

Tending stone fruit trees damaged by cold

Bill Shane

Tree Fruit Extension Specialist

Michigan State University

SW Michigan Research and Extension Center

Benton Harbor, Michigan

Purpose of talk

- How to assess cold damage in peach, types of damage, short and long term implications.
- Chose management options (pruning and fertilizer) based on assessment of bud loss or wood injury.
- Help learn / reinforce strategies to reduce impact of future cold events



Pruning effects on peach trees (R. Marini)

- Summer pruning of peach trees in late summer delays leaf drop and development of winter hardiness. Flower buds on summer pruned trees tend to be less cold hardy than non-pruned trees in the early winter, but not in the mid-winter.
- Peach trees more prone to cold injury for a few days following pruning.
- In some years pruned trees begin to bloom and leaf out a little earlier than trees that are not yet pruned.

Three site / levels of cold damage to peach tree



Flower buds - Bud cross section shows brown tissue of dead fruit buds with healthy leaf bud in middle positions

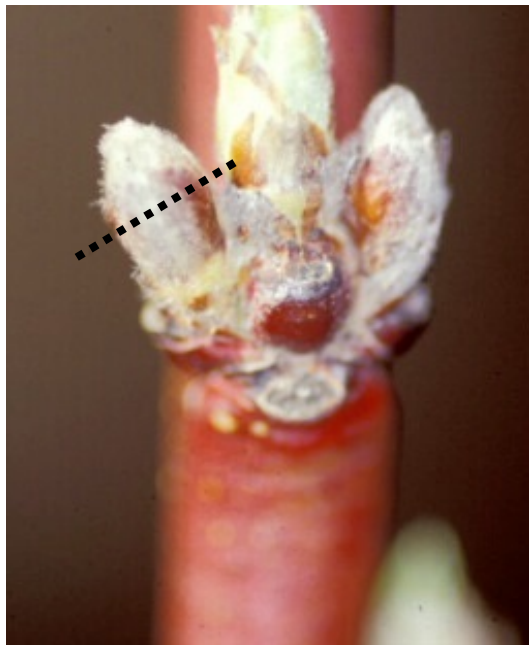


Twig damage – Brown cambial layer under bark

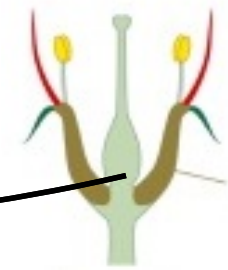
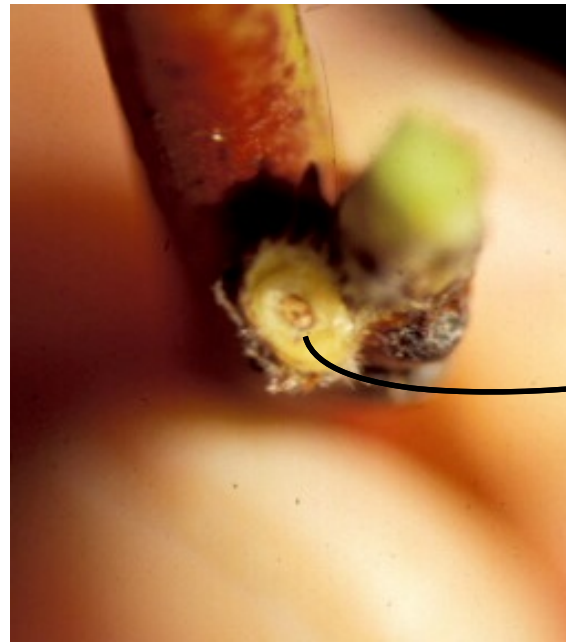


Trunk damage - Brown cambial layer under bark

Level 1: Freeze damage to peach fruit buds



Cross-section cut on left fruit bud to see if it is damaged



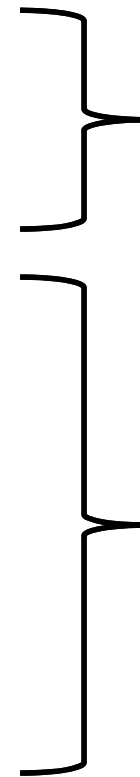
Brown pistil in peach fruit bud

Relative fruit bud winter hardiness rating for peach and nectarine varieties following 2013/2014 winter, SW Michigan Research and Extension Center.

