



Understanding and Managing Peach Diseases

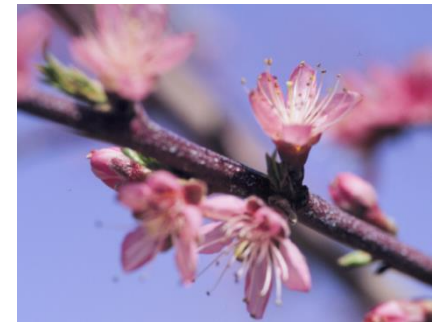
Bill Shane

Extension Tree Fruit Specialist

Michigan State University

SW Michigan Research and Extension Center

Benton Harbor, Michigan



MSU is an affirmative-action, equal-opportunity employer. Michigan State University Extension programs and materials are open to all without regard to race, color, national origin, gender, gender identity, religion, age, height, weight, disability, political beliefs, sexual orientation, marital status, family status or veteran status.



Focus on most common and troublesome disease problems of peach

- Brown rot
- Bacterial spot
- Constriction canker
- Peach leaf curl

Most Troublesome Problems with Brown Rot on Peaches



- Early onset of brown rot on green fruit
- Fungicide program does not control brown rot in harvest time

Common Causes for Brown Rot Problems in Peach - Inoculum buildup in trees -



Mummies from last year



Credit: G. Schnabel

Blossom blight (conidia circled)



Insect damage to green fruit provides
opening for pathogen

Common Causes for Brown Rot Problems in Peach

- Insect damage to fruit -



Tarnished plant bug



Oriental fruit moth



Stink bug

Common Causes for Brown Rot Problems in Peach

- Inoculum buildup in trees -



Infected wood persists even after fruit is removed

Common Causes for Brown Problems in Peach

- Over reliance on the Frac 3 (DMI, SBI) group of fungicides -

	Blossom blight	Fruit
Indar	E	G/E
Elite	G	G
Tilt / Orbit	G	G
Rhyme	G	G
Rally	E	P
Quash	G	14 day PHI

Generally fair to poor for
cherry leafspot

- This group is prone to gradual development of resistance problems which can be countered by increasing rates.
- Michigan 24(c) label for Indar allows for increased rate 6 to 12 fl oz per acre (= 3 to 6 oz Indar 75)



Cover sprays for brown rot to prevent green fruit rot and inoculum build-up

- Sulfur or Captan?

- Captan is a better brown rot material but costs more than sulfur
- Chance for sulfur phytotoxicity at >80F
- Captan increases red blush on peach but has inking potential for varieties prone to this disorder

Blossom blight and brown rot management strategy

Topsin M + Captan,
Rovral, Vangard, Bravo

Captan, sulfur

Captan, Abound,
Topsin M + Captan
Pristine, Merivon
DMI

Bloom PF/SS
(blossom blight)

Cover sprays
(green fruit rot)

Preharvest
(brown rot)

- If susceptible varieties, include rusty spot management from shuck split to pit hardening

Bacterial spot of peaches and nectarines



- Favored by hot, dewy, wet conditions, and windy, sandy sites.
- Bacterial spot pathogen moves into abrasions and nicks caused by blowing sand, especially common on outside peach rows next to dirt roads.
- Varieties differ in susceptibility to bacterial spot.

