

# Evolution of High-Density Tart Cherry Orchards in Michigan



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# **Trial #1: High Density Montmorency on Commercially Available Rootstocks**



**Planting established at NWMHRC in 2010**

- Gisela 3<sup>®</sup>
- Gisela 5<sup>®</sup>
- Gisela 6<sup>®</sup>
- Mahaleb
- Montmorency on own root



**Montmorency on own root**

- 12ft x 4.5ft
- Pruned/hedged to bush and central leader
- Irrigated and fertigated

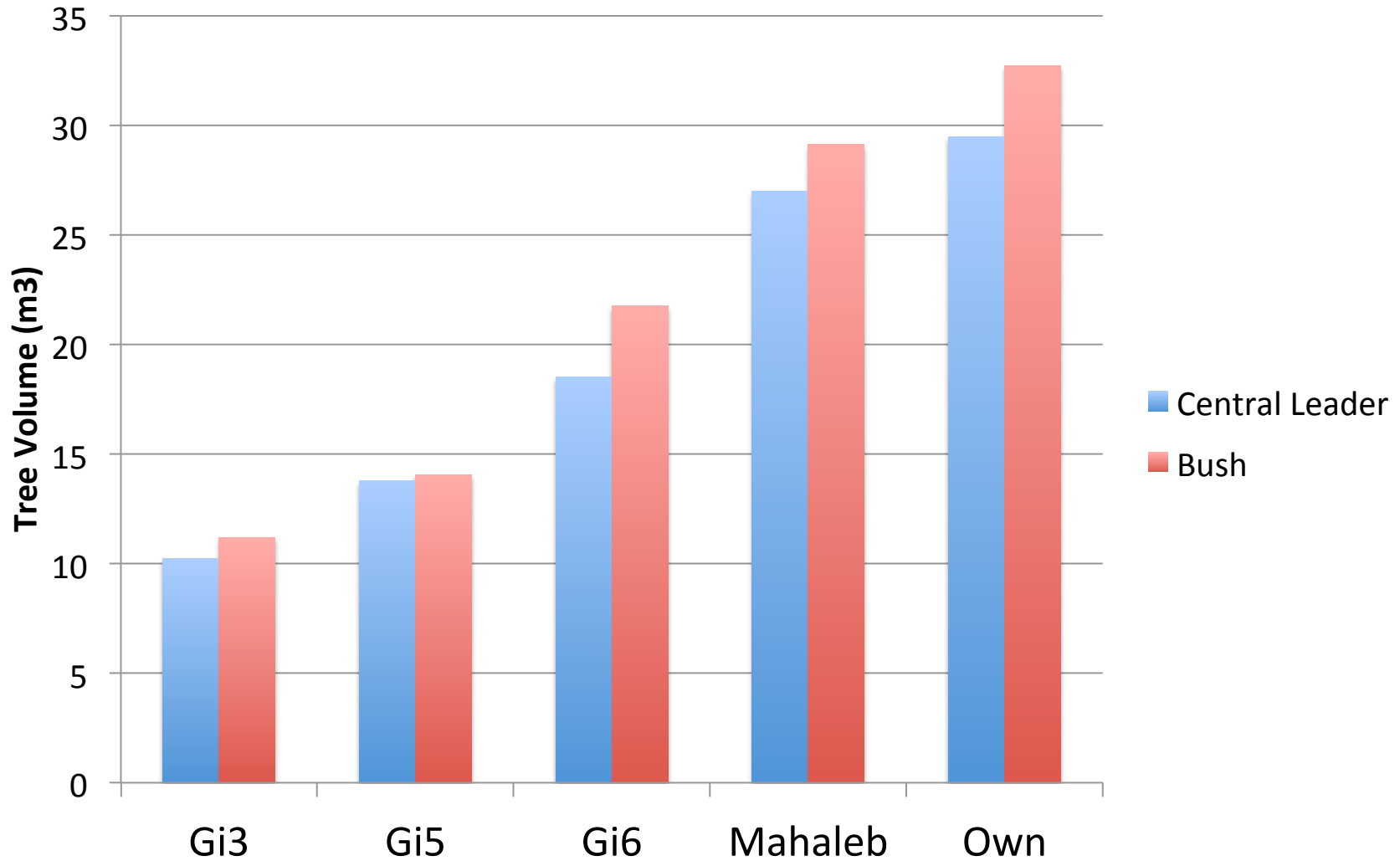


# Data Collection

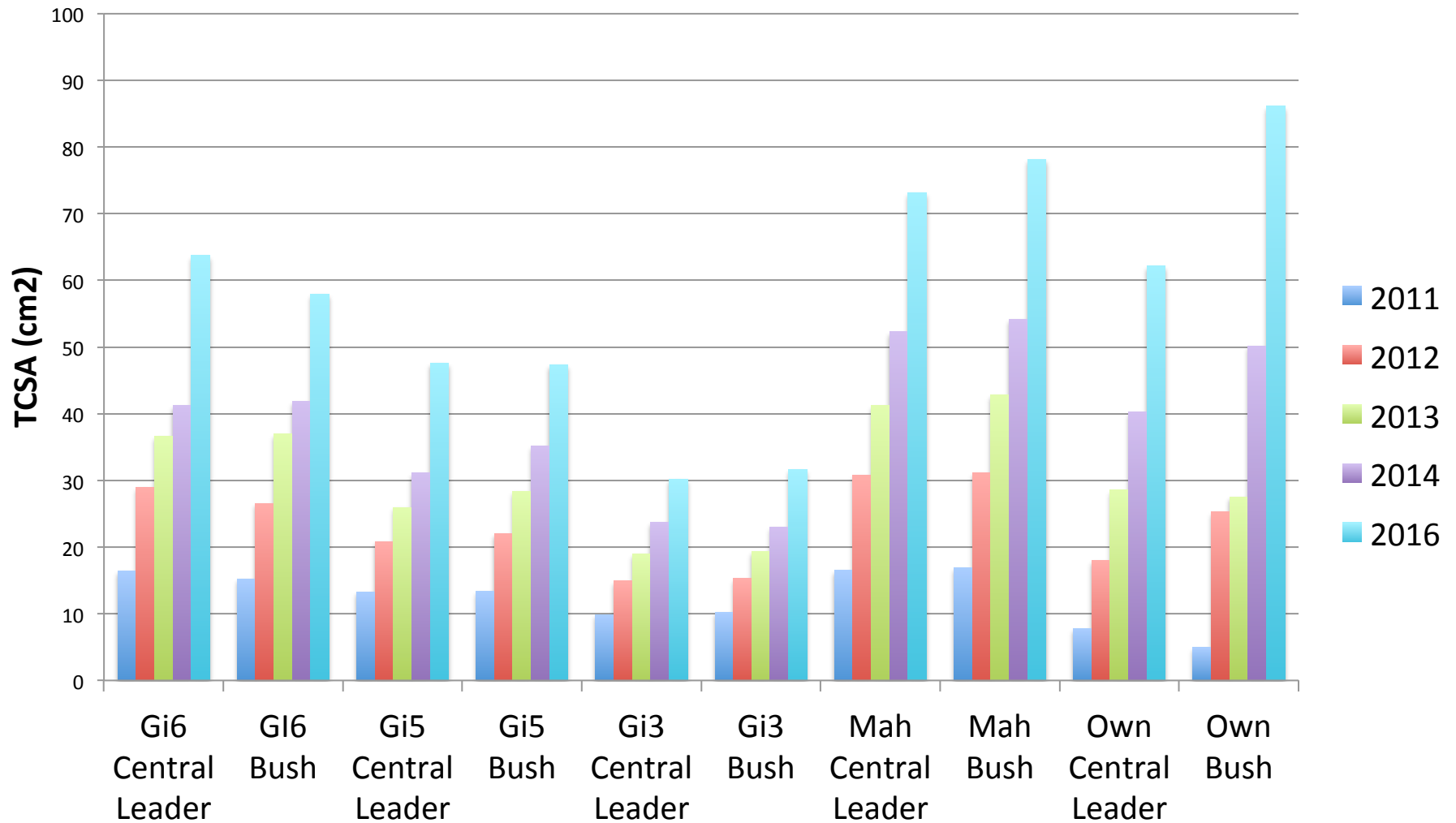
- Amount of bloom
- Leaf area
- Trunk cross-sectional area
- Tree efficiency
- Yield – first harvest 2013
  - No crop in MI in 2012
  - 2015 and 2016
    - Light crop in 2015
    - Large crop in 2016\*