Fruit bud hardiness rating	Peach	Nectarine	PeenTo
Low (poor bud survival)	Crimson Rocket, Flavrburst, PF11 Peach, PF7A-Freestone, Sweet Breeze	Ambre, Emeraude*, Honey Blaze	Tangos I (NJF16), BuenOs I (NJF18)
Intermediate	Autumnstar, Beaumont, Canadian Harmony, Coralstar, Cresthaven, Desiree, Early Redhaven, Glenglo, Gloria, Harrow Diamond, Halehaven, Loring, Messina, PF24C-Cold Hardy, PF35-007, Redstar, Risingstar, PF19-007, Vinegold#	Easternglo, Fantasia Zephyr	Galaxy, Tangos II (NJF17)*
High (good fruit bud survival)	Allstar, Blushingstar*, Brightstar, Catherina#, Contender, Earlystar, Ernies Choice, Flameprince, Glowingstar, Madison, McKay, PF Early 8 Ball, PF-25, Redhaven, PF9A-007, PF8 Ball, PF23, PF27A, PF28-007, Richhaven, Starfire, Veteran, Victoria, Virgil#		Saturn*

* = white flesh, # = non-melting flesh canning type. Limb tip dieback ratings made June 17, 2014.

Twig and branch hardiness



Exposed to
@ -15 F

Exposed to
@ -13 F

Peach cambium browning



Exposed to
@ -15 F



Exposed to
@ -13 F

Peach branch terminal dieback



Bud injury is not a good indicator of wood injury or vice-versa.

Constriction canker (Phomopsis) fungal disease sometimes worse following stressful winter on some varieties



Lower right picture: Rutgers, rest from Michigan

Constriction canker (Phomopsis) fungal disease sometimes worse following stressful winter on some varieties



Varieties thought to be more susceptible to constriction canker include Contender, Cresthaven, Empress, Springcrest, Redhaven, Red Globe, Baby Gold series, Encore, Biscoe, Jerseyglo, Autumnnglo (N. Lalancette, Rutgers)

Management: Pruning to remove affected wood may be sufficient. If severe, post harvest chlorothanil application may help to suppress disease

Branch tip dieback following 2013/2014 winter, SW Michigan Research and Extension Center.



BuenOs (NJF18) peen tao peach



Ambre nectarine

Branch tip dieback and tree decline rating for peach and nectarine varieties following 2013/2014 winter, SW Michigan Research and Extension Center.

Limb dieback rating	Peach	Nectarine	PeenTo
Severe, tree dead or dying			BuenOs I (NJF18)
Tree will live, significant pruning required	Flavrburst, Crimson Rocket, Vinegold,		TangOs I (NJF16), Tangos II (NJF17)*, BuenOs II (NJF15)
Moderate pruning needed	Halehaven, Glowingsstar, Gloria, Glenglo, Desiree, Ernies Choices, PF11 Peach		
Modest dead wood pruning needed	Honey Blaze, Sweet Breeze, PF-7A Freestone		
Few limb tips with dieback, damage relatively inconspicuous	Redhaven, PF Early 8 Ball, PF-23, PF-9A-007, Newhaven, Messina, Beaumont, PF-27A, Blushingstar*, Flameprince, PF-25, Catherina, Autumn Star, Victoria, Virgil, Redstar, Cresthaven, PF-28-007, Summerfest, Risingstar, PF-24C Cold Hardy	Easternglo, Emeraude*, Zephyr*, Ambre,	
No damage	Brightstar, Coralstar, Allstar, Canadian Harmony, Early Redhaven, Glohaven, Madison, McKay, Contender, Harrow Diamond, PF-19-007, Earlystar, PF35-007, PF5D Big, Loring, Starfire, Veteran	Fantasia, PF11 Nectarine, Silver Gem*	Saturn*



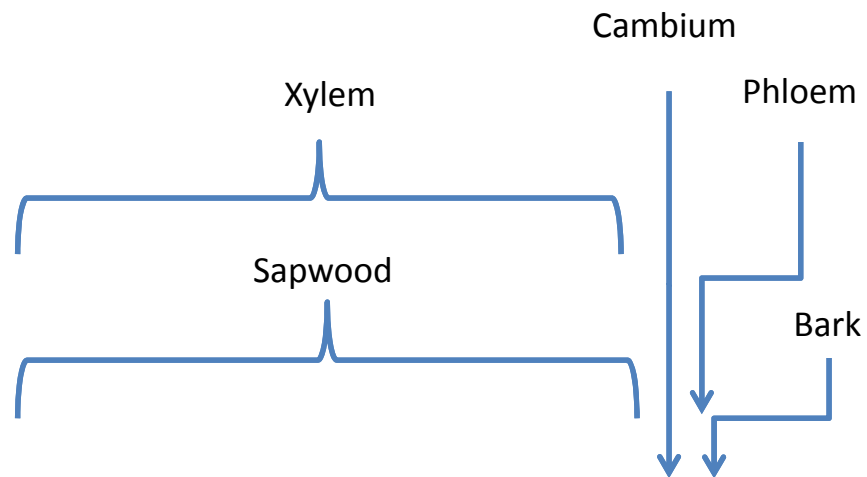
BuenOs



Ambre

* = white flesh, # = non-melting flesh canning type. Limb tip dieback ratings made June 17, 2014.

