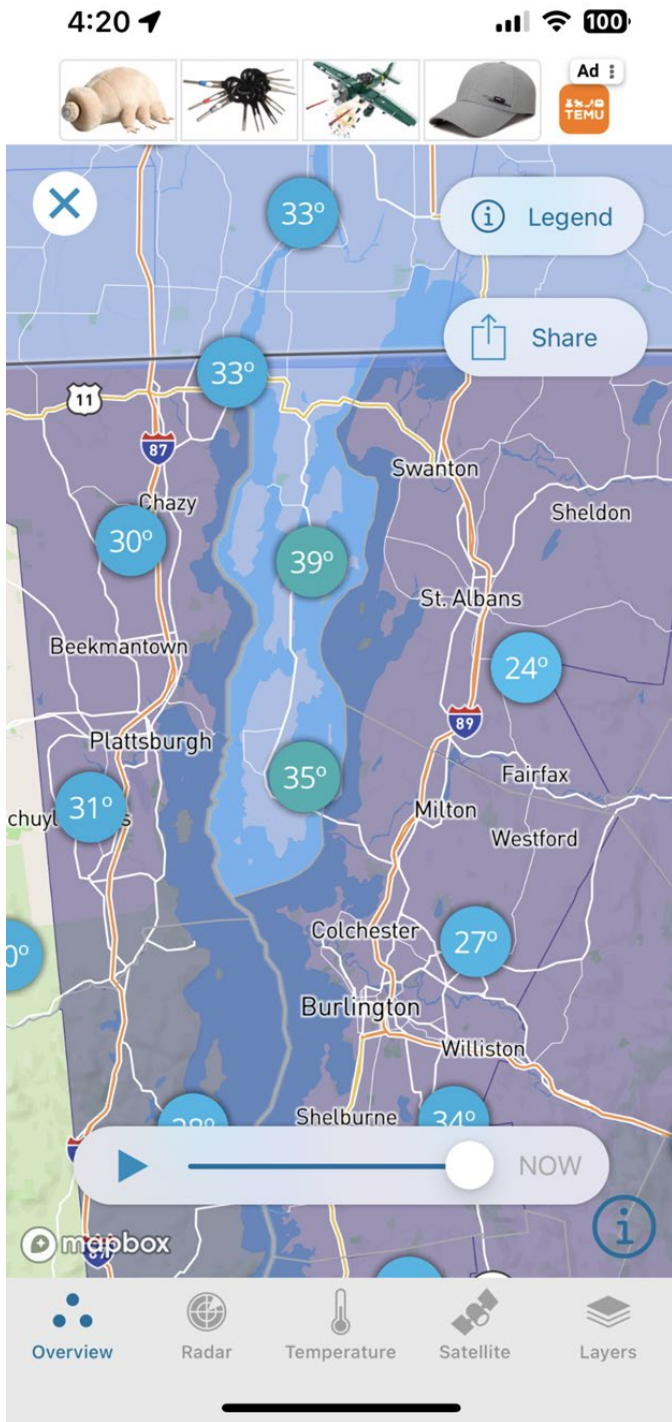
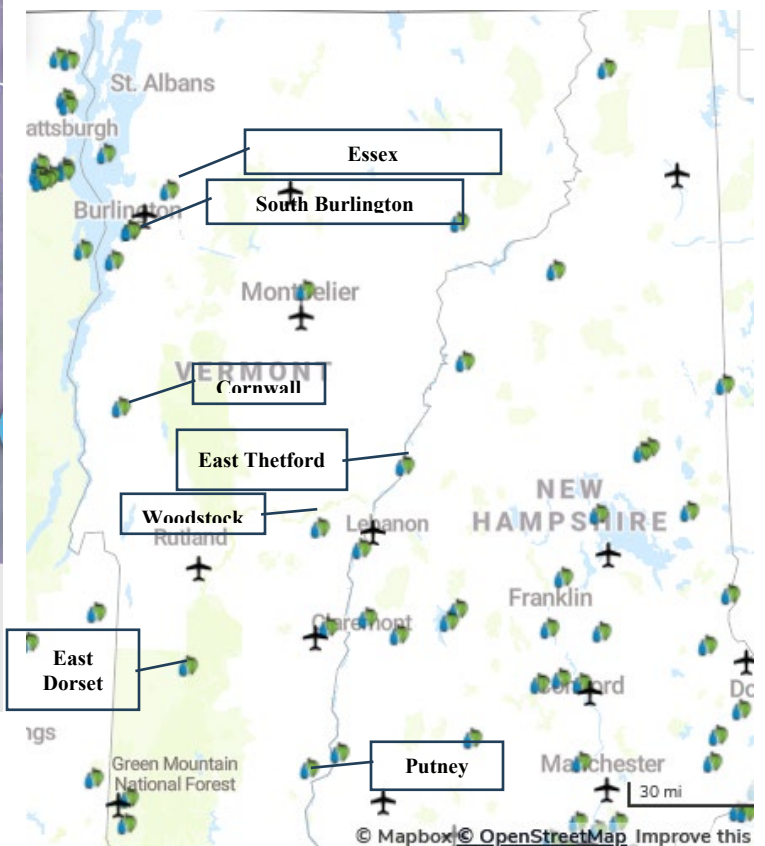


