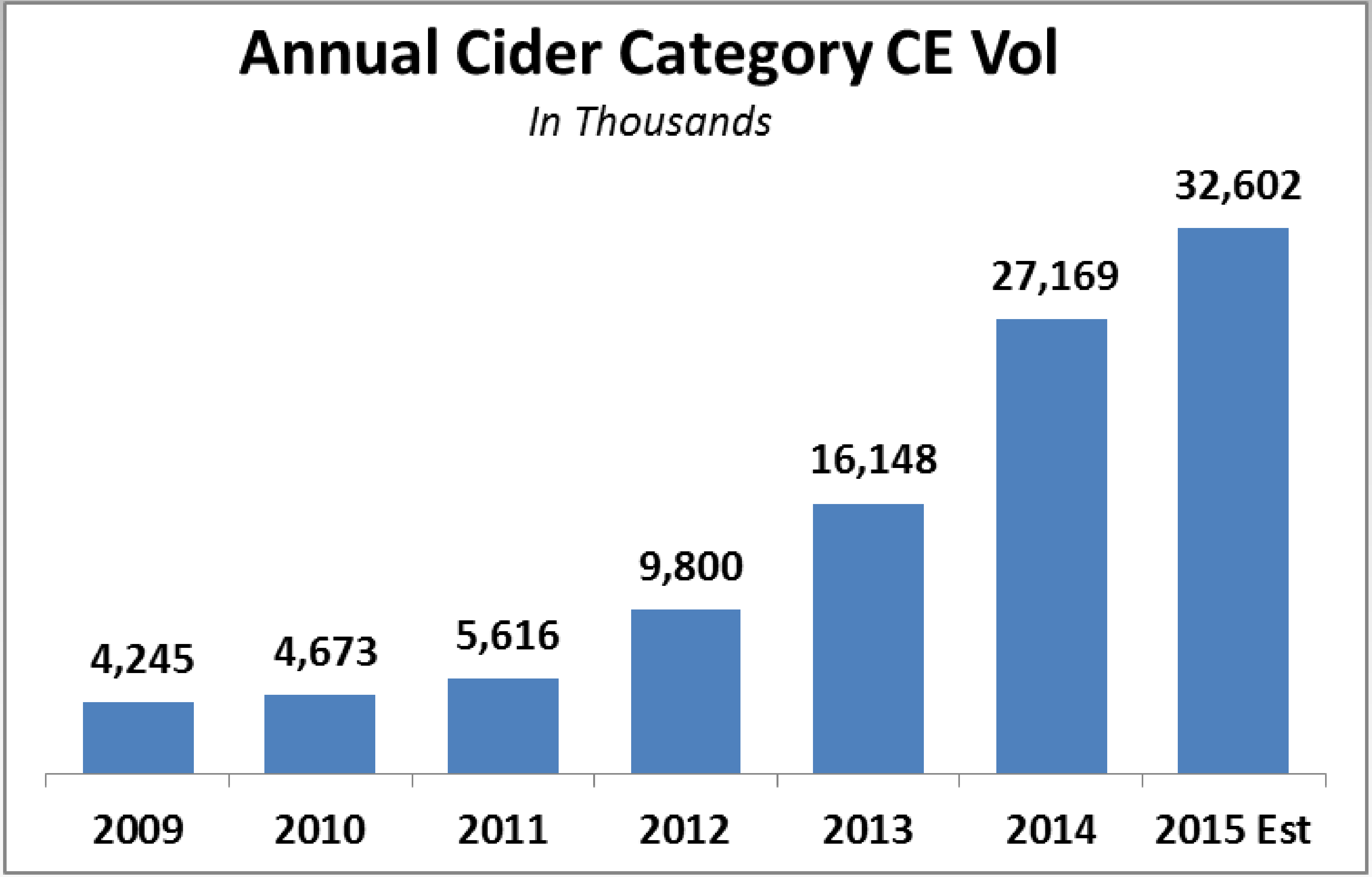
Constraints and Opportunities in Growing Apples for the Cider Market

VERMONT TREE FRUIT GROWERS ASSOCIATION ANNUAL MEETING

FEBRUARY 15, 2018



Source: Beer Institute, TTB and Commerce Department 2014. 2015 – BBC Projections

Production and Prospects in Vermont

- Growth of industry is seen as an opportunity for apple growers and cider makers

- But
  - Adequate apple price is a threat for growers
  - Adequate fruit supply is a threat for cider makers

Becot, F. A., T. L. Bradshaw and D. S. Conner (2016). "Apple Market Optimization and Expansion through Value-Added Hard Cider Production " HortTechnology **26**(2): 220-229.

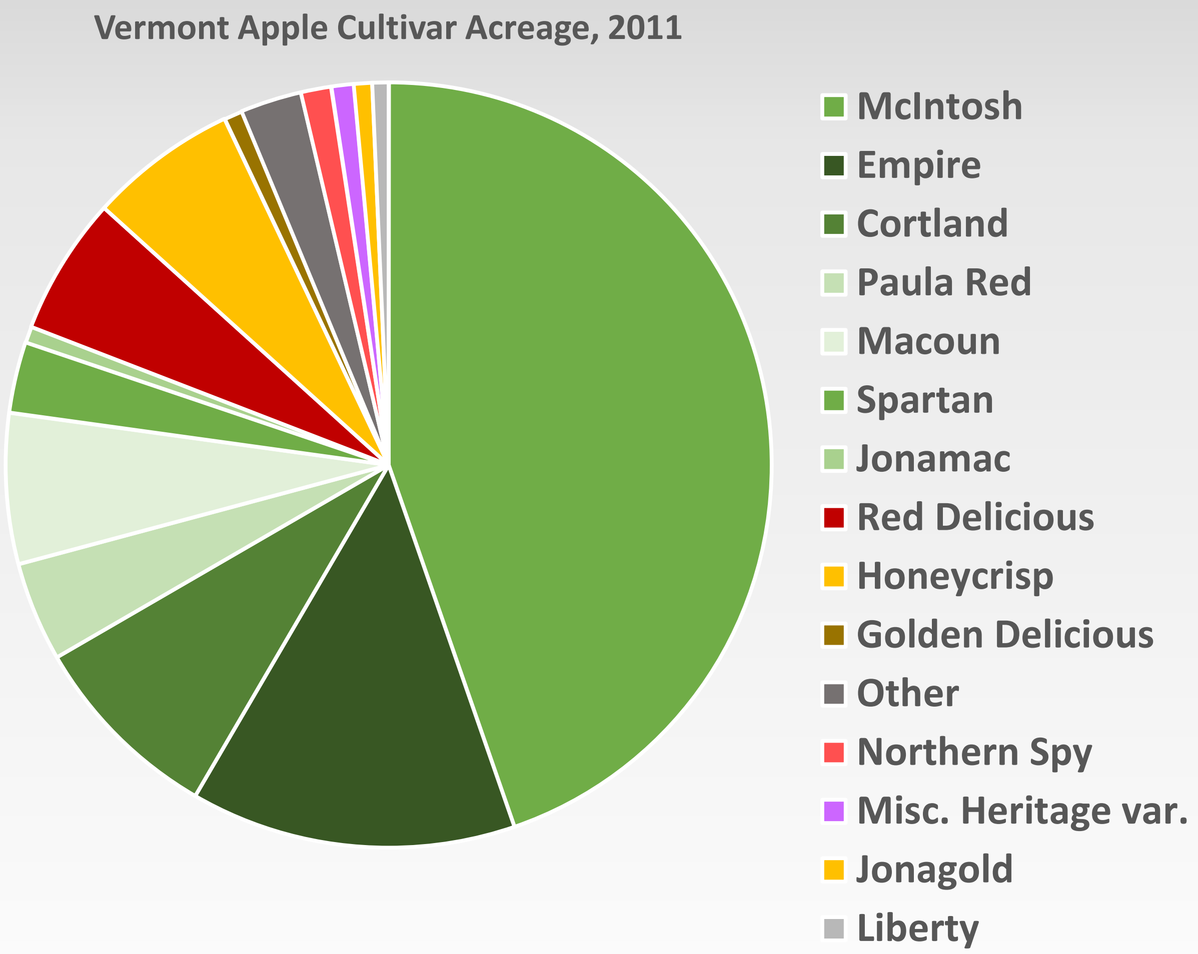
What the Cider Makers Want

Dessert	Dual-Purpose	Specialty cider
Cortland (1)	Ashmeads Kernel (4)	Ashton Bitter (1)
McIntosh (1)	Calville Blanc (1)	Bittersweet (1)
Organic empire (1)	Cox's Orange Pippin (1)	Chisel Jersey (1)
Pinova (1)	Esopus Spitzenberg (4)	Dabinett (4)
	Golden Russet (4)	Ellis Bitter (2)
	Liberty (1)	Foxwhelp (1)
	Lodi (1)	Kingston Black (5)
	Northern Spy (3)	Major (1)
	Roxbury Russet (1)	Orleans Reinette (1)
		Reine des Reinnette (1)
		Somerset Redstreak (1)
		Stoke Red (1)
		Wickson (4)
		Yarlington Mill (2)

Becot, F. A., T. L. Bradshaw and D. S. Conner (2016). "Apple Market Optimization and Expansion through Value-Added Hard Cider Production " HortTechnology **26**(2): 220-229.

What orchards are growing

‘McIntosh’ family	81%
Red Delicious	6%
Honeycrisp	6%
‘Desert cider’	7%



VTFGA (2011). Vermont Tree Fruit Growers Association Apple Industry Survey Report. http://www.uvm.edu/~orchard/2011VT_Apple_Survey_Results.pdf.

2015-16 “Kitchen Table” Surveys

Small scale orchards:

- 11.5 productive acres
- 2015 mean yield 341 bushels per acre

Large scale orchards

- 167.5 productive acres 2015 mean yield 650 bushels per acre.

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Table 1. Cost of production by main categories on small and large orchards.

Material and labor	Production Costs (US$)	Production costs * ha^{-1} (US$)	Production costs * t^{-1} (US$)	Percent expenses
	Small orchard			
Pruning and training	1,904.00	413.90	26.80	5.7
Chemicals	6,303.00	1,370.20	88.60	18.7
Beehive	130.00	28.30	1.80	0.4
Maintenance & Repairs	3,417.00	742.80	48.10	10.2
Harvest	6,727.50	1,462.50	94.60	20.0
Other[z]	15,136.50	3,290.50	212.90	45.0
Total costs	33,618.00	7,308.30	472.80	100.0
	Large orchard			
Pruning and training	64,365.40	949.30	32.50	8.3
Chemicals	123,230.30	1,817.60	62.30	15.9
Beehive	8,720.00	128.60	4.40	1.1
Maintenance & Repairs	35,954.60	530.30	18.20	4.6
Harvest	192,291.20	2,836.10	97.20	24.9
Other[z]	349,098.10	5,148.90	176.50	45.1
Total costs	773,659.60	11,410.90	391.20	100.0

[z]Other includes: miscellaneous supplies and labor, overhead expenses, taxes, insurance, and depreciation.

Becot, F.A., Bradshaw, T.L., and Conner, D.S., 2016. Growing apples for the cider industry in the U.S. Northern Climate of Vermont: Does the math add up? Acta Hort. *In press*.

Net present value

- Method used for comparing two investment options over time
- ‘Time value of money’

@ 6%, ‘Discount rate’ =
0.940 Year 2 - 0.309 Year 20

- Considered different production scenarios

Net Present Value (NPV)

$$NPV = \sum_{t=1}^{T} \frac{\text{Cash Flow}_t}{(1+i)^t} - \text{Initial Cash Investment}$$