Peach peach trunk cross-section



Sapwood – water conduction, active disease defense,

Two types of midwinter damage: sapwood and cambium damage



Young xylem (sapwood) discoloration



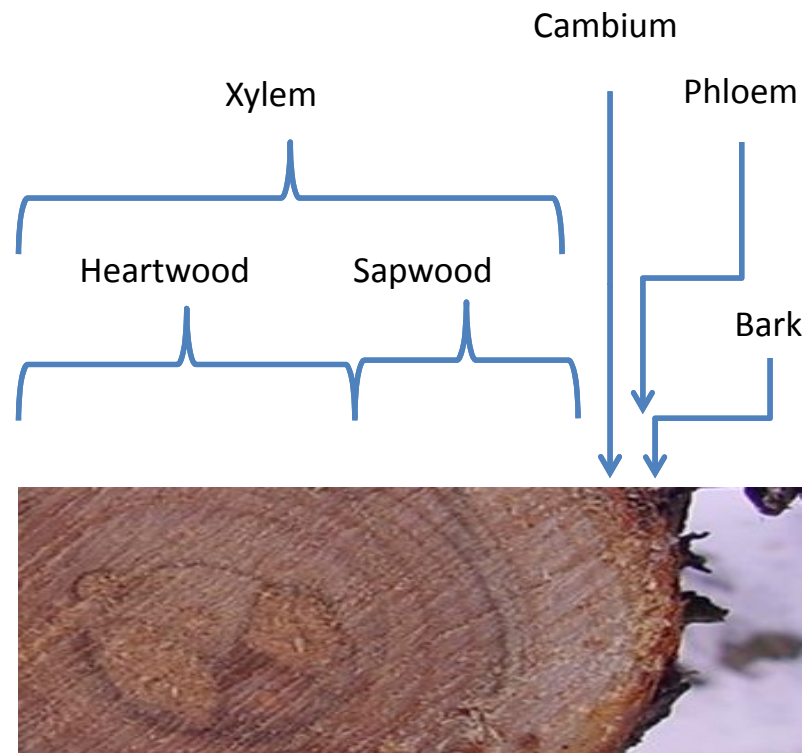
Broad zone of damaged xylem



Narrower zone of damaged xylem



Older peach trunk cross-section



Sapwood – outer rings of xylem, water conduction, active disease defense, protection of inner heartwood center.

Heartwood – 4+ years in age, support, little water movement, no disease suppression

