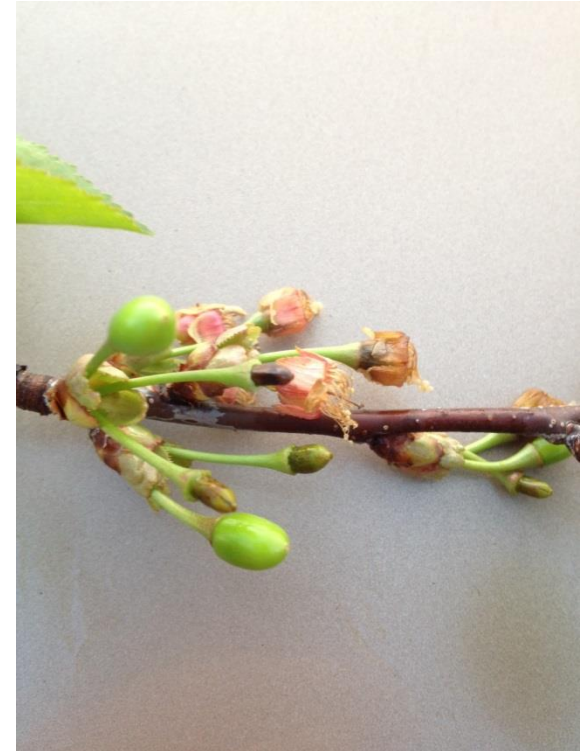


Managing Cold Damaged Fruit Trees

Bill Shane
Tree Fruit Extension Specialist
Michigan State University
SW Michigan Research and Extension Center
Benton Harbor, Michigan



Talk outline

- Anticipation and assessment of damage
- Tree structure and cold damage
- Effect of cold and tree reserves
- Pruning practices affects cold damage
- What to do in 2014?



Anticipation of damage

Low temperatures for the winter of 2014
1-1-14 to 3-5-14

Weather station	Number of times below -13° F	Coldest temperature °F (date)
Commerce Township	6	-17.0 (2/28)
Emmett	7	-18.0 (2/28)
Flint	3	-14.5 (1/7)
Freeland	5	-18.3 (3/3)
Lapeer	15	-22.5 (1/9)
Petersburg	8	-22.3 (2/12)
Pigeon	4	-17.2 (2/17)
Romeo	3	-16.1 (2/28)

Bill's table of mid winter temperatures and effects on peaches

-11 F start of fruit bud damage

-13 F 50% fruit buds damaged

-15 F 80% fruit buds damaged, some cambium discoloration

-17 F most fruit buds damaged, some significant cambium discoloration

-19 F no fruit buds left, some tree mortality expected

Mid-winter hardiness levels of flower buds

Fruit type	Critical temp. (F) for flower injury
Apple	-30
Apricot, Pear, ConCORDS	-25
Blueberries	-25
Tart Cherry	-20
Raspberry	-17
Blackberry	-15
Plum, Sweet Cherry	-15
Peach and Nectarine	-13
European Grapes	-8 to -15