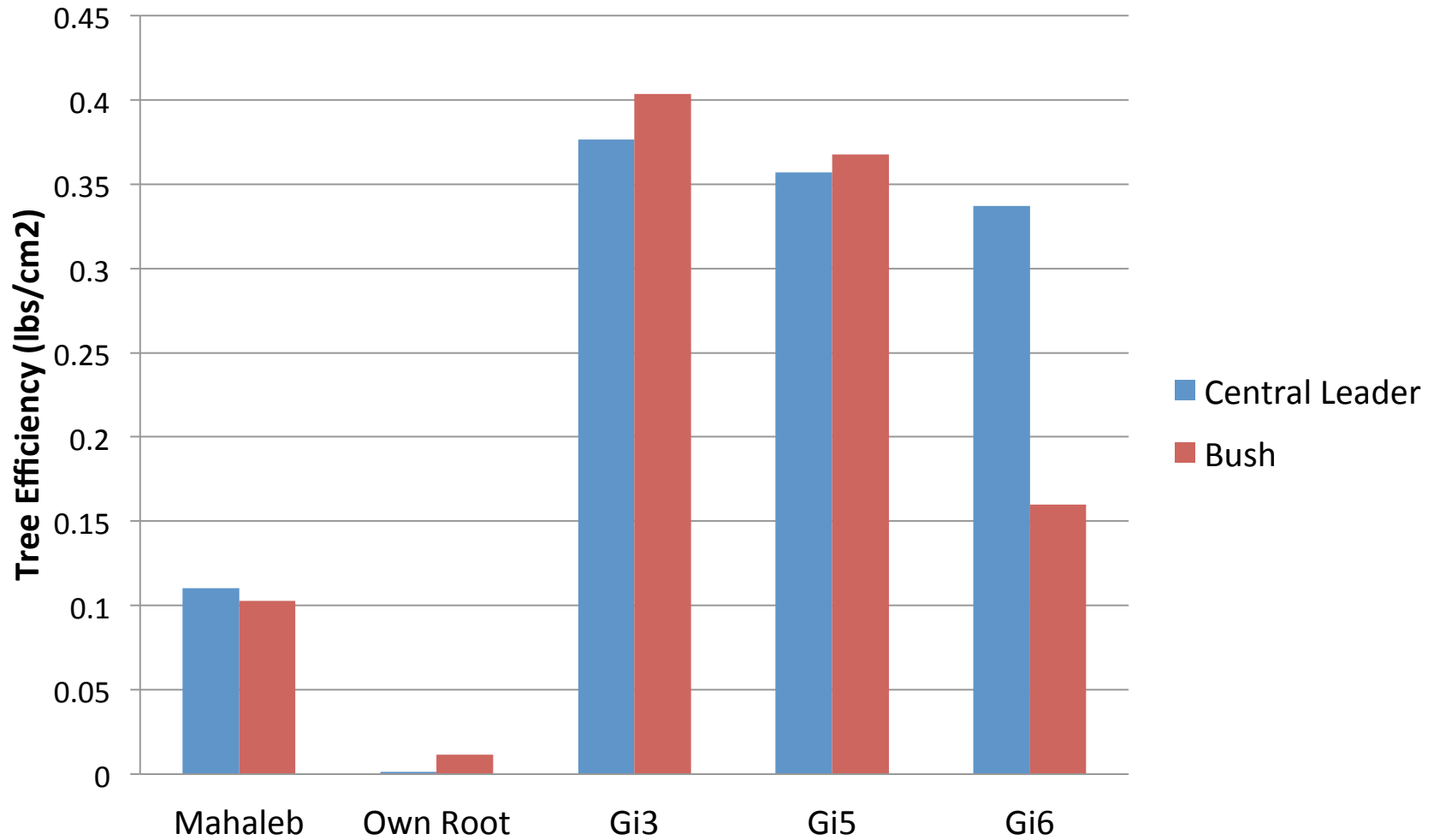
# Tree Canopy Volume 2016



# Trunk cross-sectional area (TCSA)



# 2013 Tree Efficiency



# 2013 Yield (lbs/acre)

Rootstock	Central Leader	Bush
Mahaleb	3067	2963
Own Root	24	212
Gi3	4817	5257
Gi5	6246	7021
Gi6	8308	3988