Peach/Nectarine fruit variety reaction to bacterial spot

Gouge symptom



Susceptible

G6 SS genetic test

Fleck symptom



Resistant

G6 RR genetic test



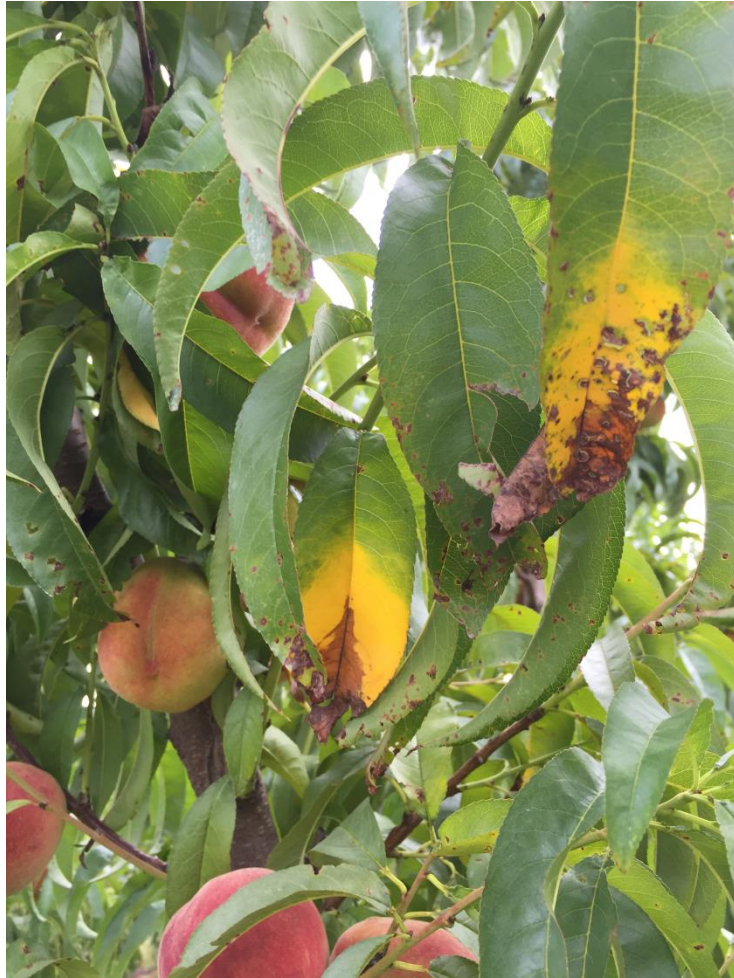
Starfire bacterial spot leaf



Starfire bacterial spot on fruit

Buildup of bacterial spot population on leaves can overwhelm fruit resistance

Buildup of bacterial spot on leaves can overwhelm fruit resistance of some varieties



Messina



Gloria

Fruit resistance not sufficient

Cultural control of bacterial spot

- Hide” more susceptible varieties on the inside of orchard blocks with the most resistant varieties on the exposed orchard edges.
- Use sod strips between trees and to use gravel or other dust-suppressing methods on nearby dirt roads.

Chemical management of bacterial spot of peaches and nectarines

Oxytetracycline (Mycoshield FireLine) - more effective than copper for bacterial spot control but is more expensive and perhaps prone to resistance problems. Oxytetracycline has a max of 48 hours activity.

Penn State (K. Peters) reports Serenade Opti (14 oz/A) and Regalia (1 qt/A) shows some benefit and can be used in rotation.



General program for in-season use of copper for bacterial spot suppression on peaches and nectarines

Stage	Formulated 53%copper (lb/acre)*	Metallic copper (lb/acre)
Delayed dormant	4 to 5	2
7 – 10 day interval	2	1
1 – 5% bloom	1	0.5
Petal fall	0.5	0.25
Shuck split	0.25	0.125
After shuck split	Switch to oxytetracycline (Mycoshield or Fireline)	

** Other coppers can be used—see label.*

If no rain since the last copper, hold off or skip the next application. Allow at least a week between applications.

Look for signs of copper injury and the amount of copper residue before each application. If copper & copper damage is obvious on the foliage, hold off.

Avoid stress such as low nitrogen, excess summer pruning, and drought on trees that can increase susceptibility to bacterial spot and copper phytotoxicity.



Postbloom pruning (right photo) made tree more susceptible to copper phytotoxicity.

Copper sprays generally cause more phytotoxicity to the sprayed foliage when applied under slow-drying conditions

Movement of bacterial spot in orchard

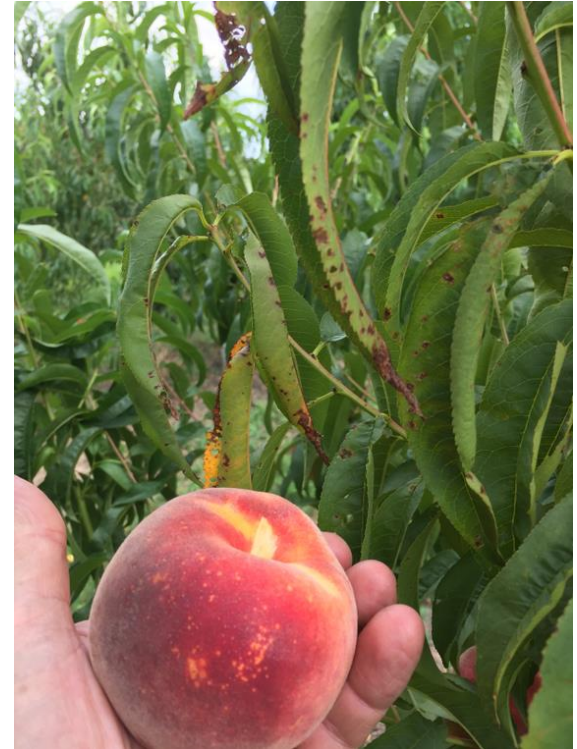
David Ritchie, North Carolina State University