Figure 1. Screen shots of air temperature in Champlain Valley on Weather Underground at 4:20 am on May 18, 2023

South Burlington	29.1
Bennington	31.3
Cornwall	29.8
East Dorset	27.2
East Thetford	24.8
Putney	24.4
Essex	25
Woodstock	22.9

Figure 2. Low temperatures observed in Vermont orchards the morning of May 18, 2023, as reported in NEWA.



Spring was relatively dry from late April until mid-June, so disease management initially was not a major concern for growers who were assessing damage from the spring freeze. Then in mid-June, the weather pattern turned rainy, with rain nearly every week in most orchards and periods of very heavy rain. On a side note, the authors of this report discovered erroneous, abnormally low rain data for many orchards, which indicates poor station maintenance. The data presented below also do not capture the severity of some events: intense rain events with >3” of rain in one day appear to not have been recorded adequately by many rain gauges. At the author’s (TB) home just outside Montpelier, over 14” of rain was observed between July 7 and July 17 in a bucket that was left outside. Anecdotes like this were repeated around the state.

Monthly 2023 accumulated precipitation (inches) at Vermont NEWA orchard sites							
	South Burlington	Bennington	Montpelier	East Dorset	East Thetford	Putney	Woodstock
Apr	3.10	2.77	3.28	3.17	3.26	4.87	4.42
May	2.74	2.45	1.55	2.03	3.05	2.72	3.66
Jun	4.40	4.98	5.25	6.73	6.34	5.41	7.02
Jul	6.32	4.25	10.49	6.88	5.14	11.57	4.51
Aug	5.64	4.06	5.73	4.70	5.79	3.62	4.85

