What we have learned about peach variety hardiness

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Typical times for cold damage to peaches

Rapid temperature drop in late fall

Low temperature below -8 F in mid winter

Drop below 28 F in spring

Summary of SW Michigan spring freeze events since 2002

Spring

April 22, 2002 13 to 28 F ← peaches in bloom
May 19, 2002 frost damage
May 2004 freeze
May 4, 2005 freeze
April 26, 2006 freeze
April 30, 2008 22 to 30 F damage in low areas
April 19, 2010 damage in low areas away from Lake Michigan
April 27 & 29, 2012 26 to 29, apple crop about 1/10 normal
March 2017 damage to apricot and peach inland

Summary of fall low temperature events

Early Fall

Oct 10, 1906 10 F ← massive tree loss

Later Fall

Nov 24, 1950 -15 F ← significant tree loss

Dec 2013 quick drop to teens

Dec 2014 quick drop to teens

Terminal dieback

Summary of SW Michigan mid winter lows

SWMREC peach variety trial - 2019

	Lows
Jan 25, 1961	-17 F
Jan 15, 1972	-17 to -20 F
Jan 16 & 19, 1994	-17 to -22 F
Feb 3, 1996	-13 to -17 F
Jan 5, 1999	-16 F
Jan 2005	Rapid drop
Feb 4-7, 2007	-4 to -14 F
Jan 2014	-13 to -18 F
Jan 2015	-9 to -23 F
Jan 21&31, 2019	-9 to -22 F

Fruit bud death & perhaps tree decline

Peach 1 year old wood after January 2019 low temperatures

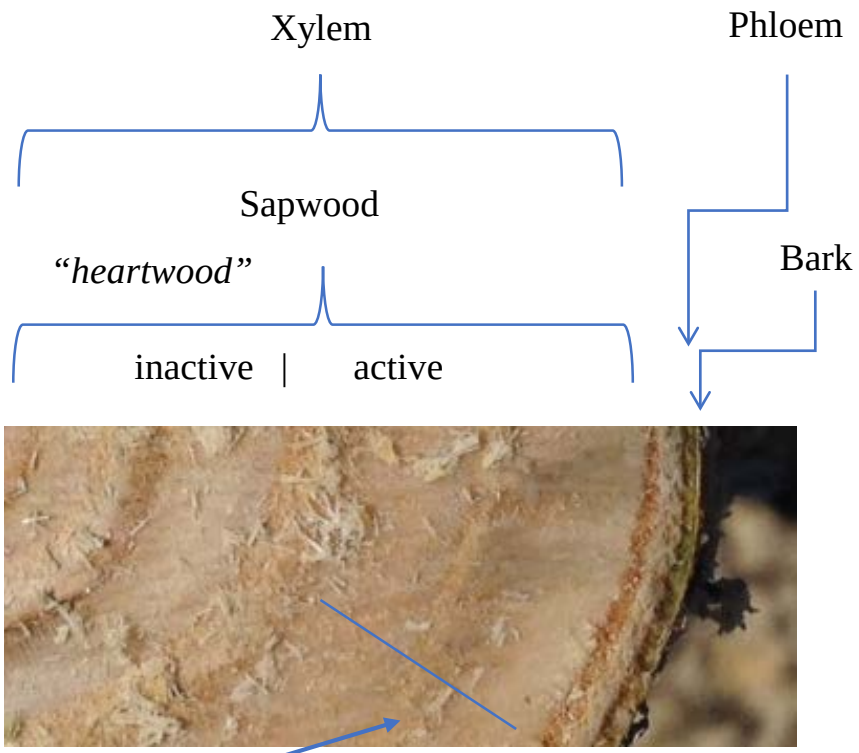
Bainbridge area

Central Berrien County

Southeast Berrien County

Two Sites of Cold Damage in Trunk

In general, severe damage to cambium causes rapid tree decline. Severe damage to xylem sets the tree up to longer term decline as wood rotting fungi move in.



Damage to active sapwood

Cambium

Peaches southwest Michigan in fall
following January 2019 low temperatures

5th leaf peach tree trunk splitting and death following January 2019 freeze

Cultivar	Trunk split (%)	Dead (%)	Total (%)
PF Lucky 13	0.0	0.0	0.0
Fantasia	0.0	0.0	0.0
Allstar	15.0	0.0	15.0
Contender	13.6	4.5	18.1
Redhaven	20.0	0.0	20.0
Early Redhaven	20.0	0.0	20.0
PF9A-007	22.2	0.0	22.2
Glowingstar	23.5	5.9	29.4
Starfire	30.0	0.0	30.0
Desiree	35.0	0.0	35.5
PF11 Nectarine	40.0	0.0	40.0
Cresthaven	45.0	5.0	50.0
Autumnstar	18.7	43.7	62.4
John Boy	60.0	20.0	80.0
PF5D Big	30.0	50.0	80.0

PF11 Nectarine

Desiree

C. Tidey farm, planted 2015, rated November 2019, 17 to 20 trees per variety, estimated -18 to -20 F, low temperature

Field observations on fruit bud survival following the 2019 polar vortex

SWMREC observations

Most varieties had no fruit bud survival. Harrow Diamond was the best at SWMREC with 16% fruit bud survival.

Other varieties with some fruit bud survival included Saturn, TangOs, Madison, BuenOs II, Virgil, Brightstar, Contender, Scarlet Rose, Veeblush, and HW 272 (Canadian experimental selection).

