Hand and mechanical pruning in ‘Carlos’

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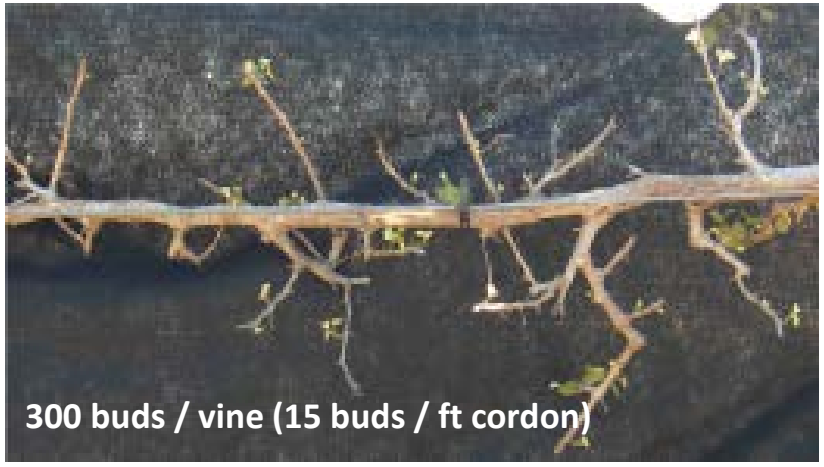
EXTENSION

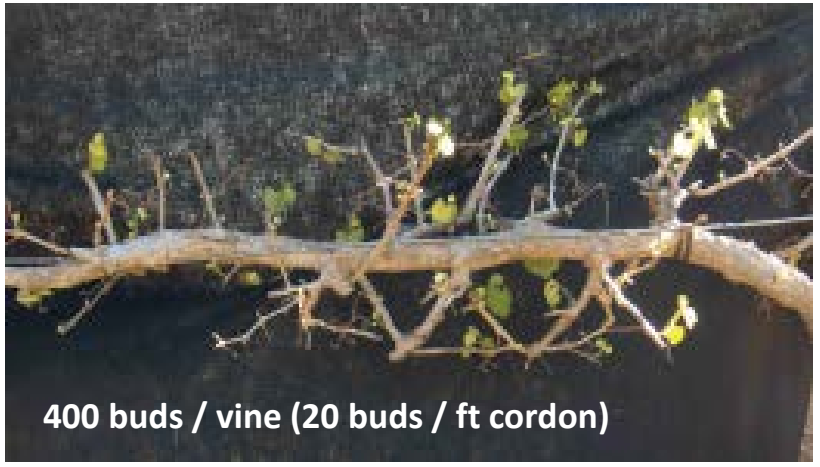
Mechanical vs. hand pruning

Background / Assumption

- Hand pruning is better for the perennial health and crop balance of muscadine vineyards

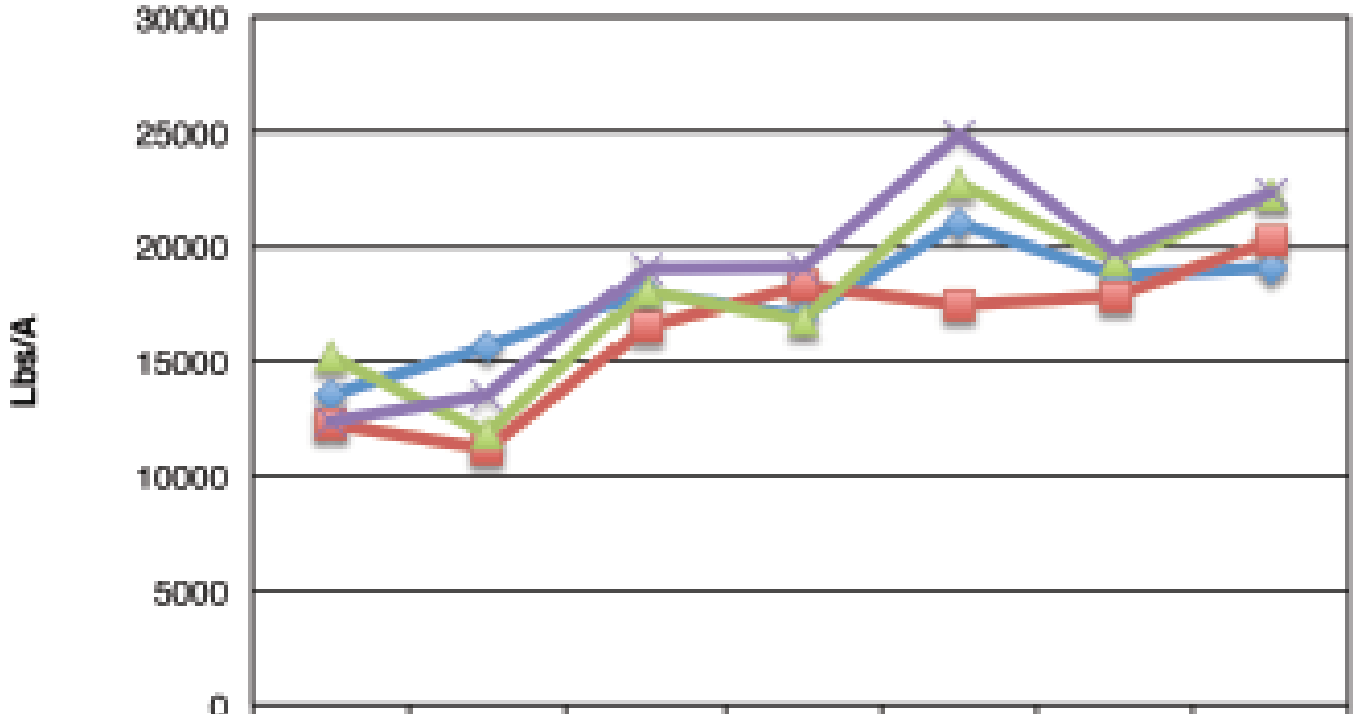
- Mechanical results in:
  - Smaller fruit of lower quality?
  - Roller coaster years?
  - Questionable perennial vine health and sustainability?


300 buds / vine (15 buds / ft cordon)


400 buds / vine (20 buds / ft cordon)

Poling (2013)

Carlos Yields Over 7 Years (2006-2012)



	2006	2007	2008	2009	2010	2011	2012
smp	13512	15621	18014	16936	21005	18748	19049
200 buds	12266	11164	16509	18285	17446	17822	20230
300 buds	15189	11835	18051	16784	22754	19359	22280
400 buds	12362	13512	19004	19100	24873	19782	22350

10 tons/acre

Brix levels?

