

Pistachio Harvester Evaluations



Trunk Shaking Harvesters





Final Harvester % Efficiency

dry weight harvested split in-shell
(harvested) + (unharvested)



2009 Preliminary Trials

- Effect of tree size on shaker efficiency
 - Efficiency decreased with increasing girth
 - High percentage edible nuts unharvested
 - 2nd shake year

Objective: 2010

Evaluate Harvester Efficiency

- 6 Harvesters
 - 4 commercial
 - 2 experimental
- 5 trees of varying girths
- 8 second shake
 - Weigh – dry - grade
- Hand harvest
 - Weigh – dry – grade









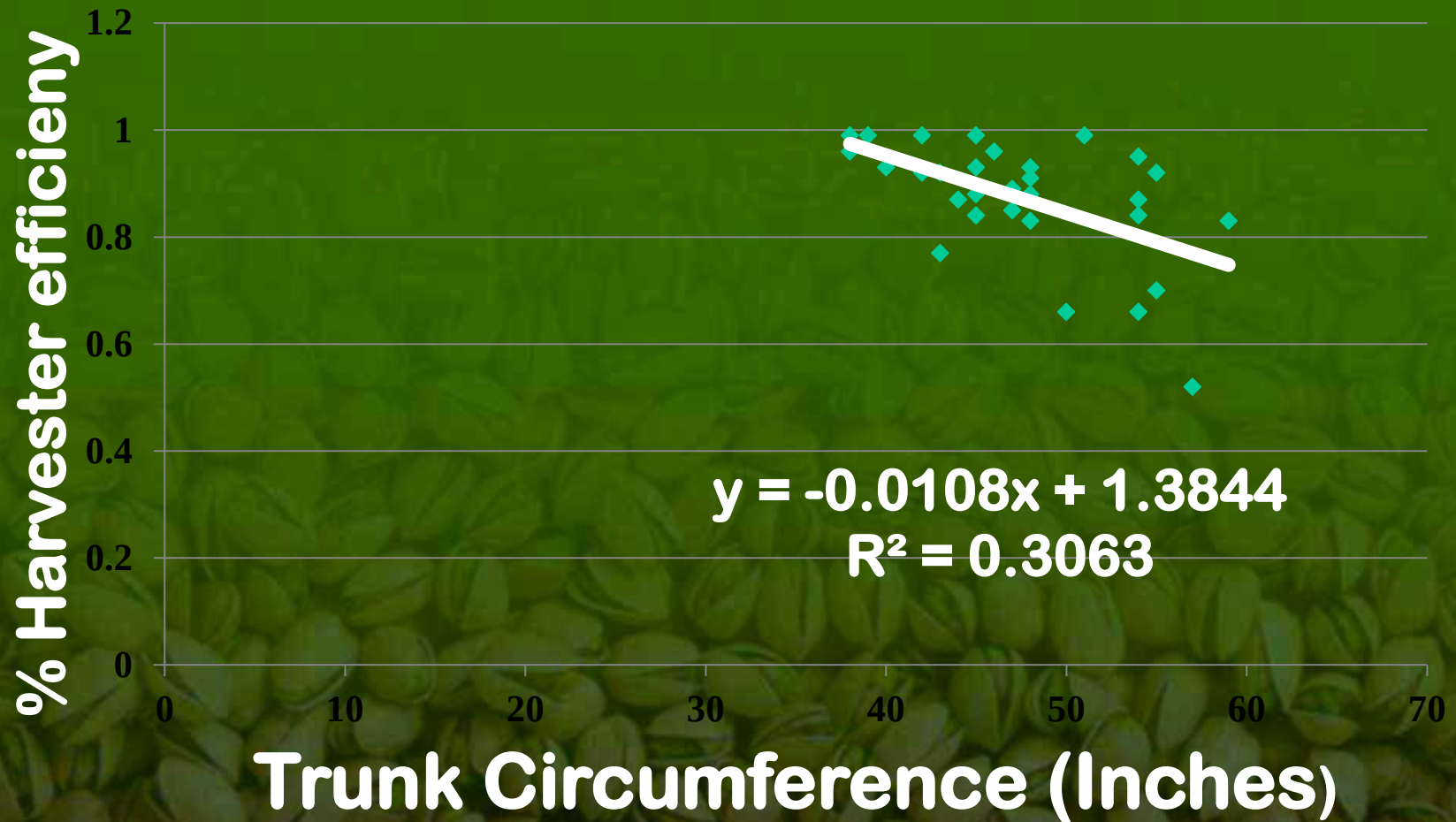


#4 / Pop#1
Ayer 2

Harvester Comparison: 2010

Harvester	% Efficiency (dry in-shell splits)	Average Trunk Circumference (“)
I	86 b	47.8
II	79 b	46.8
III	82 b	49.2
IV	84 b	49.6
V - experimental	96 a	44.0
VI - experimental	96 a	47.4

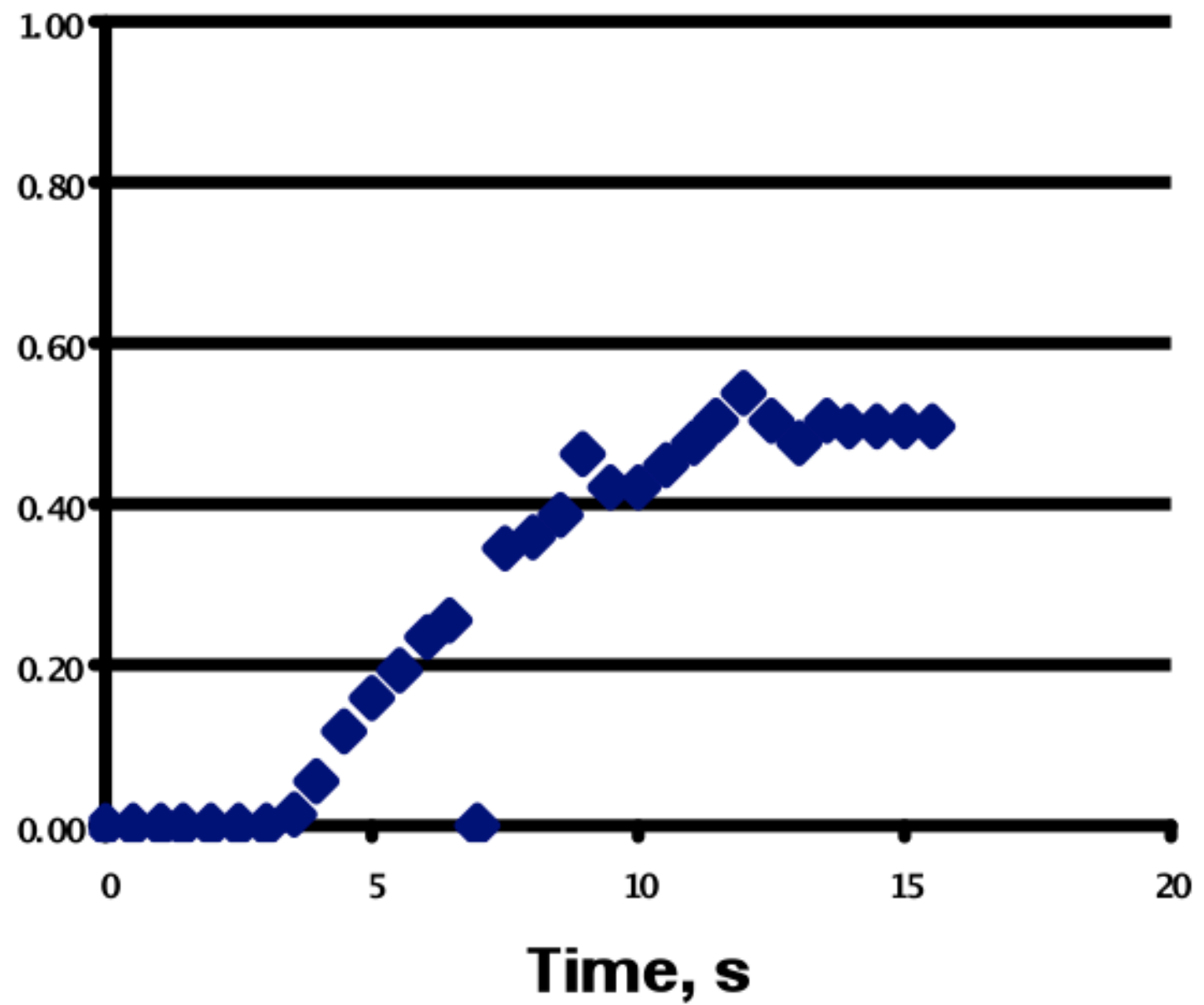
Harvester Efficiency as a Function of Trunk Circumference





