

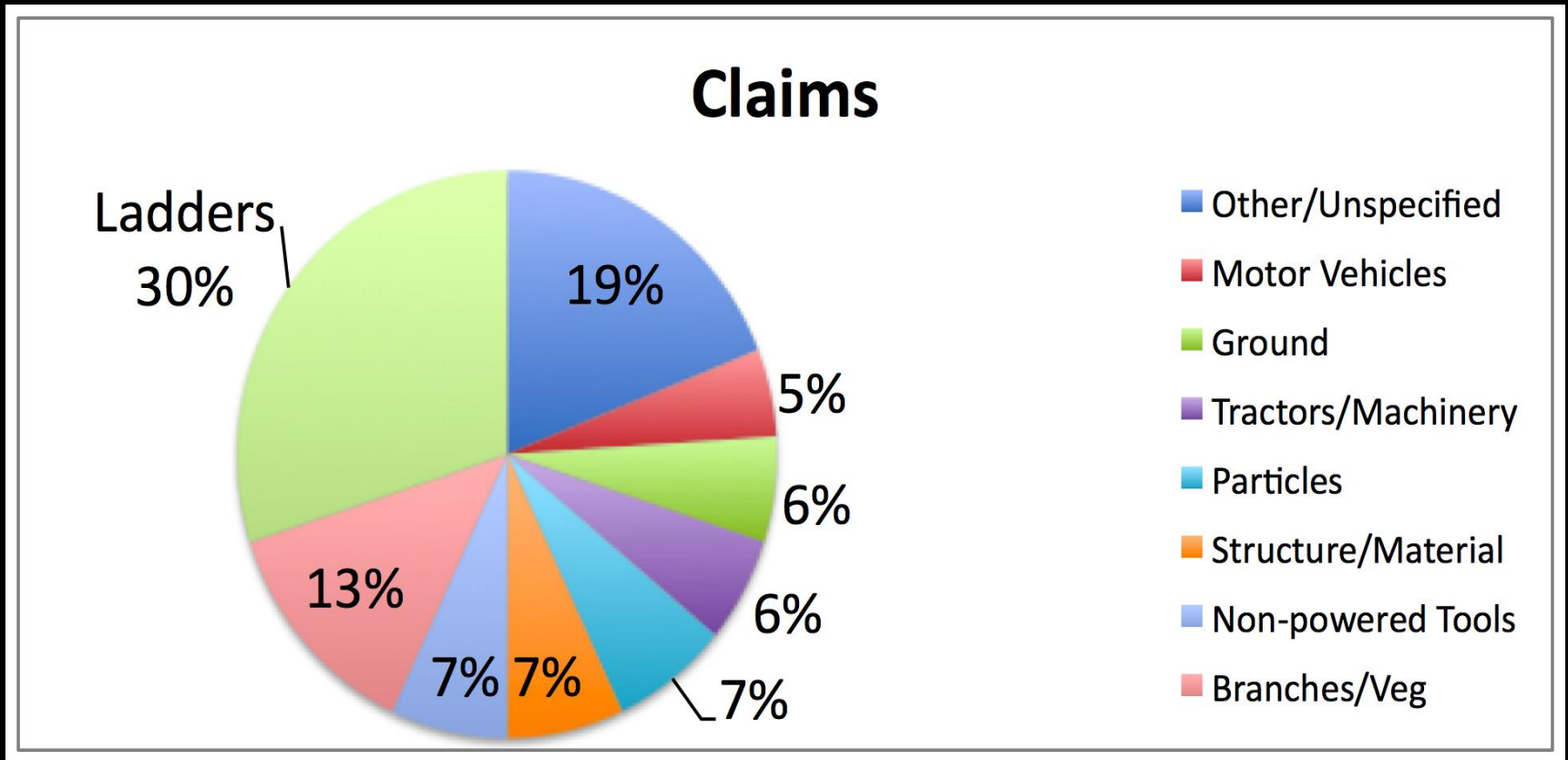
# Orchard Mechanization in Washington State

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# Total of 13,068 Claims 1996-2001

## Ladders - \$20M (time/med)



(SNAP)

Simple, Narrow, Accessible and  
Productive Canopies

Random or organized /  
narrow = accessible

Uniform Canopy/ Uniform Crop

High Early Yields

High Mature Yields

High Quality Fruit (Target)





Pear  
V trellis  
Anjou/OHF87



Cherry  
UFO  
Sweetheart/Gi6

# Scott McDougall

- “We have invested in and succeeded with high density narrow systems. We now need the engineering solutions to optimize the horticultural system and our investment”

Investment in Technologies

MUST make you money

*Increased productivity* that results in a lower per  
unit cost

Or

*Increased quality* that results in a  
greater return

- Proven reliability  
Local parts and service  
Safe  
Simple  
Scalable  
Multi purpose  
Positive ROI (not just \$\$)

Lease? Contract?