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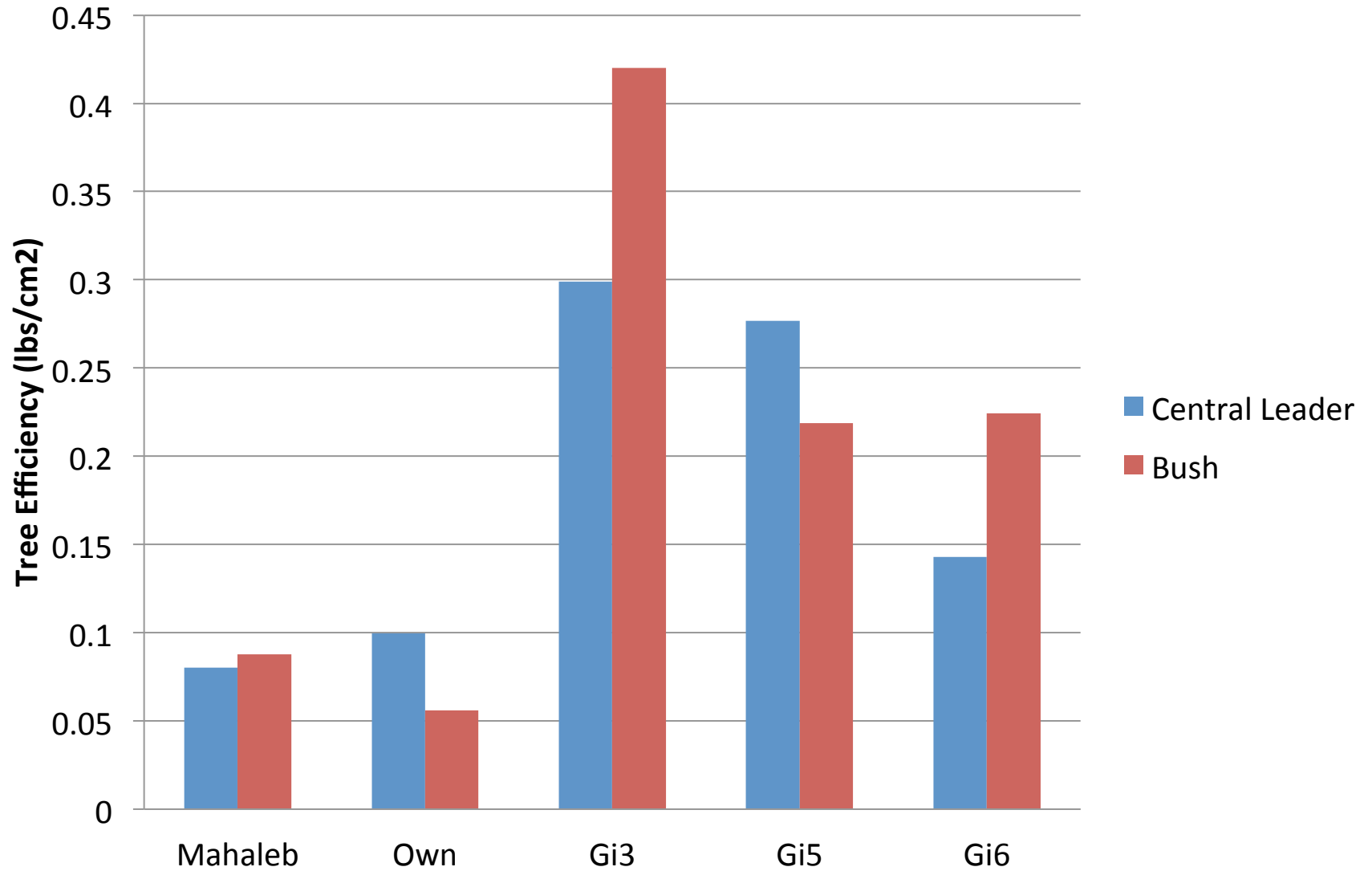
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# 2014 Yield (lbs/acre)

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Own Root	2707	1890
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# Trial #1 Conclusions