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



Peach twigs



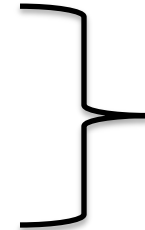
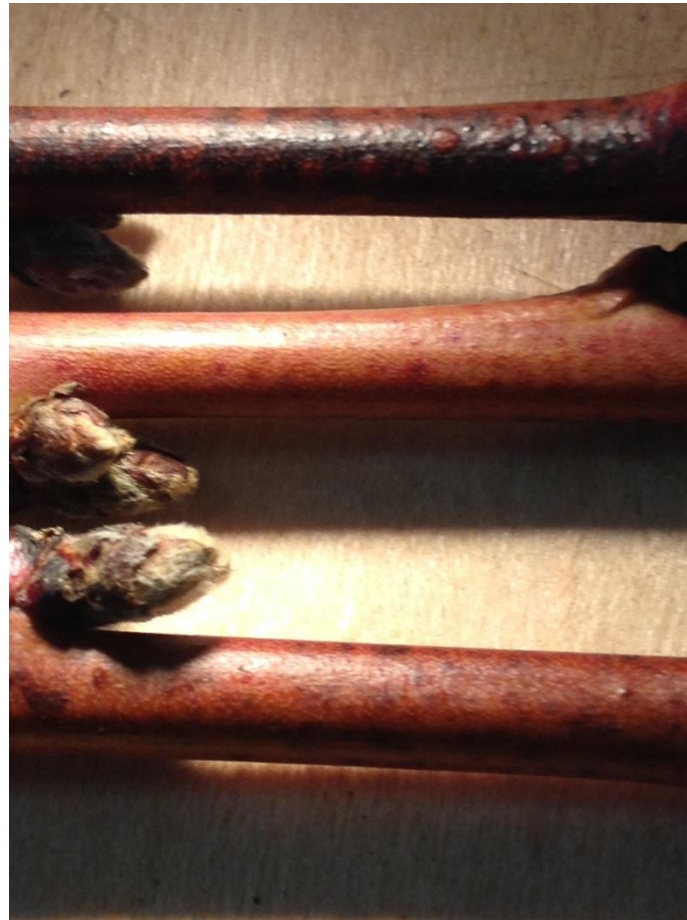
Exposed to
@ -15 F



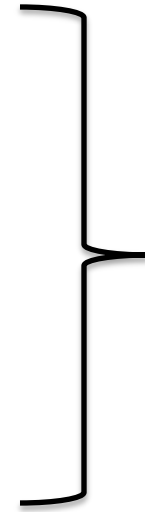
Exposed to
@ -13 F



Peach twigs



Exposed to
@ -15 F



Exposed to
@ -13 F



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



- Pruning to remove affected wood
- Post harvest chlorothanil used in NJ



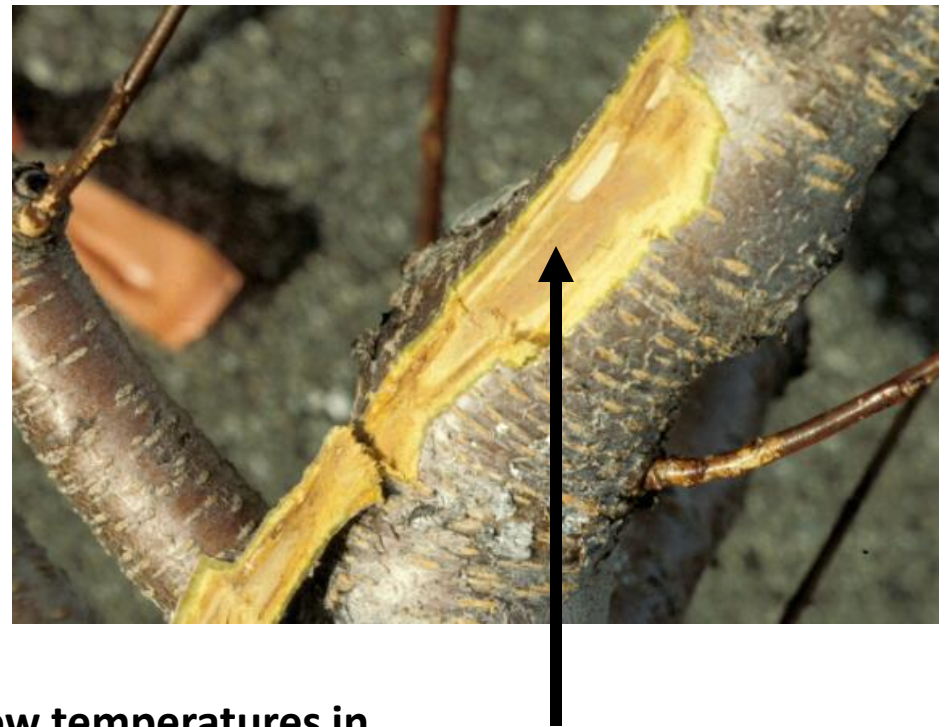
Brown cambial layer under bark



Freeze damage to peach cambium



Brown cambium following -19 F low temperatures in 1994



Peach trunk splitting

Use of small nails to close opening if detected soon (within 2 days)



Tree wraps

White wraps reduce damage due to rodents and from rapid temperature fluctuations in trunks due to sunlight in mid winter.