**For Success:** Right fit for block, people, machine and task and..

Desire to make it work





**1-1.5 mph 35 acres/day**

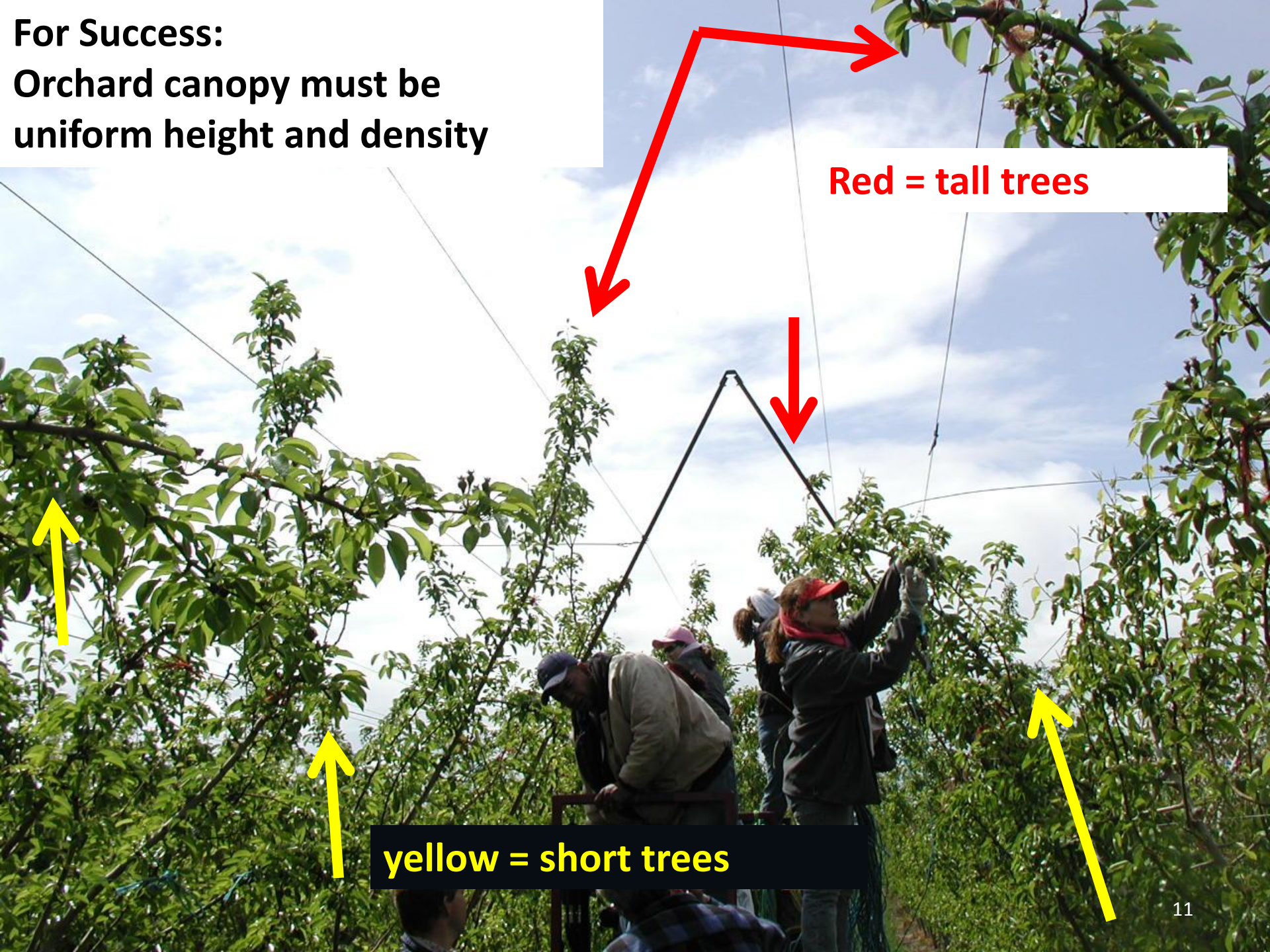
**1.5-3 km/h 14 ha / day**



**For Success:  
Orchard canopy must be  
uniform height and density**

**Red = tall trees**

**yellow = short trees**











# Efficiencies

Apple – high density, tall, narrow systems

- Tree Training +40-60%
- Bloom Thinning +25-45%
- Green Fruit Thinning +35-45%
- Pheromone Placement +75%
- String Tying +65-116%
- Trellis Construction +15-20%

# APPLE Mechanical Pruning





# Gillison Center Mount



# LaGasse Hedger





Dormant to bloom hedging sets the “box”  
for harvest assist  
Detailed hand pruning to manage bud load  
and fruit quality



Orchard system is based on short, stiff, horizontal fruiting units, with 2-4 buds





# Pretty Scary



# Apple trials: Fuji – treatments



Treatment	Dormant pruning	Summer pruning
1	Hand	
2	Mechanical	
3	Hand	Mech. 12-15 leaves
4	Mechanical	Mech. 12-15 leaves
5	Hand	Mech. 20 leaves