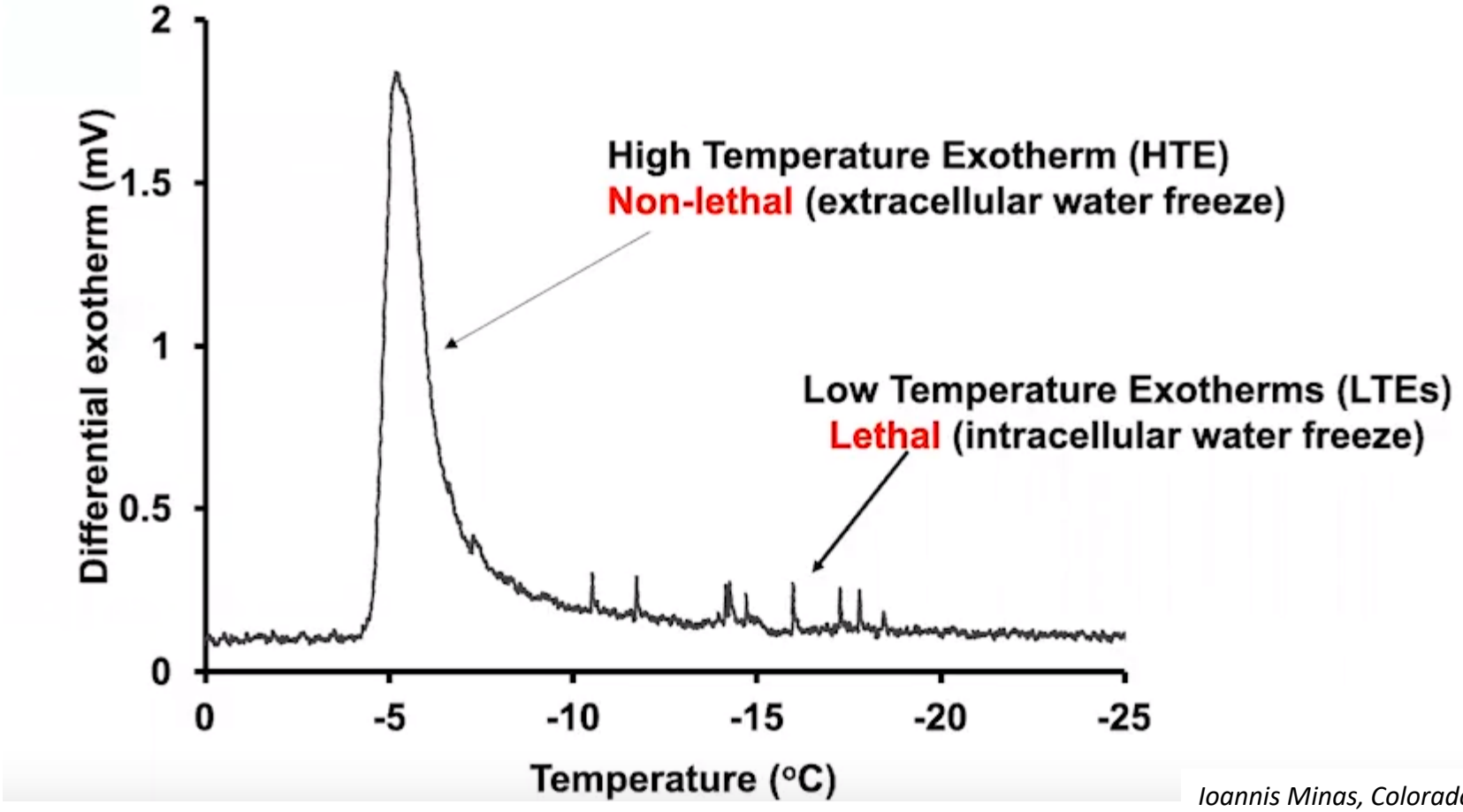
Observations offstation

Varieties that showed better than average fruit bud survival offstation included Sweetstar, Desiree, Gloria, Earlystar, and PF15A. Of these, Sweetstar was the most impressive. Summer Serenade produced fruit in 2019 but these were generally nubbins.