t = Cash Flow Period
i = Interest Rate Assumption

http://www.mysmp.com/fundamental-analysis/net-present-value.html

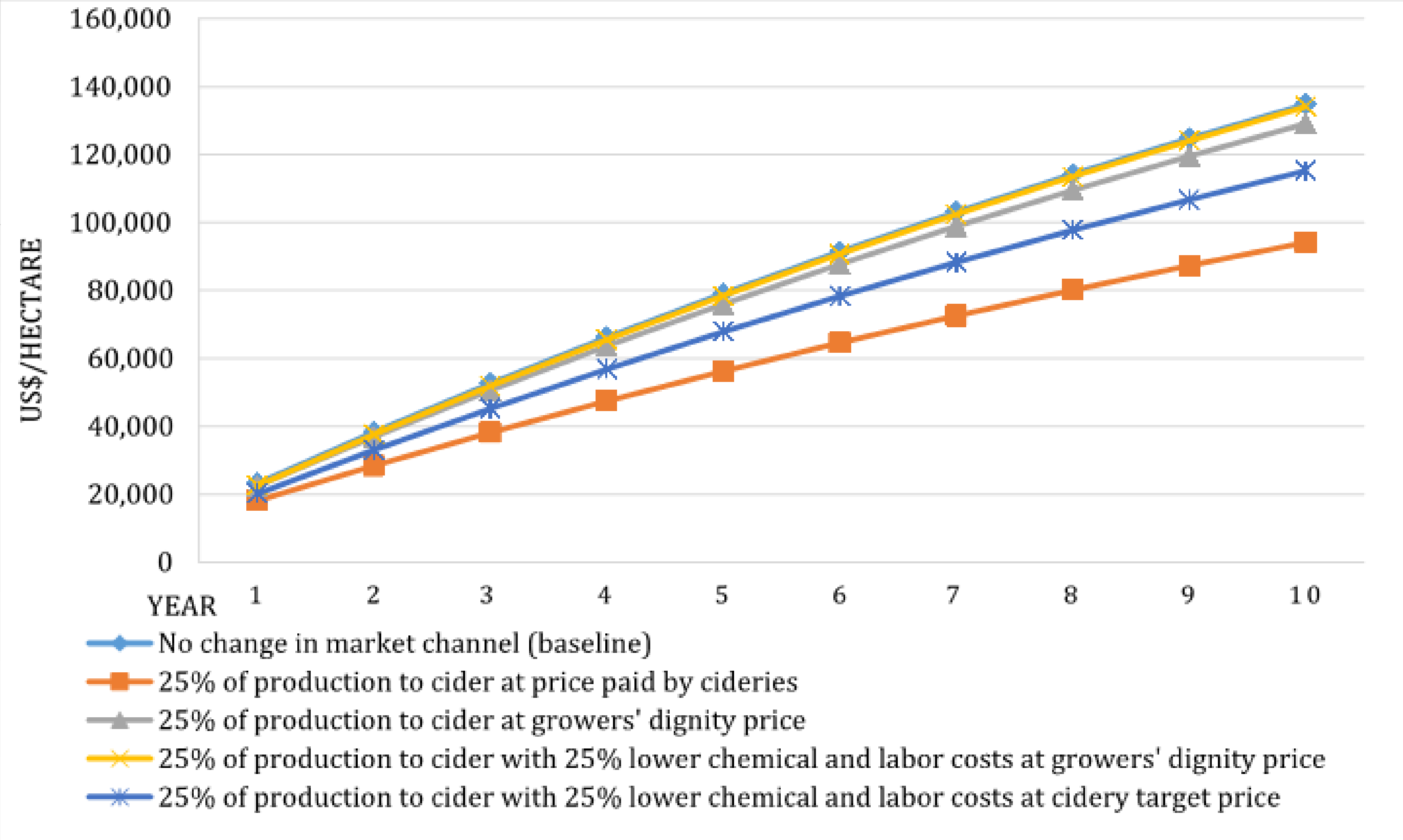


Figure 2. Net present value for small scale orchard selling 25% of the dessert cultivar orchard run production to cider under various price and management scenarios.

Becot, F.A., Bradshaw, T.L., and Conner, D.S., 2016. Growing apples for the cider industry in the U.S. Northern Climate of Vermont: Does the math add up? *Acta Hort*. In press.

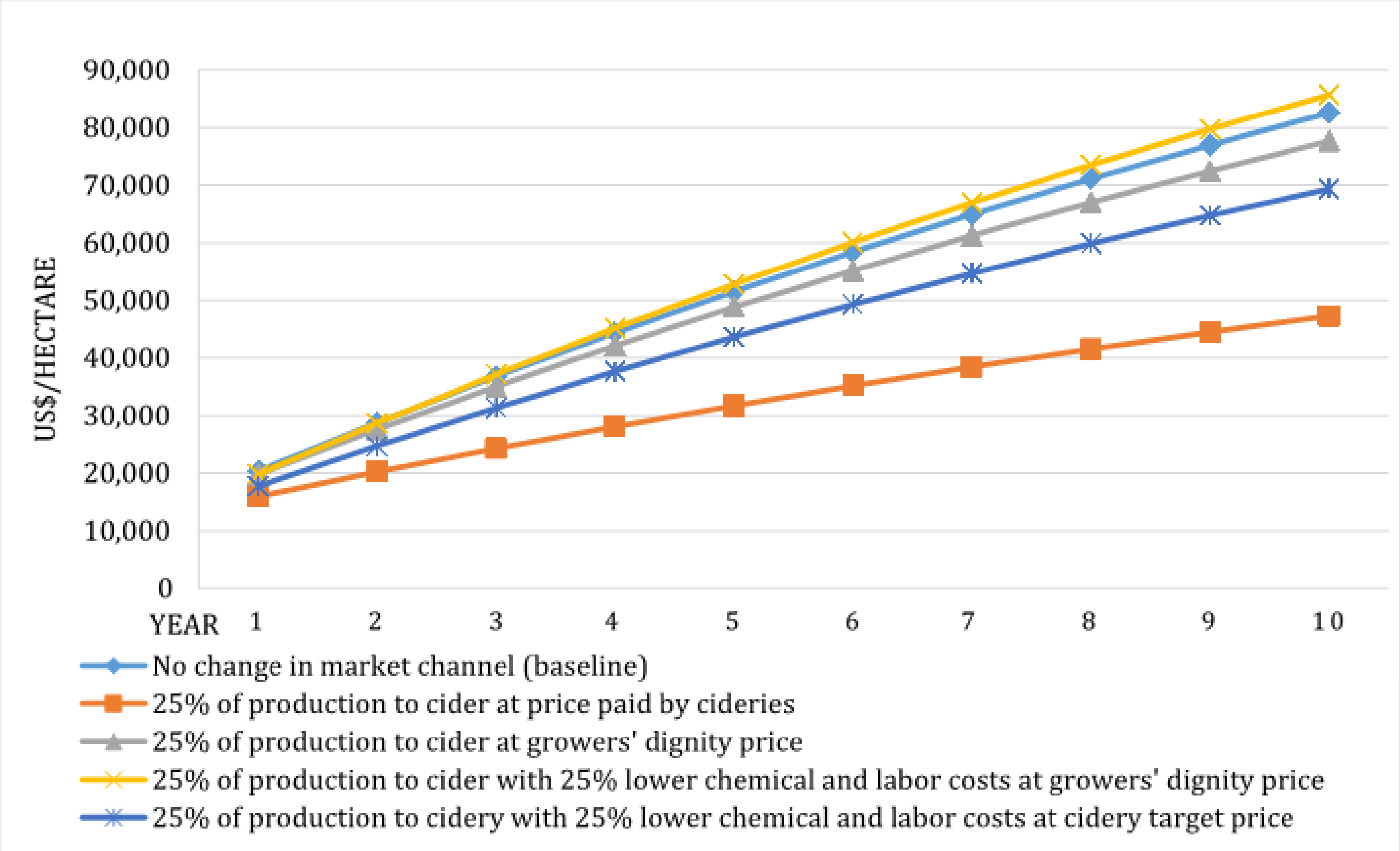
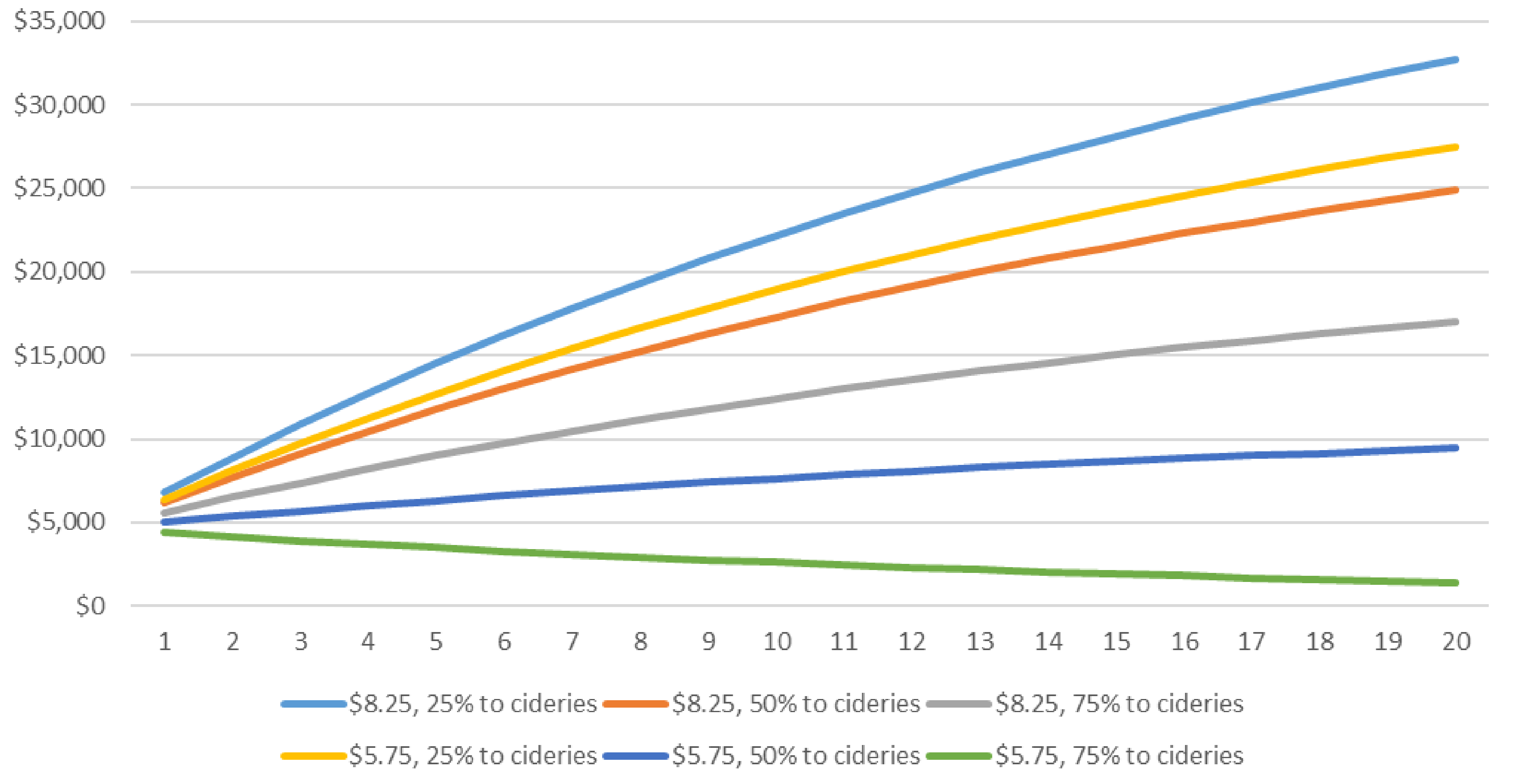


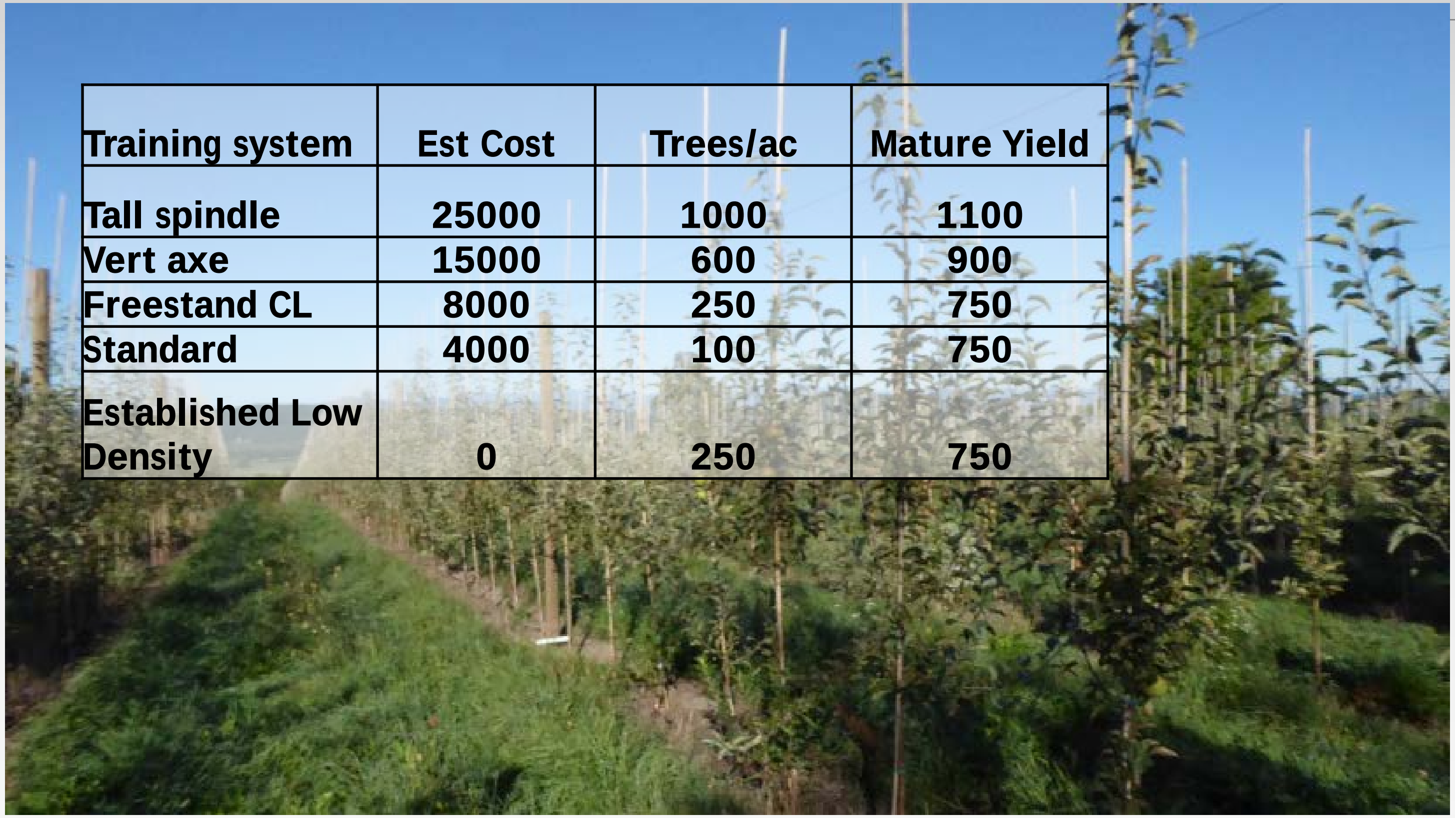
Figure 3. Net present value for large scale orchard selling 25% of the dessert cultivar orchard run production to cider under various price and management scenarios.

