### Updates on Beet Leafhopper and Beet Curly Top Virus on Processing Tomatoes in Stanislaus County

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# The 2021 most encountered pest and disease in processing tomato fields: Beet leafhopper and beet curly top virus





Source: UGA, bugwood.org

#### BLH and Potato LH



Wedge-shaped body with tapering posterior 1/8 inch long, olive green to light tan body color Small dark-brown black markings A distinct and broad head with a rounded anterior margin



#### **Source: Iowa State Extension**

Wedge-shaped body with tapered abdomen 1/8 inch long, bright, limey green body color Six white spots behind eyes A broad head with short antennae, big, white eyes

## We ALL know the damage by BLH – Vector of curly top virus



**Russian thistle** 



Redroot pigweed



Filaree



Lambsquarters

Not all BLHs carry curly top virus – They will become infectious after acquiring virus by probing on viruscarrying host weeds.

This process usually happens in the foothills and when temperature warms up in March.

Completed (virus-acquired) first generation adult BLHs will migrate down to the valley.

#### **Feeding Biology and Symptoms**



- 1. Indiscriminating feeding characteristic infections are scattered in the field.
- 2. Infested plants exhibit purpling of veins and stunting.
- 3. A diseased plant may have premature fruit turning red.
- 4. After being transmitted, young plants usually die, but more mature ones will survive.

#### **Disease Transmission and Management**

- 1. The virus must be inoculated from diseased to healthy plants by BLH direct feeding.
- 2. There is no risk of disease spread from one plant to another without a vector.
- 3. Controlling BLH by insecticide is usually applied as chemical control, but this could be very difficult and costly to identify their hotspots where they overwinter and make effective applications.
- 4. Although infested plants can not recover, some practices may help reduce the feeding incidence: <u>Plant densely</u>, <u>delay transplanting to avoid the peak</u> <u>migration</u>, <u>eliminate host weed near tomato fields</u>, <u>replant timely to avoid big</u> <u>area of soil exposed</u> BLH prefers being attracted by plants next to gaps.

#### **Damage on Yield**





- 1. Single diseased plant is typically compensated by the healthy neighbors.
- 2. A field with an infection rate below 5% may still reduce yield if several diseased plants emerge next to each other in multiple rows.
- 3. Field infestations over 10% are more likely to cause a substantial yield loss.

#### **Collaborated Study with CTRI in 2021**



- 1. Monitor BLH population and curly top virus incidence in processing tomato fields
- 2. Other collaborators: Dr. Gilbertson's Lab and CDFA-Curly Top Virus Program
- 3. Monitored area: Westley-Patterson and Crows Landing-Newman



#### **10 Monitored Locations and 22 Tomato Fields**



Patterson/Grayson to Crows Landing/Newman

10 sites covering 22 tomato fields with 2,200 acres

Inspected and replaced sticky traps biweekly

Sweep net samples monthly

Sampled over 60 tomato plants – CDFA and Gilbertson's Lab for I.D. and positive test

#### Location Characteristics: Vegetation, Planting, Variety

Field code	No. of fields included	Total acreage	Traps set at (vegetations)	Varieties	Planting date (2021)
LOC1	2	68	Ditches, grass land, alfalfa	DRI 319	April 5
LOC2	3	106	Between the edges of tomato and almond	HM 4521	April 20
LOC3	1	93	Wild grass land, ditches	BOS 811, SVTM 9014	April 10
LOC4	2	340	Roadside, edges of tomato and orchard fields	HM 4521, SVTM 9014, DRI 319, SVTM 9013	April 22
LOC5	2	127	Edges of tomato and almond, ditches at canal	HM 58841	May 16
LOC6	2	190	Roadside, ditches, wild grass land, edges of tomato and orchard fields	HM 4521, SVTM 9014, SVTM 9013, BOS 811, HM 9905	May 20
LOC7	4	570	Edges of tomato and almond, ditches, roadside	N6474, SVTM 1082, DRI 319, BP74	May 4, 7, 9, and 11
LOC8	1	90	Roadside, wild grass	SVTM 1082	April 29
LOC9	4	500	Edges of tomato field and walnut fields	DRI 319, HM 58801, N6420, HM 8163, HM 7885	April 27, May 3, 12, 14
LOC10	1	100	Roadside, ditches	HM 5522	May 1

#### **Started with Setting Traps**



- 1. 3-ft tall to the ground
- 2. All faced to the west foothills
- 3. Check and replace every two weeks
- 4. BLHs were sorted and sent for virus positivity test

#### **Sweep Net Sampling and Lab Processes**



- 1. Sort BLHs from the bags of sweep net samples.
- 2. BLHs saved in the vials with alcohol.
- 3. Labeled vials to CDFA Curly Top Control Lab in Fresno

#### **Field Incidence of Curly Top Virus**



Count infected plants for 5 rows x 200-300 ft/field in July.