Measuring peach fruit bud hardiness

Conversion

C	F
-10	14
-15	5
-20	-4
-25	-13



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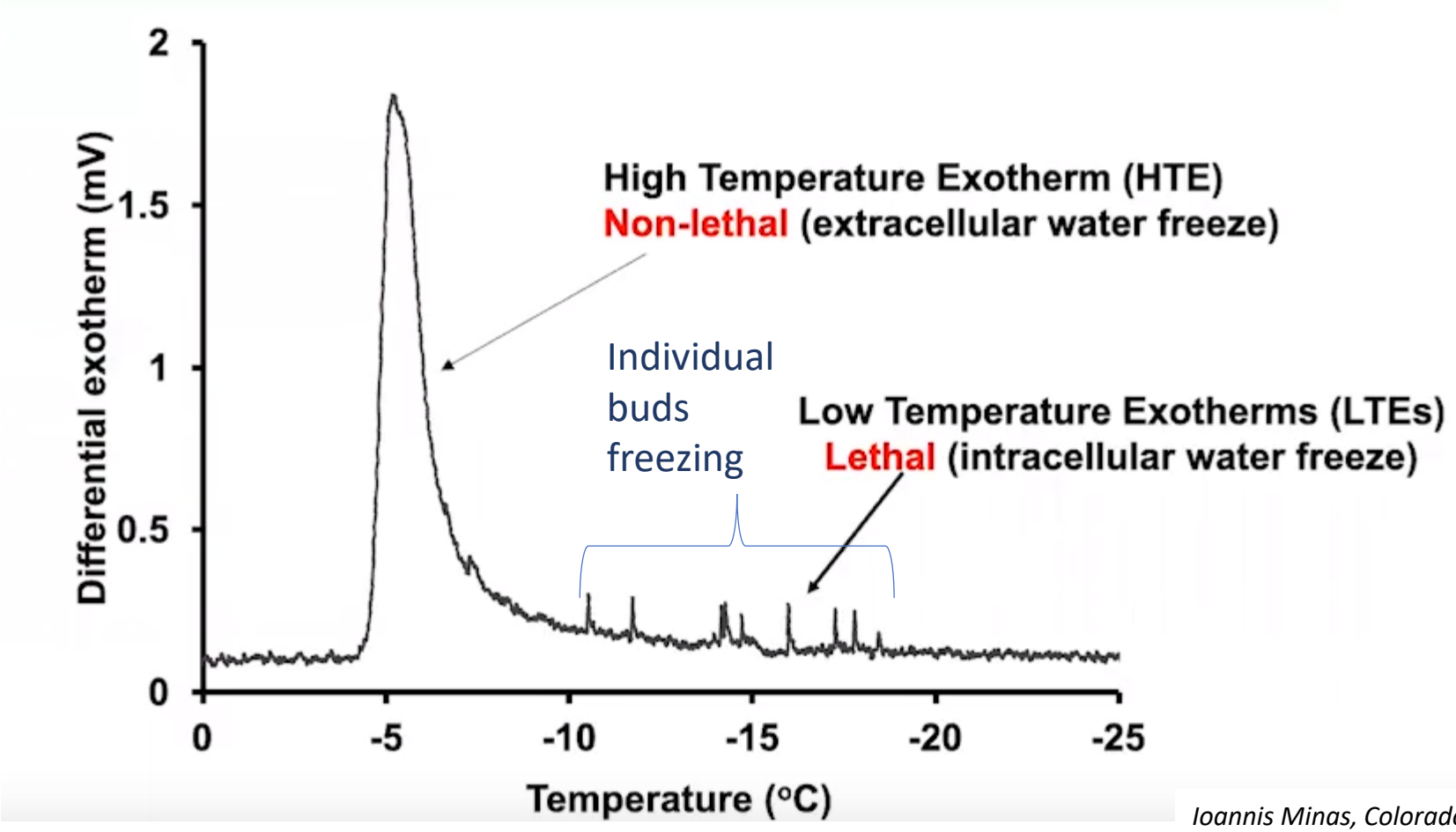

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Differential thermal analysis for bud hardiness assessment

Data visualization and storage

Data acquisition

Programmable freezer

Temperature change sensing plates

Equipment purchase supported by Specialty Block Grant, Michigan Tree Fruit Agreement & AgBio Research

Differential thermal analysis for bud hardiness assessment

Fruit Type	Critical Temp (F) for flower injury
Apple	-30
Apricot, Pear, Concords	-25
Blueberries	-25
Tart Cherry	-20
Raspberry	-17
Thorny Blackberry	-15
Plum, Sweet Cherry	-15
Peach & Nectarines	-13
European Grapes	-8 to -15

Typical Mid Winter Fruit Bud Hardiness

Peach fruit bud hardiness

Conversion

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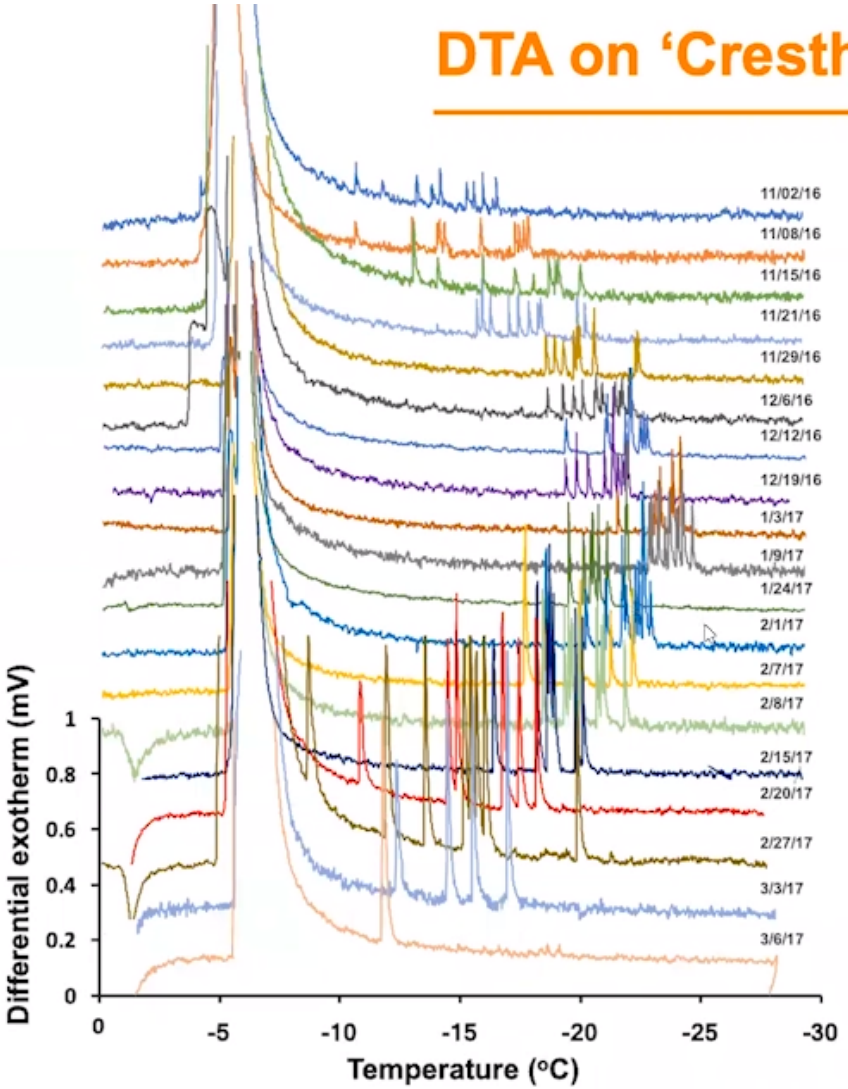
DTA on 'Cresthaven' floral buds