Poling (2013)

Take homes from Poling (2013)

- 200 buds per vine is not enough
  - Can cost growers $
    - Reduce yields by about 1 ton per acre
    - $500 per ton
    - $20,000 reduction in return revenue on a 40 acre vineyard
- Poling et al. (2004)
  - 150 buds per vine should be retained
  - **WRONG**

Balance pruning formula for Carlos:

“120 + 20”

- 120 buds for first pound
- 20 buds for each additional
- 5 lbs = [120 + (4*20)] = 200 buds
- 15 lbs = [120 + (14*20)] = 400 buds

Mechanical vs. hand pruning

Goal

- Determine if mechanical pruning is a viable dormant pruning option in commercial ‘Carlos’ muscadine vineyards

- Save labor and maintain / improve crop production

Mechanical vs. hand pruning

Methods

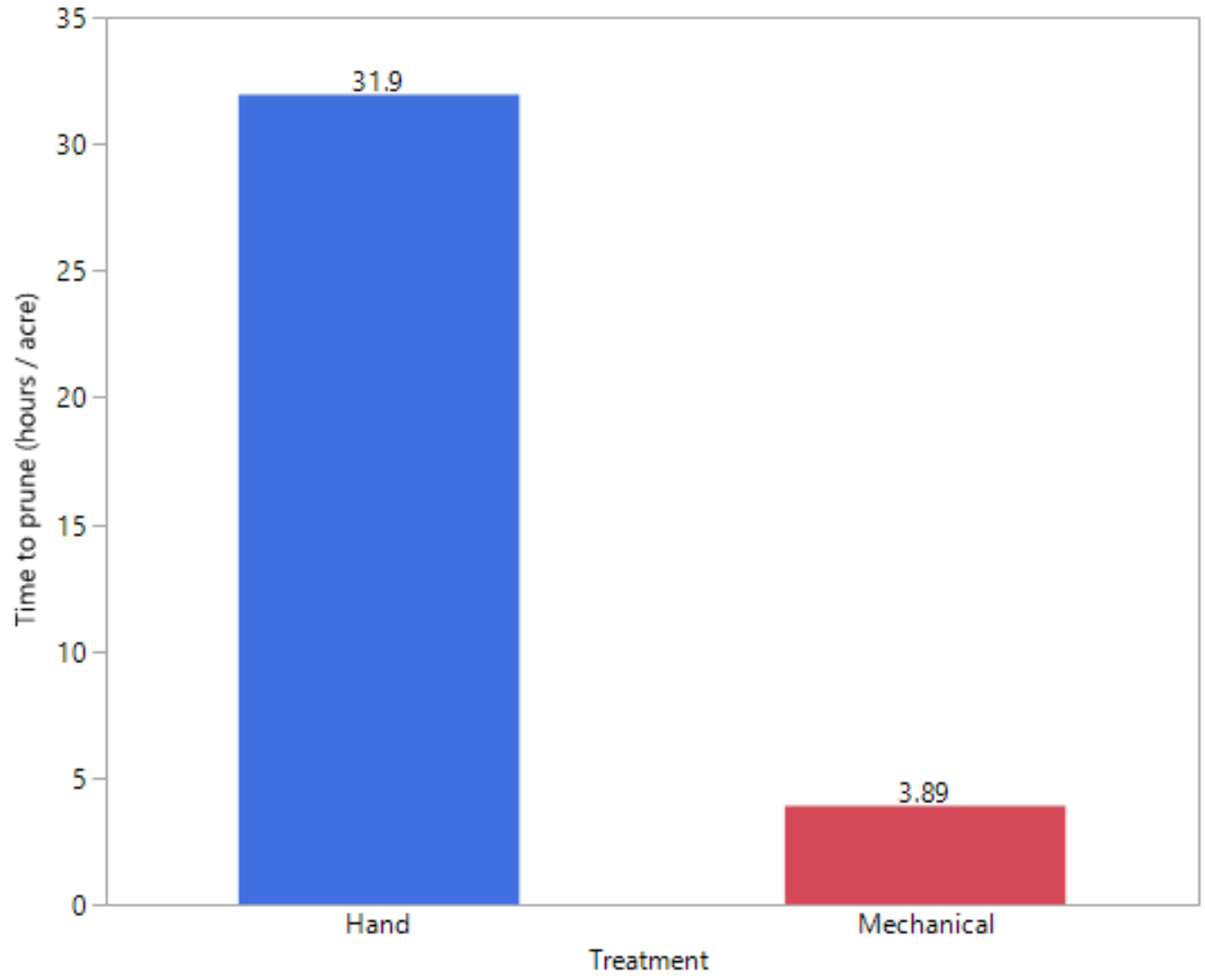
- Carlos
- Mechanical
  - 6” box hedge on top and sides
  - 2” hedge on bottom
  - Mechanical hedger
- Hand
  - Bearers (“spurs”) and buds
  - Hand shears

counted buds after pruning….