Becot, F.A., Bradshaw, T.L., and Conner, D.S., 2016. Growing apples for the cider industry in the U.S. Northern Climate of Vermont: Does the math add up? *Acta Hort Accepted Nov 2016*.

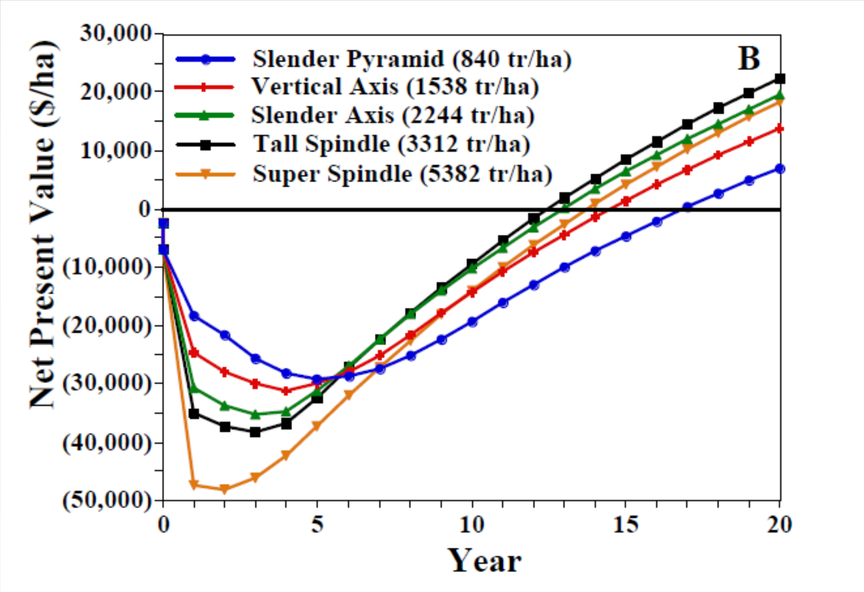
Net Present Value for established orchards: change in prices and percent of production going to cider market



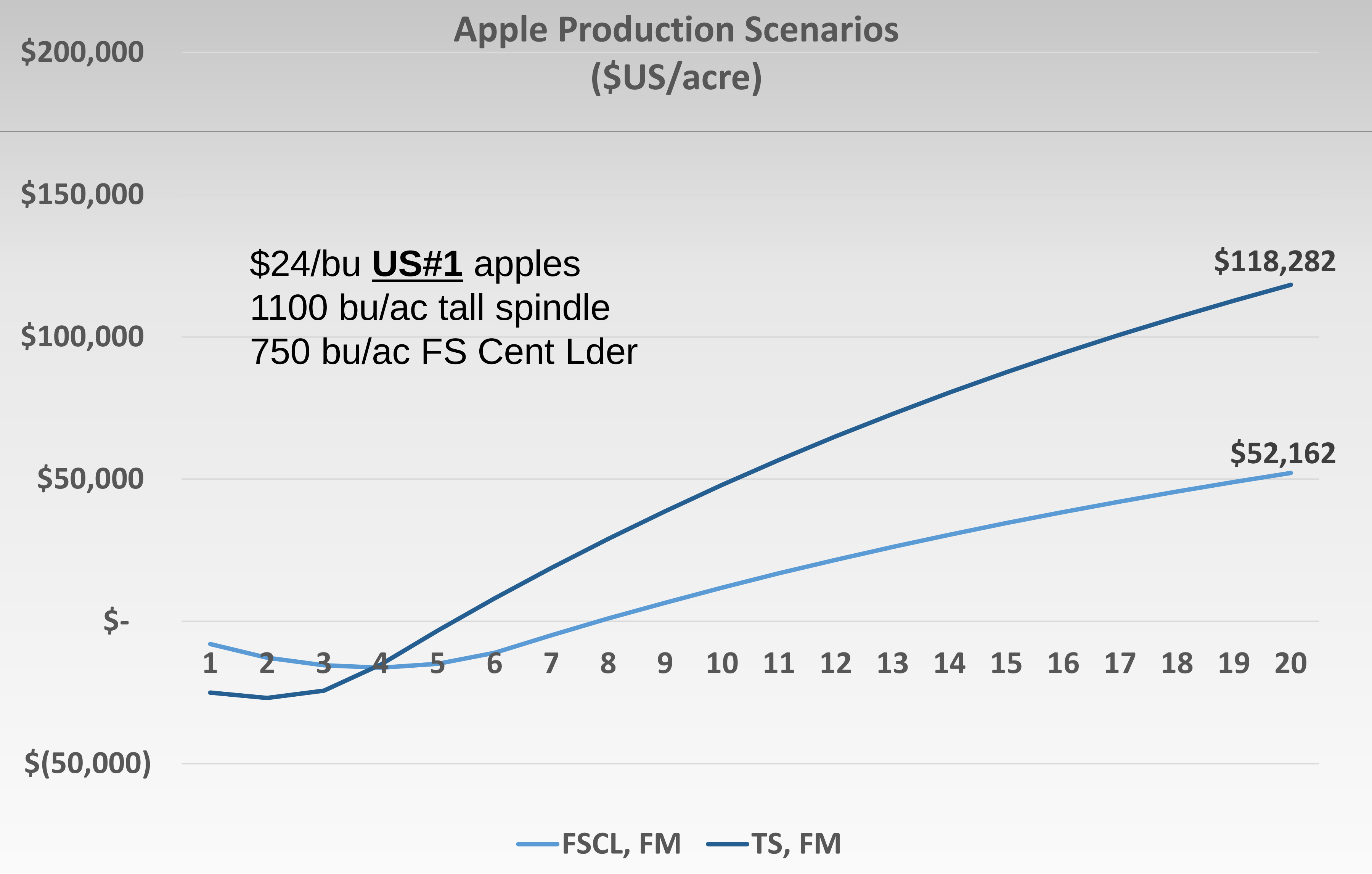
New orchard establishment



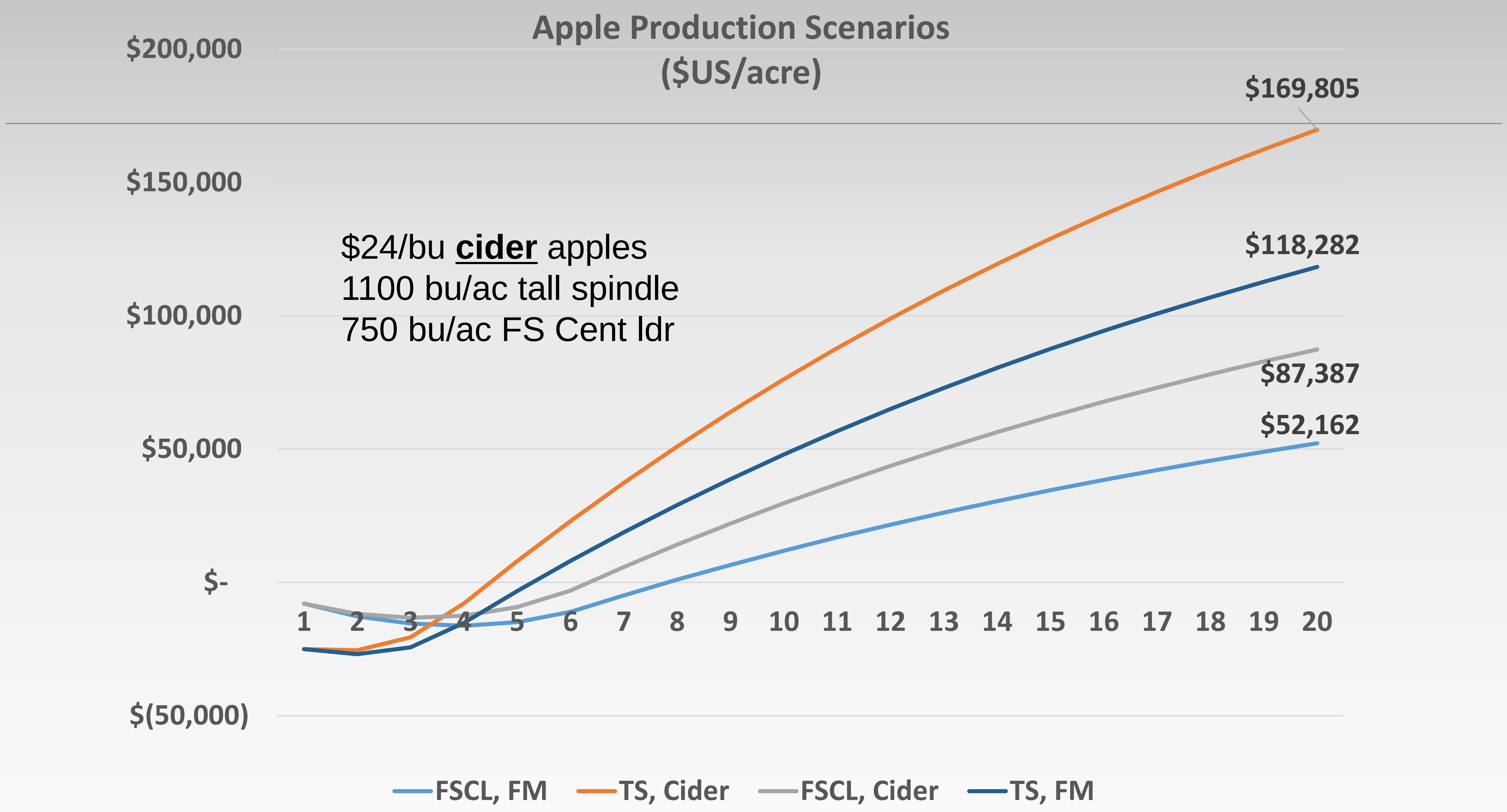
Training system	Est Cost	Trees/ac	Mature Yield
Tall spindle	25000	1000	1100
Vert axe	15000	600	900
Freestand CL	8000	250	750
Standard	4000	100	750
Established Low Density	0	250	750



Robinson, T., A. DeMarree and S. Hoying (2007). "An economic comparison of five high density apple planting systems." Acta Hort 732: 481-489.