- No crop in past two seasons
  - Winter injury from two hard winters
    - 2013-14/2014-15
    - Are Gisela more sensitive to cold temperatures?
    - Does increased bacterial canker in Gisela reduce bud survivorship?
  - Are we pruning too hard and removing too many buds?
    - Shading issues causing lower limb death
    - Attempting to prune for increased light penetration
- Difficulty in new shoot regeneration
  - Decreasing overall fruiting capacity?
- Gi3 and Gi5 are weak trees with few fruit buds
  - Are they too weak for MI sands?
  - Increase water/fertilizer?
- Do high density tart plantings on Gisela have to be on optimum sites?
  - Current planting is on a good site
  - Adjacent blocks on Mahaleb rootstock had a crop in 2016
    - Is our site not good enough?

## **Trial #2: Over-The-Row Harvest of Tart Cherry**

Spring 2011  
Established a High-Density  
Research Orchard  
@ NWMHRC

# CHERRY RESEARCH PROJECTS



Funded in part by the...  
MICHIGAN CHERRY COMMITTEE



NWMHRC  
Hand Harvest  
July 28, 2014



NWMHRC  
Berry  
Harvester  
July 2015  
& 2016



<b>Lbs / tree</b>	<b>2013</b>	<b>2014</b>	<b>2015</b>	<b>2016</b>	<b>Cumulative</b>
Carmin Jewel	0.3	10.9	5.2	21.8	38.2
Crimson Passion	0.04	2.3	3.0	12.8	18.1
Montmorency	1.94	18.7	16.2	9.2	46.1
MSU 27-12-2	0.41	6.6	3.6	5.6	16.1
Nana	3.2	12.6	3.7	13.3	32.7

<b>Lbs / Acre</b>	Year 3	Year 4	Year 5	Year 6	<b>Cumulative</b>
Varieties	<b>2013</b>	<b>2014</b>	<b>2015</b>	<b>2016</b>	
Carmin Jwl	202	7320	3520	14680	25722
Crimson Psn	27	1521	2046	8602	12196
Mont	1306	12610	10916	6162	30994
MSU 27-12-2	276	4413	2396	3744	10828
Nana	2154	8477	2483	8917	22031