Black twig cankers show up in early spring



Leaf infections from spring canker



Bacteria are moved from leaf to leaf and to fruit by water, and wind blown rain

Caution for in-season use of copper on peaches and nectarines

- Copper is toxic when the dissolved form penetrates into plant tissue.
- Avoid the use of spray additives such as spray oils, foliar nutrients, and surfactants such as organosilicants with penetrating characteristics when applying coppers.
- Solubility of fixed coppers increases under acidic conditions. Don't use acidifiers such as LI-700 and non-buffered phosphite fungicides with coppers.



Copper damage to peach leaves and fruit

Copper for bacterial spot control on peach

- Different copper bactericides provided the same level of control of peach bacterial spot when applied at the same metallic copper equivalent (MCE) per acre (Lalancette, Rutgers).
 - Comparisons were made with Kocide, Badge X2, Nordox, Cueva
- Small particle (micronized) copper adhere to foliage better than standard particle size formulations but there is no evidence yet that control is better.
- Liquid formulations of copper may be more convenient to use than dry formulations but there is no evidence yet that the liquid forms are safer to use at the same metallic copper rate per acre.

Pay attention to metallic content of copper compounds

Product	Copper form	Amount of active ingredient	Metallic copper equivalent	Unit type	Metallic copper per unit	OMRI listed ?
Badge SC	Copper oxychloride Copper hydroxide	16.81% 15.36%	20%	1 gal	2.27 lb	no
Champ 2F	Copper hydroxide	37.5%	24.4%	1 gal	3.00 lb	no
Nu-Cop 3L	Copper hydroxide	37.5%	24.40%	1 gal	3.03 lb	no
Copper-Count-N	Copper ammonium carbonate	31.4%	8%	1 gal	0.78 lb	no
Magna-Bon CS 2005	Copper sulfate pentahydrate	19.9%	5%	1 gal	0.42 lb	yes
Cueva Fungicide Concentrate***	Copper octanoate (copper salt of fatty acid)	10%	1.8%	1 gal	0.15 lb	yes
Cuproxat	Basic copper sulfate	27.1%	15.2%	1 gal	1.6 lb	no
Mastercop	Copper sulfate pentahydrate	21.5%	54%	1 gal	0.6 lb	no

Constriction canker (*Phomopsis amygdali*)



Impact of Constriction canker

- Reduced fruit production per tree
- Increased pruning labor to remove dead shoots



Constriction canker infects injured limbs

- Brown rot infection of limb
- Early winter damage to terminal ends of limbs





Figure 10. Tendrils of conidia held together by mucilage (cirri) exuding from pycnidia of *Phomopsis amygdali* on peach.

