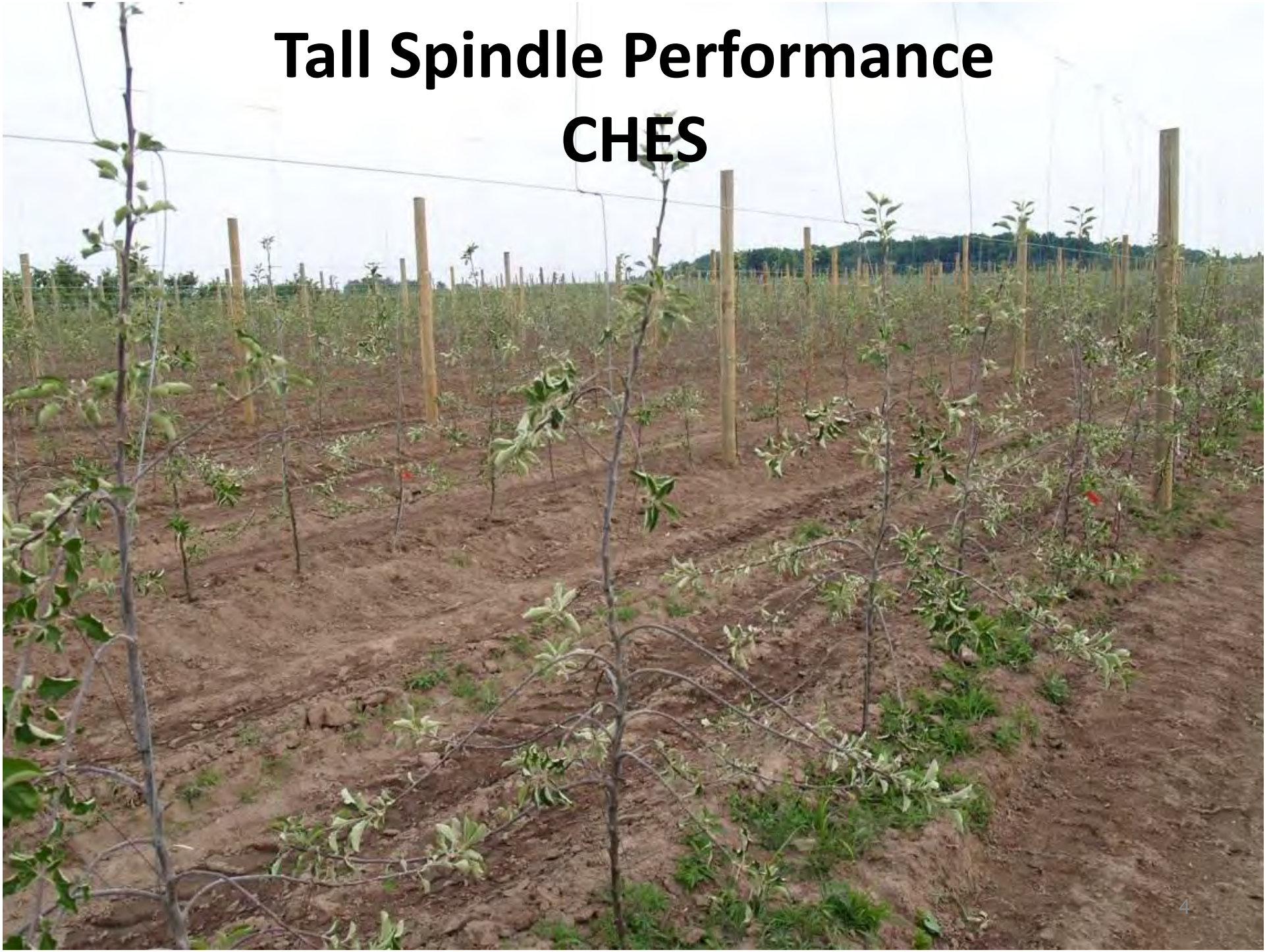
# Tall Spindle Performance CHES


Thanks to:
Michigan Apple Research Committee
Michigan State Hort Society
International Fruit Tree Assocation
Supporting Growers
Summit Tree Sales
Willow Drive Nursery
Walfer Nursery
MICHIGAN STATE UNIVERSITY EXTENSION
MICHIGAN STATE UNIVERSITY AgBioResearch

# New Orchards
## A 20+ year commitment

- Planting time decisions determine the potential of the The most Important decisions are:
  - cultivar,
  - rootstock,
  - tree spacing and
  - tree training system
- Plant 5% of orchard each year.
- 3 Important Factors
  - System
  - Irrigation
  - Fertility

# Tall Spindle Performance
# CHES



# Why Consider Tall Spindle?

- Best early and gross dollar return.
- A new apple orchard is a long term investment, 20+ years.
- It is highly adaptable to future machine assisted practices (pruning, harvest).
- It is proving to be the most efficient, cost effective apple training system.
- It is highly productive of high quality fruit in early and mature bearing years.
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# Kropf Tall Spindle

# Why Consider Tall Spindle?

- It fits the natural growing characteristics of a high density apple tree.
- It maximizes the trees ability to capture of sunlight.
- It has little to no wasted space (shaded) in a tree.
- It maximizes yield/acre due to its tall (10-11') tree height.
- It has one the best carbon footprint apple production systems.
- Apogee treated Tall Spindle can be protected from FireBlight and yet yield nearly as well as non-treated trees.

# Sparta Tall Spindle

# Sparta Tall Spindle

# NY targets for early yield:

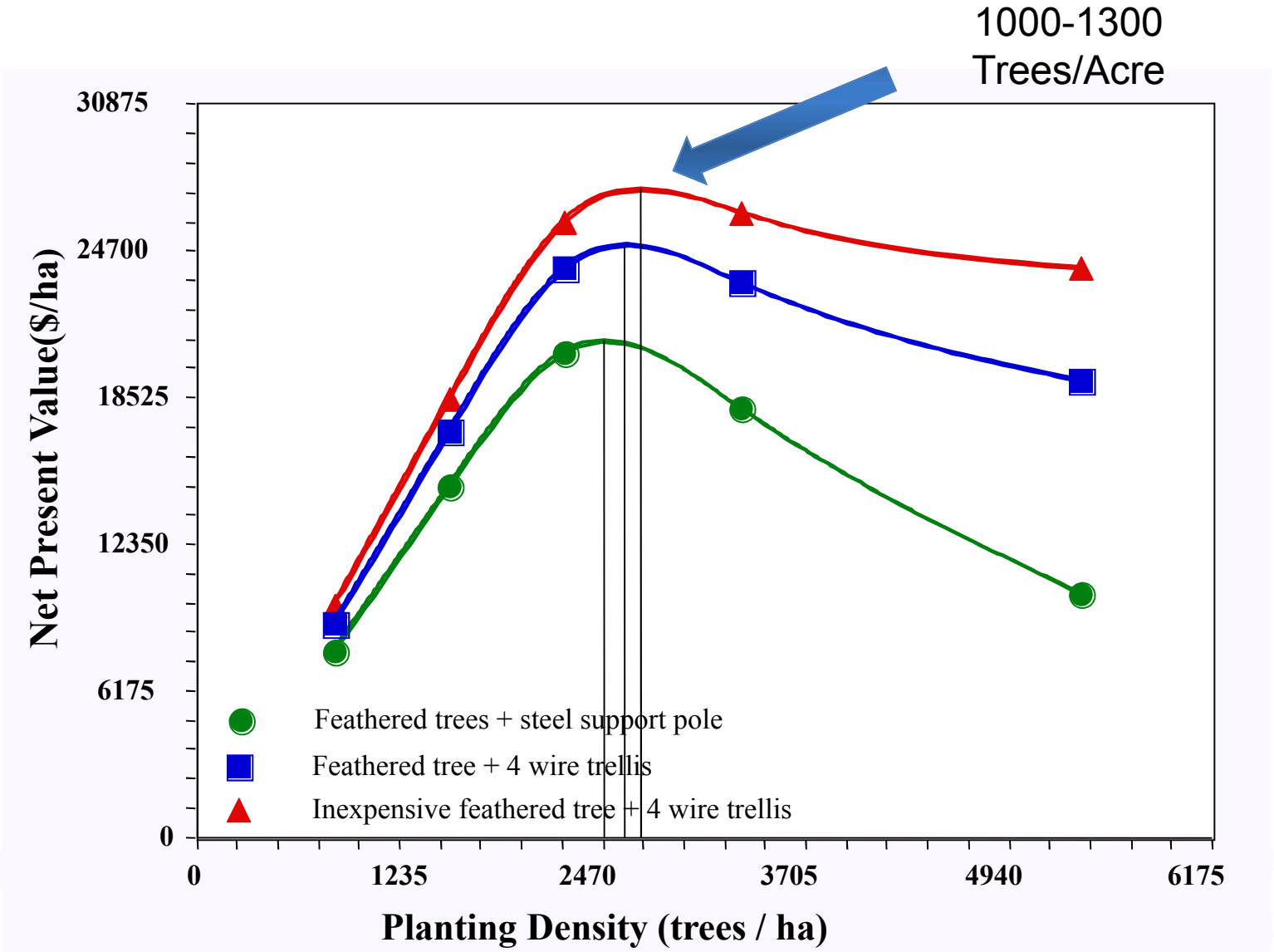
- 200 bu/acre — second leaf
- 500 bu/acre — third leaf
- 900 bu/acre — fourth leaf
- 1400 bu/acre — fifth leaf

Accumulate a total of 3,000 bu/acre over the first 5 years


2000 bu/acre
Fuji/M9
4th Leaf


Thome Tall Spindle
Gala 2009, 3rd leaf

# NY Economic Studies



# Tying Branches down in year one

# Mechanical Summer Pruning with the Tall Spindle

Reduction of costs,
Improved fruit quality.