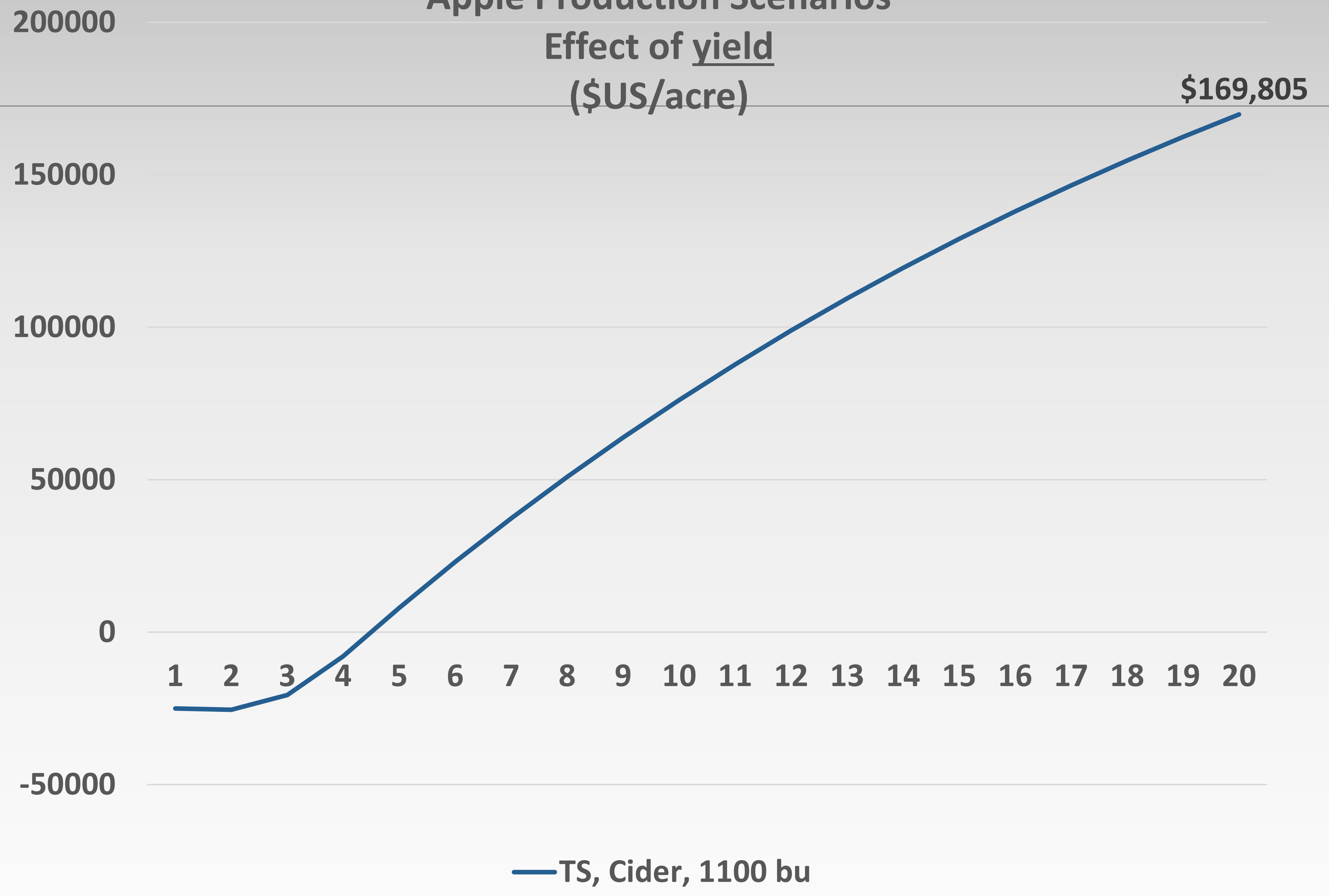


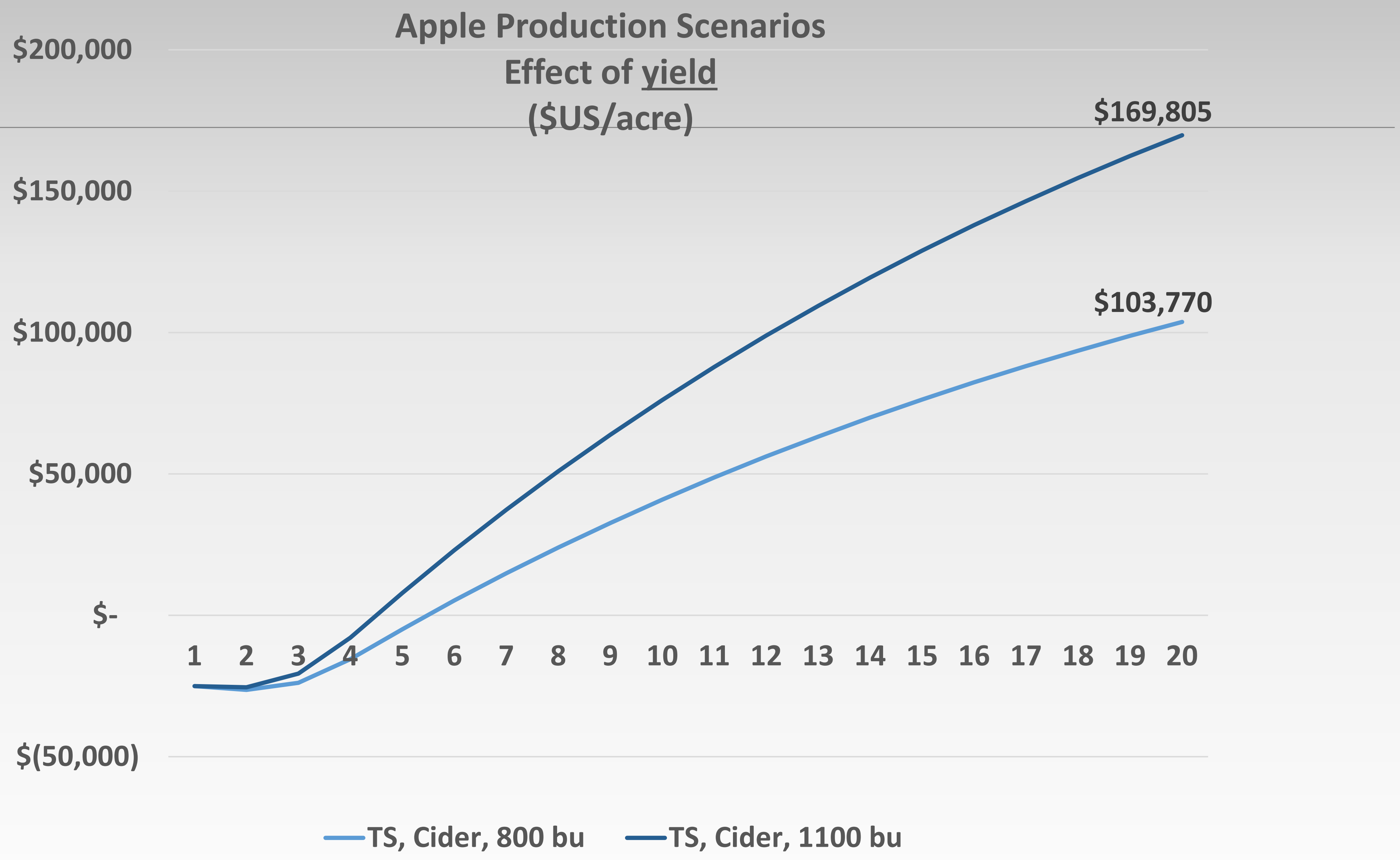
Apple Production Scenarios
($US/acre)
$200,000
$150,000
$100,000
$50,000
$-
$(50,000)
$24/bu US#1 apples
1100 bu/ac tall spindle
750 bu/ac FS Cent Lder
$118,282
$52,162
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20
FSCL, FM
TS, FM



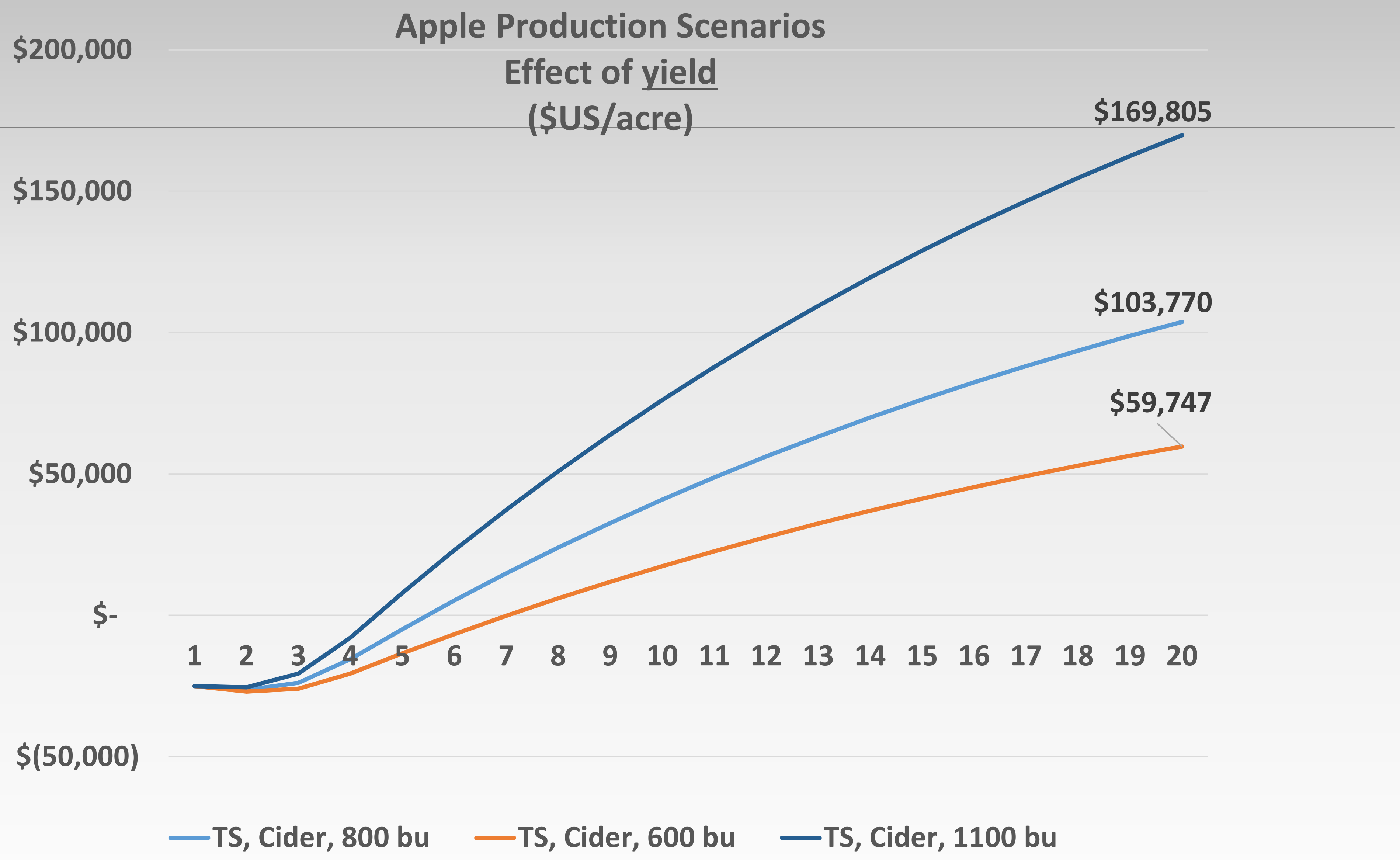
Apple Production Scenarios
($US/acre)
$200,000
$150,000
$100,000
$50,000
$-
$(50,000)
$169,805
$118,282
$87,387
$52,162
$24/bu cider apples
1100 bu/ac tall spindle
750 bu/ac FS Cent ldr
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20
FSCL, FM
TS, Cider
FSCL, Cider
TS, FM

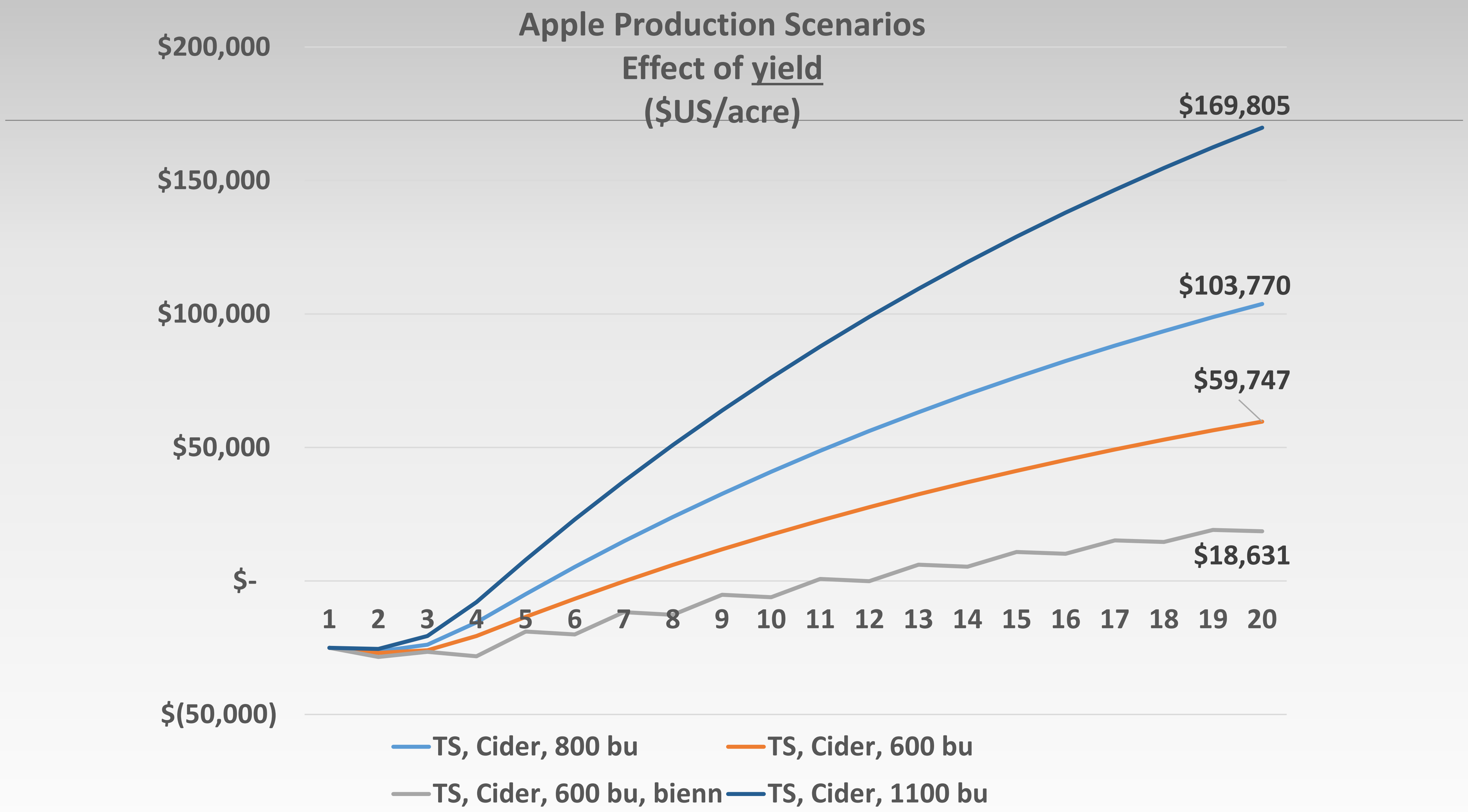
Apple Production Scenarios
Effect of yield
($US/acre)