Phomopsis constriction canker spore production by time of year

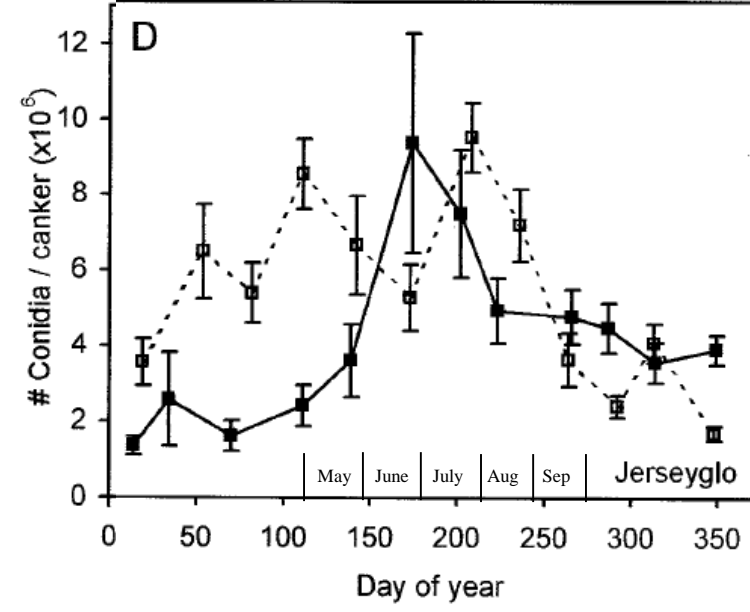
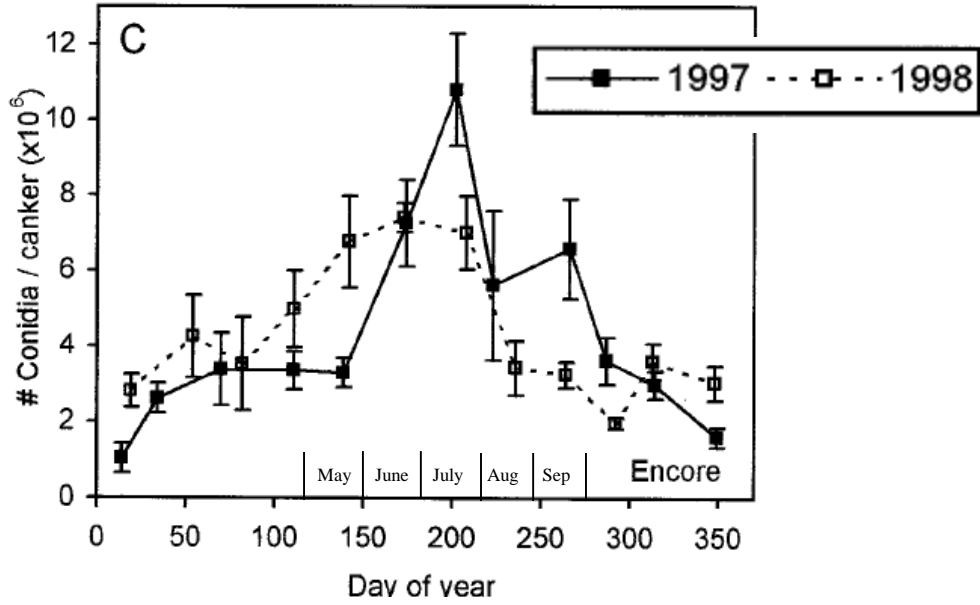


Figure 10. Tendrils of conidia held together by mucilage (cirri) exuding from pyrenidia of *Phomopsis amygdali* on peach.

Constriction canker



Management of Constriction Canker

- Prune out diseased and dead limbs to reduce inoculum source
- Consider fungicide application in fall during leaf drop to protect leaf scars. Most effective is chlorothalonil (Bravo, Echo) > captan > ferbam. Fungicides are not very effective without pruning (N. Lalancette).

Peach Leaf Curl (*Taphrina deformans*)



- Leaf loss weakens tree, can cause small, poor tasting, disfigured fruit
- Infection generally takes place in spring when buds start to swell. Symptoms usually take 9 to 24 days to show.
- Usually controlled by late fall or very early spring fungicide application.
- Effective material include chlorothalonil (Bravo or equivalent), Ziram, or copper.

Comparisons of liquid copper formulations

Product	Copper form	Amount of active ingredient	Metallic copper equivalent	Unit type	Metallic copper per unit	OMRI listed? *
Liquid formulations						
Badge SC	Copper oxychloride Copper hydroxide	16.81% 15.36%	20%	1 gal	2.27 lb	no
Champ 2F	Copper hydroxide	37.5%	24.4%	1 gal	3.00 lb	no
Nu-Cop 3L	Copper hydroxide	37.5%	24.4%	1 gal	3.03 lb	no
Copper-Count-N	Copper ammonium carbonate	31.4%	8%	1 gal	0.784 lb	no
Magna-Bon CS 2005	Copper sulfate pentahydrate	19.9%	5%	1 gal	0.418 lb	yes
Cueva Fungicide Concentrate***	Copper octanoate (copper salt of fatty acid)	10%	1.8%	1 gal	0.15 lb	yes
Cuproxat	Basic copper sulfate	27.1%	15.2%	1 gal	1.6 lb	no
Mastercop	Copper sulfate pentahydrate	21.5%	5.4%	1 gal	0.6 lb	no

Peach bud swell estimated to start approximately
100 degree days base 42F after January 1 (with normal chill
hour accumulation)

Sprays for peach leaf curl need to be applied before buds start to swell. Onset of swelling differs from year to year.