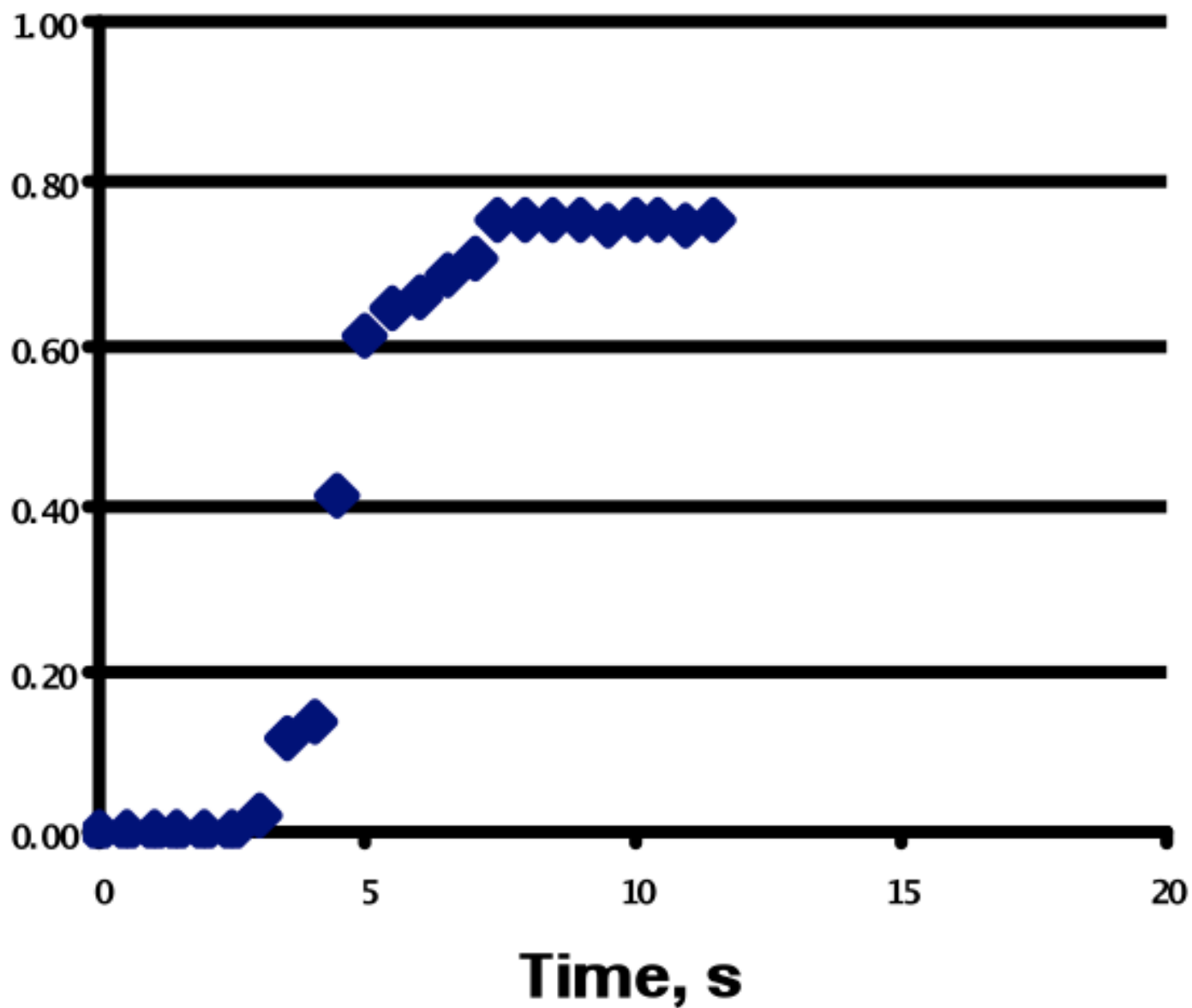
Tree#16

Area of harvested fruit /
area of white reference
frame, %



Tree #9

Area of harvested fruit /
area of white reference
frame, %



2010 Trial Conclusions