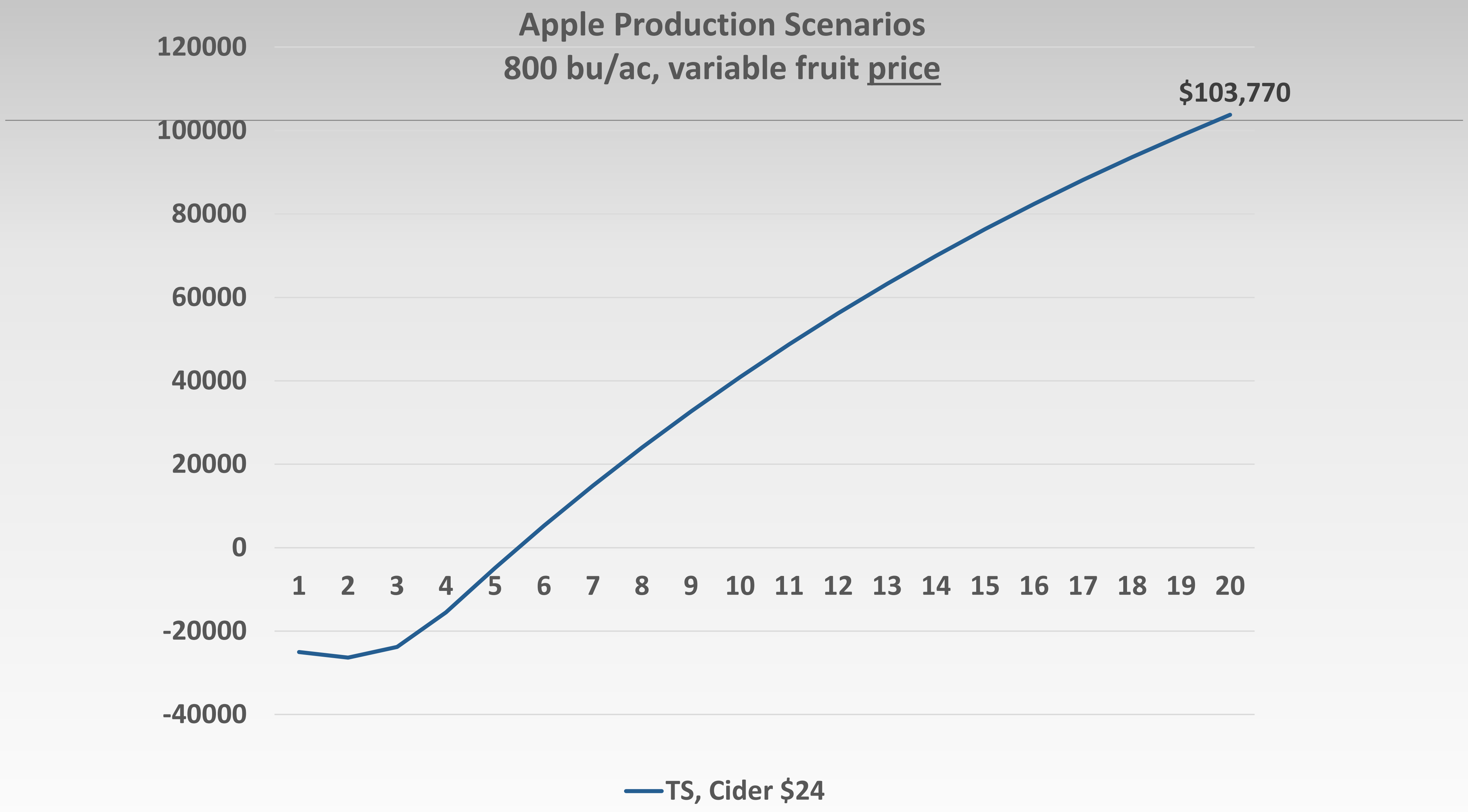


Apple Production Scenarios
Effect of yield
($US/acre)
$200,000
$150,000
$100,000
$50,000
$-
$(50,000)
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
$169,805
$103,770
TS, Cider, 800 bu
TS, Cider, 1100 bu

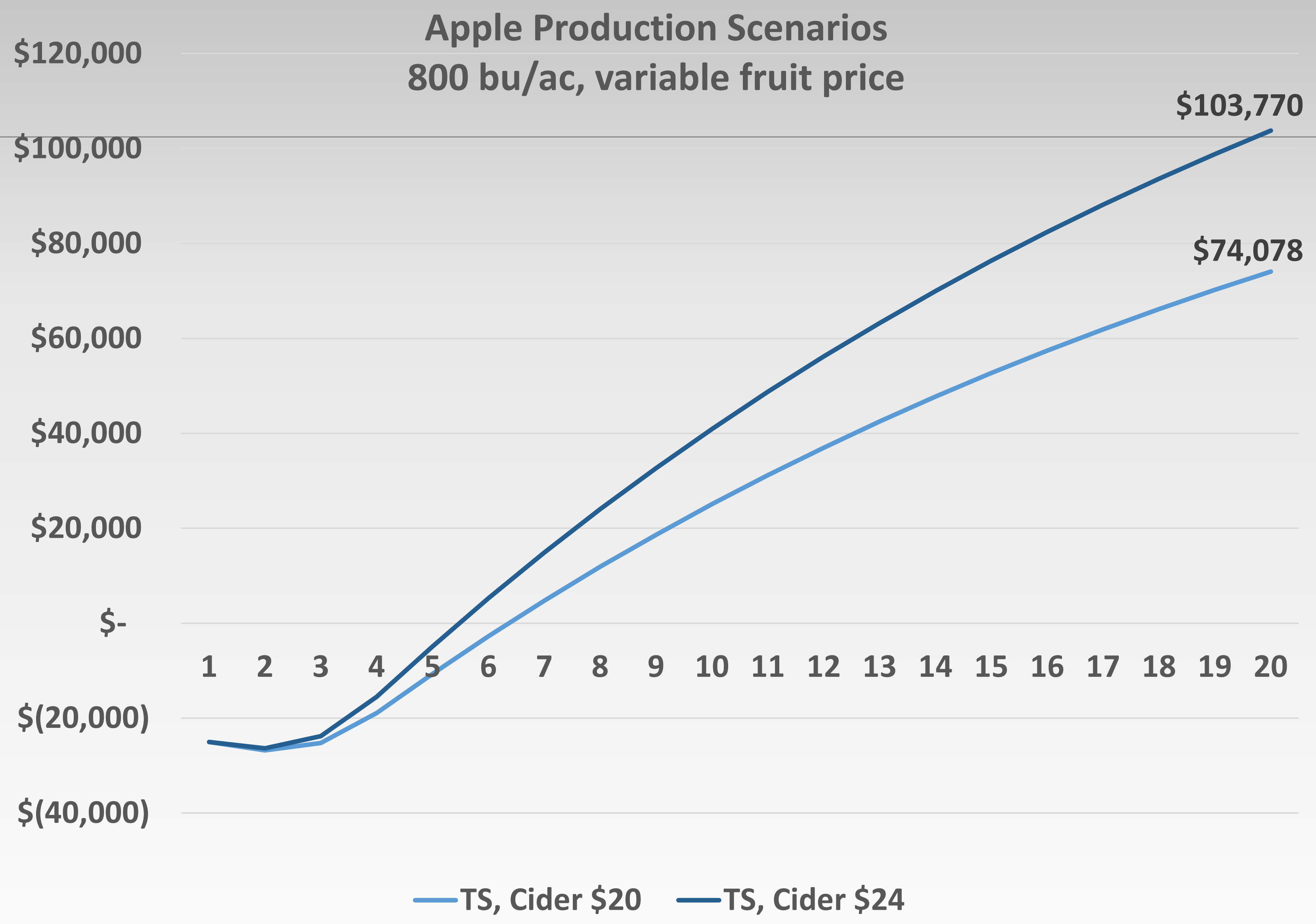

Apple Production Scenarios
Effect of yield
($US/acre)
$200,000
$150,000
$100,000
$50,000
$-
$(50,000)
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20
$169,805
$103,770
$59,747
TS, Cider, 800 bu
TS, Cider, 600 bu
TS, Cider, 1100 bu



Apple Production Scenarios
Effect of yield
($US/acre)
$200,000
$150,000
$100,000
$50,000
$-
$(50,000)
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20
$169,805
$103,770
$59,747
$18,631
TS, Cider, 800 bu
TS, Cider, 600 bu
TS, Cider, 600 bu, bienn
TS, Cider, 1100 bu



Apple Production Scenarios
800 bu/ac, variable fruit price
120000
100000
80000
60000
40000
20000
0
-20000
-40000
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
$103,770
TS, Cider $24



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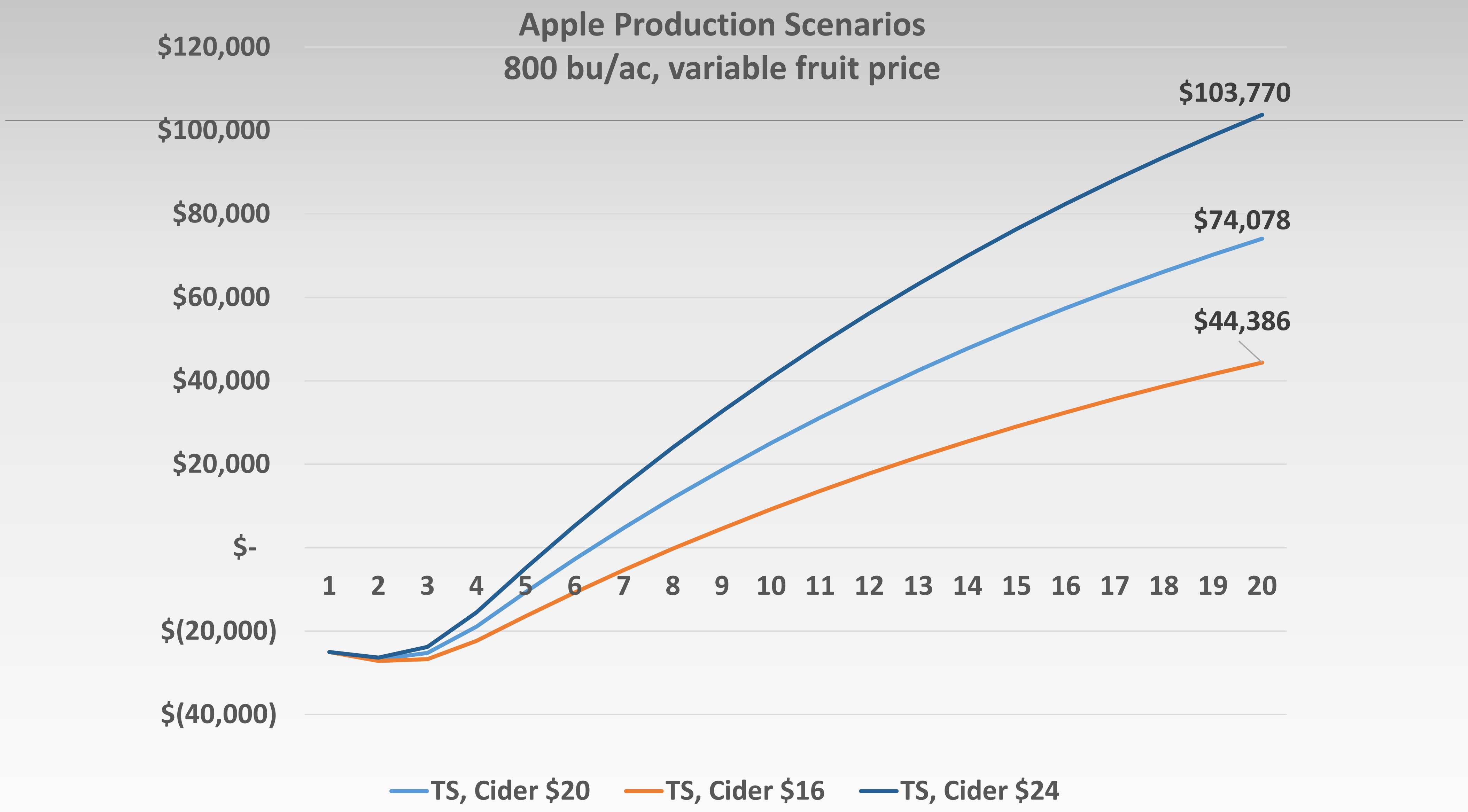
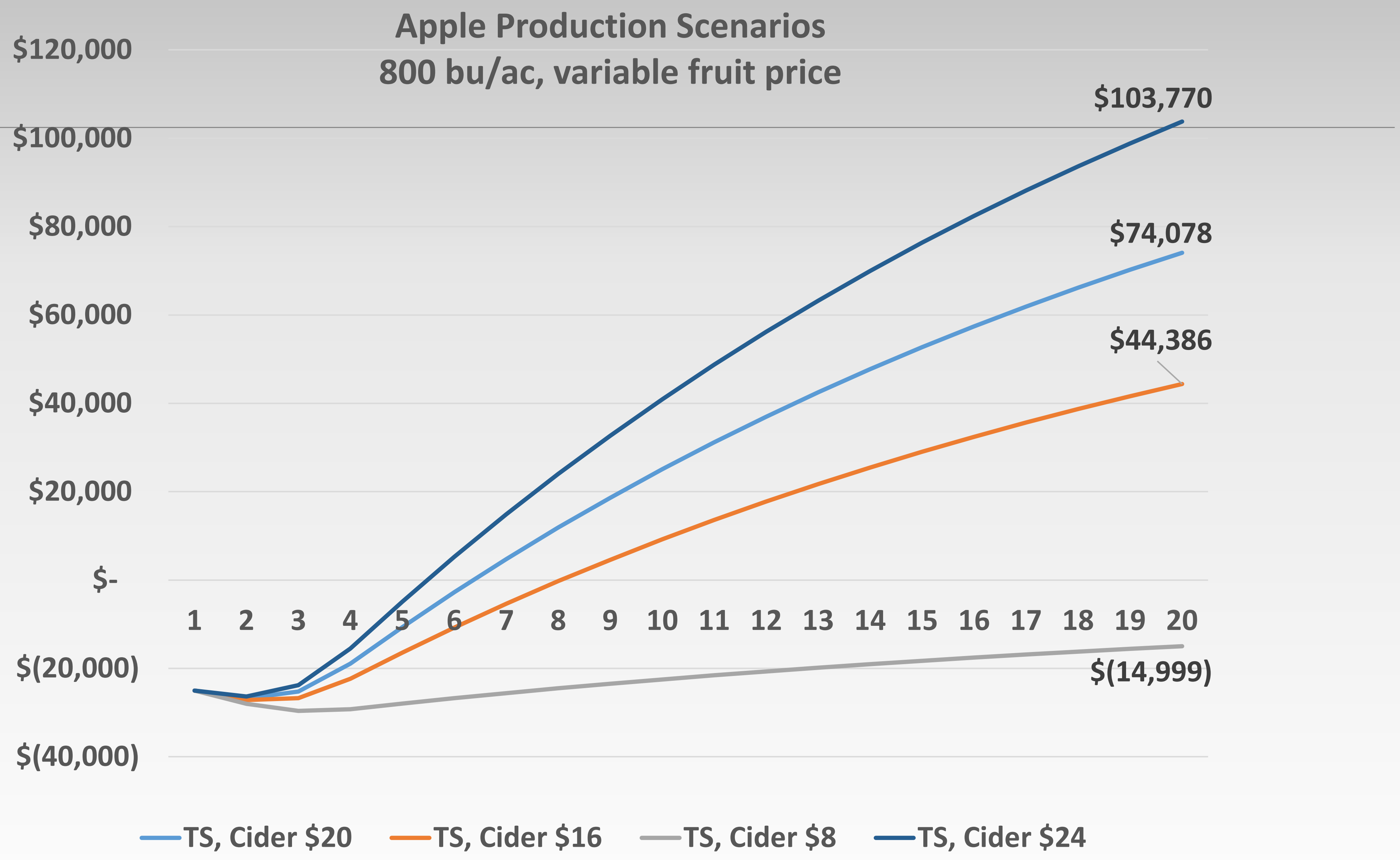