Time to execute

- Mechanical pruning is faster than hand pruning

earth shattering result…

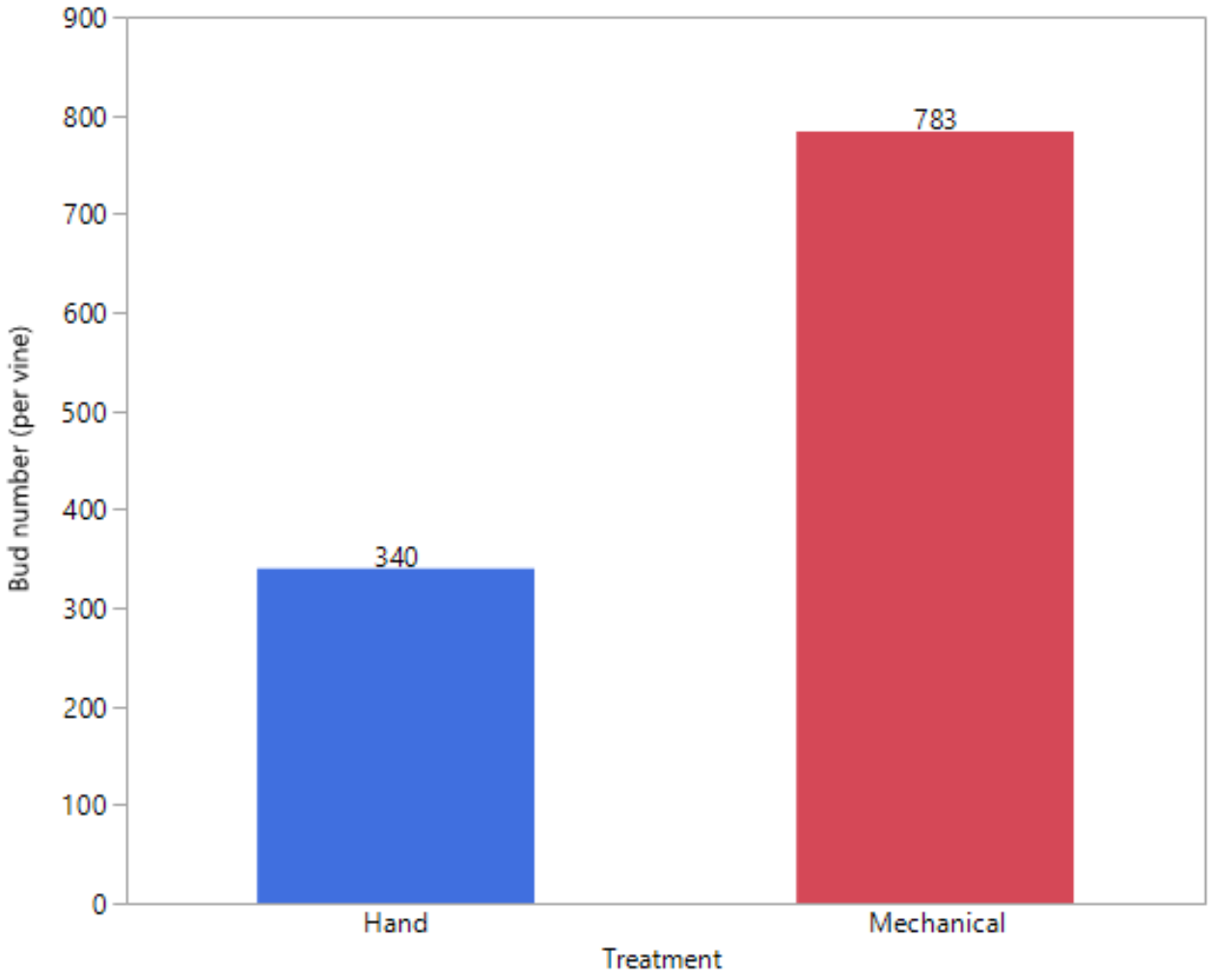


Bud numbers

Results to date

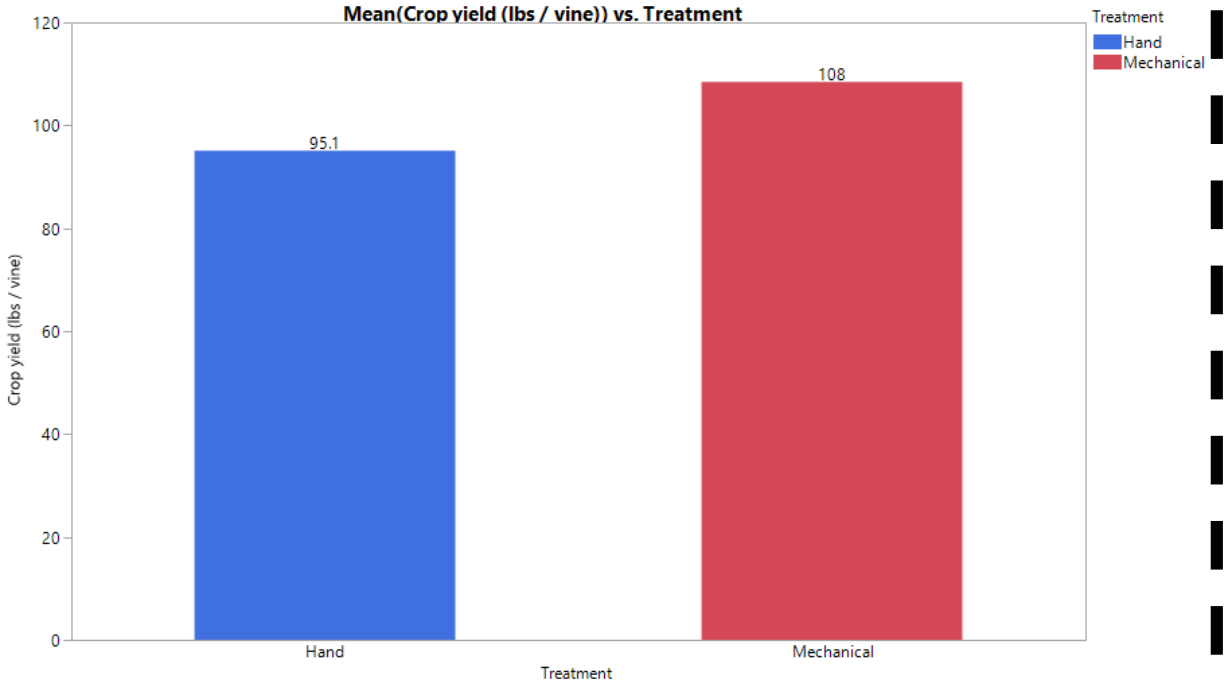
- Mechanical pruning leaves more buds than hand pruning
    - 340 buds per vine is “in the pocket” per the recommendation of Poling (300-400 buds; 2013)