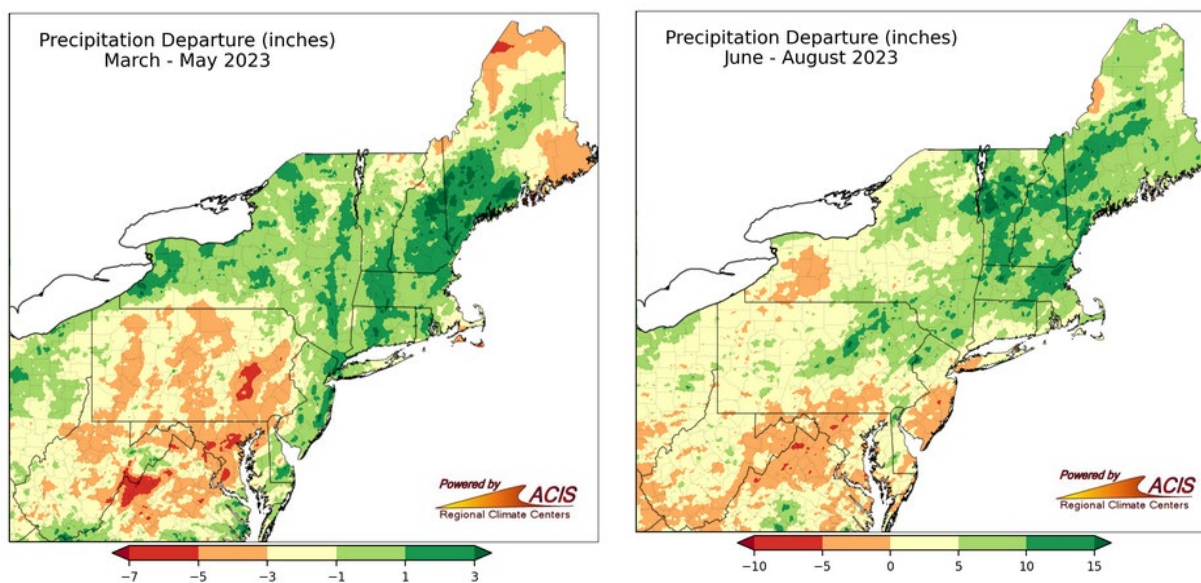


Figure 3. Northeast Regional Climate Center precipitation departure maps. Note change in scale in for summer map (right). <http://www.nrcc.cornell.edu/regional/monthly/monthly.html>

## Horticulture Overview

Bloom weather, until the freeze, was very good for pollination and fertilization. Orchards overall were expecting a better than average crop with generally good to great bloom density. On the day of the freeze, bud conditions were all over the place- inland and upland orchards, e.g., Cabot, Brookfield) were at tight cluster to pink bud stage, and suffered less damage than those in full bloom or early fruit set. Assessments were conducted in orchards across the state in the week following the freeze, in total we received nineteen reports from apple growers from nine counties. Among reporting orchards, the trend was very clear that proximity to Lake Champlain was critical to minimizing damage: no reported damage was made from Grand Isle County, and the only orchards with less than 50% damage were located adjacent to the lake or within ¼ mile from it. Orchards just a few miles inland in Chittenden, Franklin, and Addison Counties suffered heavy damage. For the vast majority of respondents, estimated crop loss was 95% or greater. A handful of orchards relatively close to the lake reported 35% or less damage on apples. Follow up assessments conducted in July indicated that more fruit survived than expected, although many were disfigured by frost rings, had low seed count (or no seeds at all), or suffered from internal breakdown. Final harvest data have not been collected from all orchards. On a side note, feral apples were surprisingly abundant in most of the state except for the Connecticut Valley.

### **Pest Management Overview**

#### **Primary Apple Scab Infection Periods:**

4/17-18; 4/23-25; 4/30-5/4; 5/20-21; 5/24-25; 6/6-10.

**\*McIntosh Green Tip Date:** 4/13

**Estimated date of 100% Ascospore Release (NEWA):** June 13

According to the NEWA apple scab model, primary apple scab season lasted for approximately eight weeks in 2023. While nine primary apple scab infection periods were recorded in 2023, overall, scab was almost non-existent in the early season due to relatively dry conditions that led to ‘light’ infection events and easy spray weather windows. Late-season, secondary scab however was terrible, and growers who started to cut sprays after seeing extensive crop loss from the freeze got behind on sprays. In many orchards, substantial scab inoculum exists that threatens to make 2024 a potentially difficult season.

#### **Fire Blight Blossom Blight Infection Periods at UVM HREC:**

Fire blight conditions for the majority of bloom were, according to Cougarblight and (NEWA) Maryblyt models, not generally conducive to fire blight infection. Cool temperatures during much of bloom prevented substantial buildup of epiphytic infection potential, although a few warm days right around peak bloom May 10-12 did allow bacteria populations to increase. However, the weather was dry and with low humidity for that entire week.

Date (2023)	Cougar Blight V8 Daily TRV			Infection Potential EIP value			
	Marginal	High	Extreme	Low	Moderate	High	Infection
May 8	113			33			
May 9	112			16			
May 10	126			43			
May 11	210			91			
May 12	408			143			
May 13	438			148			
May 14	389			81			
May 15	265			94			
May 16	87			72			
May 17	56			0			
May 18	59			0			
May 19	77			24			
May 20	101			48			
May 21	120			58			
May 22	119			39			
May 23	196			82			
May 24	155			67			
May 25	139			45			
May 26	157			46			
May 27	272			110			
May 28	676			207			
May 29	791			221			
May 30	1102			300			
May 31	1312			344			

\* Indicates incomplete accumulation of the 4-day DH total. The DH value may reach "Caution", "High" or "Extreme" levels before spanning the 4-day accumulation cut-off time of Cougarblight.