\* 673 trees per acre

## Yield for 5 varieties

No Canopy or root pruning treatments



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# Carmine Jewel



## Conclusions from Trial #2: OTR

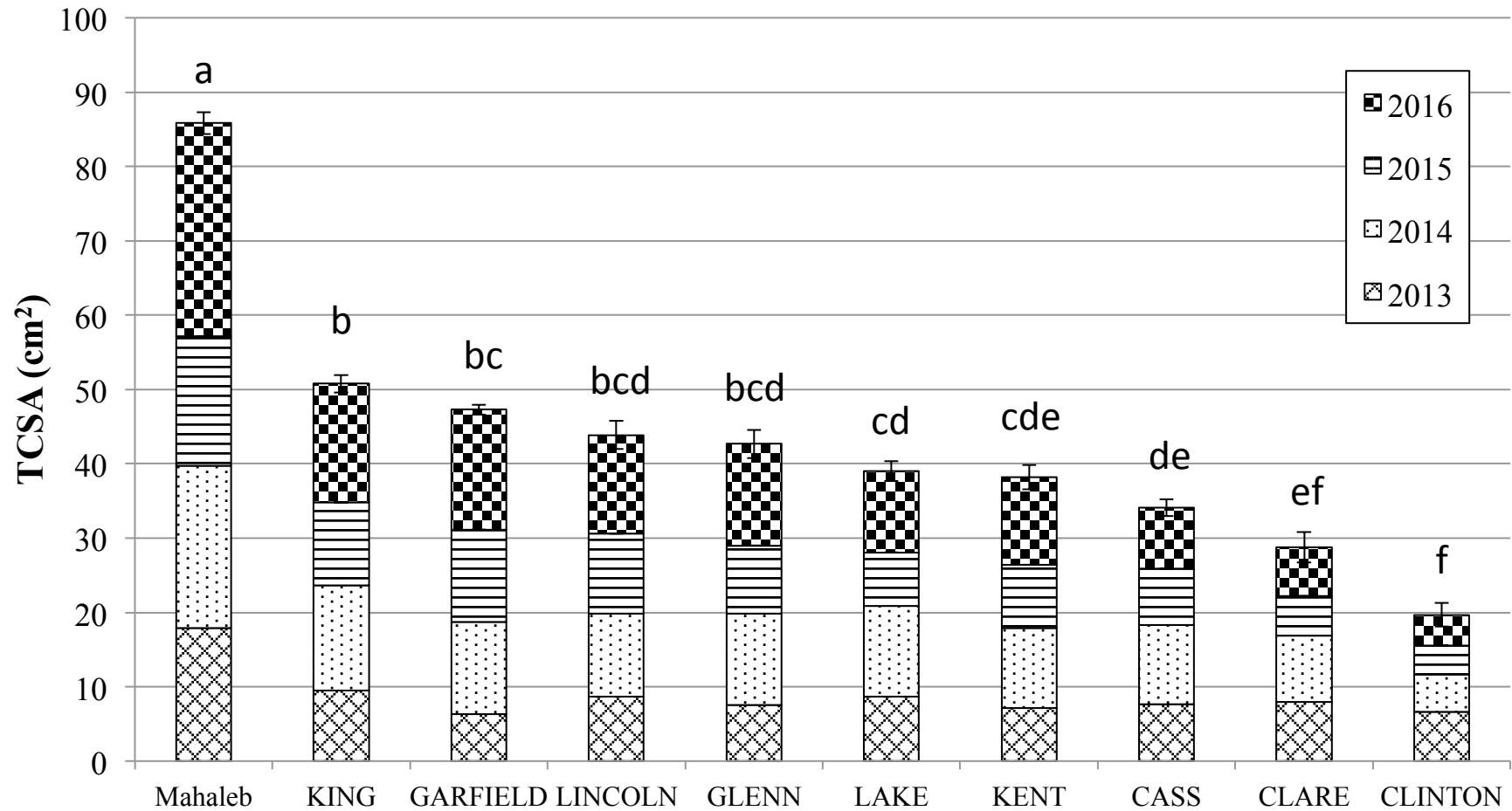
- Carmine Jewel shows potential to have yields similar to Montmorency/Mahaleb
- Crimson Passion and Carmine Jewel are harvested later than Montmorency
  - Concerns about SWD
  - Both are susceptible to leaf spot and mildew
- Nana are weak trees
- Korvan 9000 OTR shaker has good fruit removal
  - Fruit had decreased quality compared with conventional harvester
  - Willowy-type trees have better fruit removal
- Trees cannot be 10ft+ to fit through without damage

# Trial #3: Investigating MSU Cherry Rootstocks

- Planted in 2011 at NWHMRC
  - 19.5' x 13'
    - Closer to standard spacing
  - Montmorency grafted onto following:
    - Mahaleb
    - King
    - Garfield
    - Lincoln
    - Glenn
    - Lake
    - Kent
    - Cass
    - Claire
    - Clinton



# Trunk Cross-Sectional Area



**Mahaleb & Mazzard**



90+%

**Gisela 6**



60-80%



50-60%

**Clinton**

**Gisela 5**



40-50%

**Lake, Cass,  
Clare**



# Yield per Acre

Rootstocks	2013	2014	2015	2016	Total
LAKE	135 b	4,955 a	10,358 a	11,026 ab	26,474 a
CASS	169 b	4,955 a	10,294 a	11,958 a	27,376 a
CLARE	174 b	5,970 a	9,152 ab	6,171 bc	21,476 ab
CLINTON	503 a	6,601 a	5,937 bc	2,500 c	15,541 bc
Mahaleb	12 b	1,200 b	4,410 c	5,166 c	10,788 c