another result for the record books…

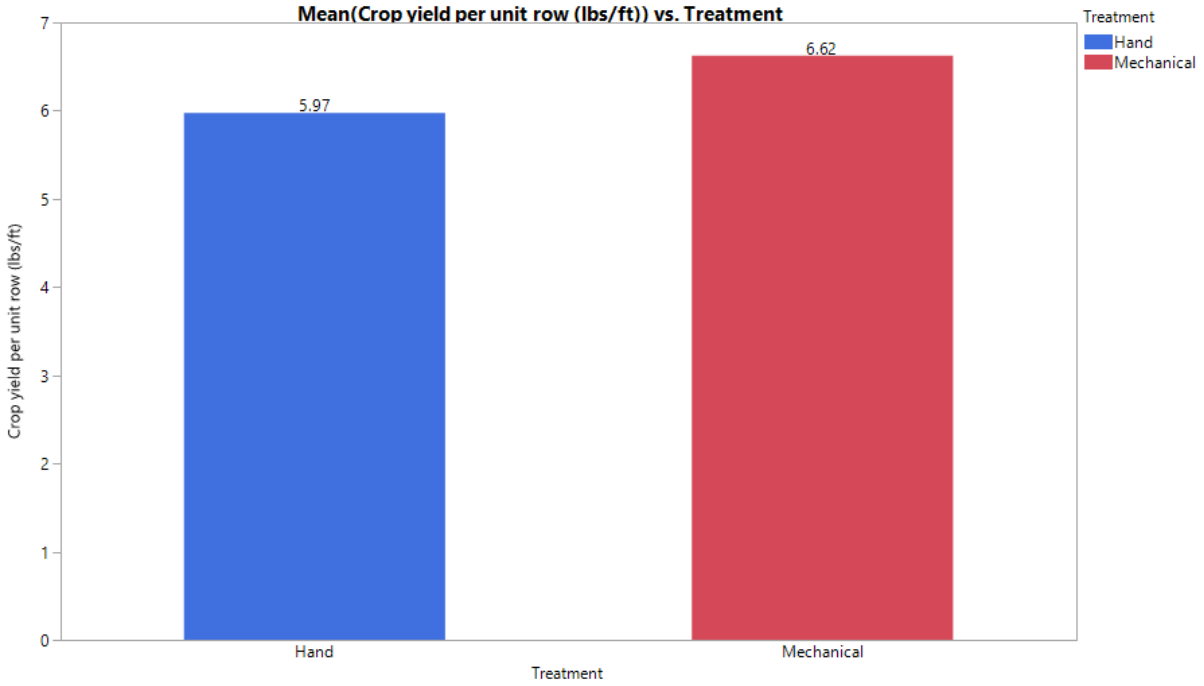


Crop yield – actual (with empty trellis)