**Figure 4. NEWA output for fire blight infection potential in South Burlington, VT in May, 2023.**

Despite low expected infection risk, according to the models, moderate to sometimes severe fire blight was observed in orchards around the state. We hypothesize that scab sprays applied during this time may have triggered low levels of infection that were exacerbated by very good conditions for bacterial development later in the month. We also question the effect that the freeze may have

had on infection and wonder if bacteria was not pulled into developing and damaged ovaries during the initial temperature drop of May 17-18.

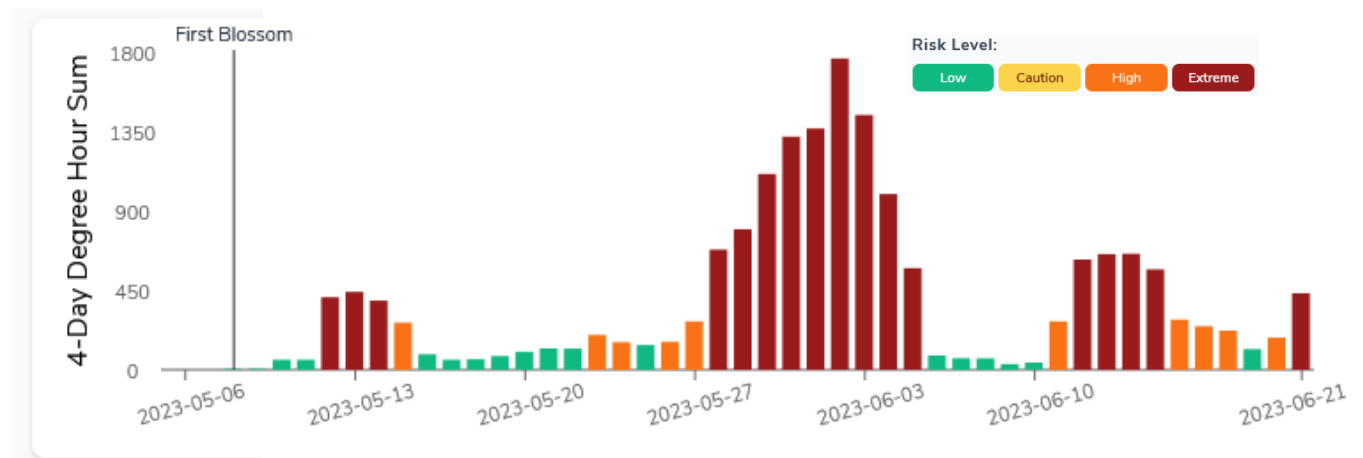


Figure 5. NEWA calculated Cougarblight risk levels for fire blight infection, South Burlington, VT, May-June 2023.

## Arthropod Pests

The UVM Fruit Program started 2023 with a revitalized partnership with Vermont Tree Fruit Growers Association (VTFGA) to facilitate a statewide orchard monitoring program. VTFGA purchased traps for over a dozen orchards, UVM staff delivered and set up the initial traps, and scouting sheets were developed and shared among growers. The intent of the project was for growers to submit trap captures and other monitoring data weekly in share spreadsheets to better develop regional pest management recommendations. After the freeze, however, grower morale was low and few participated in the program. We hosted two summer Agroecology and Extension Fellows from Montana for June and July, who collected weekly (mostly) data from orchards near Burlington, but after they returned for the season, essentially no scouting was continued by growers.

Broadly speaking, insect management was good overall, but questions remain about the impact that few fruit (hosts) may have had on arthropod populations. As mentioned above, feral apples continued to set fruit, and many pests may have shifted to alternate hosts- we doubt that the loss of fruit was so bad that we will see substantial reductions in pest populations in 2024 as a result.

**Redbanded leafroller** and Oriental **fruit moth** continue to be caught in pheromone traps, but few growers manage for them specifically. **Codling moth** is now widespread in the state and some farms trapped over fifty per week during peak flights. **Apple leafcurling midge** was reported in most orchards. **Spotted lanternfly** is present in Vermont but, like **brown marmorated stinkbug**, has not yet reached worrisome levels. **Obliquebanded leafroller** generally peaked in late-June to mid-July, and are commonly targeted as a primary pest using degree-day models. Many growers are using mating disruption for **dogwood borer**, and many are also making trunk applications of Assail to manage that pest. Mites, especially **European red mite**, generally not a problem in 2021. **San Jose scale** continues to be problematic as growers are using less prebloom oil.