Acclimation: the gradual increase of cold hardiness **(Fall – Dec 6th, 2016)**

Maximum Hardiness **(Dec 12th - Feb 1st, 2017)**

Deacclimation: the decrease of cold hardiness towards bud break **(Feb 7nd - March 6rd, 2017)**

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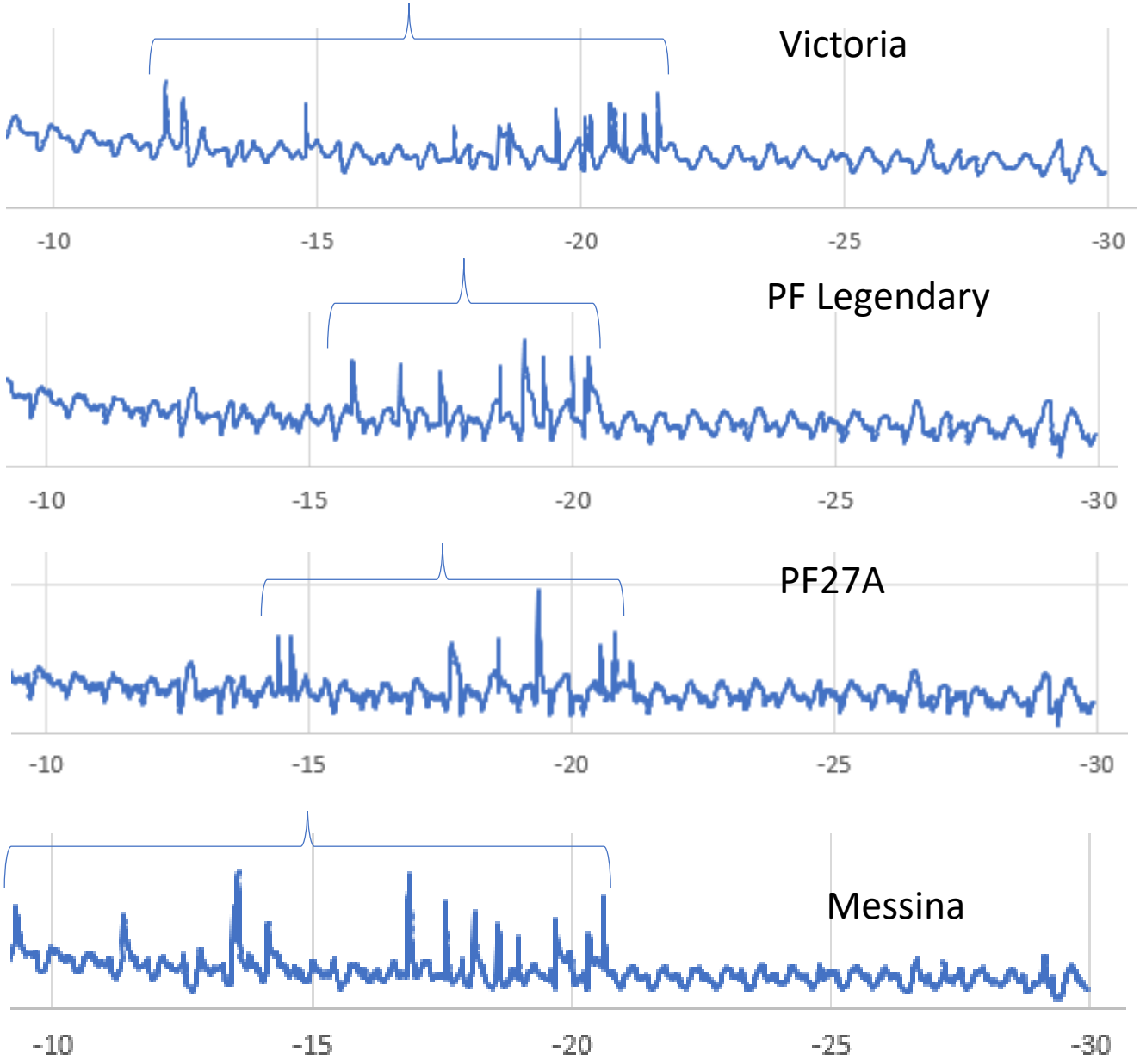
Differential Thermal Analysis Peach Varieties SWMREC