Year	Date reach 100 DD42
2010	3/30
2011	4/18
2012	3/12
2013	4/14
2014	4/12
2015	4/7
2016	3/11
2017	2/21
2018	4/11



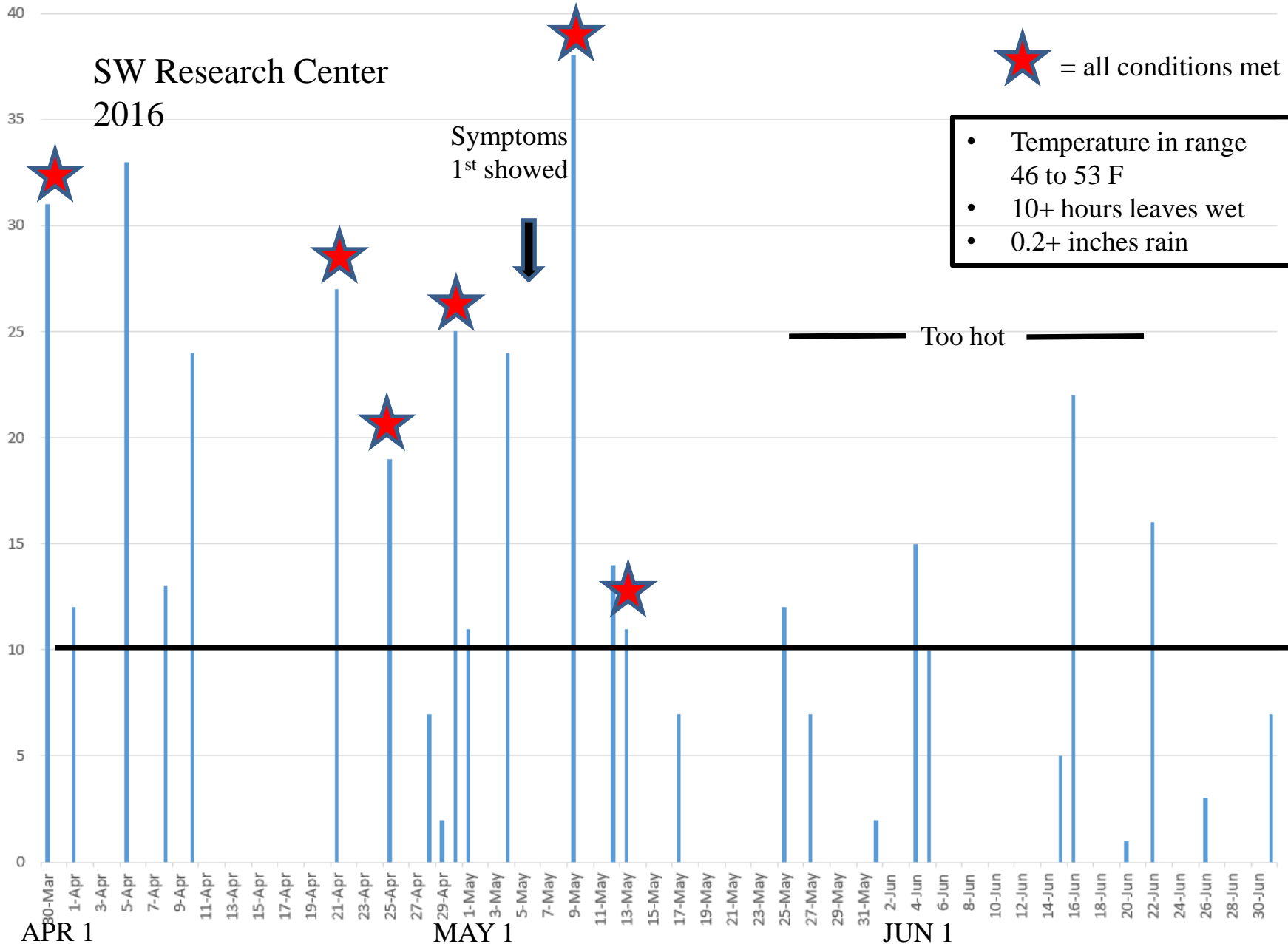
Conditions for Peach leaf curl infection