Remove tree wraps in summer to avoid disease & insect problems.



Borer damage under wrap



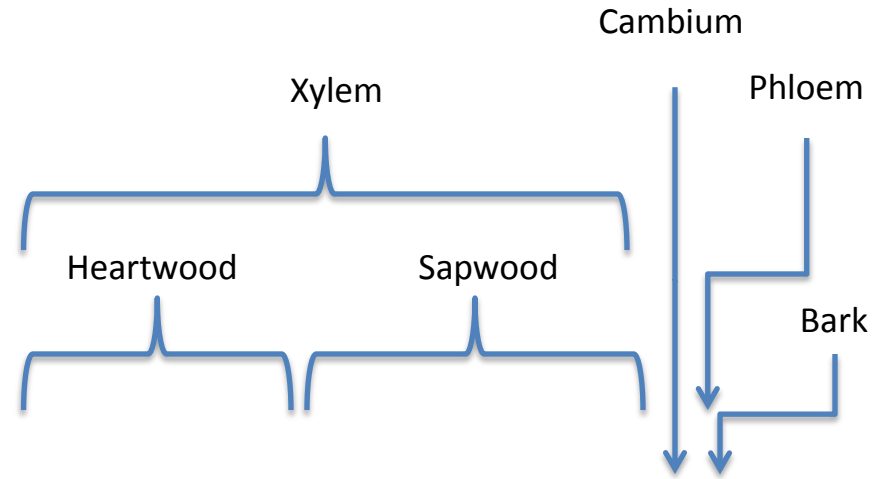
Tree paint

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

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



Peach peach trunk cross-section



Heartwood – support, little water movement, no disease suppression

Sapwood – water conduction, active disease defense, protection of heartwood.



Brown sapwood revealed in x-section of peach. Trees were exposed to -17 F or lower.



Peach peach trunk cross-section



Undamaged



Damaged but generally healed



Peach peach trunk cross-section



Heartwood
poorly protected




Peach tree decline due to *Leucostoma* (Cytospora) canker



Scaffolds missing



Talk outline

- Anticipation and assessment of damage
- Tree structure and cold damage 




Pruning practices affects cold damage

Observations on cold injury to apple trees in Pennsylvania - 1936

- Apple tree injury following a very rapid decline in temperatures in mid-January 1936.
- Trees that were most injured were those that lacked adequate vigor, those that were too vigorous, and those that had been pruned before the cold event.
- Trunk injury was greater than expected considering that the lowest temperature was only -15°F , but this low was accompanied by a rapid drop of 40 to 50° .

Anthony, Sudds and Clarke (1936)



Observations on cold injury to apple trees in Indiana – 1936

- Students at Purdue pruned trees in November as part of their pruning lab exercises. The first half of January was fairly mild followed by a ten-day stretch of temperatures below zero with a minimum temperature of -20°F .
- By the following September all 43 heavily pruned 'Jonathan' trees were dead or nearly dead, the 8 trees that were lightly pruned had slight trunk injury, and none of the non-pruned trees were injured.

Burkholder (1936)



Effect of time of pruning on peach growth and canker problems

Late dormant to green tip



Pre pink to bloom



Post bloom



Vigor response
Cut healing
Pathogen active

++++
+
+++

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+++
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+
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+