PER VINE

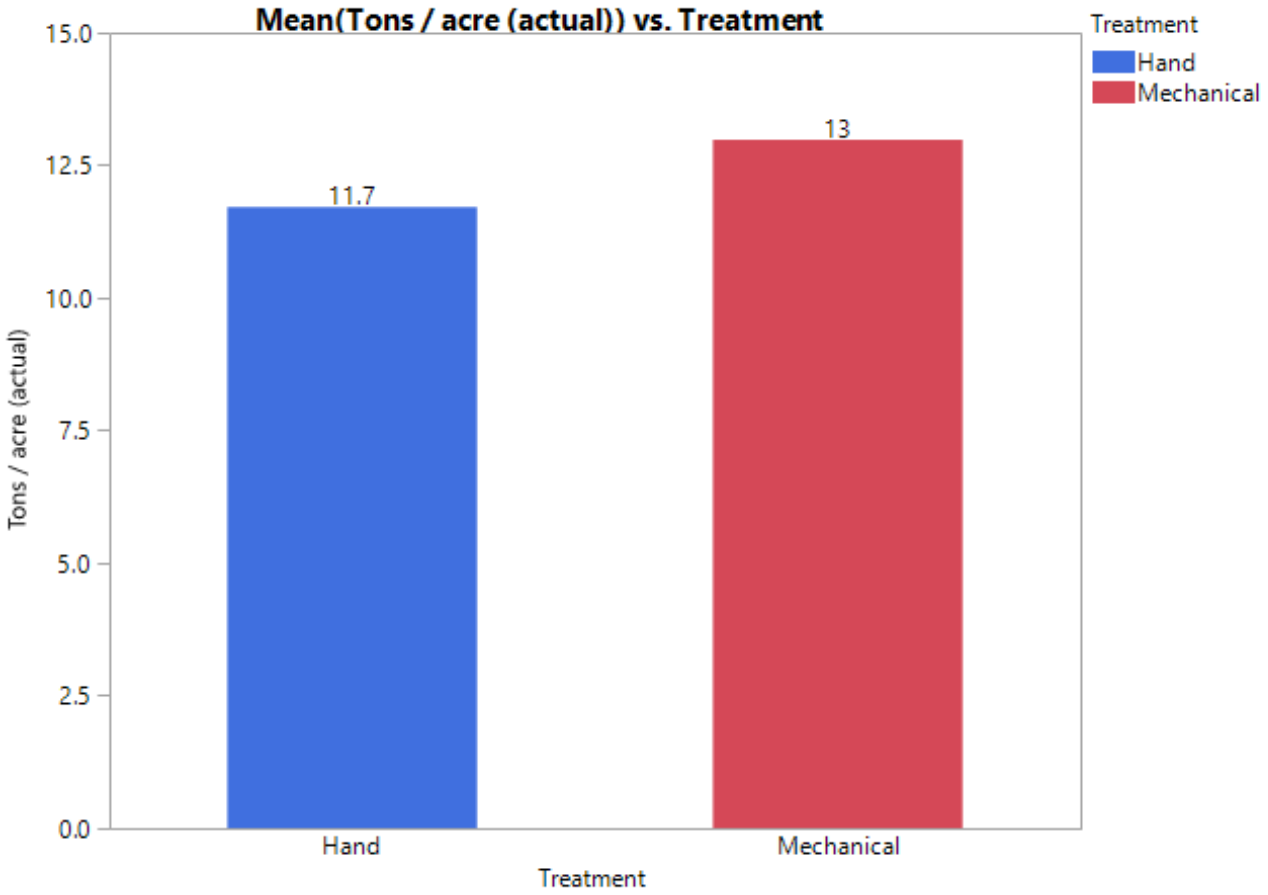


PER FOOT OF TRELLIS



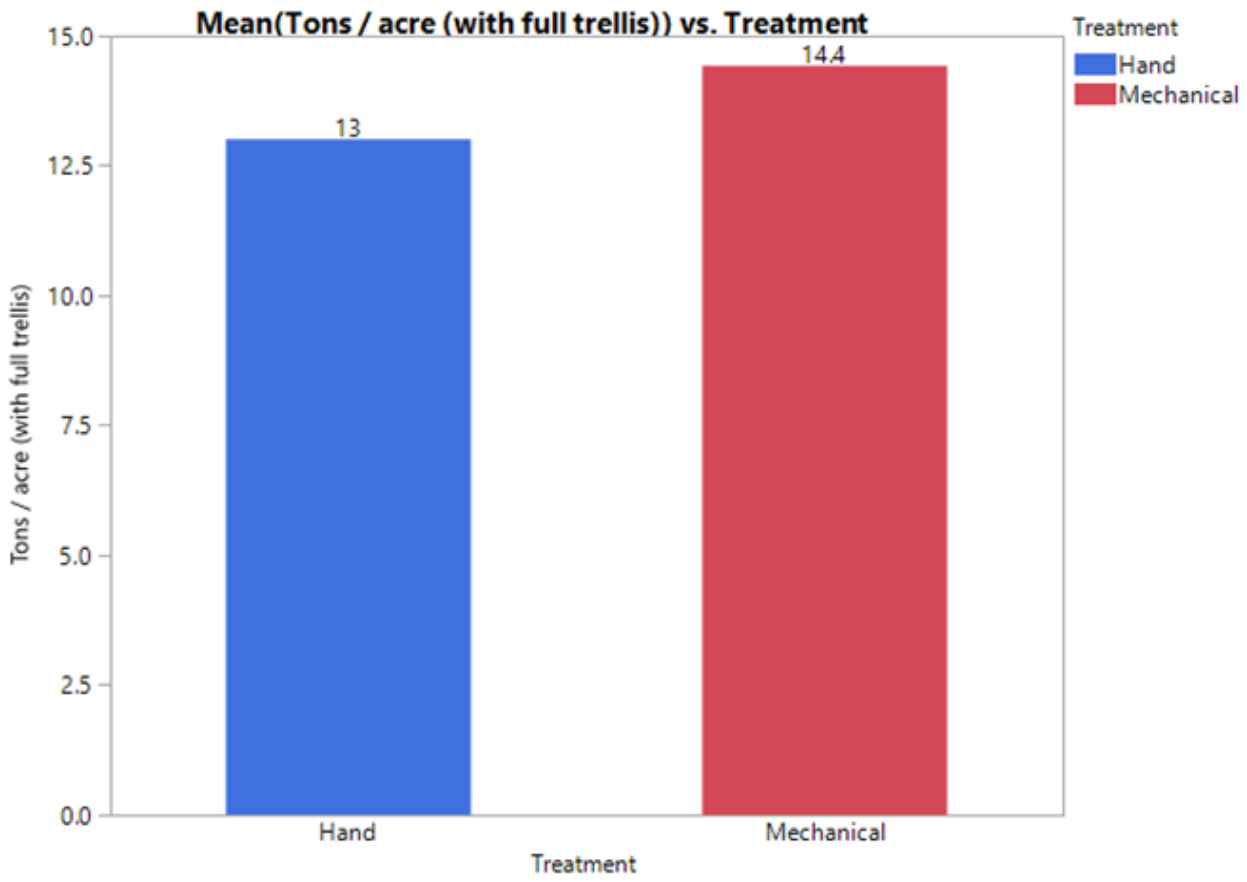
Predicted crop yield per acre (with empty trellis space)

- Average cordon length was 16.2 ft.
  - In research plots
- Intended plant spacing
  - 18’ (vine) x 10’ (row)
    - 242 vines per acre
  - 10% less cordon
  - = roughly 218 vines per acre

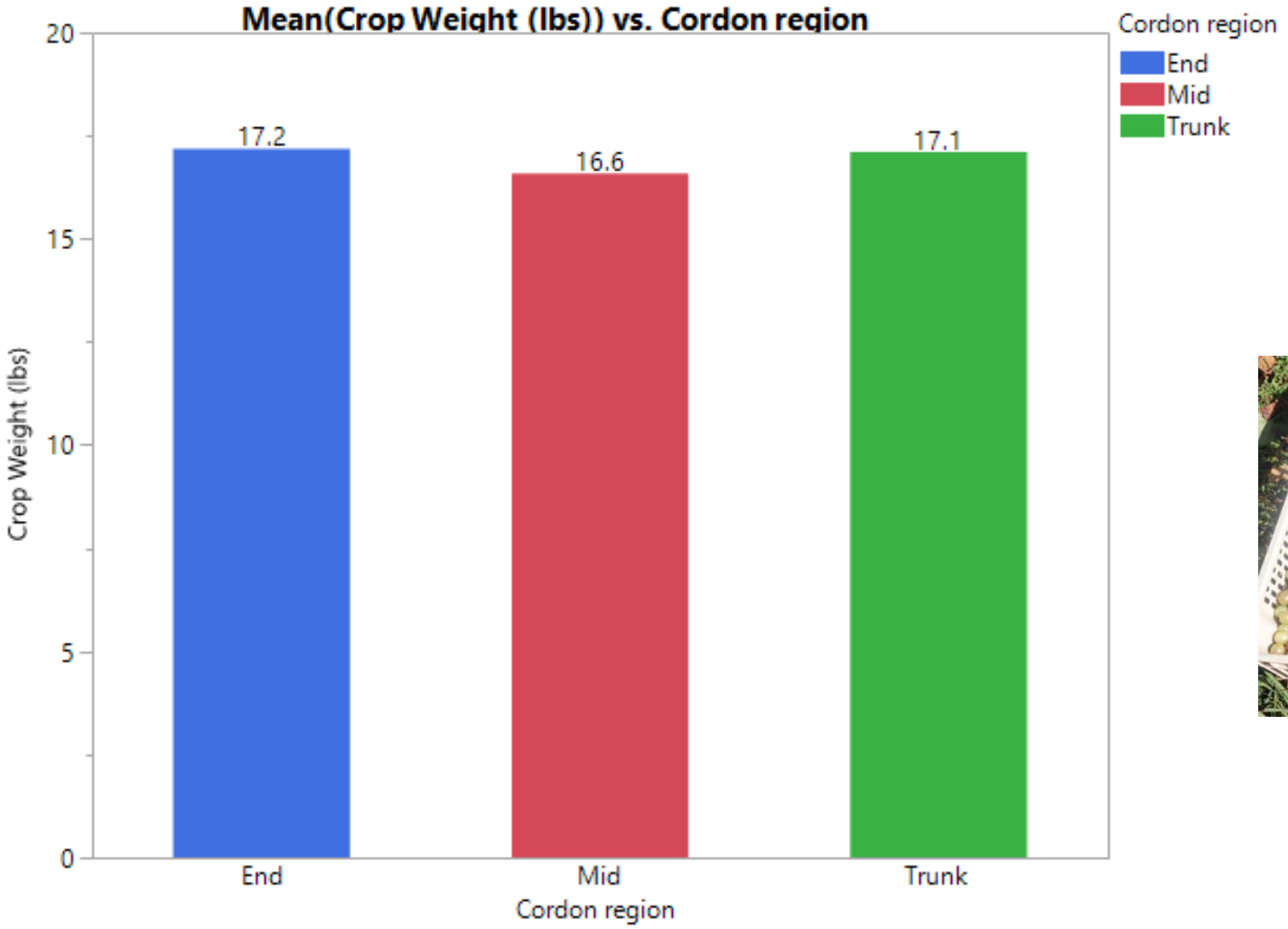


Predicted crop yield per acre (with full trellis)

- Average cordon length was 16.2 ft.
  - In research plots
- Intended plant spacing
  - 18’ (vine) x 10’ (row)
    - 242 vines per acre