Timing: June, July, August

# Tall Spindle Trial CHES

- 2006 Planting
- Direct comparison of TS and VA.
- Very Productive
- Easy to Learn System

# Tall Spindle Apogee, Planted 2006

| | Tall Spindle | Vertical Axe |
|---|---|---|
| **Spacing** | 3'x11' | 5'x14 |
| **Trees/Acre** | 1320 | 622 |
| **Varieties (7)** | Empire, Fuji, Gala, Honeycrisp, Jonagold, Jonathan, N. Spy | |
| **Well Feathered** | Gala, Honeycrisp, Jonagold, Jonathan, Fuji | |

# Tall Spindle Yields

**Table 1. Yield/Acre (bushels) of Tall Spindle and Vertical Axe.**

| Variety | | Gala | | Honeycrisp | | Jonagold | | Jonathan | | Empire | | Fuji | | N Spy | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Treatment | | UTC | Apogee | UTC | Apogee | UTC | Apogee | UTC | Apogee | UTC | Apogee | UTC | Apogee | UTC | Apogee |
| 6th 11 | Tall S. | 951 | 951 | 566 | 512 | 1018 | 972 | 1132 | 615 | 808 | 883 | 928 | 809 | 599 | 664 |
| | V. Axe | 1124 | 742 | 558 | 580 | 917 | 492 | 565 | 572 | 853 | 792 | 1051 | 950 | 823 | 744 |
| 5th 10 | Tall S. | 1300 | 1232 | 890 | 459 | 796 | 880 | 876 | 786 | 332 | 273 | 410 | 696 | 221 | 415 |
| | V. Axe | 554 | 558 | 64 | 160 | 286 | 255 | 379 | 379 | 101 | 65 | 168 | 281 | 103 | 68 |
| 4th 09 | Tall S. | 1293 | 1431 | 437 | 605 | 993 | 770 | 735 | 731 | 782 | 741 | 1227 | 1014 | 476 | 784 |
| | V. Axe | 838 | 647 | 221 | 217 | 452 | 358 | 482 | 469 | 502 | 349 | 589 | 533 | 487 | 443 |
| 3rd 08 | Tall S. | 294 | 329 | 298 | 259 | 378 | 411 | 332 | 299 | 110 | 141 | 152 | 183 | 38 | 83 |
| | V. Axe | 117 | 89 | 69 | 50 | 142 | 98 | 203 | 193 | 44 | 40 | 98 | 85 | 22 | 24 |
| 2nd 07 | Tall S. | 22 | 43 | 66 | 92 | 36 | 53 | 72 | 53 | 14 | 16 | 82 | 81 | 0 | 13 |
| | V. Axe | 7 | 34 | 34 | 27 | 9 | 0 | 33 | 41 | 3 | 6 | 37 | 22 | 0 | 0 |

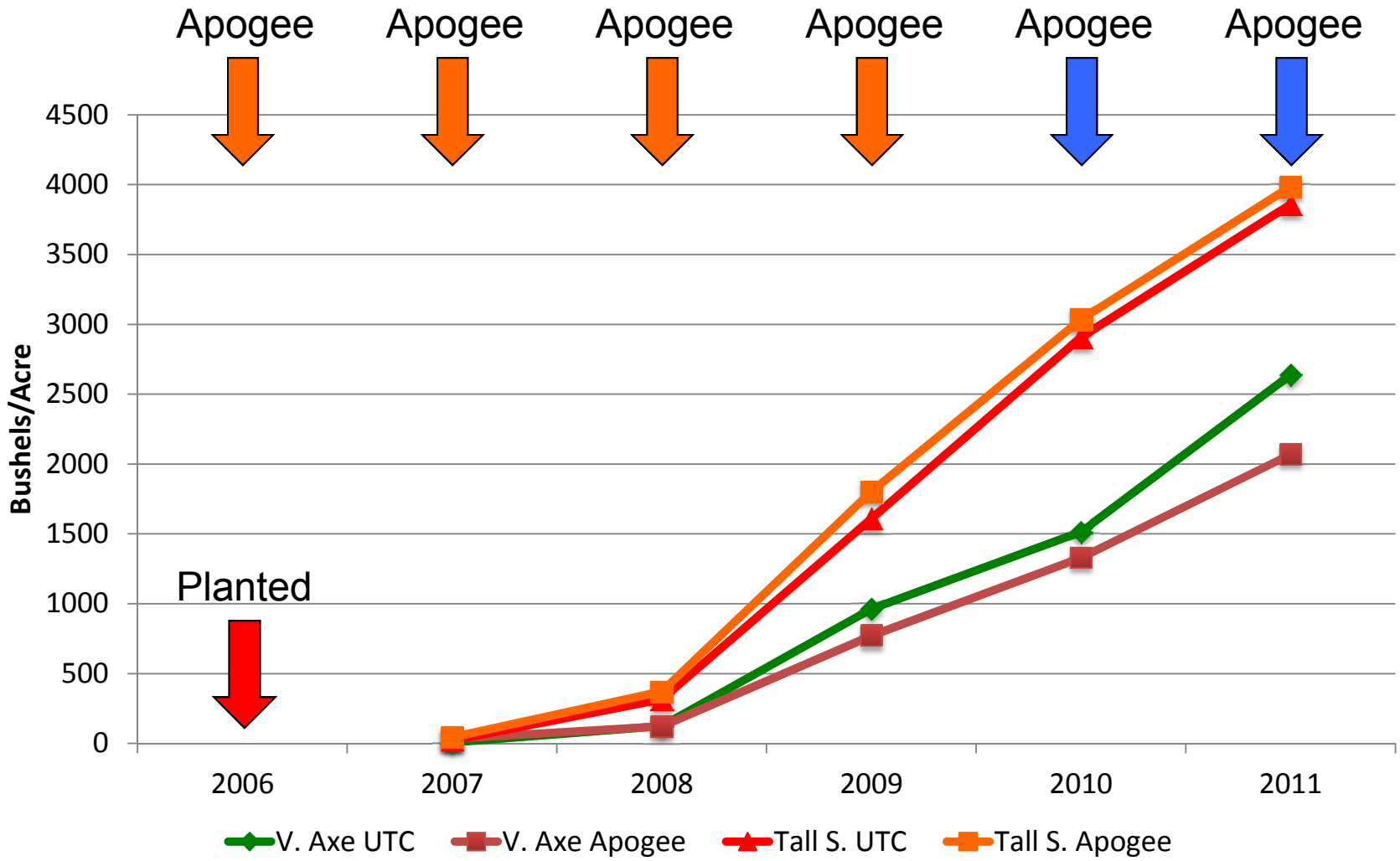
# Early Cropping

- **Cropping must begin:**
  - **In the second year with the Tall Spindle system.**
- **Cropping targets (NY) for the Tall Spindle**

**New York**

| | CHES |
|---|---|
| | Year |
| – Year 1 | 1-5 fruits |
| | 0 to 3 |
| | 06 |
| – Year 2 | 20 fruits |
| | 0 to 33 |
| | 07 |
| – Year 3 | 40 fruits |
| | 0 to 72 |
| | 08 |

# Tall Spindle Gala Accumulated Yield 07-11

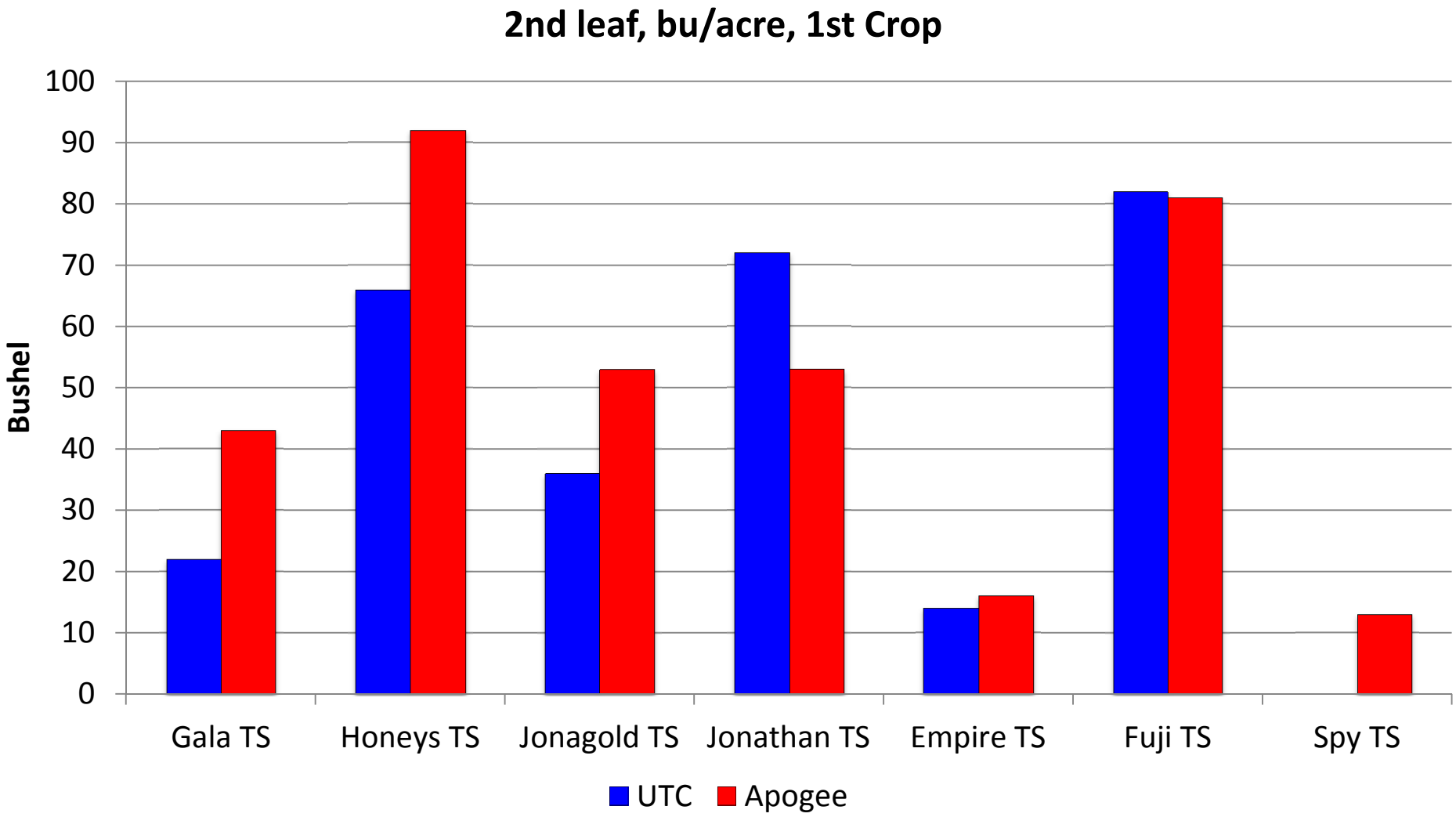



All Apogee, all years, applied at 12 oz/100 by handgun at KBPF.