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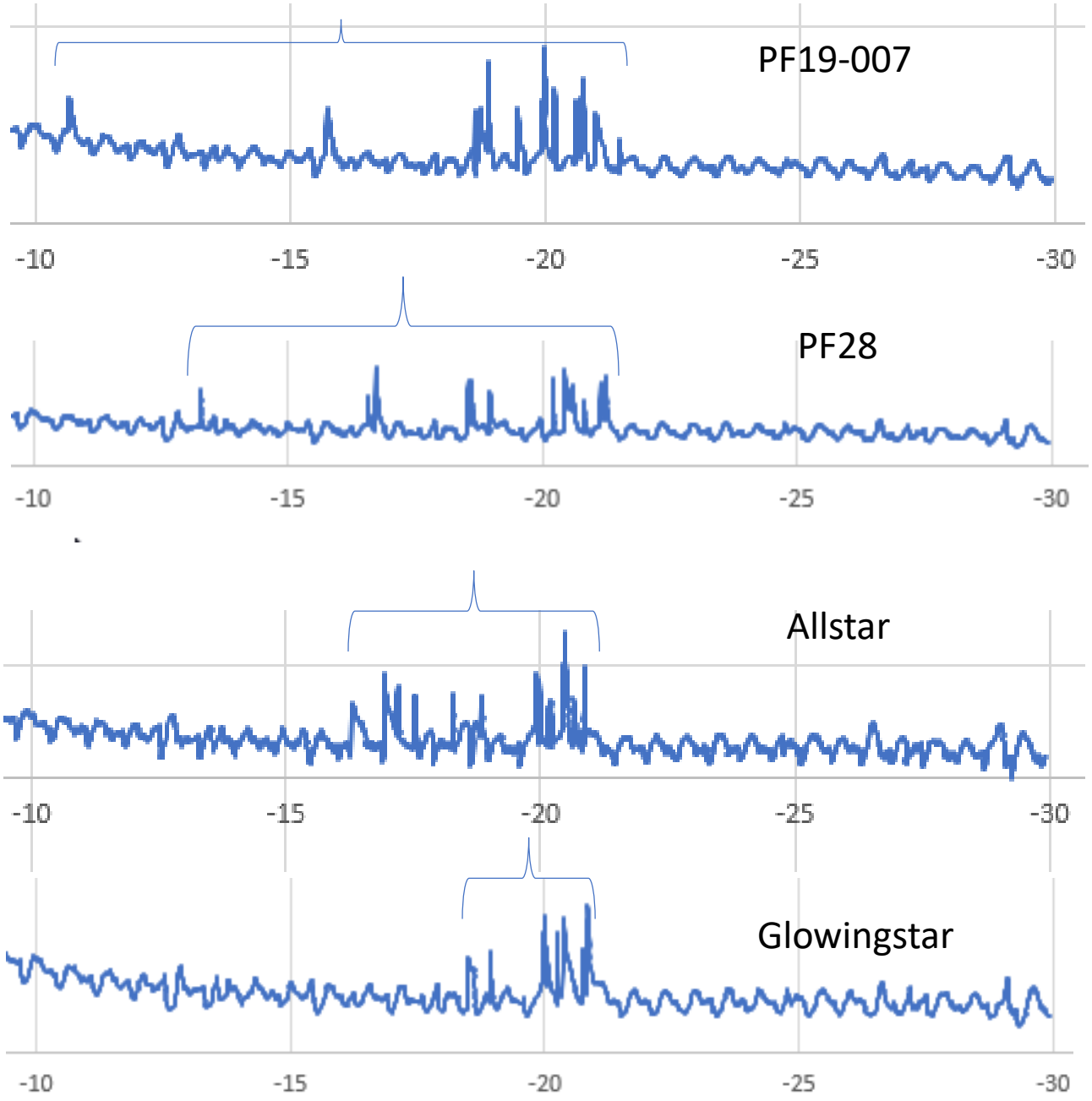
Assessed Feb 8, 2020



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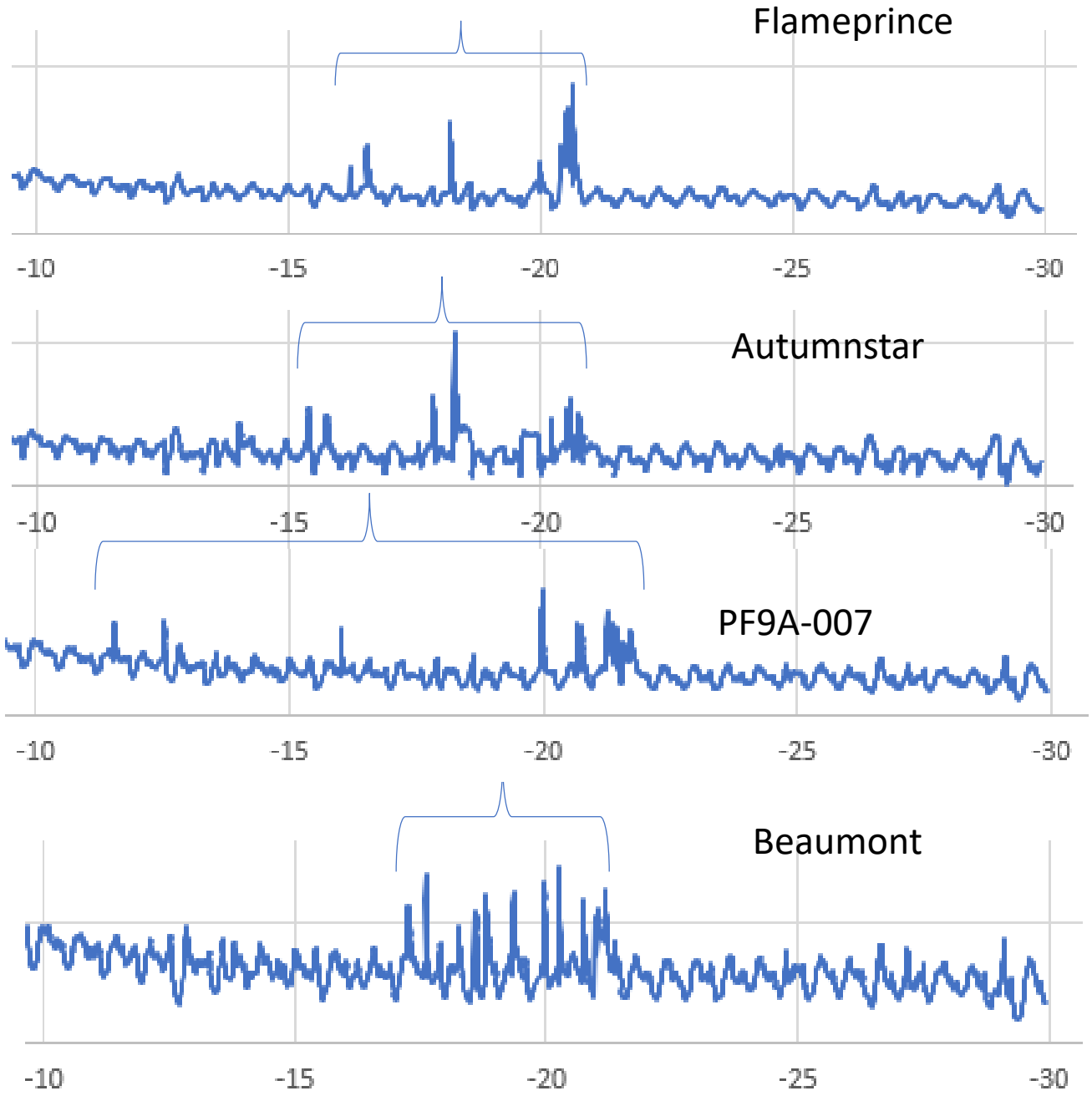