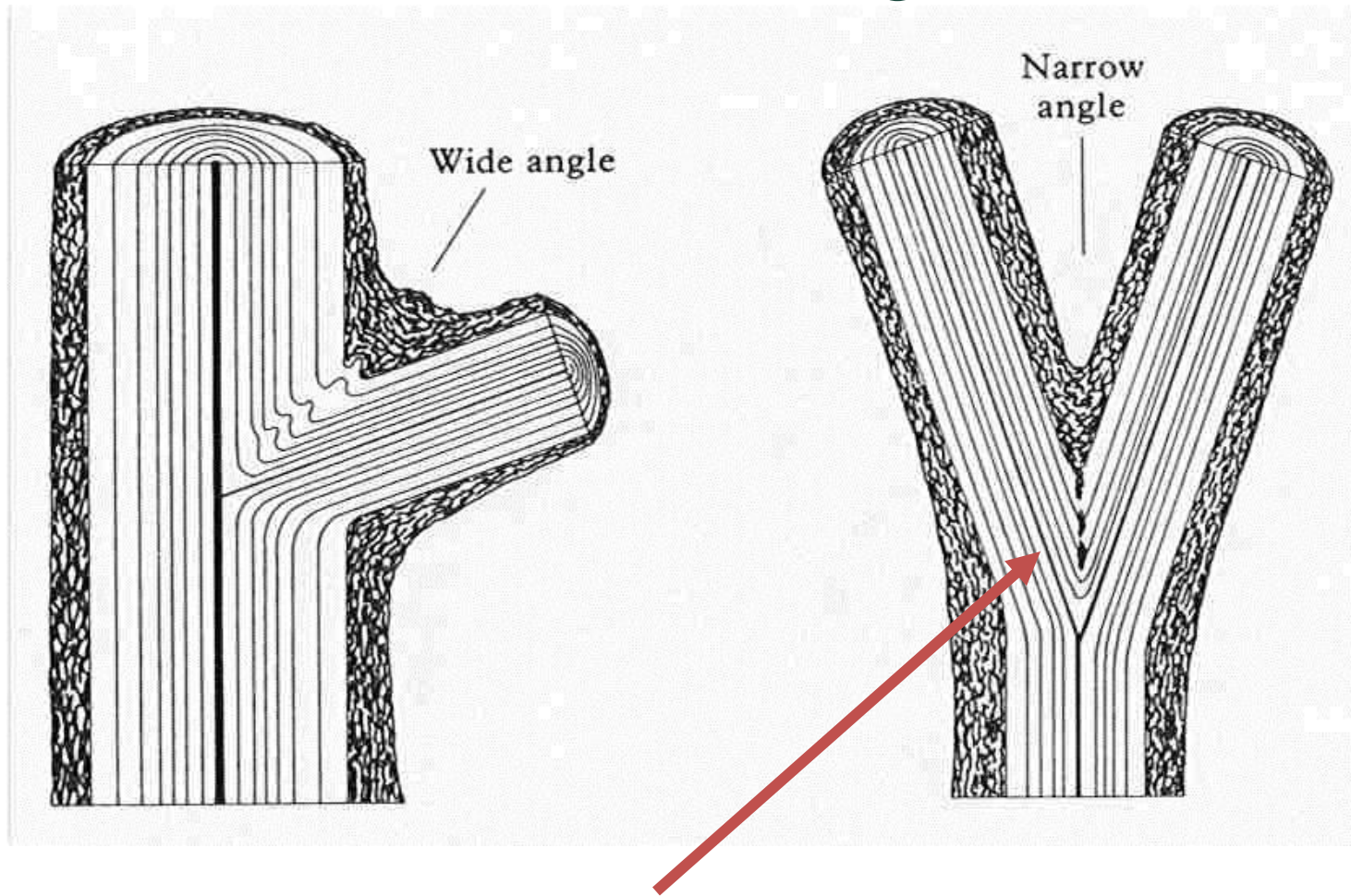
Best time



Weak fruiting wood is danger sign



Train for wide crotch angle limbs



Bark inclusions in narrow angle crotches weaken limb



Clothespins to insure wide crotch angles from new growth



- Use clothes pins to flatten growth
- Remove clothes pins about 2 to 3 weeks later once growth has 'locked' into place

Benign neglect training

- pinching, breaking limbs on inside of tree to direct growth outward & avoiding big cuts