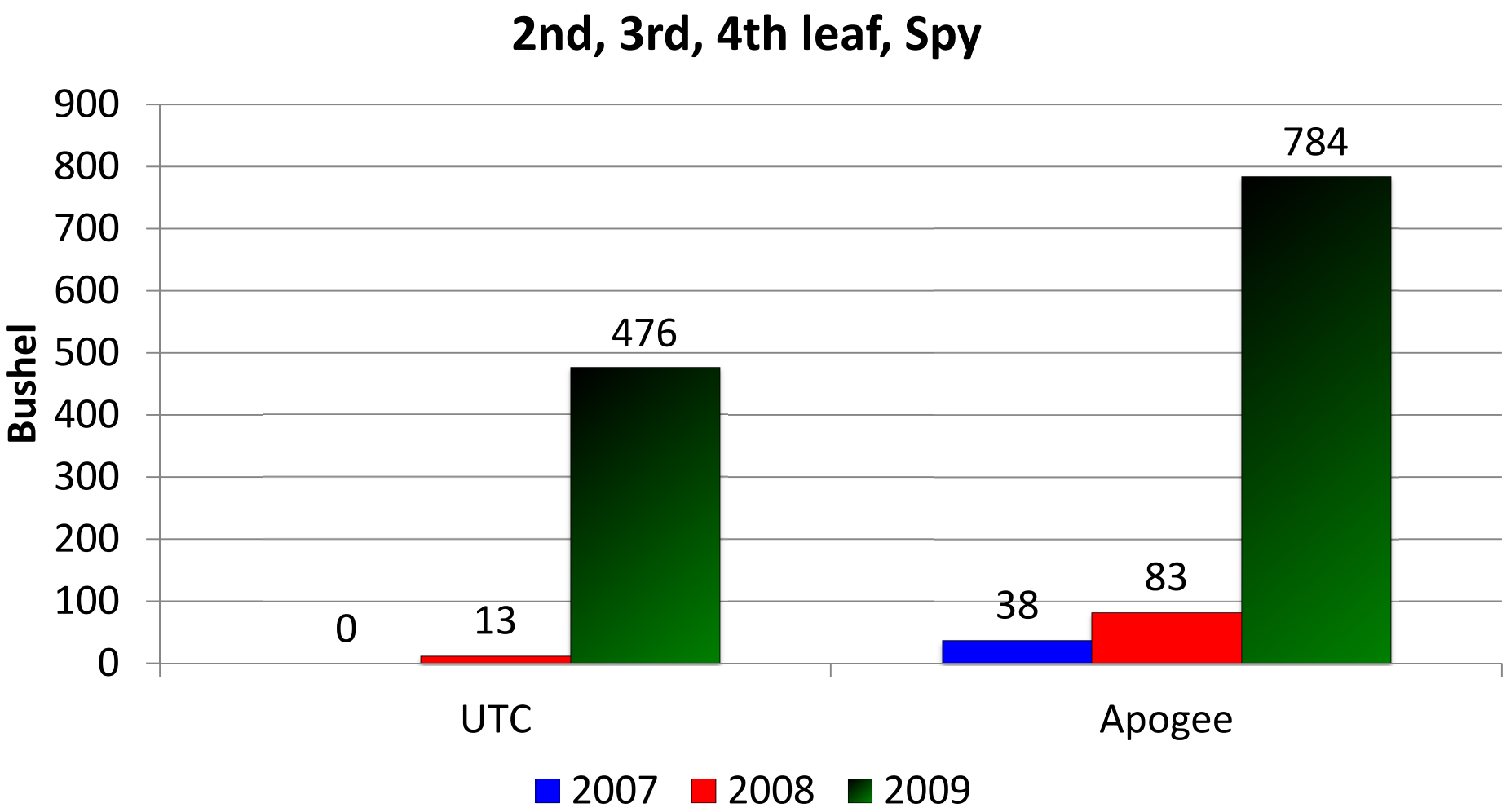
Apogee, half of the trees treated 2006 to 2009, half untreated.

Apogee, all trees treated 2010 and 2011.