Apple Production Scenarios
800 bu/ac, variable fruit price
$120,000
$100,000
$80,000
$60,000
$40,000
$20,000
$-
$(20,000)
$(40,000)
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20
$103,770
$74,078
$44,386
TS, Cider $20
TS, Cider $16
TS, Cider $24



Apple Production Scenarios
800 bu/ac, variable fruit price
$120,000
$100,000
$80,000
$60,000
$40,000
$20,000
$-
$(20,000)
$(40,000)
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20
$103,770
$74,078
$44,386
$(14,999)
TS, Cider $20
TS, Cider $16
TS, Cider $8
TS, Cider $24

Labor cost reduction:

NESARE Project ONE16-254:
Orchard Pruning for
Cider Apple Production

Light interception throughout canopy influences crop yield
(Robinson & Lakso, 1991)

- *Ignoring differences between cultivars…*
- Narrower canopies resulted in higher PAR interception
- High-intensity Y-canopy resulted in highest PAR and crop yield
- Cumulative intercepted PAR was highly correlated (r^2=0.86) to crop yield

Table 3. Cumulative PAR intercepted and yield (1984–1987) of 'Empire' and 'Delicious' apple trees grown in four orchard production systems.

Cultivar	System	Cumulative PAR intercepted ($GJ \cdot ha^{-1}$) 1984–1987	Cumulative yield ($t \cdot ha^{-1}$) Unadjusted 1984–1987	Cumulative yield ($t \cdot ha^{-1}$) Adjusted for PAR[z] 1984–1987
Empire		26,100	126	89
Delicious		16,200	59	95
$LSD_{0.05}$[y]		2,800		
	Slender Sp./M.9	22,000	102	94
	Y-trellis/M.26	28,600	155	100
	C.L./M.9/MM.111	17,000	71	92
	C.L./M.7a	13,900	43	75
	$LSD_{0.05}$[y]	3,960		
Empire	Slender Sp./M.9	25,900	130	94
	Y-trellis/M.26	35,200	212	110
	C.L./M.9/MM.111	22,000	100	92
	C.L./M.7a	21,300	61	59
Delicious	Slender Sp./M.9	18,100	73	94
	Y-trellis/M.26	22,100	97	89
	C.L./M.9/MM.111	12,000	42	106
	C.L./M.7a	11,600	24	91
$LSD_{0.05}$[y]			23	26

[z]Adjusted yield = grand mean + residual from the regression of PAR (x) and yield (y).

[y]Wherever main effect LSD values are not presented, the cultivar × system interaction was significant at $P = 0.05$. n = 16 for the cultivar means; n = 8 for the system means; n = 4 for the cultivar × system means.

Robinson, T. L. and A. N. Lakso (1991). "Bases of yield and production efficiency in apple orchard systems." Journal of the American Society for Horticultural Science 116(2): 188-194.

Research basis and question:

- Growers are adopting 'cider orchard management' on limited acreage
  - Established, dessert cultivars
  - Depreciated orchards
  - Contracts or agreements for fruit purchase
  - Pricing: $6-12/bushel

- ***At reduced fruit price compared to dessert fruit, but guaranteed markets and reduced packing costs, can pruning labor inputs be reduced to meet price points?***

Experimental design

- Two orchards, similar tree age & size:
  - ‘Empire’ M7, pl. 1992, loamy sand
  - ‘McIntosh’ M26, pl. 1980s, clay soil
- Four pruning regimes:
  - No pruning
  - Winter pruning only
  - Summer pruning only
  - Winter + Summer pruning
- Parameters measured:
  - Tree size, % light interception, crop yield, pest damage, USDA grade, juice quality

2016 data

Percent of full sun measured in canopy, m from trunk

trt	m from ground	Orchard 1 Trunk	Orchard 1 1.0 m	Orchard 1 1.5 m	Orchard 1 2.0 m	Orchard 13 Trunk	Orchard 13 1.0 m	Orchard 13 1.5 m	Orchard 13 2.0 m
Winter Prune	4					62.3	57.2		
	3	34.3				9.3	23.7	41.5	
	2	18.5	40.4			4.1	21.0	19.6	11.1
	1	15.7	23.3	22.2		11.3 a	9.5	19.5	5.9
Winter + Summer Prune	4					75.6	15.2		
	3	58.0				12.8	33.1	33.5	
	2	22.0	20.8	40.8		11.8	24.2	24.8	
	1	14.9	33.5	47.5	20.5 a	3.2 b	12.1	20.3	45.3
No Prune	4	3.8				76.3			
	3	31.0	12.0			8.5	25.5	30.6	
	2	6.9	28.7	21.0	4.2	14.7	19.3	19.2	15.4
	1	10.9	30.3	29.0	4.4 b	3.4 b	6.4	18.3	21.1
Summer Prune	4					72.5	39.3		
	3	28.2				26.9	36.1	21.1	
	2	36.2	40.2	63.6		5.3	20.7	23.9	4.6
	1	11.3	39.6	22.5	6.2 b	4.0 b	18.9	22.0	17.4

Measurements taken at four transects (N,S,E,W) within canopy compared to above canopy full-light measurement. Data collected with LI-COR LI-190R Quantum Sensor (Lincoln, NE).

2016 Yield and packout

Orchard	TRT	Kg fruit/ tree	Fruit weight (g)	Percent packout (USDA grades) All US#1	utility	cull
1	WP	40.6	161.3	76.3	21.7	2.0
1	WSP	68.7	151.6	84.0	15.3	0.7
1	NoP	73.9	158.0	76.0	22.7	1.3
1	SP	30.7	152.0	73.7	21.0	5.3
13	WP	39.6	114.0	78.3	21.7	0.0
13	WSP	56.1	123.5	75.0	25.0	0.0
13	NoP	61.1	109.6	76.7	23.3	0.0
13	SP	62.3	115.9	76.7	23.3	0.0

- No differences in yield, fruit size, or distribution among USDA grades
- Irrigated (orchard 1) vs non-irrigated (Orchard 13)
- Different cultivars (‘Empire’ Orchard 1; ‘McIntosh’, Orchard 13)
- Overall, good crop for low-input system

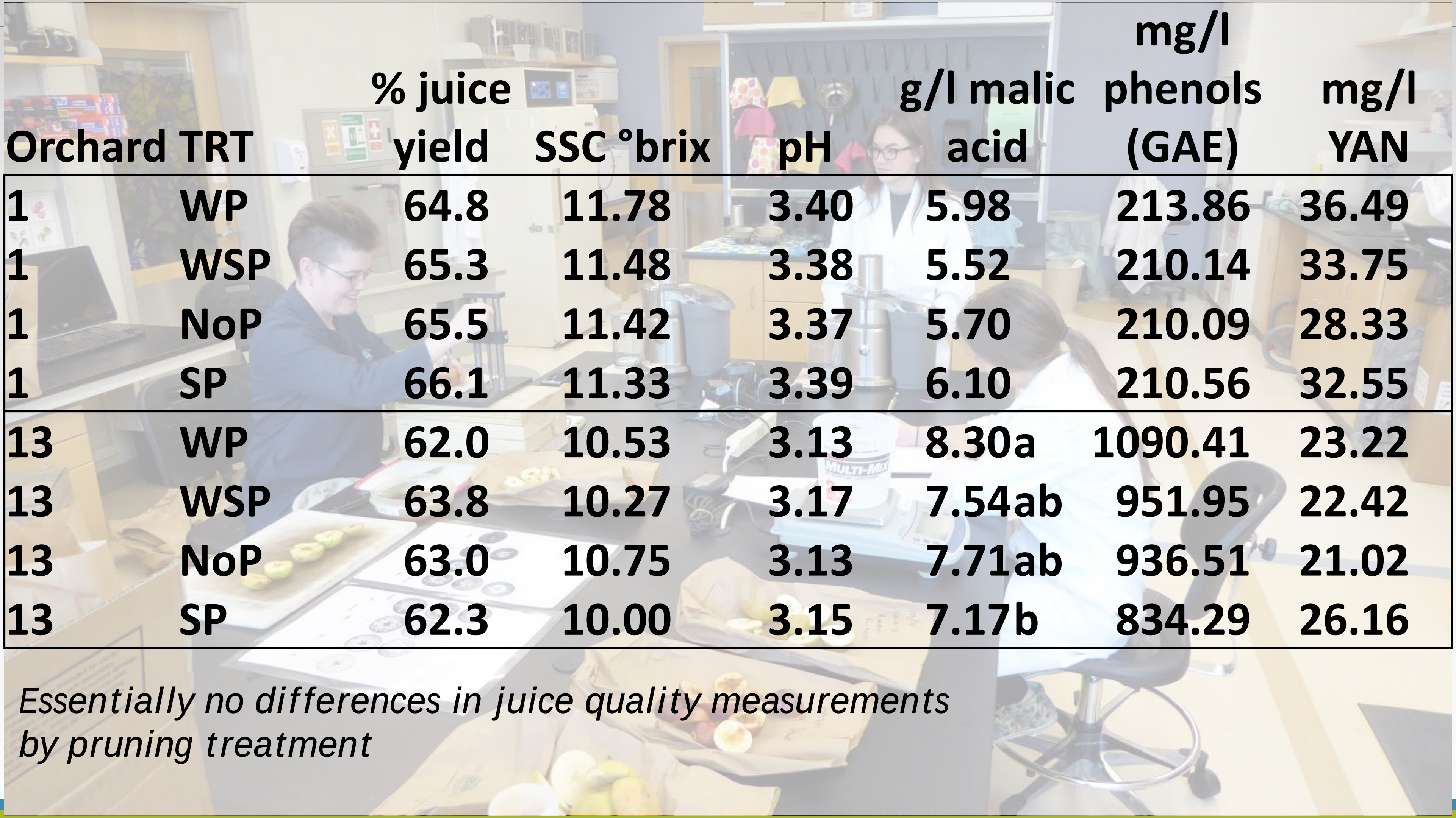
2017 Yield and packout

Percent packout (USDA grades)

Orchard	TRT	Kg fruit/ tree	Fruit weight (g)	All US#1	utility	cull
1	WP	68.6 ab	164	83.6	15.4	1.0
1	WSP	78.6ab	160	89.3	10.3	0.3
1	NoP	98.5A	161	85.7	13.3	1.3
1	SP	52.5 b	161	83.9	13.4	2.4
13	WP	39.6	138 ab	47.1	52.4	0.5
13	WSP	56.1	140A	41.7	57.9	0.5
13	NoP	61.1	121B	43.8	52.9	3.3
13	SP	62.3	126 ab	51.0	48.6	0.5

- More fruit in one non-pruned orchard
  - Summer pruning reduced that yield (cut it off)
- Few differences in fruit weight
- No differences in fruit quality/grade within orchards