Yield per acre = average yield per tree x trees per acre

\*173 trees/acre for mahaleb

\*\*726 tree/acre for MSU rootstocks

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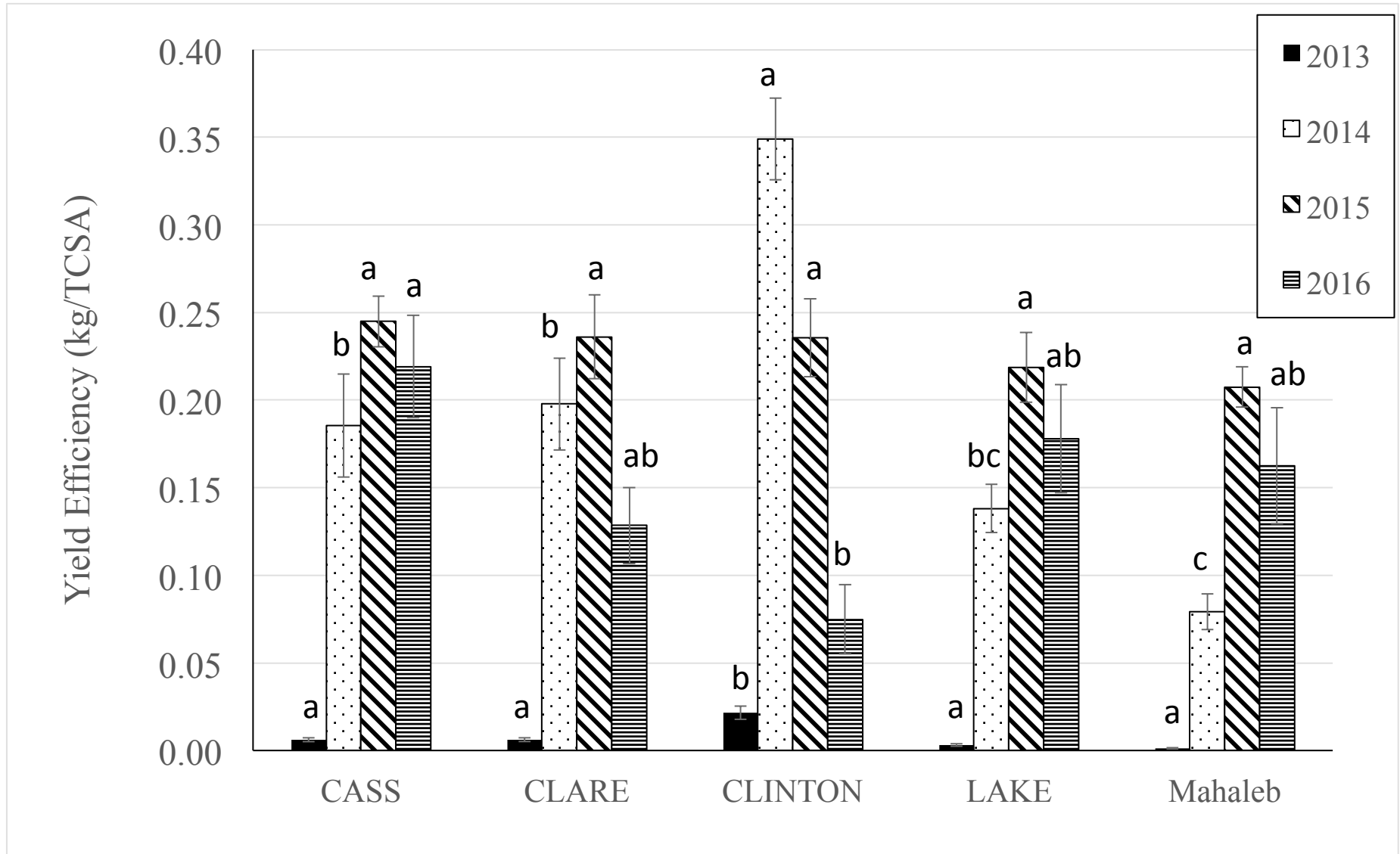
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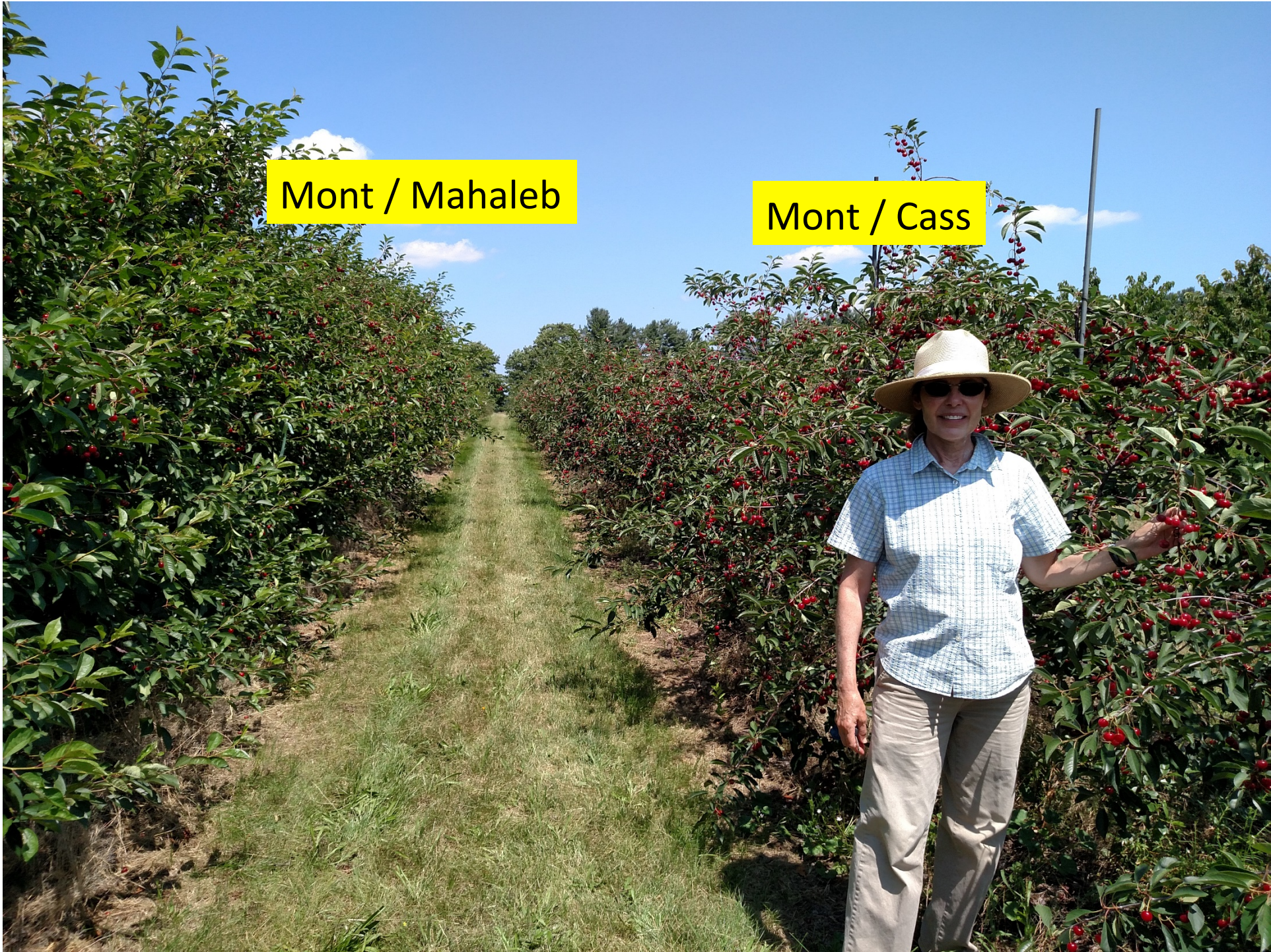
# Yield Efficiency





Mont / Mahaleb

Mont / Cass



## Conclusions for Trial #3: MSU Cherry Rootstocks

- Cass, Clare, and Lake
  - Higher yield efficiency in 3<sup>rd</sup> and 4<sup>th</sup> year after planting than Mahaleb
  - By 5<sup>th</sup> year after planting, Cass, Clare, Clinton and Mahaleb are not statistically different
  - Need to be evaluated at high densities
- Clinton had highest initial yields
  - Dry season/down irrigation system impacted Clinton
  - More evaluation is needed with adequate water
- New high density plantings for 2017
  - Cass, Clare, Clinton, Lake, Crawford, Gi5, Gi3, and Mahaleb
  - Planted at 3 MI grower sites
  - Planted at 3-4 UT grower sites
  - 5ft x 12ft





Thank You!



# Thank You

- High density team:
  - Dr. Dan Guyer
  - Dr. Greg Lang
  - Dr. Jim Flore
- Grower Cooperators:
  - Oxley Farms
  - Lutz Farms
  - Engle Farms
- Harvester Cooperator:
  - Spring Brook Supply,  
South Haven, MI (Littau  
Harvester, OR)
- NWMHRC staff
- MSU Horticulture  
undergraduate students