# Early TS Production

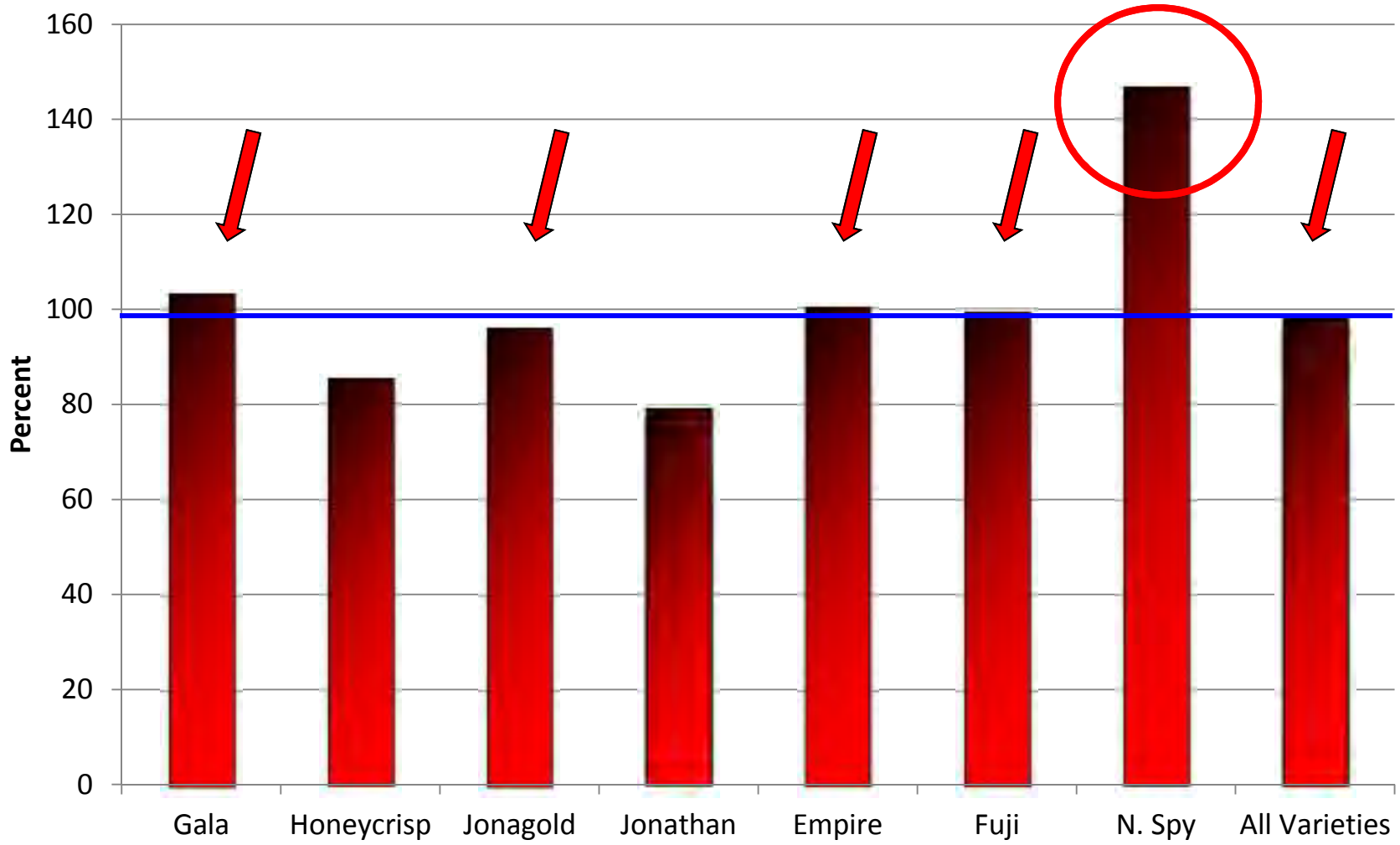


# Early Spy Production



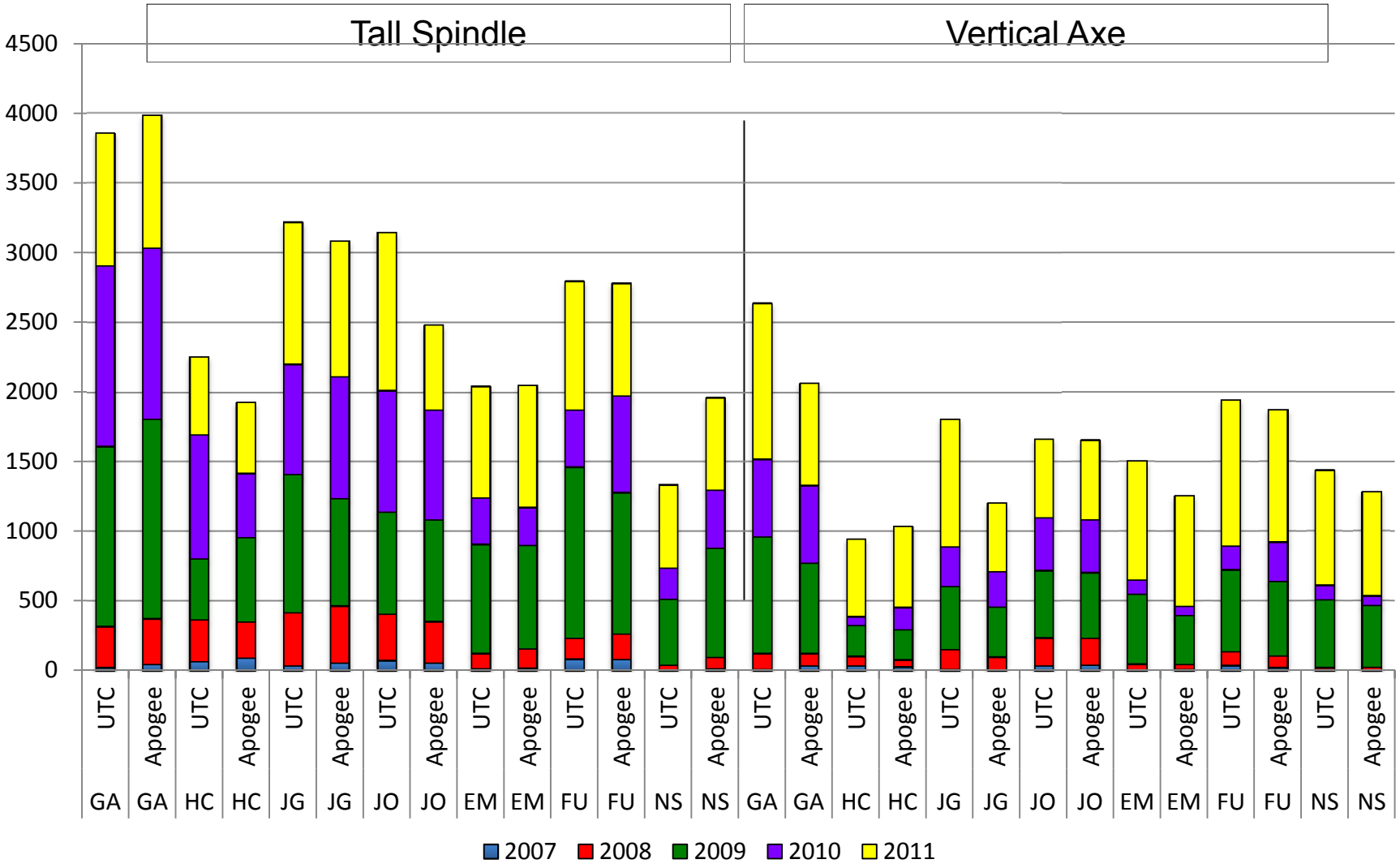

Tall Spindle
N. Spy

# Tall Spindle Apogee Accumulated Yield/Acre as % of UTC

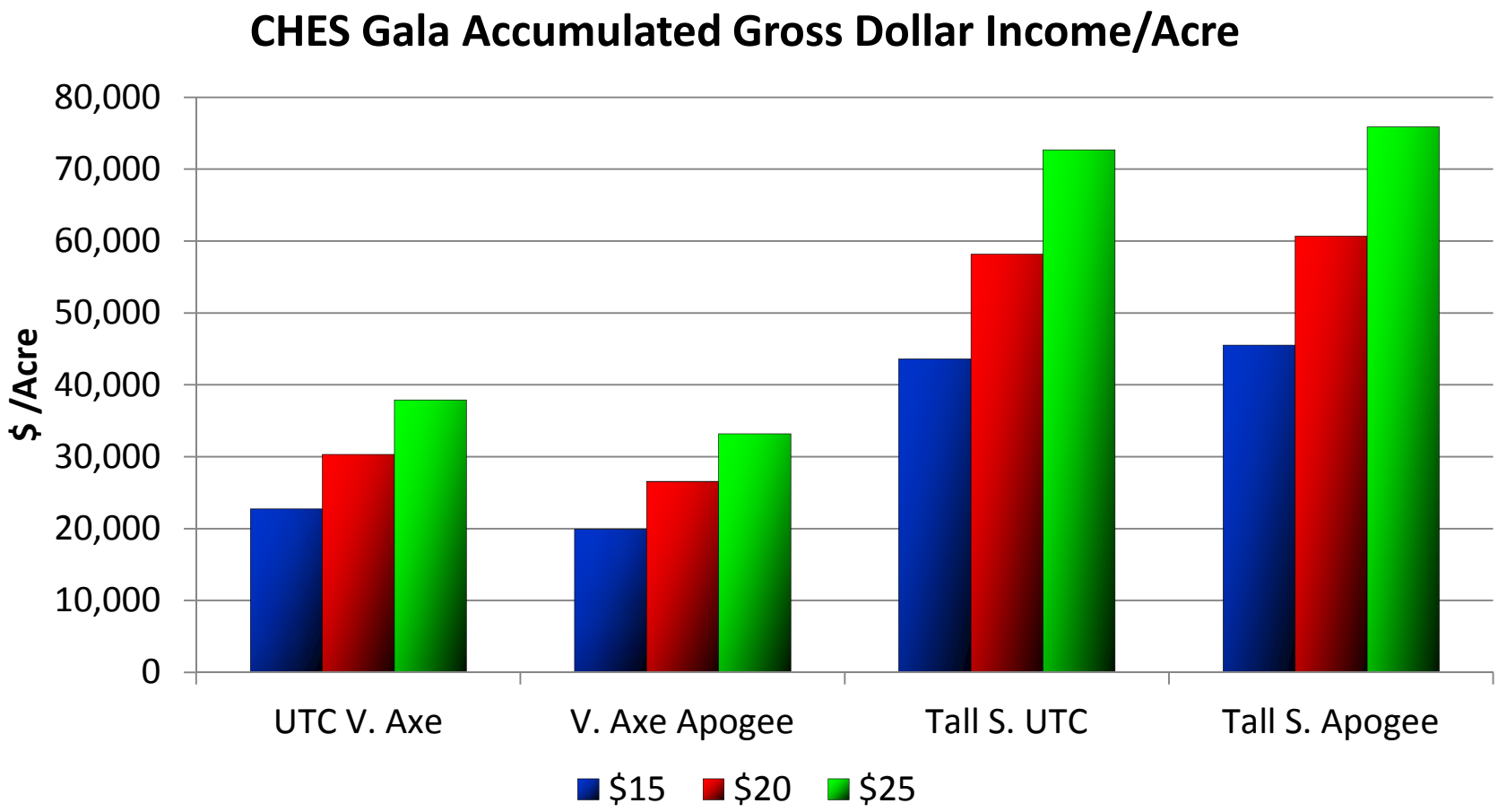


# Tall Spindle & Vertical Axe 07-11

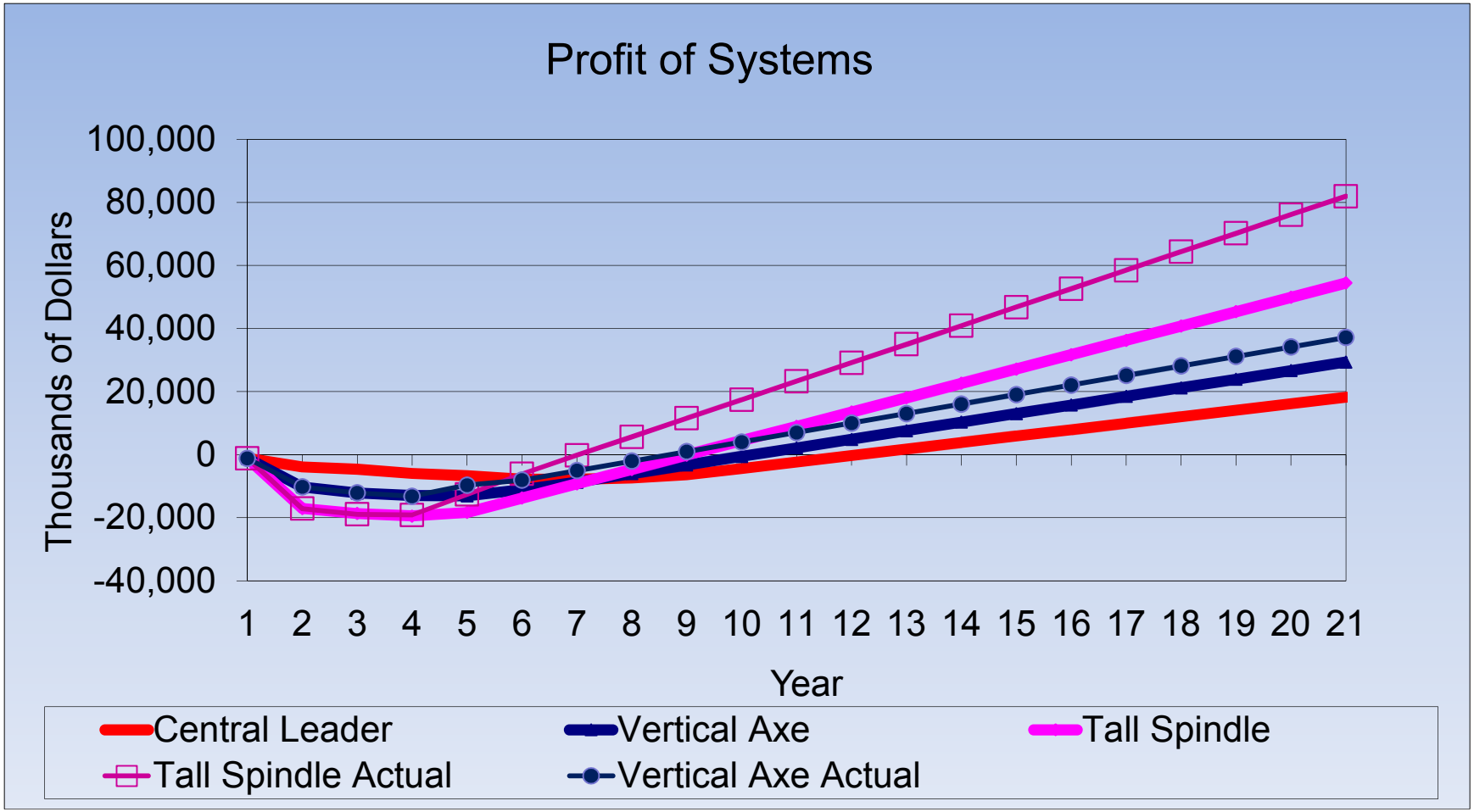
## Yield/Acre (bu)