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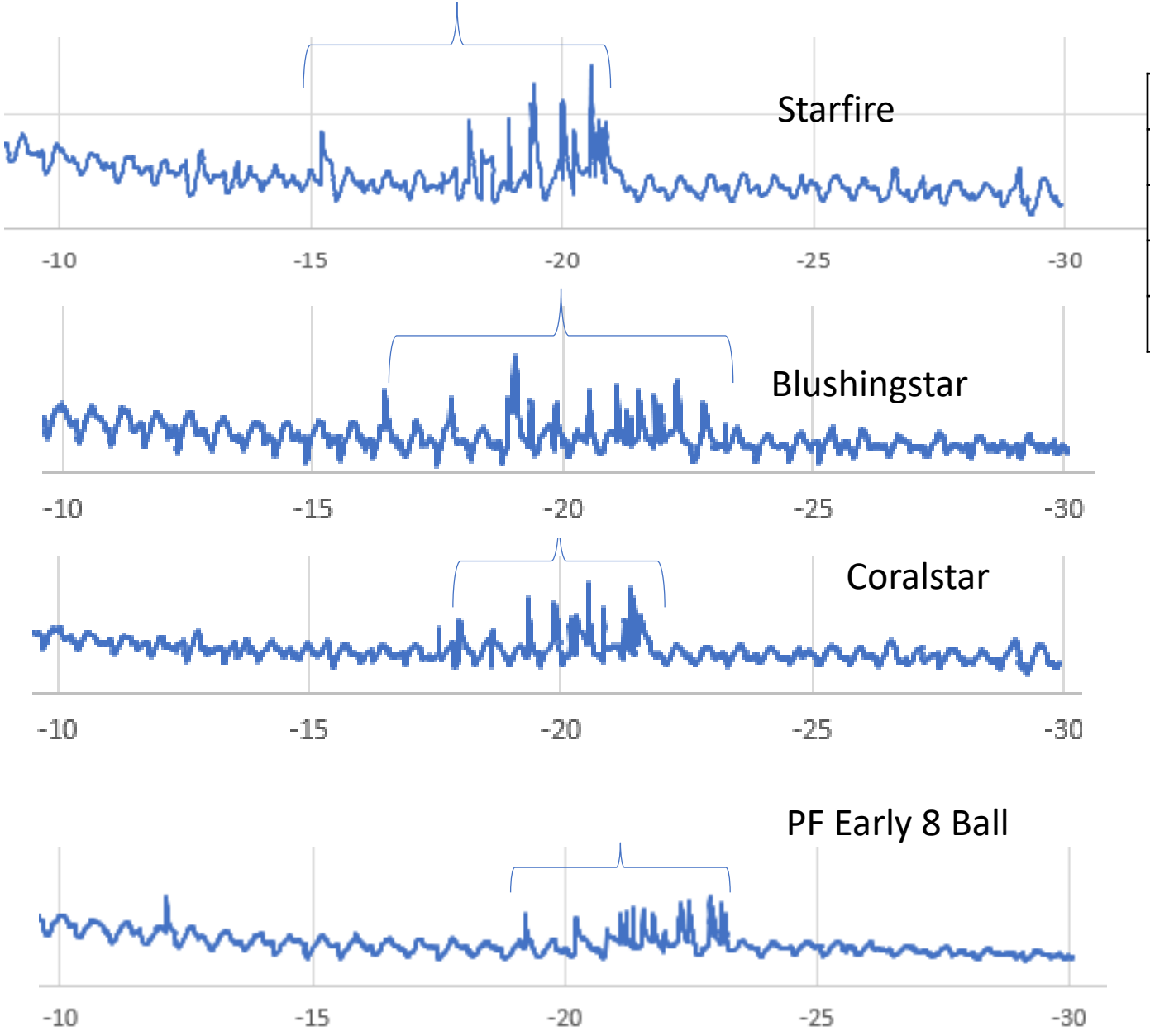