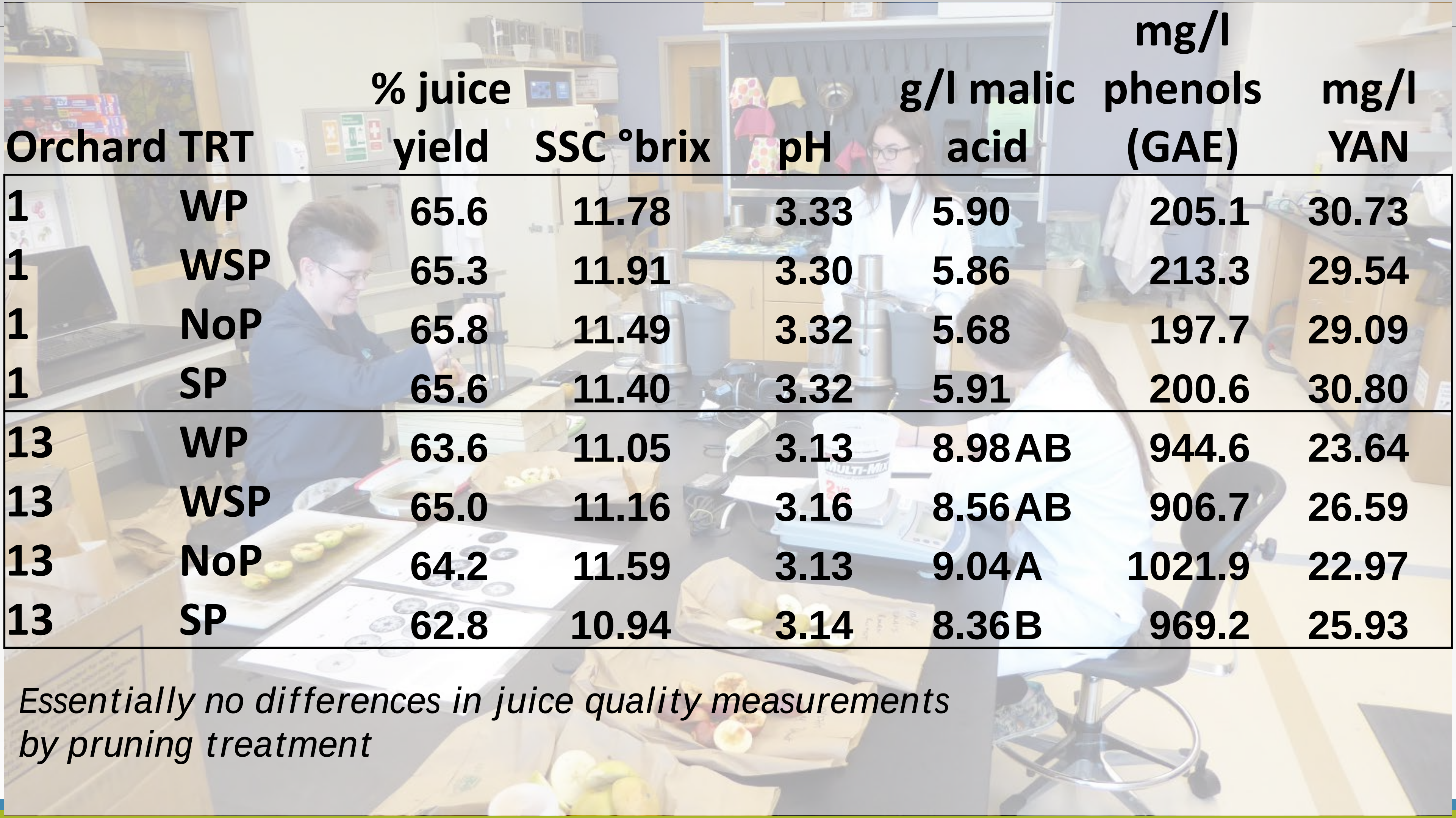
2016 Juice quality measurements



Orchard	TRT	% juice yield	SSC °brix	pH	g/l malic acid	mg/l phenols (GAE)	mg/l YAN
1	WP	64.8	11.78	3.40	5.98	213.86	36.49
1	WSP	65.3	11.48	3.38	5.52	210.14	33.75
1	NoP	65.5	11.42	3.37	5.70	210.09	28.33
1	SP	66.1	11.33	3.39	6.10	210.56	32.55
13	WP	62.0	10.53	3.13	8.30a	1090.41	23.22
13	WSP	63.8	10.27	3.17	7.54ab	951.95	22.42
13	NoP	63.0	10.75	3.13	7.71ab	936.51	21.02
13	SP	62.3	10.00	3.15	7.17b	834.29	26.16

Essentially no differences in juice quality measurements by pruning treatment

201 Juice quality measurements



Orchard	TRT	% juice yield	SSC °brix	pH	g/l malic acid		mg/l phenols (GAE)	mg/l YAN
1	WP	65.6	11.78	3.33	5.90		205.1	30.73
1	WSP	65.3	11.91	3.30	5.86		213.3	29.54
1	NoP	65.8	11.49	3.32	5.68		197.7	29.09
1	SP	65.6	11.40	3.32	5.91		200.6	30.80
13	WP	63.6	11.05	3.13	8.98	AB	944.6	23.64
13	WSP	65.0	11.16	3.16	8.56	AB	906.7	26.59
13	NoP	64.2	11.59	3.13	9.04	A	1021.9	22.97
13	SP	62.8	10.94	3.14	8.36	B	969.2	25.93

Essentially no differences in juice quality measurements by pruning treatment

Cumulative economics

Orchard	TRT	Bu/Ac	Gross $ rev fresh + utility	Gross $ cider, $6/bu	Gross $ cider, $8/bu	Gross $ cider, $10/bu	Pruning cost, $/ac
1	WP	1277.1	22016.3	14708.9	19611.9	24514.9	586.5
1	WSP	1720.8	31195.6	18498.3	24664.4	30830.5	1174.8
1	NoP	2014.4	34940.5	22118.3	29491.1	36863.9	0.0
1	SP	972.2	16518.2	11049.4	14732.5	18415.7	588.3
13	WP	1024.5	14911.6	9023.4	12031.1	15038.9	586.5
13	WSP	1302.5	18455.5	10980.1	14640.2	18300.2	1174.8
13	NoP	1382.9	19931.6	10881.2	14508.2	18135.3	0.0
13	SP	1372.2	20623.5	11215.2	14953.6	18691.9	588.3

**** Very, very preliminary! Small sample size.

Typical annual gross revenue fresh market 'modern' orchard: >$20,000

‘Cider IPM’

NORTHEAST IPM CENTER:
‘ADDRESSING UNIQUE IPM NEEDS IN NORTHEAST CIDER ORCHARDS’

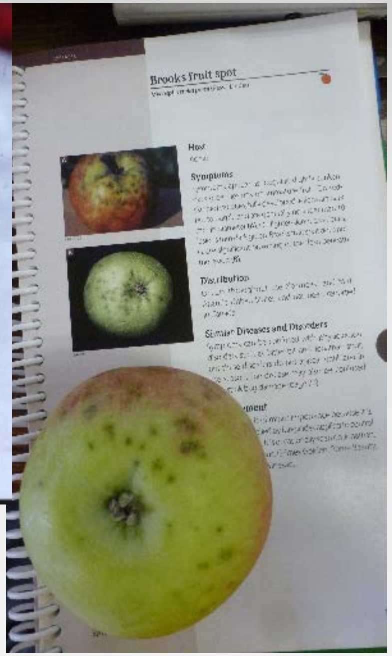
Central concepts of *Integrated Pest Management*

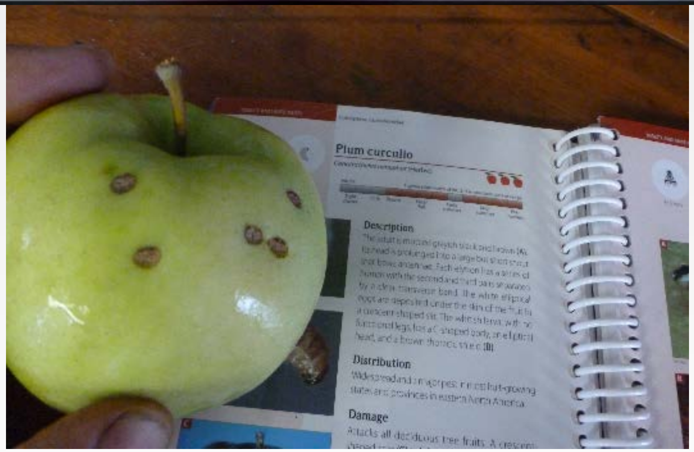
- Pest tolerance (economic thresholds)
- Knowledge of pest life cycles
- Knowledge of agroecosystem
- Cultural pest management
- Biological pest management
- Chemical pest management

Cosmetic fruit injury

No concern for cidermaking:

- Abiotic defects
  - Russeting, frost rings
- *Minor*, healed insect damage
  - (plum curculio, tarnished plant bug)
- Surface fungi
  - (sooty blotch, flyspeck, Brooks spot)





Direct fruit arthropod pests of concern

Pest damage where open wounds encourage fruit decay, preharvest drop, microbial infection

- Codling moth
- Plum curculio
- European apple sawfly
- Apple maggot

Indirect pests and diseases of concern




Pests and diseases that may not affect fruit but could reduce yield and tree growth

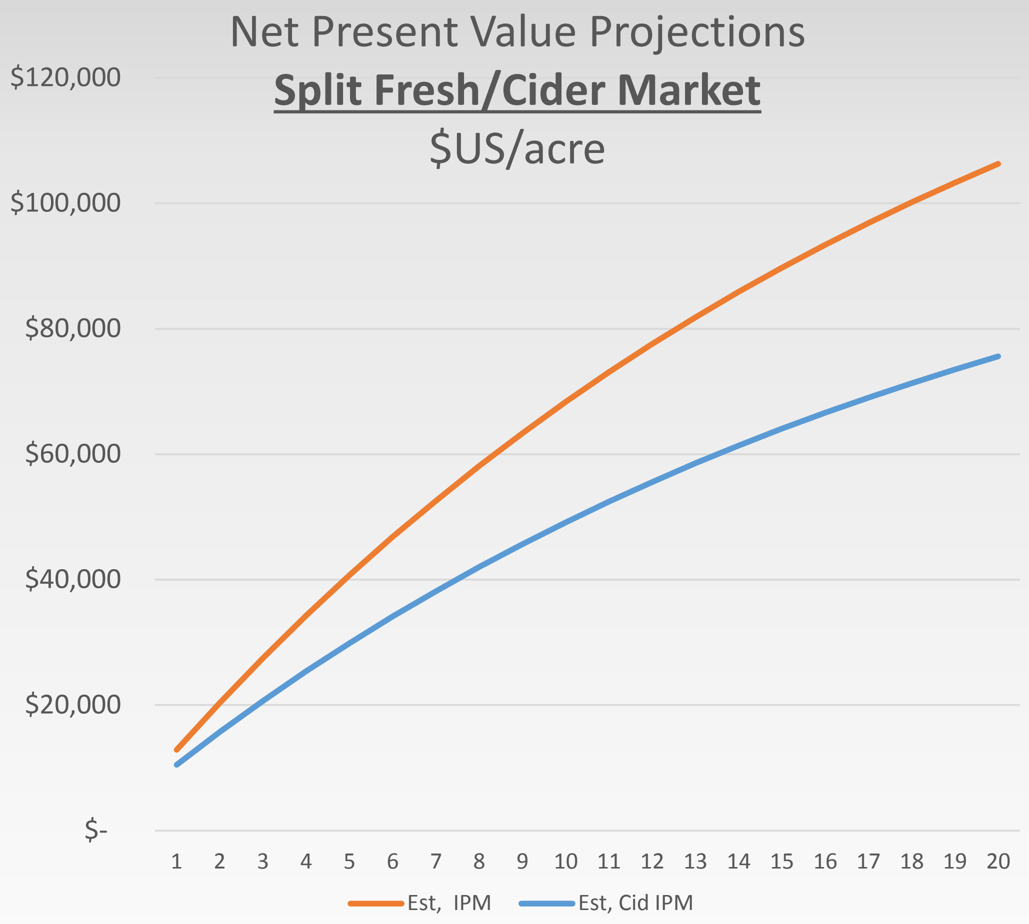
- European red mite/Two-spotted spider mite
- Aphids
- Apple scab
- Cedar apple rust
- Powdery mildew

Project objectives

- Evaluate reduced-input pest management programs on dessert cultivars for effects on crop yield, juice quality, and profitability;
- Test novel crop load management programs on specialty cider apples to reduce biennial production and potentially eliminate carbaryl from thinning programs used on them;
- Develop and deliver research-based IPM training programs to growers to increase adoption of reduced-input cider orchards.