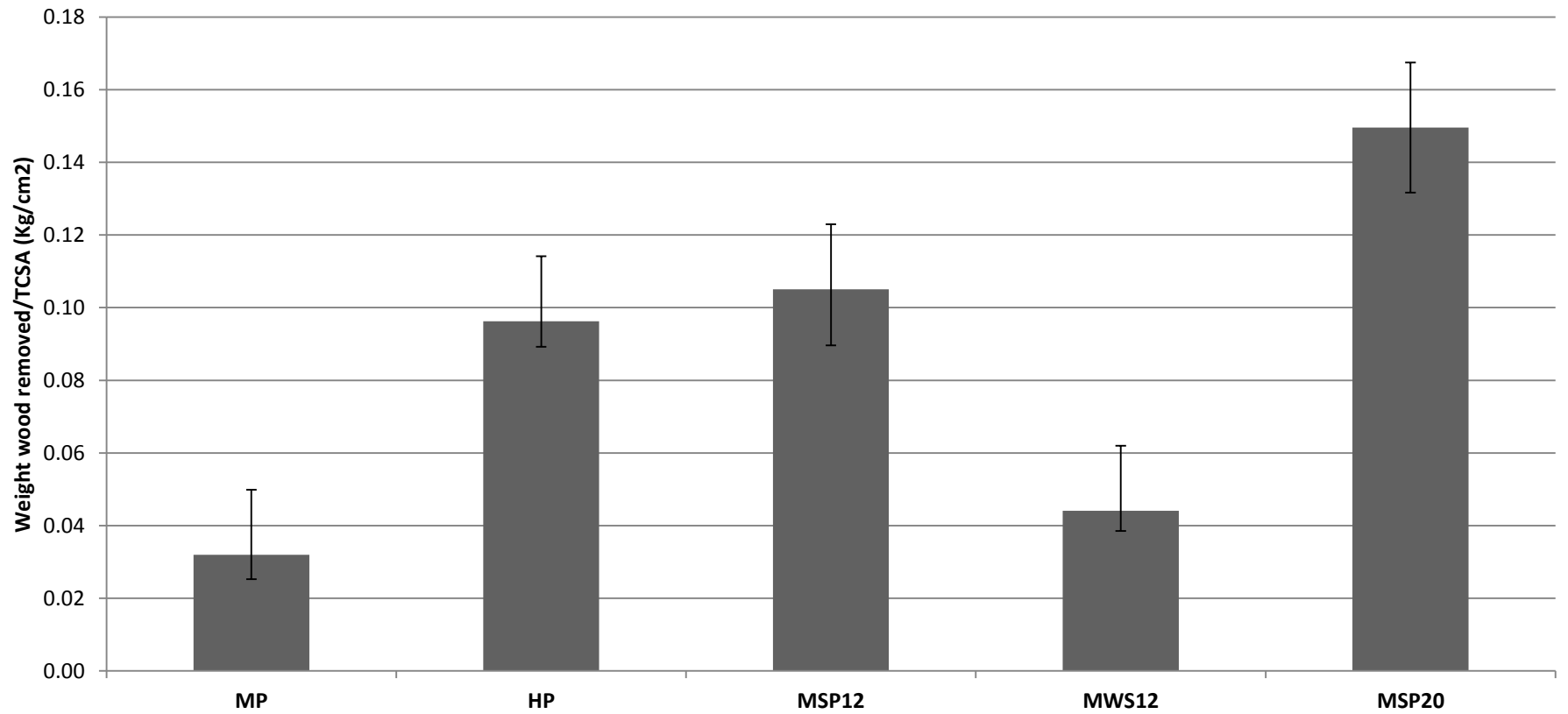


June 2, 2014 10-12 leaves – Fuji/M9





# Wood Removal



# Summer pruning



Before pruning



After pruning



Max 3.5% damaged  
fruit/tree before green  
thinning

# Regrowth

TREATMENT	Current season shoot length/tree (cm)		st error	Number current season shoots/tree		st error	Shoot length/T CSA	st error
MP	1637.33	a	327.23	96.33	a	9.13	143.51	28.35
HP	1481.00	ab	153.94	92.33	ab	10.24	136.67	18.07
MSP12	1176.78	ab	109.52	72.33	b	5.55	107.31	18.19
MWS12	1051.11	b	115.94	77.22	ab	7.15	97.36	13.03
MSP20	1223.11	ab	132.58	75.22	b	5.91	119.25	19.17
p-value	0.027			0.011			0.1458	