Peach peach trunk cross-section



Undamaged



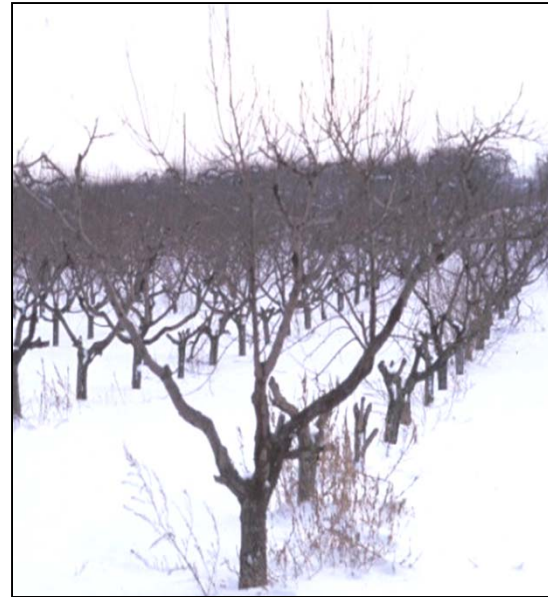
Damaged but generally healed

Peach trunk cross-section



Heartwood
poorly protected
by sapwood
layer

Peach tree decline due to Leucostoma (Cytospora) canker



Loss of scaffolds due to Leucostoma canker



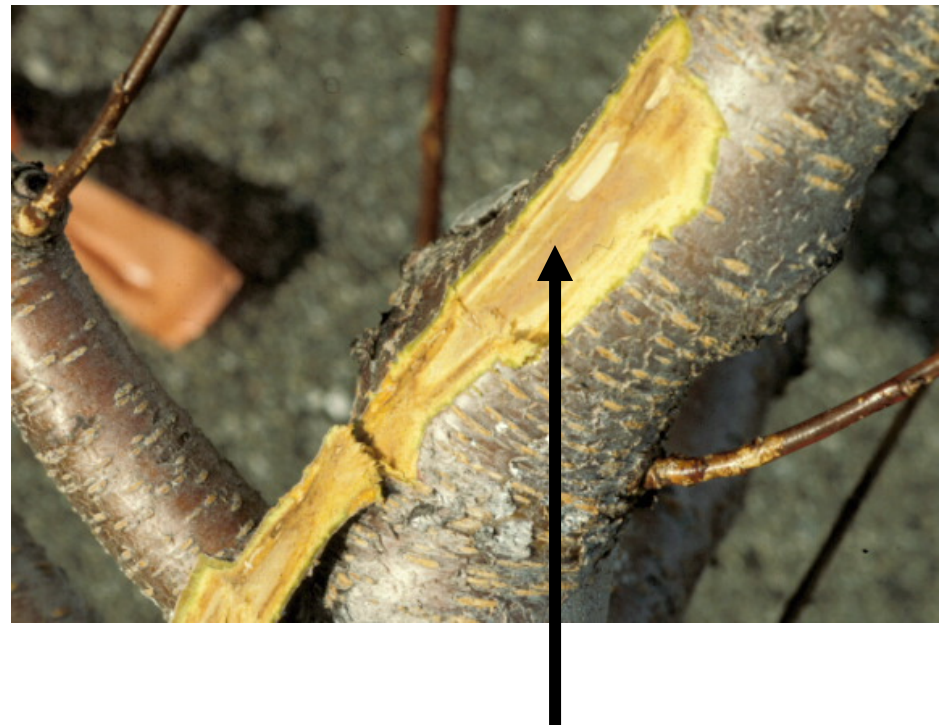
Deterioration of inner wood layers



Wood rotting fungi are usually indication that heartwood is infected



Level 3: Freeze damage to peach trunk & scaffold cambium



Brown cambium following -19 F low temperatures in 1994



Prognosis: not good.

Root suckers is usually sign that phloem and xylem of trunk are functioning poorly. Dead trunk tissue usually does not extend beneath the soil line, thus leaving the primary root system alive. As a result, root suckers are usually produced at the base of the tree during summer

Rapid temperature drop in mid winter associated with later trunk splitting



Prognosis: not good.



Prognosis: not good.

Day	Date	Min	Max
Sat	1/1	27.2	35.9
Sun	1/2	33.5	54.6
Mon	1/3	32.5	35.1
Tue	1/4	30.5	36.9
Wed	1/5	20.3	30.8
Thu	1/6	20.2	29
Fri	1/7	17.1	26.6
Sat	1/8	25.1	31.1
Sun	1/9	26.7	34.7
Mon	1/10	30	34.7
Tue	1/11	30.4	34.7
Wed	1/12	33.5	62.2
Thu	1/13	25.2	51.1
Fri	1/14	13	25.5
Sat	1/15	12.6	18.9
Sun	1/16	10.9	17.6
Mon	1/17	2.2	13.7
Tue	1/18	-2.2	17
Wed	1/19	16.8	33.2
Thu	1/20	15.5	33.2

Tree paint

White latex paint reduce damage due to rapid temperature fluctuations in trunks due to sunlight in mid winter.

White latex paint provides some protection against damage by contact herbicides like gramoxone



What to do following a harsh winter?

- Prune at bud swell to pink (normal time).
- Delay pruning a few days if temperature is predicted to drop down close to damaging temperature.
- Prune with normal intensity, strong pruning not advised while trees are recovering from cold damage.
- Dead scaffolds and large limbs can be pruned off any time.



What to do following a harsh winter?

Consider nitrogen program closely...split applications in order to tailor the program according to rainfall and crop situation. Be careful to not starve the tree.

Monitor growth of tree: If average annual growth is less than 1.5 feet then tree is prone to canker and winter damage. If growth is greater than approximately 2.5 feet then tree is prone to fall cold damage



Planning in advance

- Use tree training strategies that help to develop good cambium and vascular system and avoids large cuts on trunk and lower scaffold regions.
- Use white latex paint on the trunk to reduce damage due to rapid temperature fluctuations in trunks due to sunlight in mid winter.
- Keep good air drainage on the downhill side of the orchard
- Have an orchard replanting strategy so that there is a balance of young, medium-aged, and older orchard blocks.

Questions?

Bill Shane, SW Mich Res & Ext
Center, Benter Harbor, Michigan
49022, 269-208-1652 cell,
email: shane@msu.edu