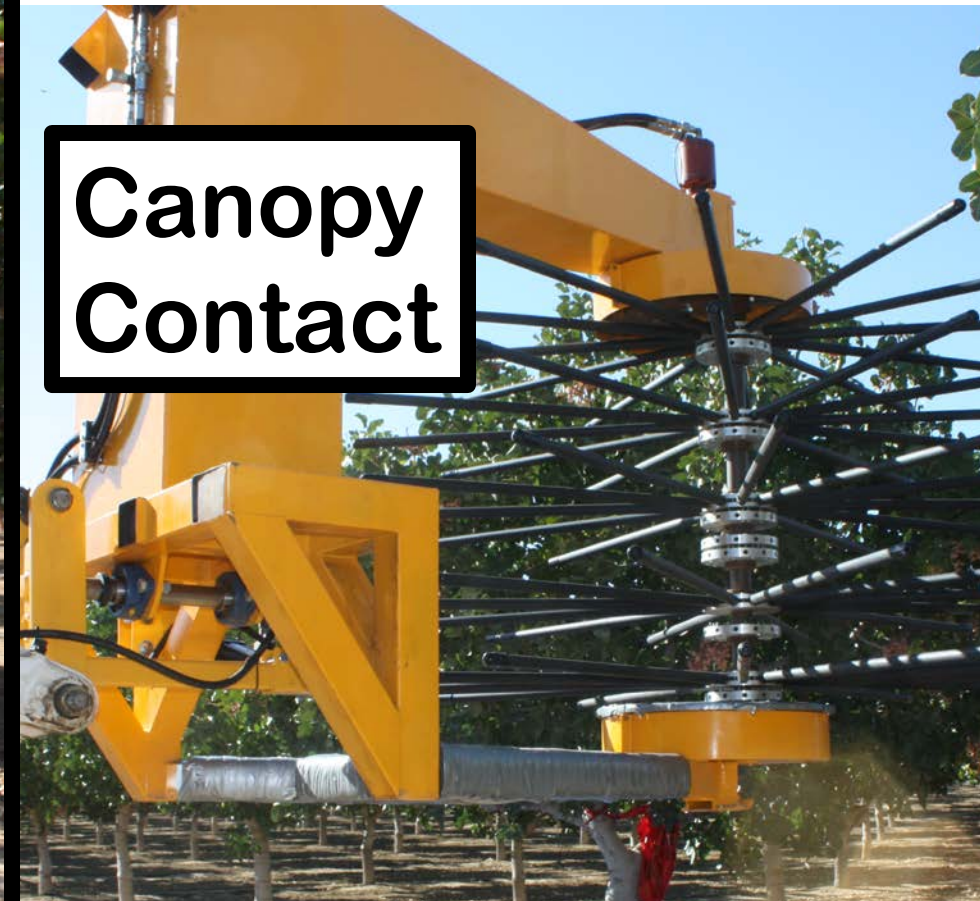
- Difference in trunk shakers:
 - Technology can be improved
- Pruning could improve efficiency:
 - Height and width
 - Branch angle
 - Circle ties (?)