Avoiding Problem Cuts





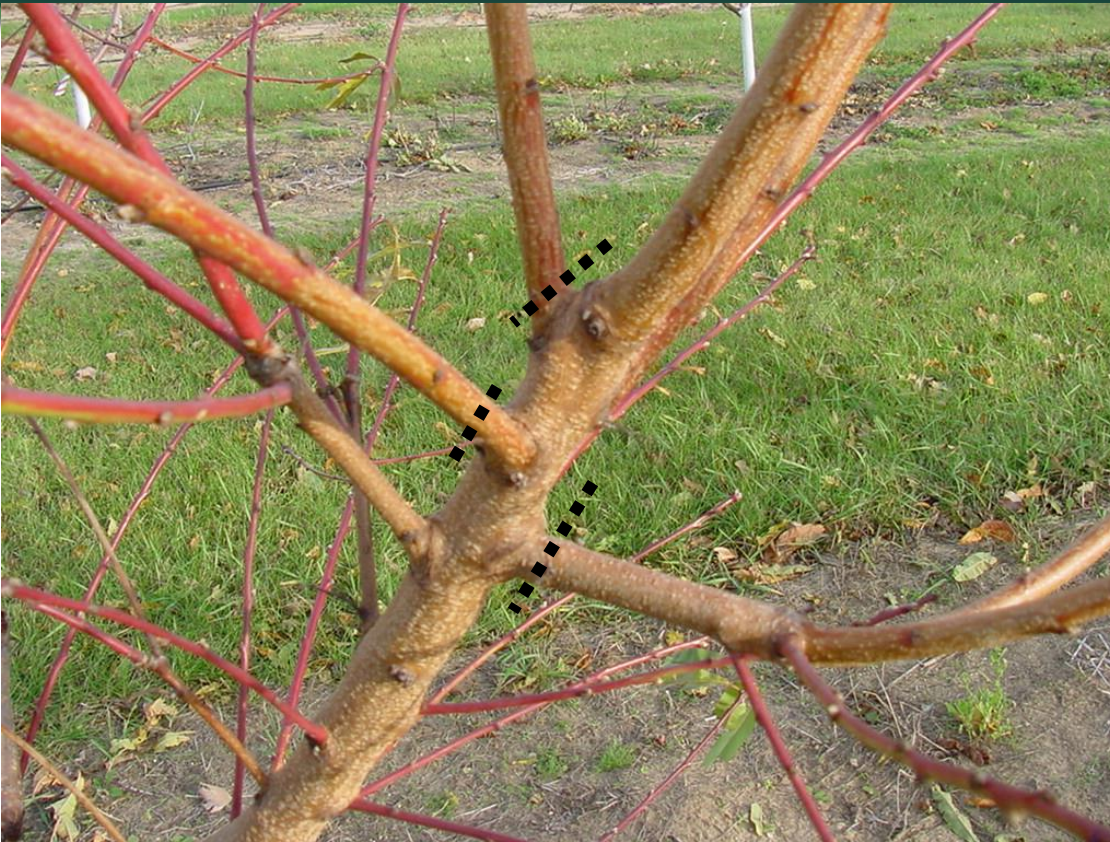
Canker associated with upright crotch angles