# Tall Spindle-Vertical Axe



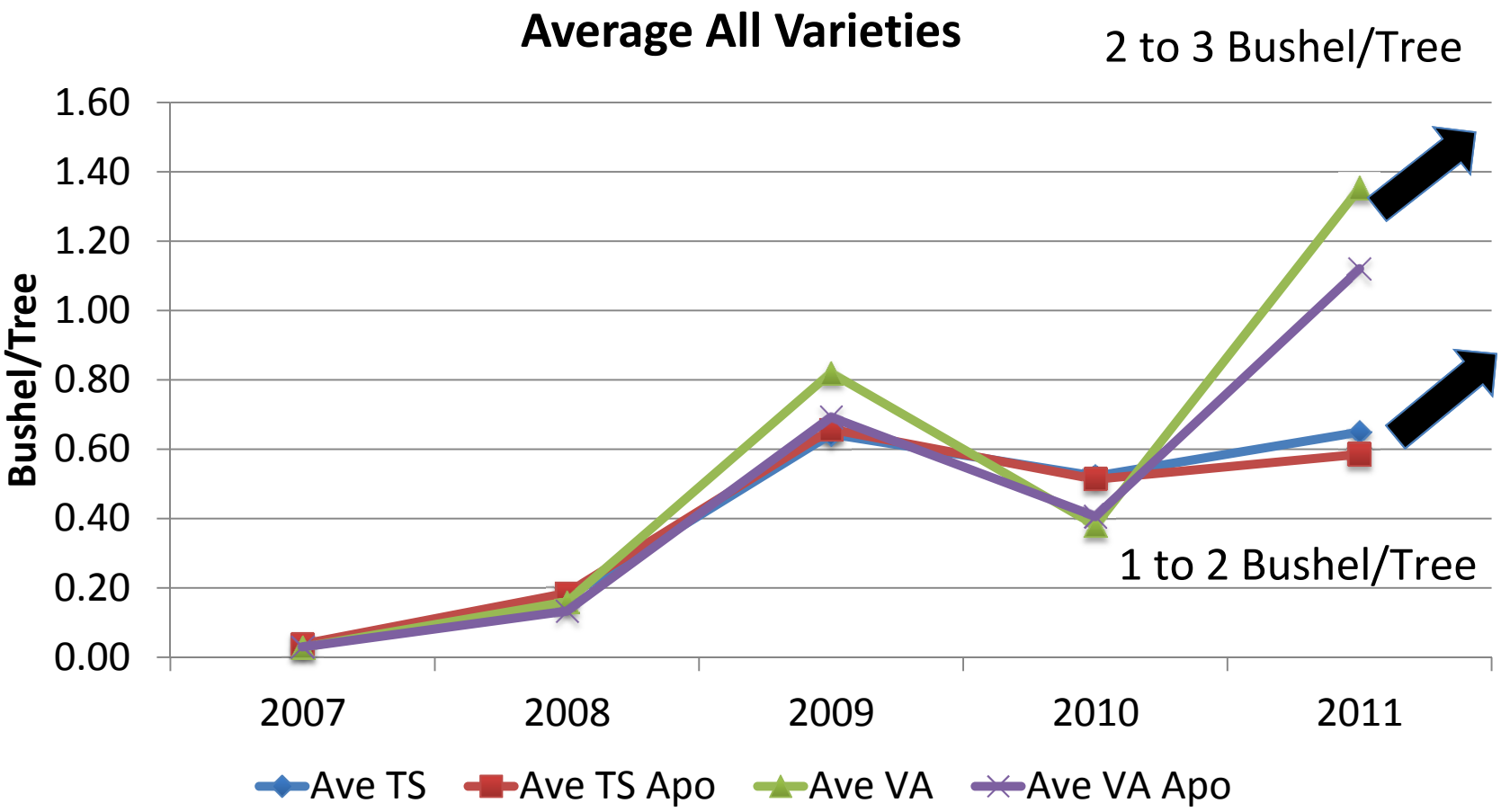
# Profit of Systems with Actual Yields



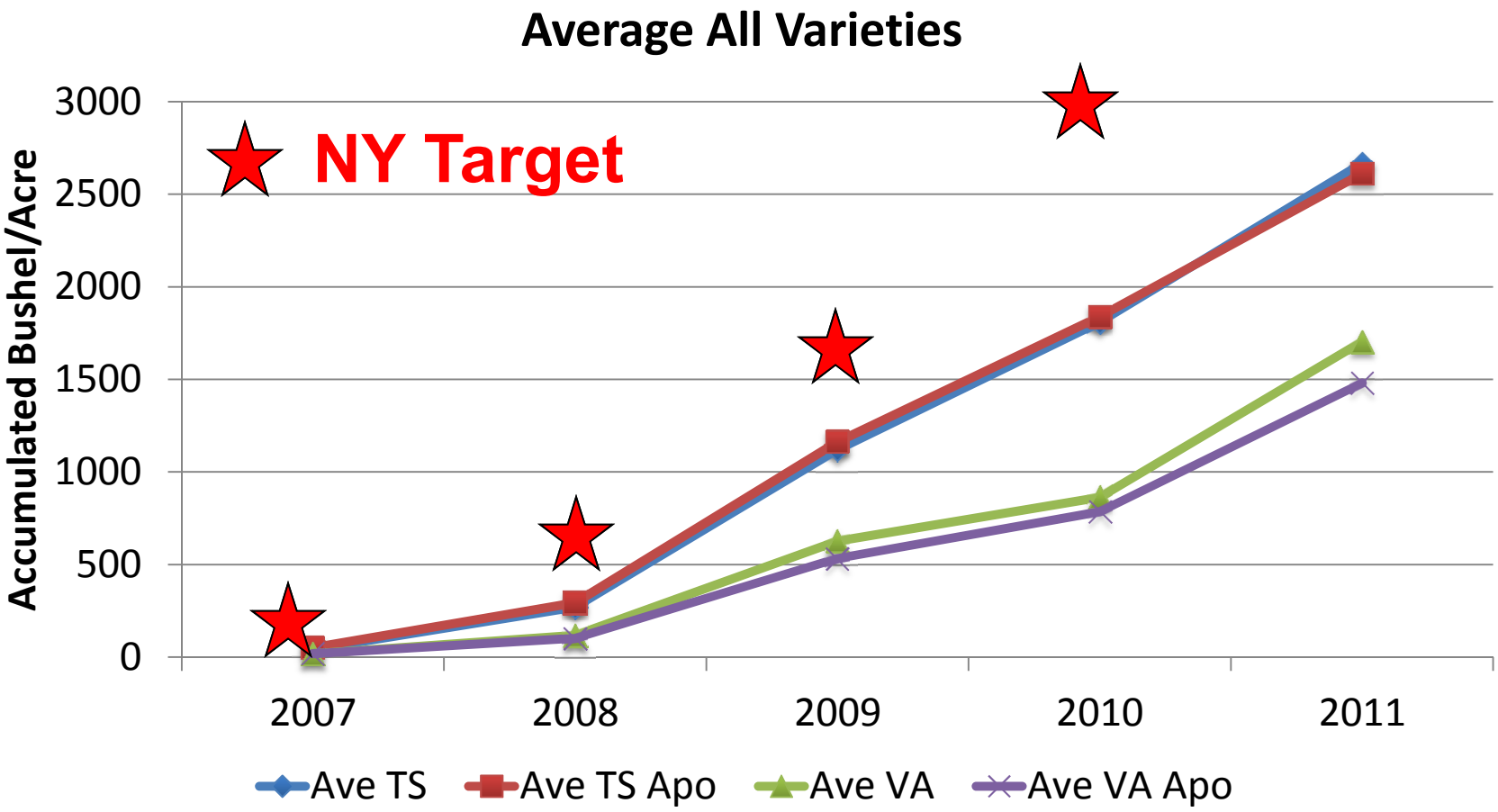
# CHES Performance
# Tree, Acre, Accumulated Yields