Pistachio Harvester Evaluations: 2011

Two Trunk Shakers



**Canopy
Contact**



Objective: 2010

Evaluate Harvester Efficiency

- 3 Harvesters
 - 1 control trunk shaker
 - 2 experimental: trunk and canopy
- 12 – 36 tree replications
- 4 - 6 second shake
 - Weigh – dry - grade
- Hand harvest
 - Weigh – dry - grade

Control vs. Experimental Trunk Shaker*



Control vs. Experimental Trunk Shaker

- 1.8 lbs/tree X 120/trees acre
- 216 lbs/acre X \$1.00/lb

\$216.00/acre

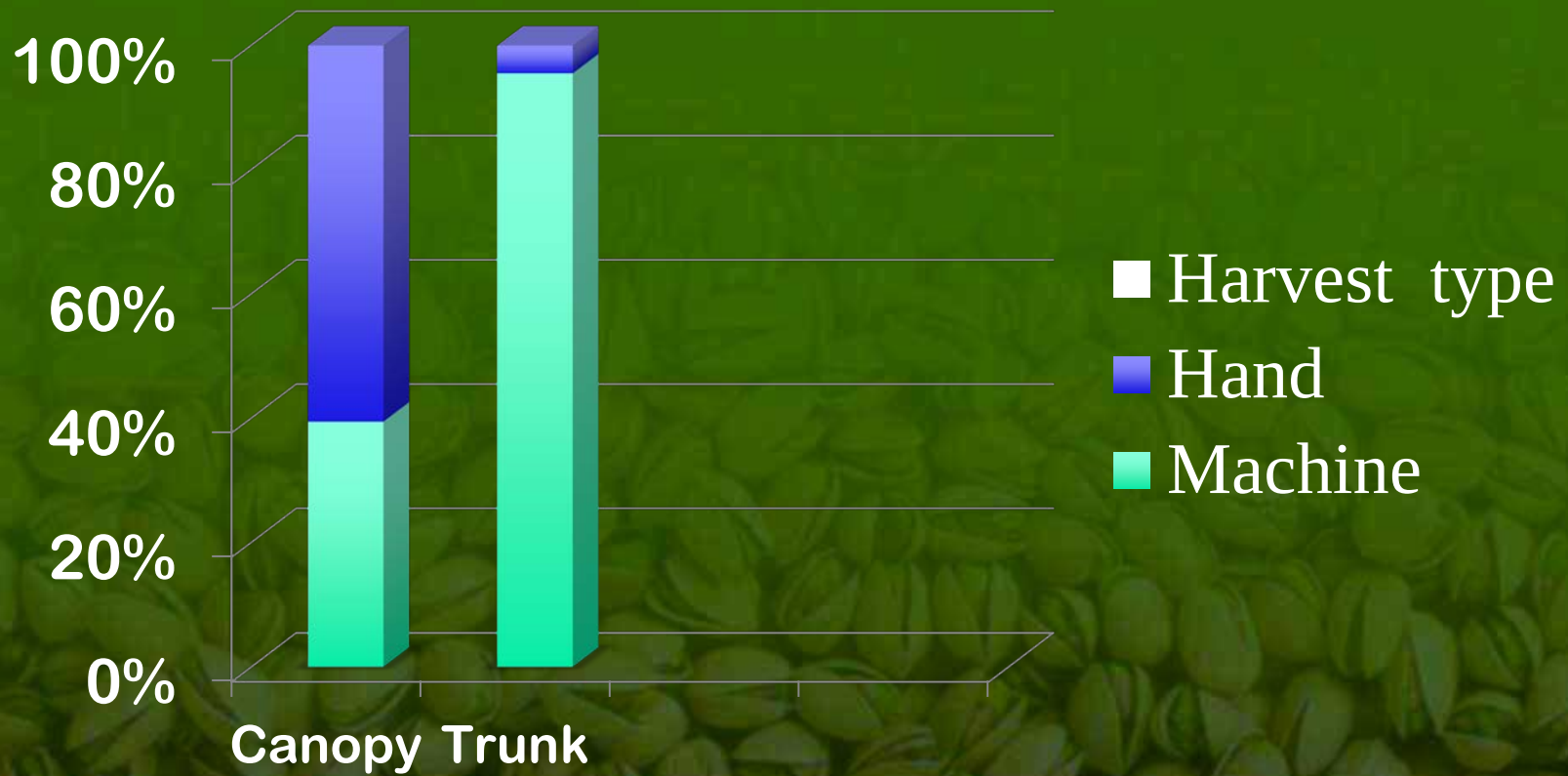
Canopy Contact Harvester







Canopy Contact vs. Trunk Shaker*



Canopy Contact

Slower:

1.1 vs. 0.3"/tree*

Removed tips:

7.4 vs. 1.6/tree*



2011 Trial Conclusions

- Currently, trunk shakers work well
 - For trees $< 40''$ in circumference
 - 86 % on larger trees (> 25 years)
 - 95% on smaller trees (< 12 years)
- But we need to be improving efficiency now

Final Harvester Efficiency





Traditional Orchards: 96 trees/acre



12 Feet

6 Feet

New Orchards: > 200 trees/ac



Hedgerow Orchards: 200+/-acre

Since 2000: > 25% acreage



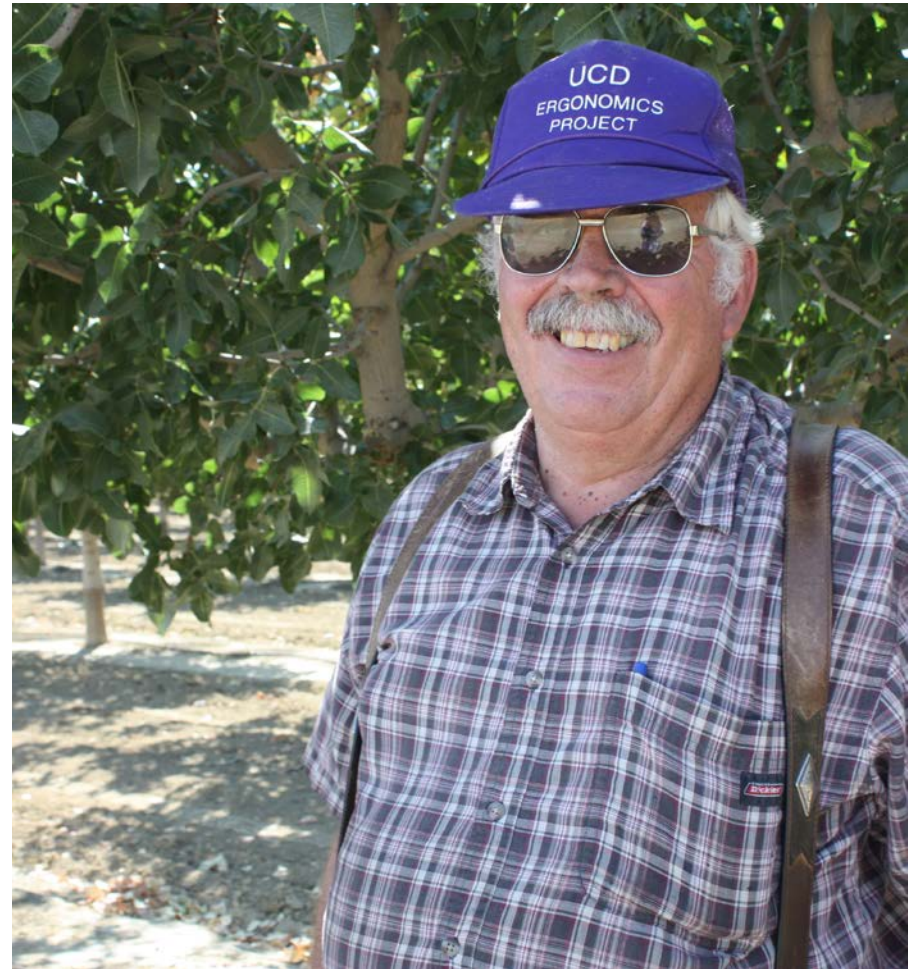
2011 Trial Conclusions

- Difference in trunk shakers:
 - Efficiency can be improved
 - Proprietary engineering
 - Orchard adaptation

2011 Trial Conclusions

- Canopy contact technology: 4 steps
 - ✓ Demonstrate removal technology
 - ✓ Determine if harms tree or product
 - Develop carrier + catch frame
 - Increase final efficiency
 - Engineering
 - Orchard adaptation

Special Thanks



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