Problems arise when scaffold ends are not pruned





Strong limb growth following scaffold end heading cut

- Cuts to remove large limbs will leave big, slow healing wounds



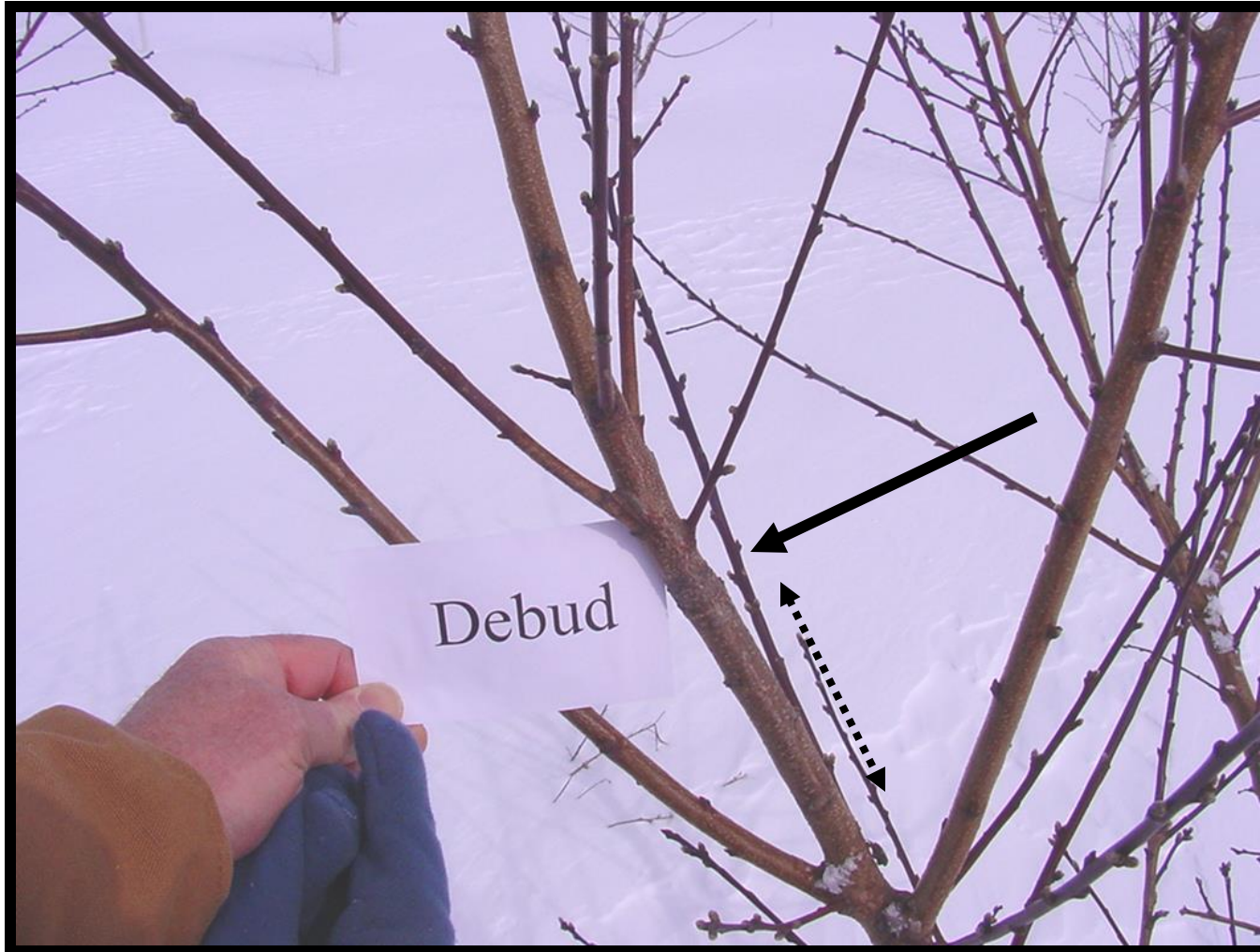
Single & debud



**Remove all
but one or two
buds at tip**

Clear 3 – 4 “





Results of singling and debud






What to do in 2014?

- Prune at bud swell to pink (normal time)
- Prune with normal intensity, strong pruning not advised while trees are recovering from cold damage.
- Consider nitrogen program closely...split applications in order to tailor the program according to rainfall and crop situation
- Adopt practices that minimize big cuts on the lower part of the scaffolds.



Questions?

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

A photograph of a large, modern building with a dark roof and light-colored walls, likely the Michigan State University Southwest Michigan Research & Extension Center. In the foreground, there is a dark sign with white text that reads "Michigan State University" and "SOUTHWEST MICHIGAN RESEARCH & EXTENSION CENTER". The building is surrounded by greenery and a tall light pole is visible in the background.

Michigan State University
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