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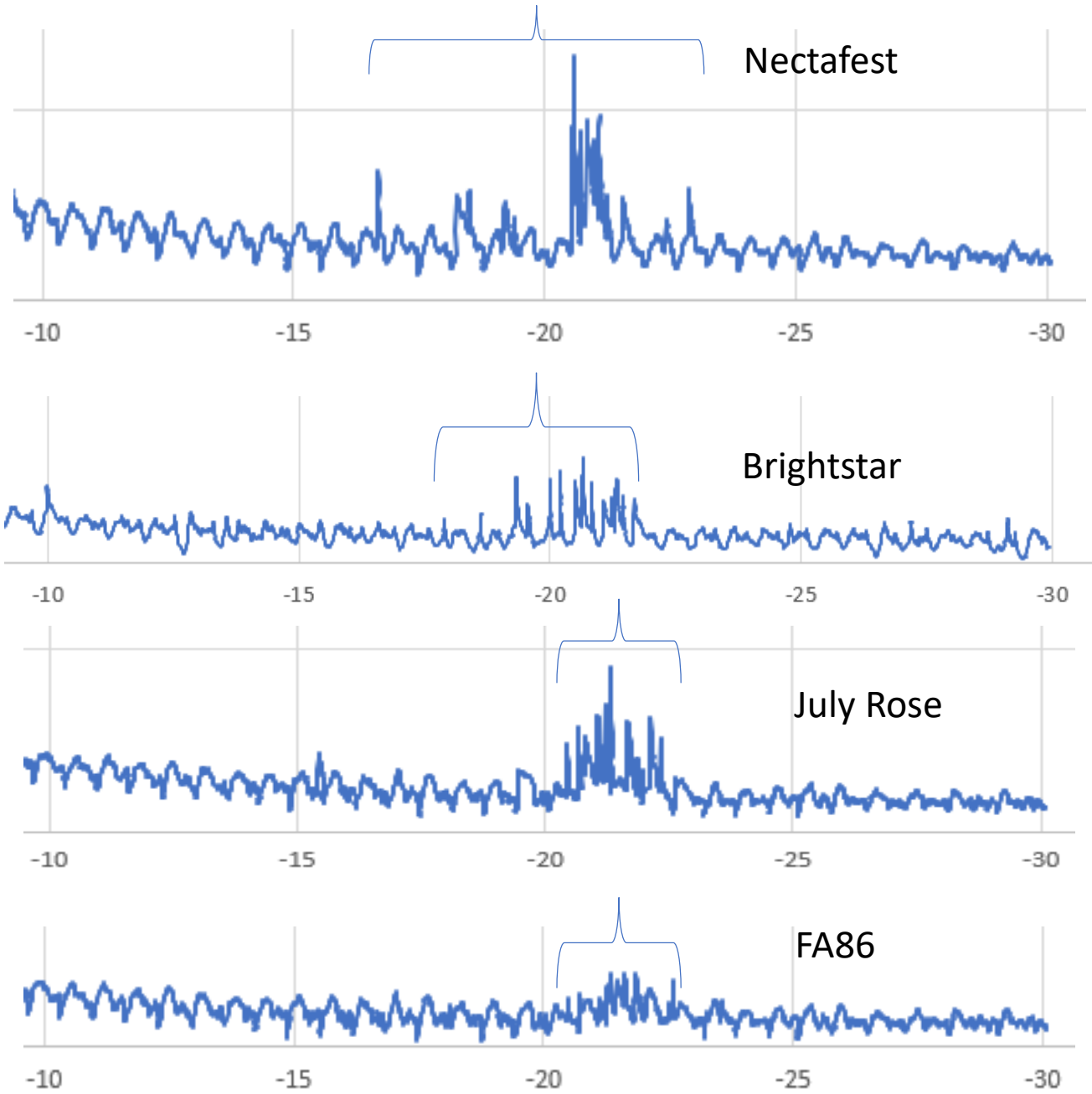