- Average of all varieties
- Gala
- Honeycrisp
- Spy

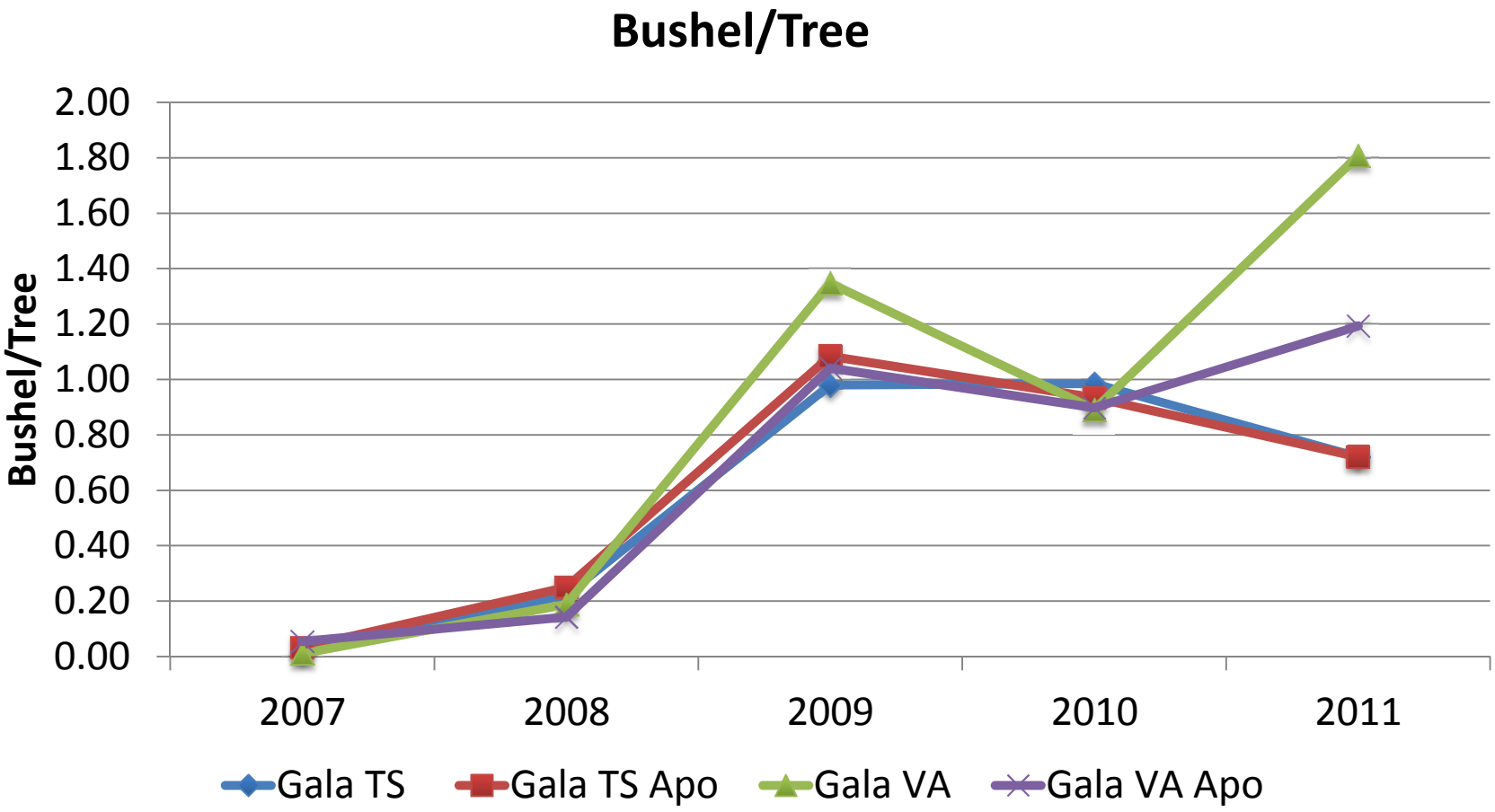
# Ave All Varieties Bu/Tree



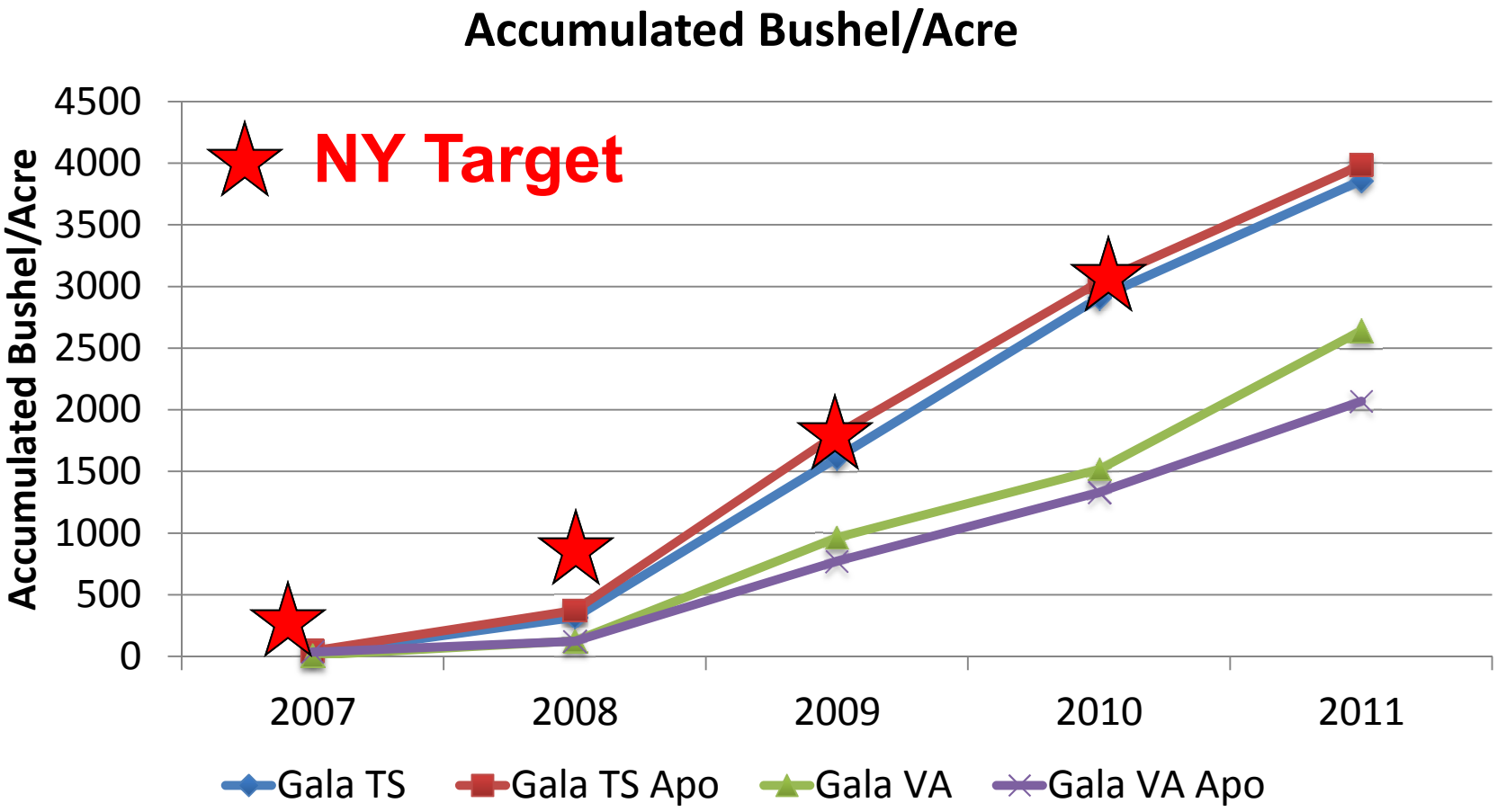
# Ave All Varieties Accumulated Bu/Acre



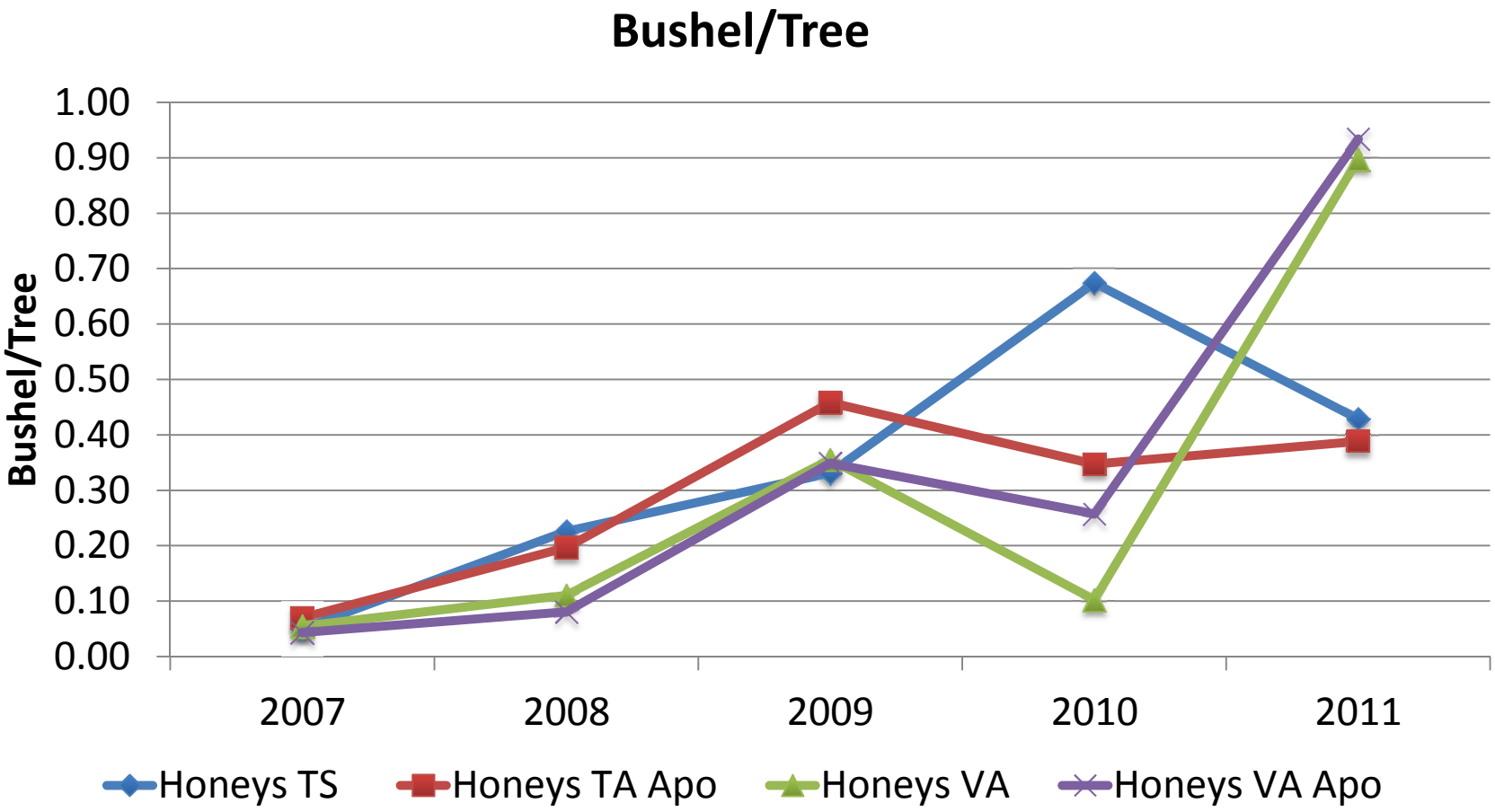
# Gala Bushel/Tree



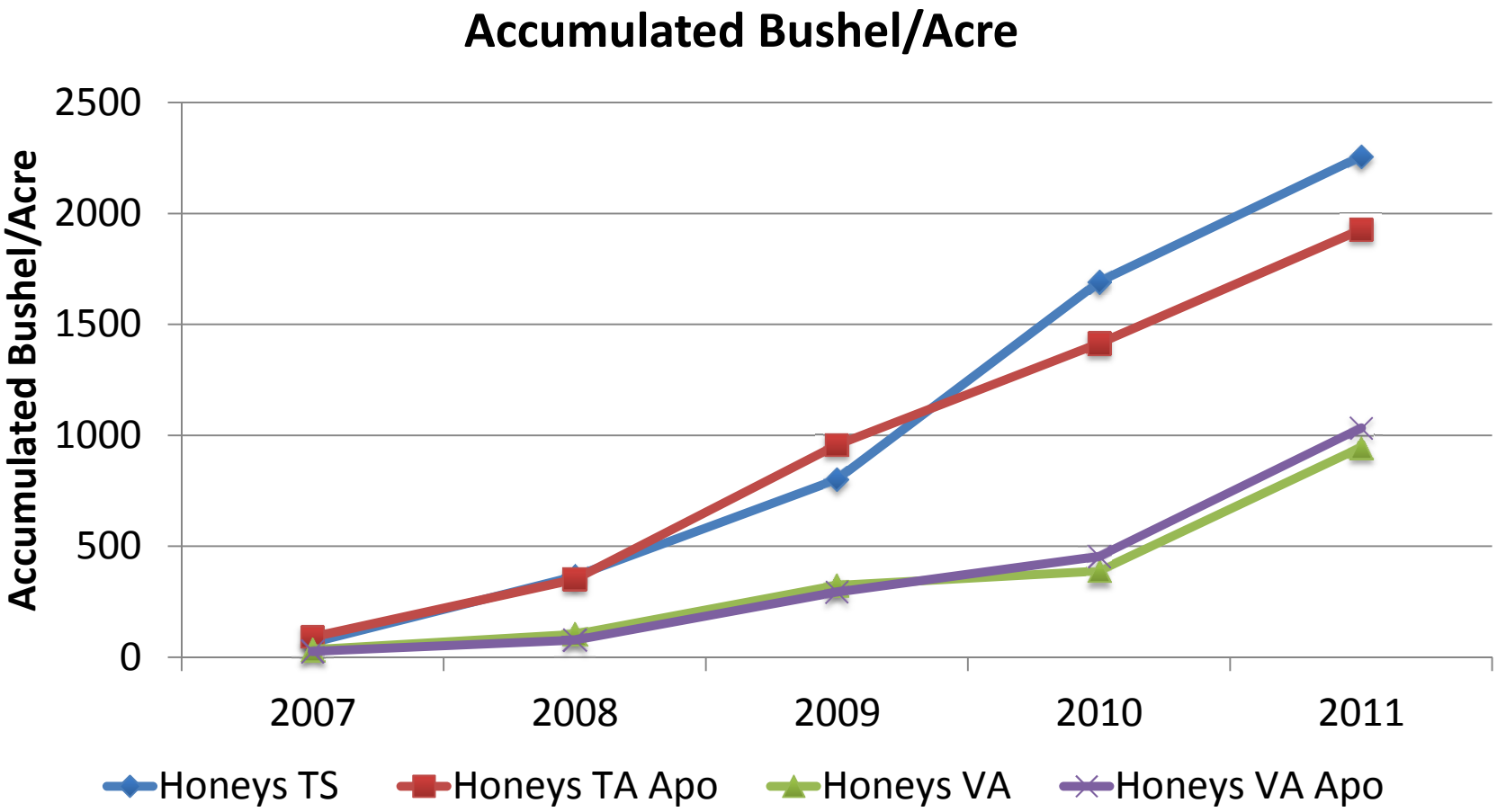
# Gala Accumulated Bu/Acre



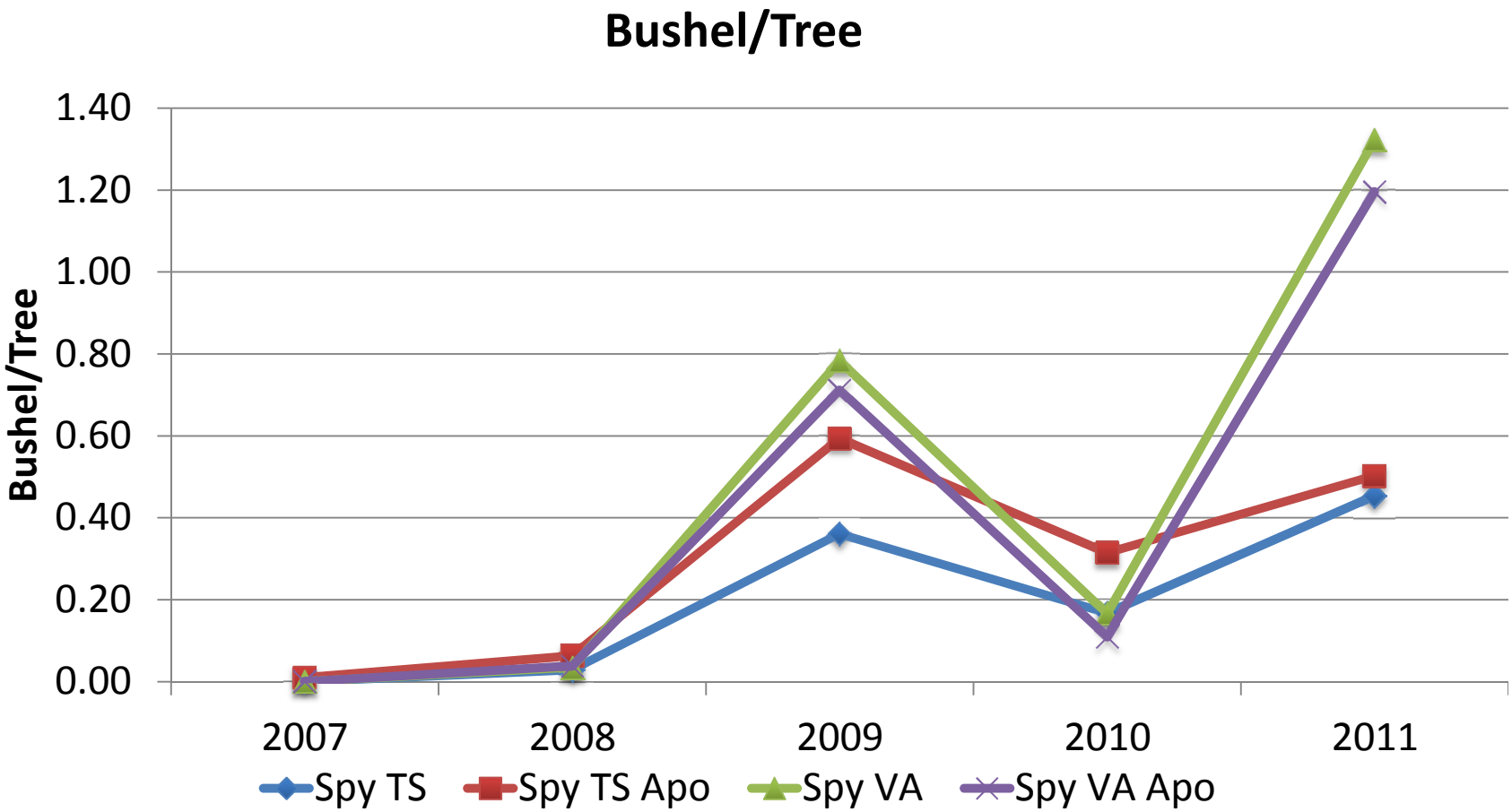
# Honeycrisp Bushel/Tree



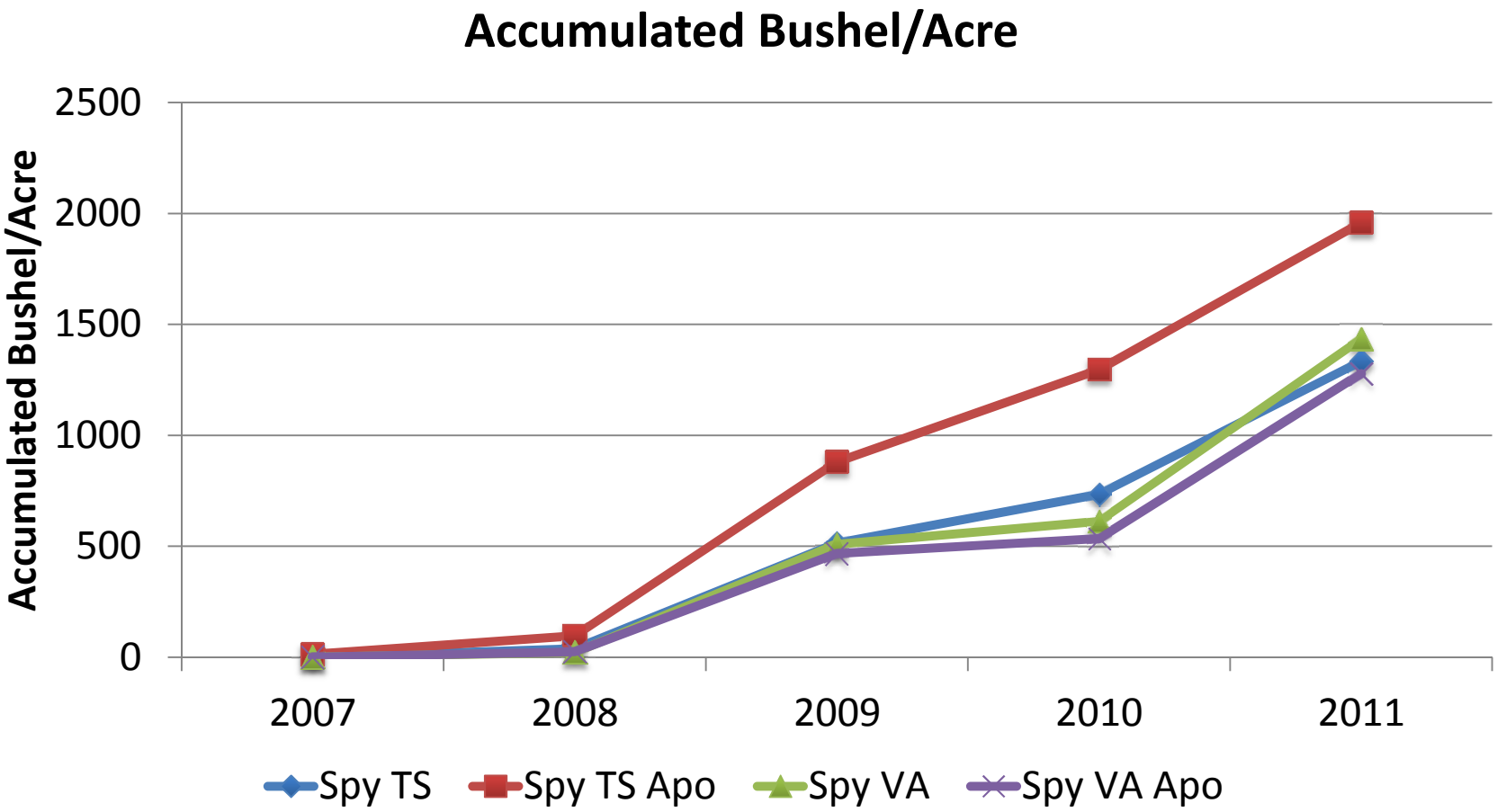
# Honeycrisp Accumulated Bu/Acre



# N. Spy Bushel/Tree



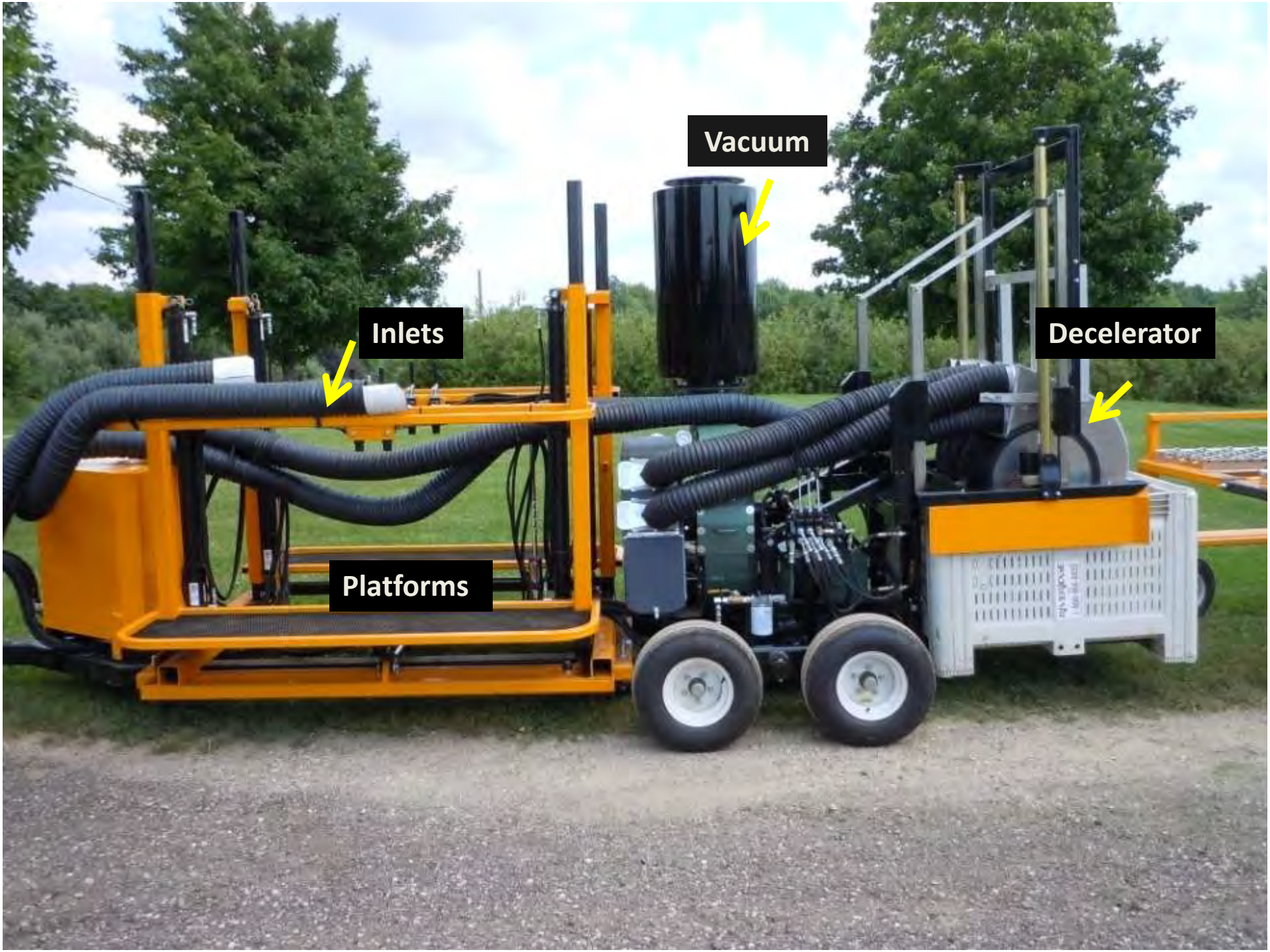
# N. Spy Accumulated Bu/Acre




Tall Spindle
Gala

# Summary

- Tall Spindle production increases quickly.
- TS production is 166% of VA.
- Apogee increases early production (some varieties).
- Apogee 5 year production was not significantly different to UTC.
- Must have good trees, nutrition, irrigation.
- TS produces high quality fruit.
- Spy responds well to Apogee and TS.


Vacuum
Inlets
Decelerator
Platforms

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Super Spindle/M9


V- Super Spindle/M.9

# Tree Training of the Tall Spindle

First Year

- Do not head leader.
- Do not head feathers.
- Remove feathers that compete with leader using a stub cut.
- Tie down 5-8 feathers below horizontal at planting or in July.
- Trees with many short, flat feathers need no pruning.