% infection was estimated by a combination of visual assessment and number of infected plants in total plants within the 1,000-1,500 row feet.

Monitored fields were grouped into 0-5%, 5-10%, and >10% and reported by location (LOC).

#### **Beet Curly Top Virus Incidence at Each Location**

Field code	Incidence	Traps set at (vegetations)	Varieties	Planting date (2021)
LOC1	<mark>&gt;10%</mark>	Ditches, grass land, alfalfa	DRI 319	April 5
LOC2	0-5%	Between the edges of tomato and almond	HM 4521	April 20
LOC3	<mark>5-10%</mark>	Wild grass land, ditches	BOS 811, SVTM 9014	April 10
LOC4	<mark>&gt;10%</mark>	Roadside, edges of tomato and orchard fields	HM 4521, SVTM 9014, DRI 319, SVTM 9013	April 22
LOC5	<mark>&gt;10%</mark>	Edges of tomato and almond, ditches at canal	HM 58841	May 16
LOC6	<mark>5-10%</mark>	Roadside, ditches, wild grass land, edges of tomato and orchard fields	HM 4521, SVTM 9014, SVTM 9013, BOS 811, HM 9905	May 20
LOC7	<mark>5-10%</mark>	Edges of tomato and almond, ditches, roadside	N6474, SVTM 1082, DRI 319, BP74	May 4, 7, 9, and 11
LOC8	0-5%	Roadside, wild grass	SVTM 1082	April 29
LOC9	<mark>5-10%</mark>	Edges of tomato field and walnut fields	DRI 319, HM 58801, N6420, HM 8163, HM 7885	April 27, May 3, 12, 14
LOC10	<mark>5-10%</mark>	Roadside, ditches	HM 5522	May 1

#### LOC 1

LOC 4



#### Number of BLHs Found at Each Collection Period-Sticky Traps



The population of viruscarrying BLHs from sticky cards and sweep net samples across the season is still being processed by the CDFA lab.

Total number of BLHs at each collection period from <u>3 sticky traps</u> at each location throughout the season. Collection 1 = 3/17 - 3/31; Collection 2 = 3/31 - 4/15; Collection 3 = 4/15 - 4/30; Collection 4 = 4/30 - 5/14 ..... Collection 12 = 8/20 - 9/10; Collection 13 = 9/10 - 9/24.

#### Number of BLHs Found at Each Collection Period-Sweep Nets

Netting Date	Total number of BLHs from all LOCs (Fields not planted or already harvested were not sampled)	Number of Virus-positive BLHs
April 15	14 (LOC 3, 5, 7) = 4.7 per 10 sweep nets	
May 14	37 (LOC 1, 3, 4, 5, 7, 10) = 6.2 per 10 sweep nets	11 (LOC 1, 4, 5, 10)
June 11	47 (LOC1, 3, 5, 6, 7, 10) = 7.8 per 10 sweep nets	13 (LOC 1, 3, 5, 6, 7)
July 9	27 (LOC 3, 4, 6, 7) = 6.8 per 10 sweep nets	
August 10	9 (LOC 1, 3) = 4.5 per 10 sweep nets	
September 10	5 (LOC 3, 4) = 2.5 per 10 sweep nets	
Total	139	24

#### Summary

- 1. The incidence of BLH feeding and BCTV seem to be irregular, but there still might be something we can follow to predict (e.g., complexity of nearby vegetations/weeds).
- 2. According to growers' reports, yield reduction was lower than expected, but some monitored fields were affected seriously.
- 3. Within field spatial analysis using Geo-Spatial methods can help to better understand the variation of in-field disease incidence and distribution, that way to develop an effective sampling plan, predict crop loss, and make decisions of chemical control (2022 CTRI-funded study).

### Thank our zzwwang@ucanr.edu