Cordon region effects on crop yield



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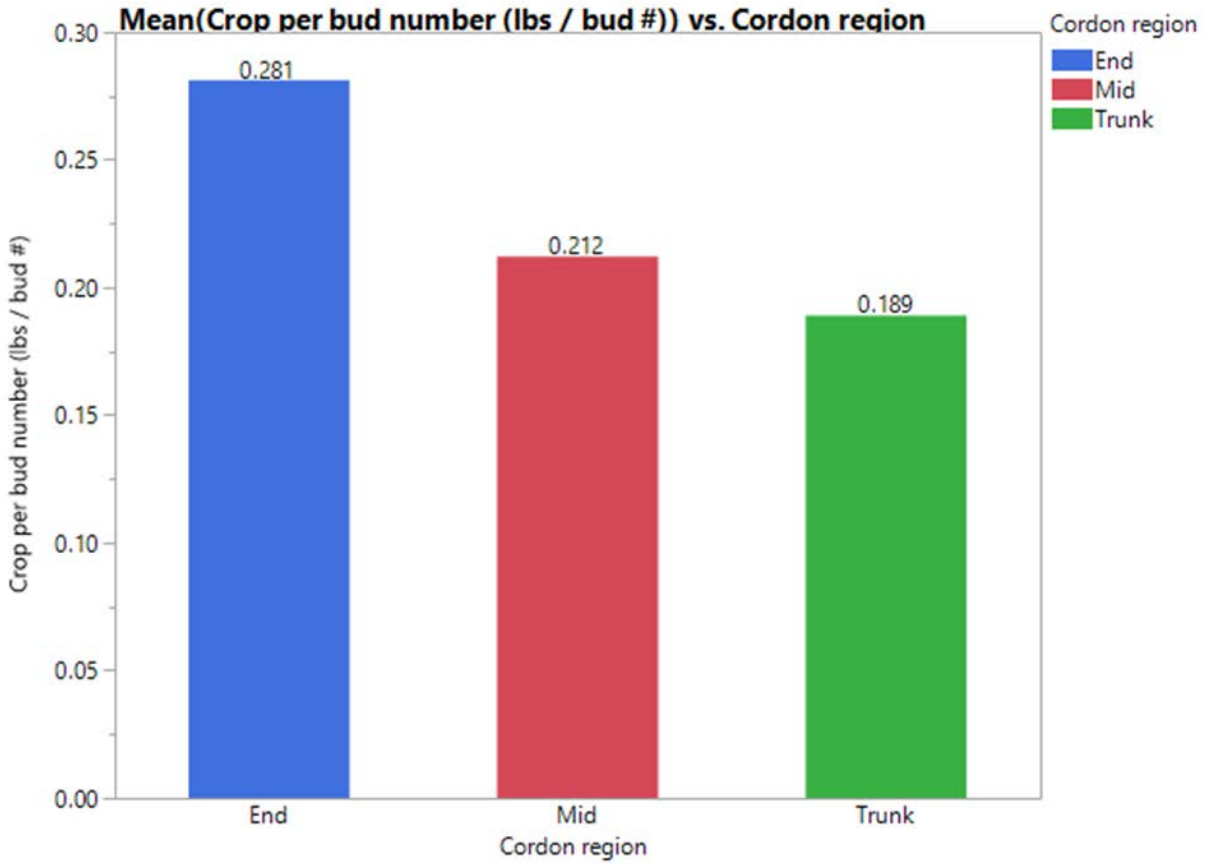
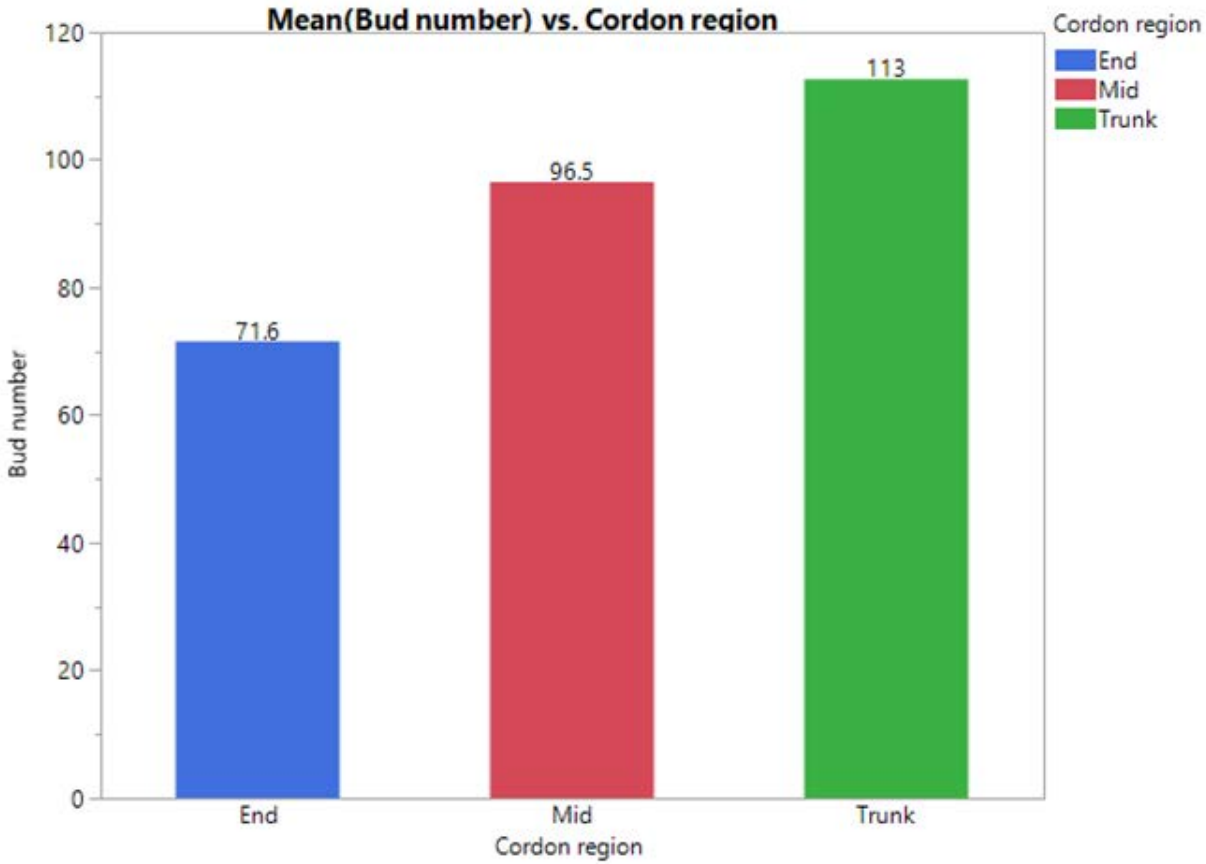
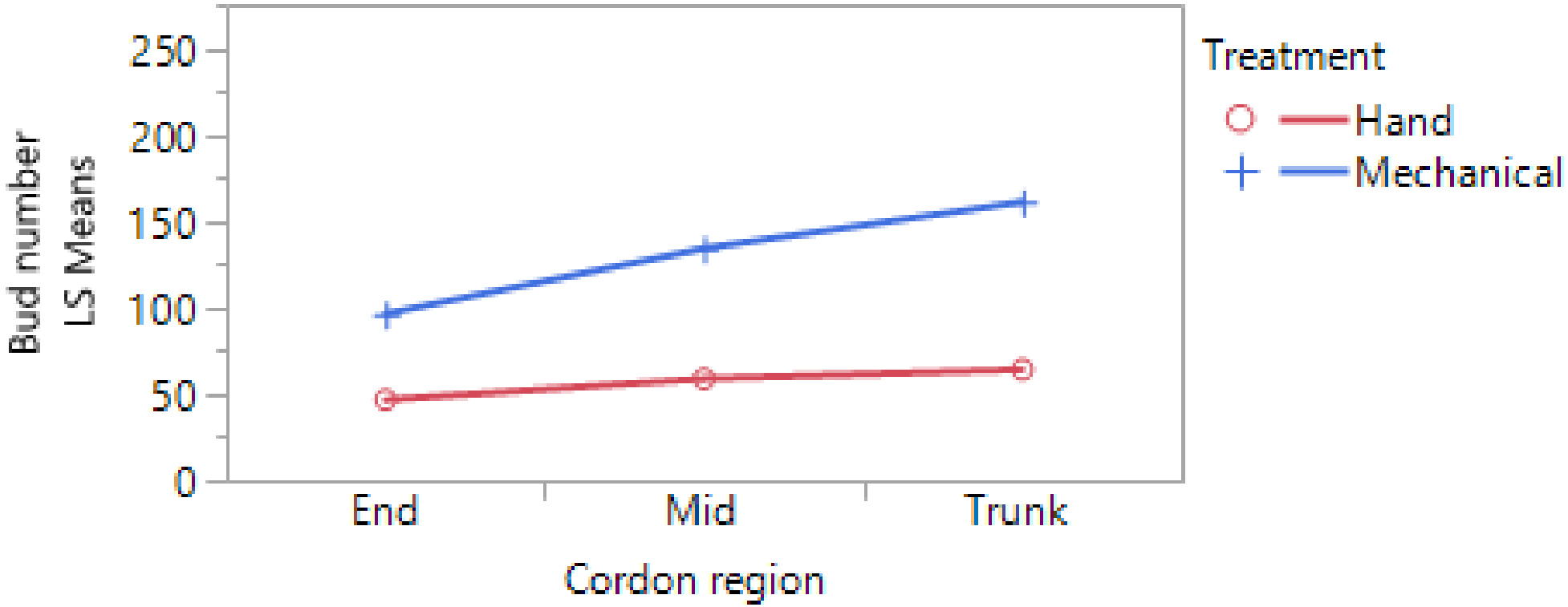