Too cold

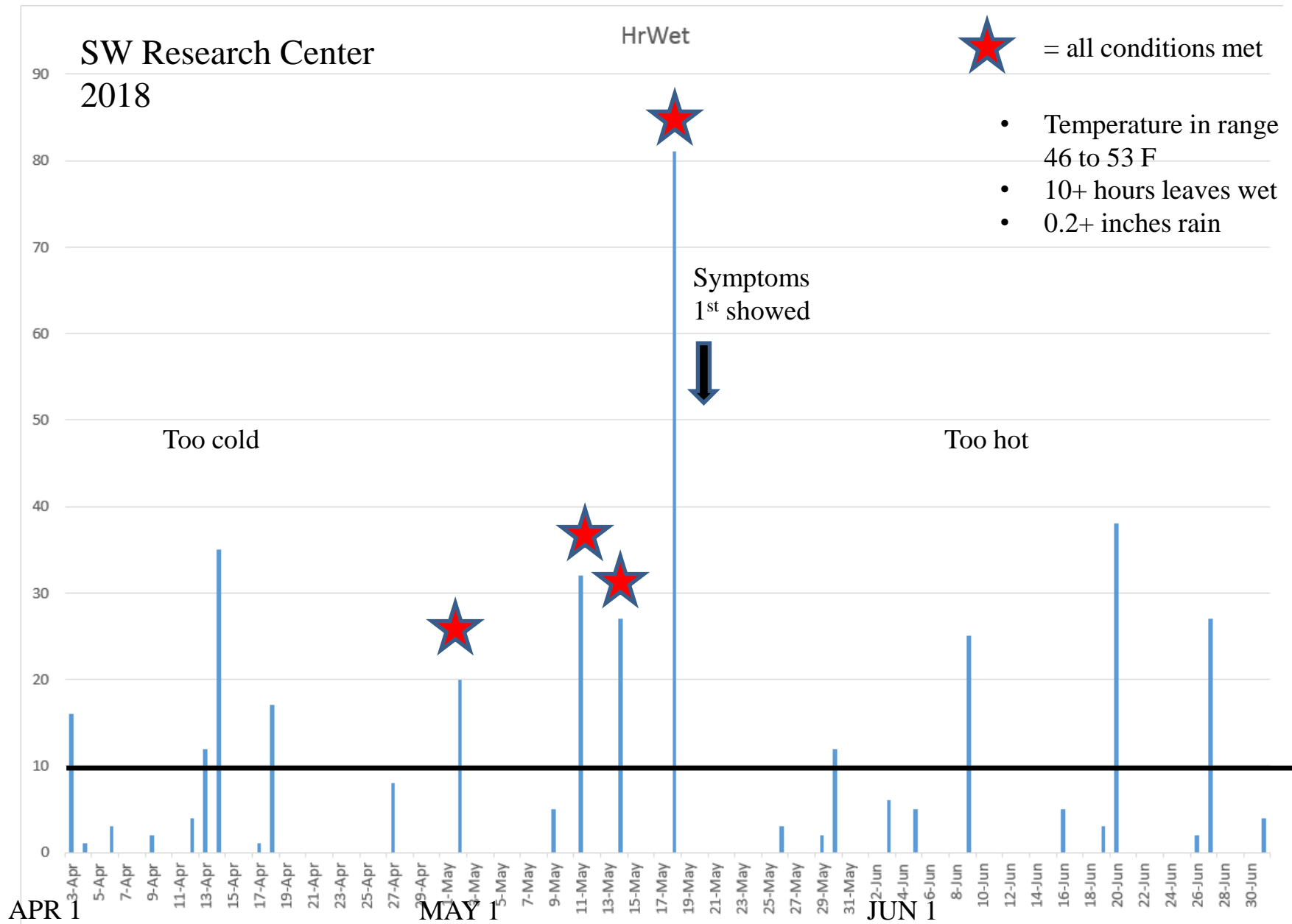
SW Research Center
2016

 = all conditions met

- Temperature in range 46 to 53 F
- 10+ hours leaves wet
- 0.2+ inches rain



Conditions for Peach leaf curl infection





- Later infections tend to be on middle of leaf or leaf tips
- Spray treatment past bud swell is not necessarily too late – it depends on if an infection has already taken place



Bill Shane
SW Mich Research & Extension Center
Benton Harbor, Michigan 49022
269-208-1652 cell
email: shane@msu.edu