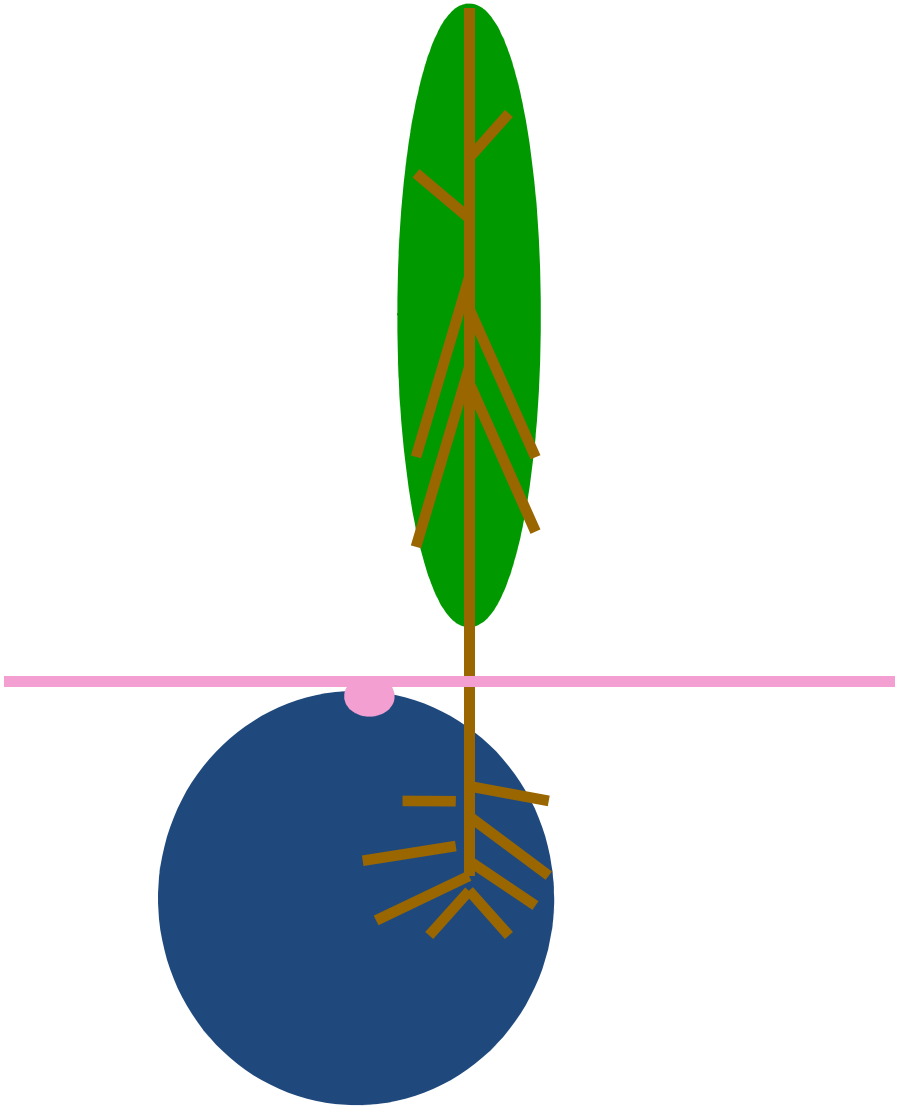



# Pruning Years 2-5

- Remove any branch that is larger than ¾” diameter.
- Removal of large branches helps keep trees small and manageable.
- Large branches create large trees by exporting carbohydrates to the rest of the tree.

# Irrigation and fertigation improve growth and early cropping of the Tall Spindle trees

- Highly feathered trees experience water stress
- Trickle irrigation should be installed within 2 weeks of planting and water should be applied frequently to limit water stress.
- Newly planted trees that getfertigation can significantly improve tree growth.



3 Yr. Old Empire (Unirrigated)

3 Yr. Old Empire (Fertigated)

# Characteristics of G.11

- Tree size similar to M.9 T337.
- Very productivity, and precocious.
- Outperformed M9 clones.
- Resistant to Fire Blight.
- Resistant to Crown Rot
- Not tolerant to replant
- Susceptible to Wooly Apple Aphid



Golden Reinders Bologna, ITALY
Courtesy of Stefano Musacchi

# Characteristics of G.41

- M.9 vigor, Slightly larger than 337
- Highly yield efficient
- Highly productive, yields 100-125% of M.9)
- Very precocious
- Very cold hardy
- Excellent fruit size
- Wide branches
- Immune to Fire Blight, Crown Rot,
  Wooly Apple Aphid
- Replant tolerant
- Tends to be less biennial on Honeycrisp.
- In the USA new stoolbeds were planted in 2009 and 2010 (100,000 plants).

# Characteristics of G.935

- Vigor between M.9 Pajam 2 and M.26
- More productive than 26, like 9.
- Wide branch angles.
- Very cold hardy
- Good graft union and propagation characteristics
- Resistant to Fire Blight and Crown Rot
- Tolerant to Replant Disease Complex
- Susceptible to Wooly Apple Aphid
- Best semi-dwarf rootstock in NY trials
- Fruit size is smaller than M9.

# Characteristics of G.202

- It is similar in size to M.26
- Precocious, productive
- It is resistant to woolly apple aphid, fire blight, and crown rot
- Good choice for weak growing cultivars like Honeycrisp
- Tolerance to apple replant disease
- Good hardiness.

# Characteristics of G.214

Vigor similar to M.9 Pajam2

Highly yield efficient

Highly productive, yields 100-125% of M.9.

Good precocity

Resistant to Fire Blight, Crown Rot and Wooly Apple Aphid

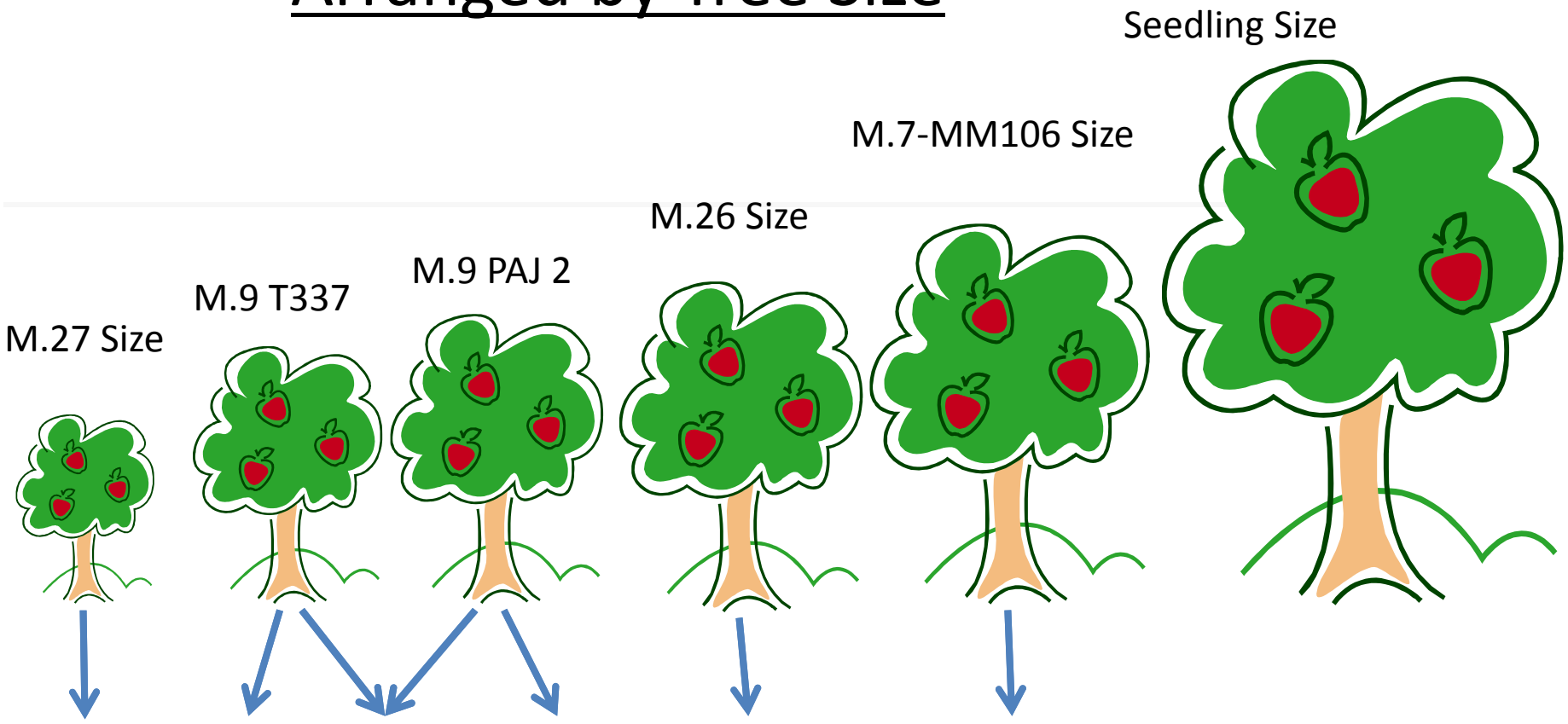
Replant tolerant

Good for weak varieties.

# Characteristics of G.969, G.210 and G.890

- Vigor between M.7 and MM.106
- Replacements for G.30
- Free standing
- Precocious, productive
- Yield efficiency similar or better than M.9
- Resistance to woolly apple aphid, fire blight, and crown rot.
- Tolerance to apple replant disease.
- Good rooting in stoolbed few spines.
- Mostly for processing industry

# Released Geneva® Apple Rootstocks Arranged by Tree Size



# Rootstock Guide

| | **G11** | **G41** | **G214<br>G16** | **G935** | **G202<br>G30** | **G969<br>G210<br>G890** |
|---|---|---|---|---|---|---|
| Vigor | 337 | 337 to Pajam 2 | Pajam 2 | Pajam 2 to M26 | M26 | M7 to MM106 |
| Fireblight | Resistant | Immune | Resistant | Resistant | Resistant | Resistant |
| Crown Rot | Resistant | Immune | Resistant | Resistant | Resistant | Resistant |
| Replant | Not Tolerant | Tolerant | Tolerant | Tolerant | Tolerant | Tolerant |
| Wooly AA | Susceptible | Immune | Resistant | Susceptible | Resistant | Resistant |

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Marriott Copley Place

Boston, MA


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# IFTA 2013 Boston

## Saturday, February 23

2 Pre-Conference Intensive Workshops (Concurrent)


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# IFTA 2013 Boston

Saturday, February 23

Workshop 1 - Strategies for Improving Production Practices

*Flowering, Pollination, Modeling, Fruit Set*


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# IFTA 2013 Boston

Saturday, February 23

Workshop 2 - Managing Pick Your Own Tree Fruit Operations

*Keeping Sane While Chasing Fabulous Wealth*


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# IFTA 2013 Boston

Sunday, February 24

Hi-Density Cherry and Peach Pruning Demonstration

- Tougas Family Farm
- Greg Lang/Lynn Long/ Jim Schupp


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# IFTA 2013 Boston

Monday, February 25

Education Session I and II

- I – Innovation in Production
- II – Innovation in Automation


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# IFTA 2013 Boston

Tuesday, February 26

Field Learning Tours

- Belkin Lookout Farm, MA
- Tougas Family Farm, MA
- Tower Hill Botanic Garden (lunch)
- Brookdale Fruit Farms, NH
- Parlee Farms, MA


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# IFTA 2013 Boston

Tuesday, February 26

Banquet and Awards Ceremony

- New England Boiled Dinner
- Research, Extension, and Grower Awards
- Jokes and fun!


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# IFTA 2013 Boston

Wednesday, February 27

Education Session III and IV

- III – Innovation in Technology and Varieties
- IV – Innovation in Climate Change Strategies and Production


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# IFTA 2013 Boston

Thursday – Saturday
February 28 – March 1

Post Conference Tour,
Hudson Valley, NY

- UMass Research Orchard
- Cornell Hudson Valley Lab
- Innovative Hudson Valley Orchards
- Storage & Packing, PYO, Retail, Cider


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Registration is now open

Go to [http://ifruittree.org](http://ifruittree.org)

See you in Boston!


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If that's not enough incentive…

SAMUEL ADAMS®

# Tree Fruit Irrigation/Fertigation/Frost Workshop

- NW Hort Research Station, Suttons Bay
  - Feb 5th, Tuesday


Thanks to:
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MICHIGAN STATE UNIVERSITY AgBioResearch