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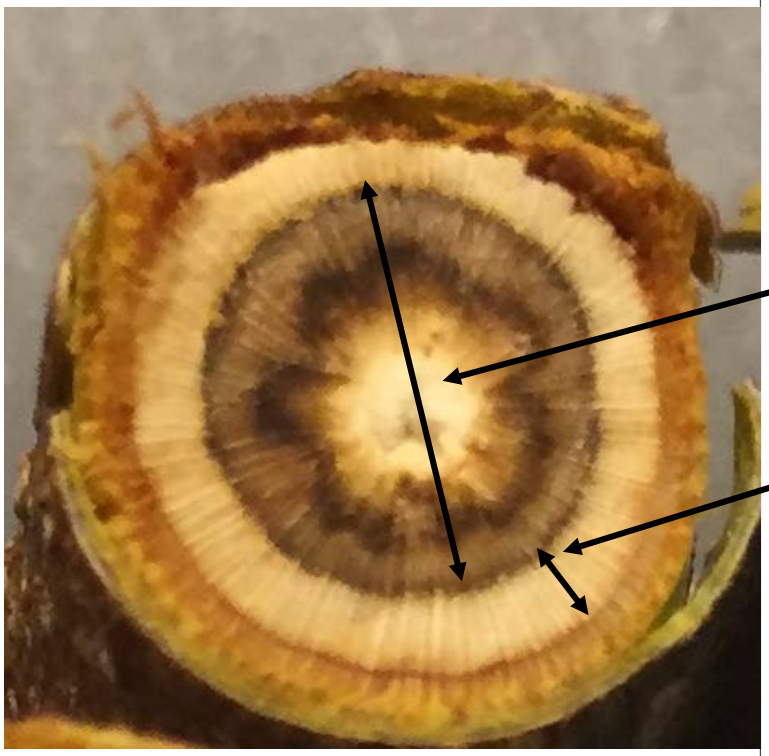
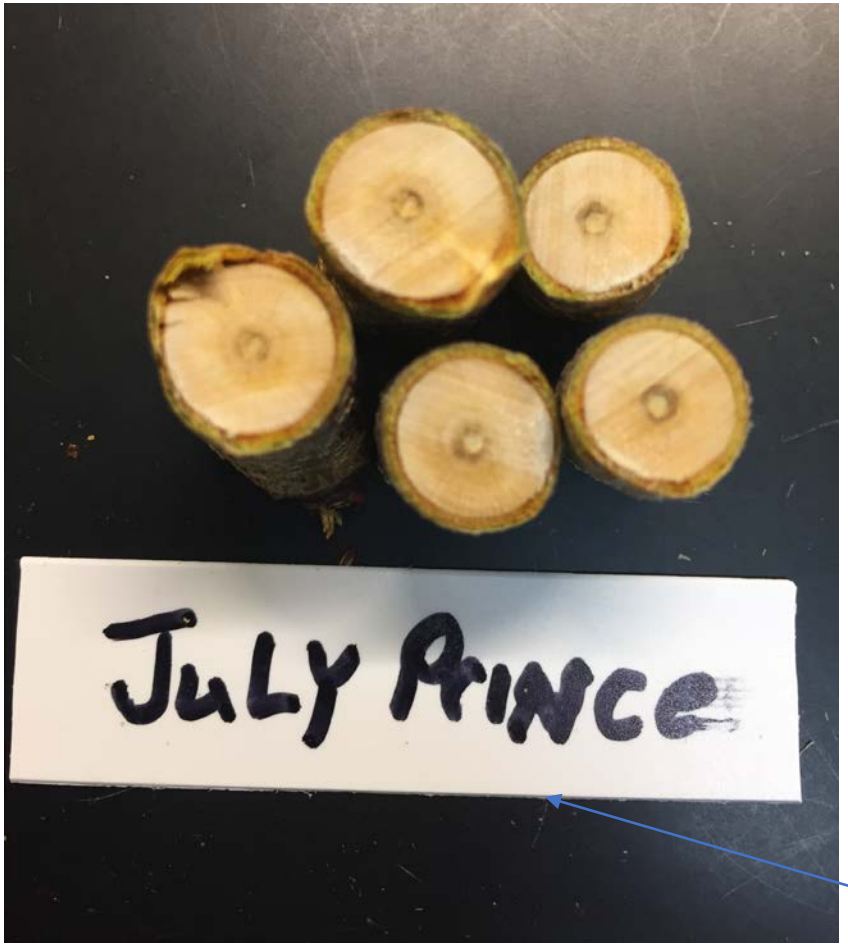
2 year old peach limb in cross section showing winter damage when it was 1 year old



Wood damaged in Jan 2019

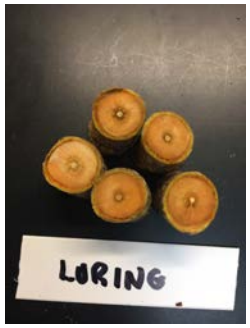
New growth in 2019


July Prince

Honeyblaze

Damage

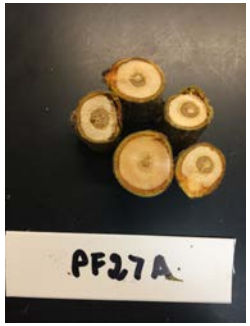
Relatively little

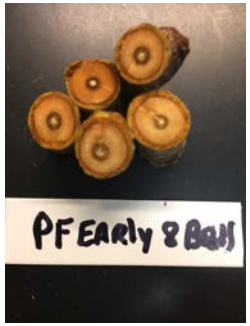


Some

Moderate

Significant





Summary: Internal damage to 1-year old wood by January 2019 freezes

Damage	Peach and Nectarine Varieties
Relatively little	July Prince, Risingstar, Redstar, Loring, PF11-Nectarine, Newhaven, Eden, Nectafest, Desiree, PF9A-007
Some	Avalon, PF11-Peach, PF2022, Veeblush, Silvergem, Contender, PF 8 Ball, PF25, Redhaven, Coralstar, Earlystar, Catherina, Gloria, Emeraude
Moderate	HW109, Harrow Diamond, HW110, Allstar, Carene, White Knight, Starfire, Blushingstar, Virtue, PF28, HW272, PF35-007, Beaumont, July Rose, Cresthaven, Glowingstar, Brightstar, Sweet Breeze, Virgil, Messina, Fantasia, Flavorburst, Victoria
Significant	Honeyblaze, PF27A, PF19-007, PF24C, Earlystar, PF23, PF2041, Canadian Harmony, PF Early 8 Ball, H4-44, D101-155, Rich May, Autumnstar, Ambre, Summerfest, Flameprince

Wood cut and assessed Feb 28, 2020, SW Research & Extension Center, Benton Harbor, MI

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