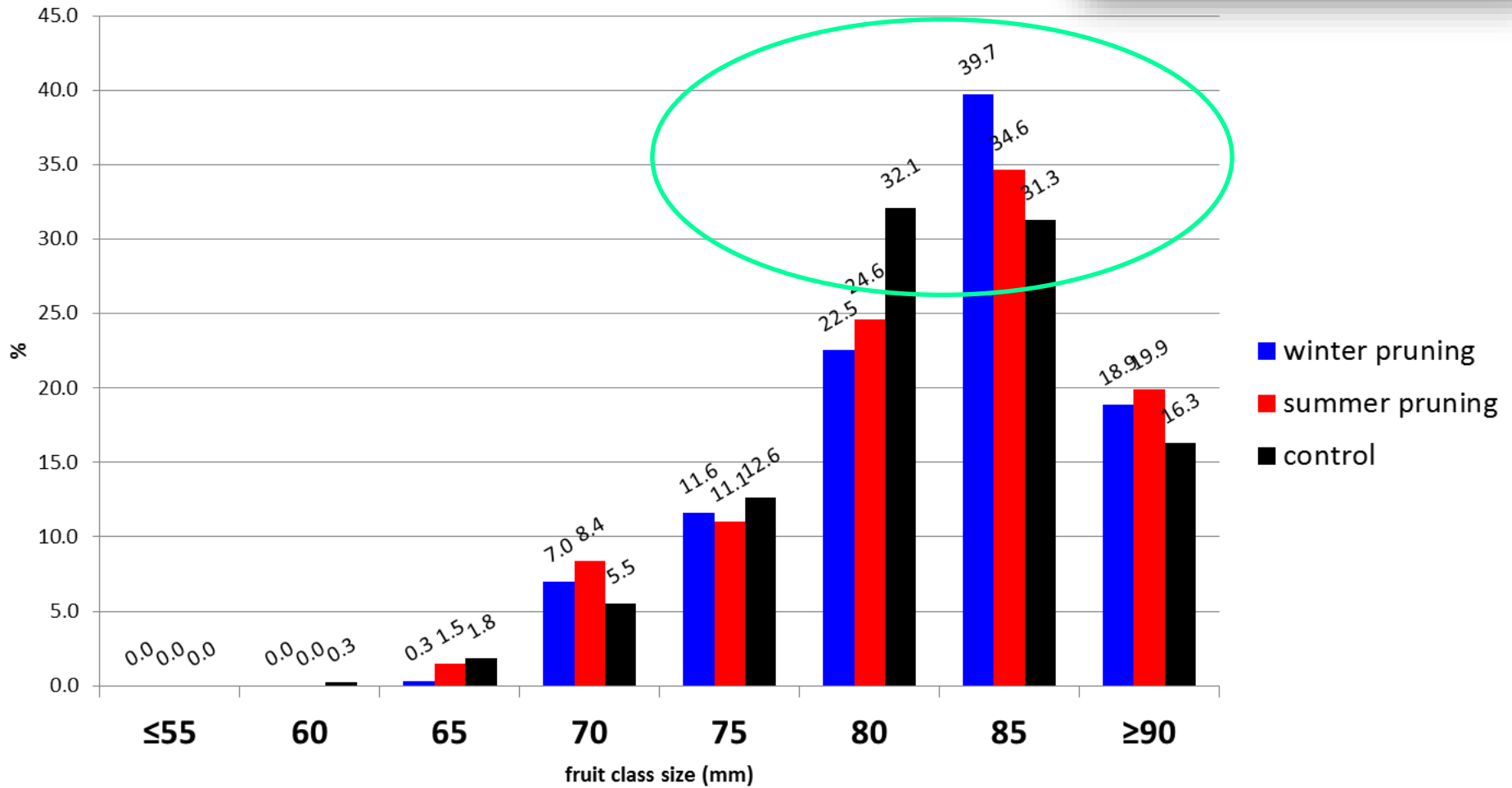


# Fuji Results

- The number fruit/tree from dormant mechanical was 31% higher than number fruit/tree from dormant hand /summer mechanical, with an average of 70.2 apples/tree.
- Apples from dormant hand treatment had 10% lower °Brix than those from dormant hand/summer mechanical with an average of 12.4 °Brix.
- Apples from dormant mechanical/summer mechanical had 46% more sunburn than the apples from dormant mechanical, with an average of 7.6 apples with some degree of sunburn per tree.

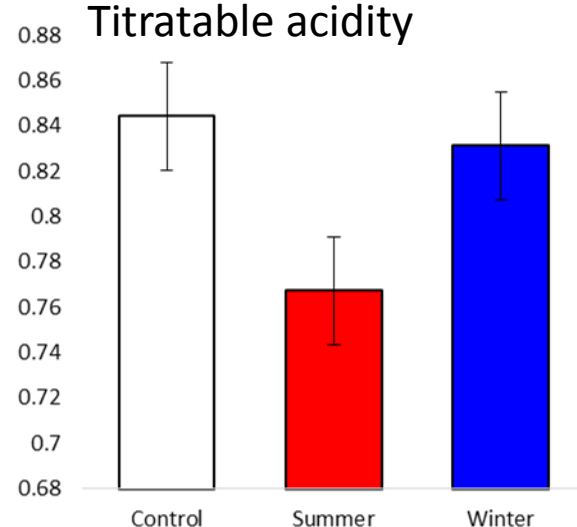
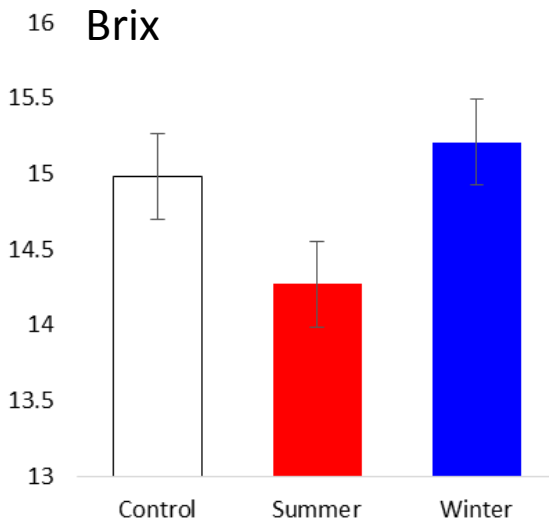


# Pink Lady 2014: fruit size distribution at harvest (9 trees per trt)



# Effects of mechanical pruning on fruit ripeness/maturity

Starch index      **Winter**      **Control**      **Summer**  
                         **5.3**            **5.8**            **6.4**



# Cripps Pink

- Trees mechanically pruned in summer and winter + summer only showed had same pruning weight.
- Trees that were mechanically pruned in summer had higher yields than trees pruned in winter by hand or machine and those that were mechanically pruned in winter and summer.
- At harvest, the number of fruit per tree, net weight of fruit, and yield efficiency was significantly lower in the control than the other treatments. However, the weight of the fruit in the control was significantly higher than other treatments