Cordon region-specific bud number as affected by pruning method



Fruit zone light penetration

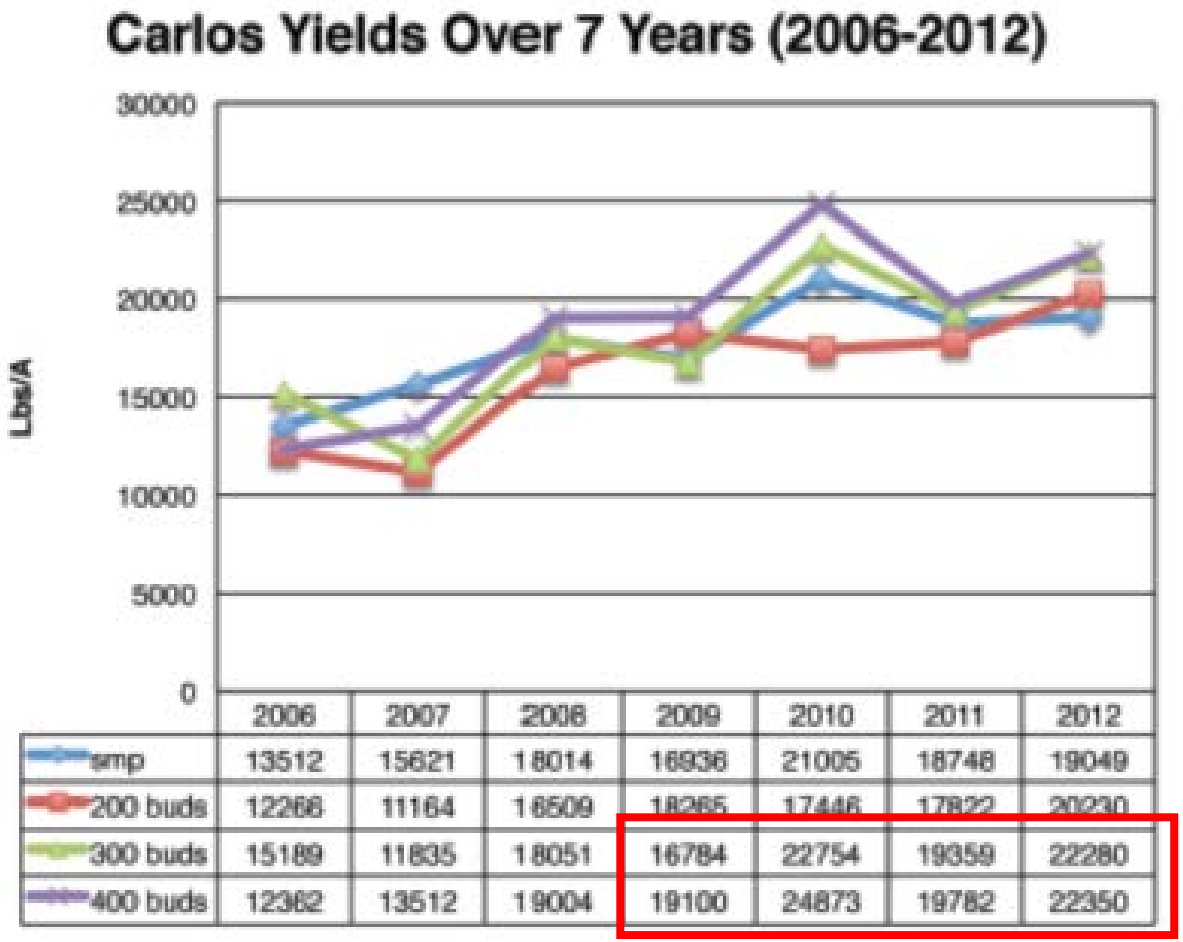
- Bud fruitfulness is improved with light exposure
  - In bunch grapes
  - Same in muscadines?

	Fruit zone PPFD (% of ambient)
Hand	1.2 %
Mechanical	0.6 %

Primary fruit chemistry and berry weight

	Soluble solids (Brix)	pH	Titratablee acidity (g/L)	Berry weight (g)
Hand	12.6	3.1	4.9	5.0
Mechanical	11.9	3.1	5.0	4.9

Discussion – crop yield compared to another study



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Poling (2013)

Our hand prune treatment had 340 buds…
And yielded 11.7 tons / acre

Mechanical had 780 buds….
And yielded 13 tons / acre

SATURATION POINT at 350-400 buds?

Hand pruning will save more fruitful buds so will likely “saturate” at a higher crop yield…

4-year average of 350 buds: 10.5 tons / acre

Take home – labor (pruning hrs) : crop yield (tons/acre) ratio

Hand	Mechanical

• Per acre:
  • 2.7 hours of pruning labor for every ton of grapes produced
	• Per acre:
	  • 0.3 hours of pruning labor for every ton of grapes produced

Mechanical pruning was 700% more efficient than hand pruning

Mechanical pruning produced 11% more crop per acre than hand pruning

Discussion

- Perennial vine sustainability?
  - Does mechanical hedging fail to save most fruitful buds?
    - Will this be exacerbated over time?
  - Will vines over-crop?

- Missing cordon space on trellis
  - Can be costly (12.3 out of 13.7 tons per acre produced)
    - 1.4 tons per acre were NOT produced
      - 100 gallons of wine (conservative estimate)
      - $5,000 per acre @ $10 per bottle

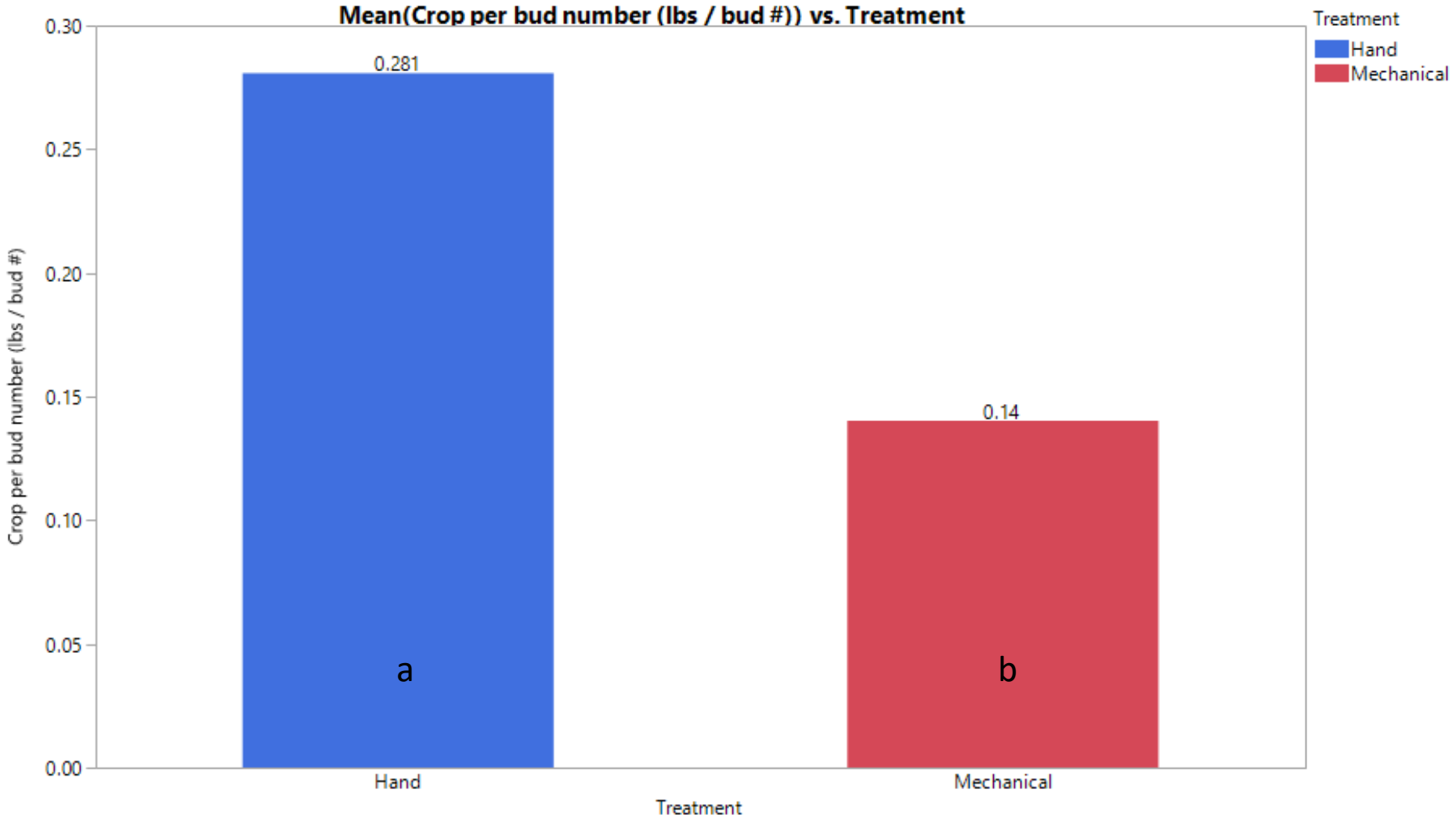
Pruning – hand vs. mechanical?

- The human eye offers precision
  - A greater proportion of fruitful buds retained

- Labor: acreage ratio?
  - Wolf Creek; Lineberger; Woodmill
  - Paulk; Still Pond

  - Sometimes vineyards are too big to think about hand pruning
  - Hand prune part of acreage on a 5 to 10 year cycle?

Crop yield – “bud fruitfulness” (crop yield / bud number)



Future directions

- Can vine spacing help increase crop per linear foot of row?
  - If for no other reason than maintaining cordons for entire trellis
    - More even ripening?
  - 10, 15, 20 foot spacings
    - Carlos
    - Paulk
- Pruning?
  - See what happens over time
  - More of an objective approach to prune to specific bud numbers?
  - Try mechanical in fresh market cultivars?

Thanks so much

Chateau Elan

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Rachael White
Alex Cameli

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