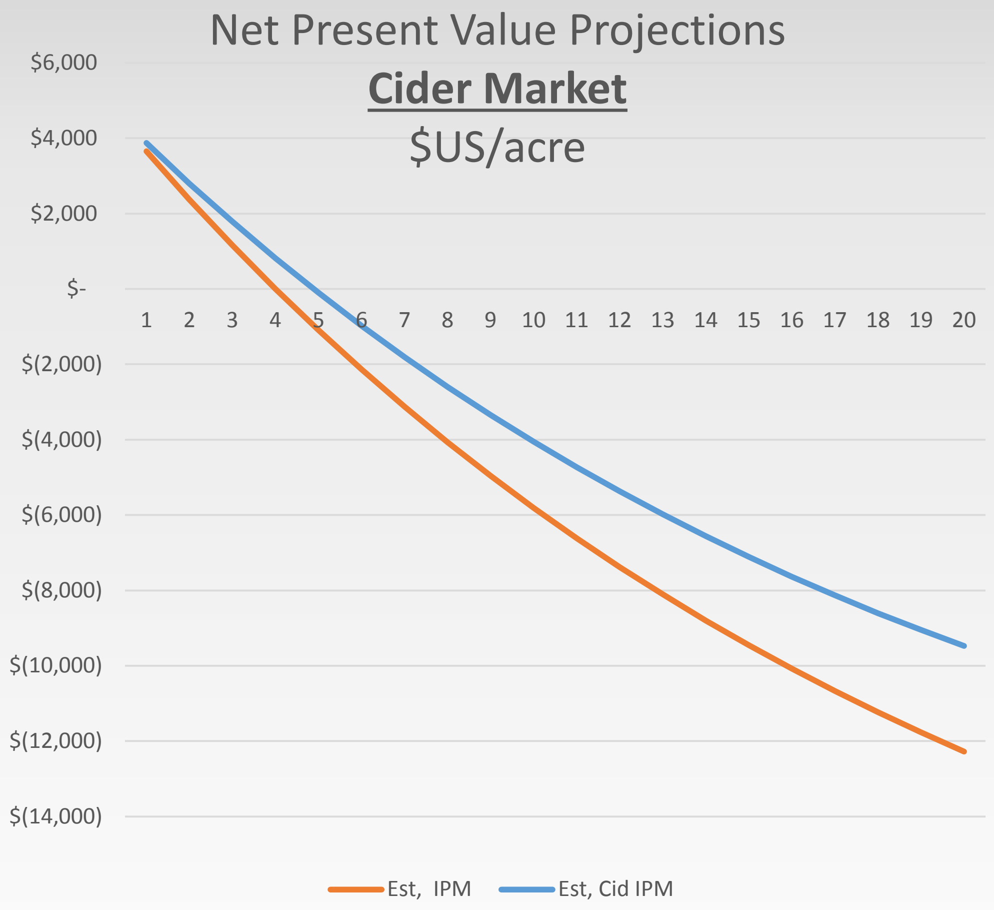
Potential profitability

- *If crop is sold on a split market model…*
  - ‘Cider IPM’ yield less profit
  - Lower costs not offset by change in distribution grade to reflect more utility fruit



Potential profitability

- *If crop is sold on a split market model…*
  - 'Cider IPM' yield less profit
  - Lower costs not offset by change in distribution grade to reflect more utility fruit
- *If crop is sold on a cider market model…*
  - *Declining productivity & time value of money = declining/negative profitability*



Two worlds of cider apple production

- **<u>Specialty cider cultivars</u>**
  - Heirloom
  - Low-input scab-resistant cultivars
  - Regionally-unique cultivars
  - Bittersweet cultivars

  - *How do these cultivars perform in Vermont orchards?*
  - *What management strategies can increase supply/profitability/cider quality?*

Juice analysis including soluble solids (SS), pH, titratable acidity (TA), total polyphenols (Tannins), and yeast assimilable nitrogen (YAN) for three lots of cider apples evaluated in 2015.

Cultivar	Lot[z]	SS (°brix)		pH		TA (g/l)[y]		Tannins (mg /l)[y]		YAN (mg/l)	
Ashmead's Kernel	1	18	a[x]	3	d	10.8	a	667	c	166.3	a
Brown Snout	1	18.2	a	3.8	c	4.1	d	2148	b	97.4	bc
Calville Blanc	1	15.3	b	3.1	d	10	ab	728	c	86.3	cd
Chisel Jersey	1	13.1	bc	4.1	b	1.5	e	2408	b	55.4	d
Dabinett	1	13.1	bc	4.2	ab	1.1	e	3656	a	31.8	de
Esopus Spitzenburg	1	15.8	ab	3.1	d	9.3	b	633	c	112.7	b
Harry Master's Jersey	1	12	c	4.3	a	1.2	e	2120	b	36.7	cd
Redfield	1	13.6	bc	3.2	d	6.5	c	3268	a	58.6	c
Yarlington Mill	1	12.2	c	3.8	c	1.7	e	3538	a	8.9	e

[z] Lot 1 = fruit replicates (n=5) collected from one orchard in Addison County, VT; lot 2 = fruit replicates (n=5) collected from one orchard in Chittenden County, VT; lot 3 = single samples (n=1) of promising wild apple cultivars collected from Franklin and Washington Counties, VT.

[y] Titratable acidity measured in malic acid equivalents, total polyphenols measures in gallic acid equivalents.

[x] Values represent mean for of all replicated for lots 1 & 2, and single values for lot 3. Values followed by the same letter within each lot do not differ at α=0.05 using Tukey's adjustment for multiple comparisons.

Bradshaw, T. L., S. L. Kingsley-Richards and J. A. Foster (2018). "Apple Cultivar Evaluations for Cider Making in Vermont, U.S.A." Acta Hort ***In press.***

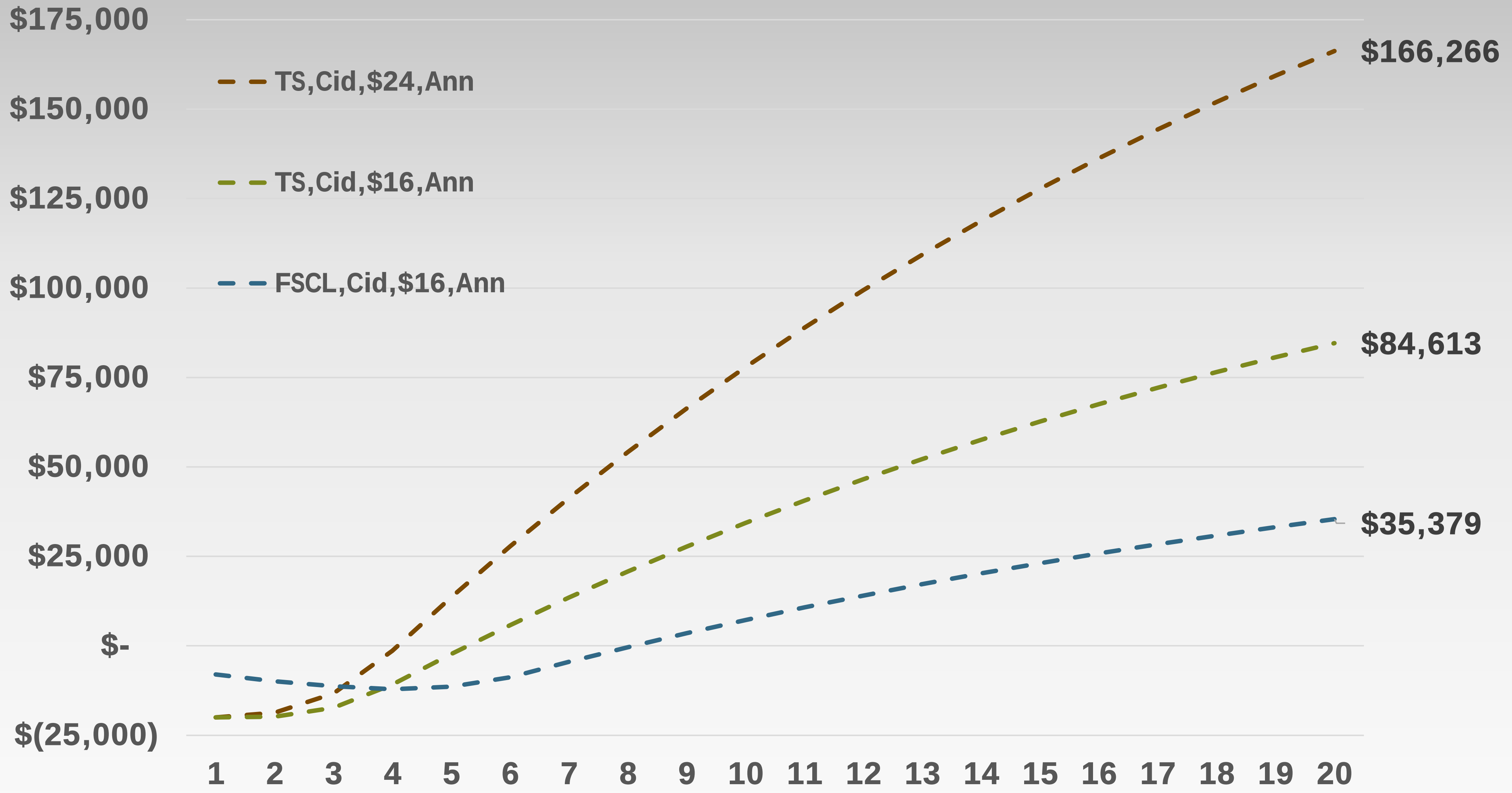
Specific Management Issues with High-Value Cider Apple Cultivars

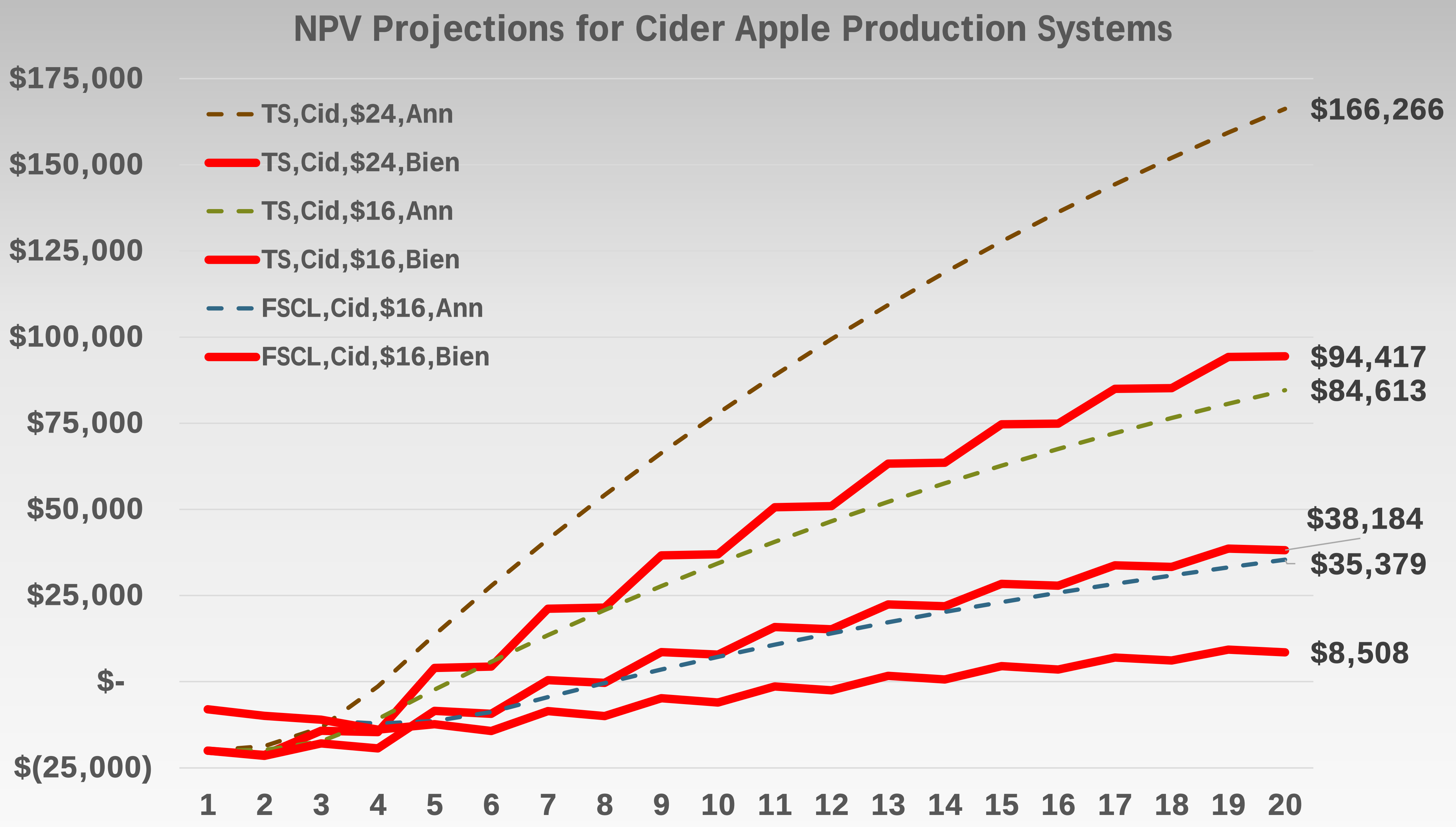
- Unknown/ unproven yield benchmarks
- Orchard architecture is unsettled
  - Big or small trees?
  - Trellis or freestanding?
  - Mechanical harvest?
- Unique Sensitivity to Disease and Horticultural Problems

Specific Management Issues with High-Value Cider Apple Cultivars

- Unknown/ unproven yield benchmarks
- Orchard architecture is unsettled
    - Big or small trees?
    - Trellis or freestanding?
    - Mechanical harvest?
- Biennial production

NPV Projections for Cider Apple Production Systems





NPV Projections for Cider Apple Production Systems
TS,Cid,$24,Ann
TS,Cid,$24,Bien
TS,Cid,$16,Ann
TS,Cid,$16,Bien
FSCL,Cid,$16,Ann
FSCL,Cid,$16,Bien
$175,000
$150,000
$125,000
$100,000
$75,000
$50,000
$25,000
$-
$(25,000)
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20
$166,266
$94,417
$84,613
$38,184
$35,379
$8,508

Specific Management Issues with High-Value Cider Apple Cultivars

- Unknown/ unproven yield benchmarks
- Orchard architecture is unsettled
  - Big or small trees?
  - Trellis or freestanding?
  - Mechanical harvest?
- Biennial production
  - Typically managed by:
    - Cultivar selection
    - Application of PGRs, including carbaryl
  - European cider cultivars don't respond well to carbaryl
  - Can newer return-bloom treatments reduce biennialism and avoid use of carbaryl?

On-Farm PGR Trials for Crop Load Management

Commercial orchard in Addison County, VT

Two cultivars: ‘Ellis Bitter’, ‘Kingston Black’

- 2011 planting; MM111/M9 interstock

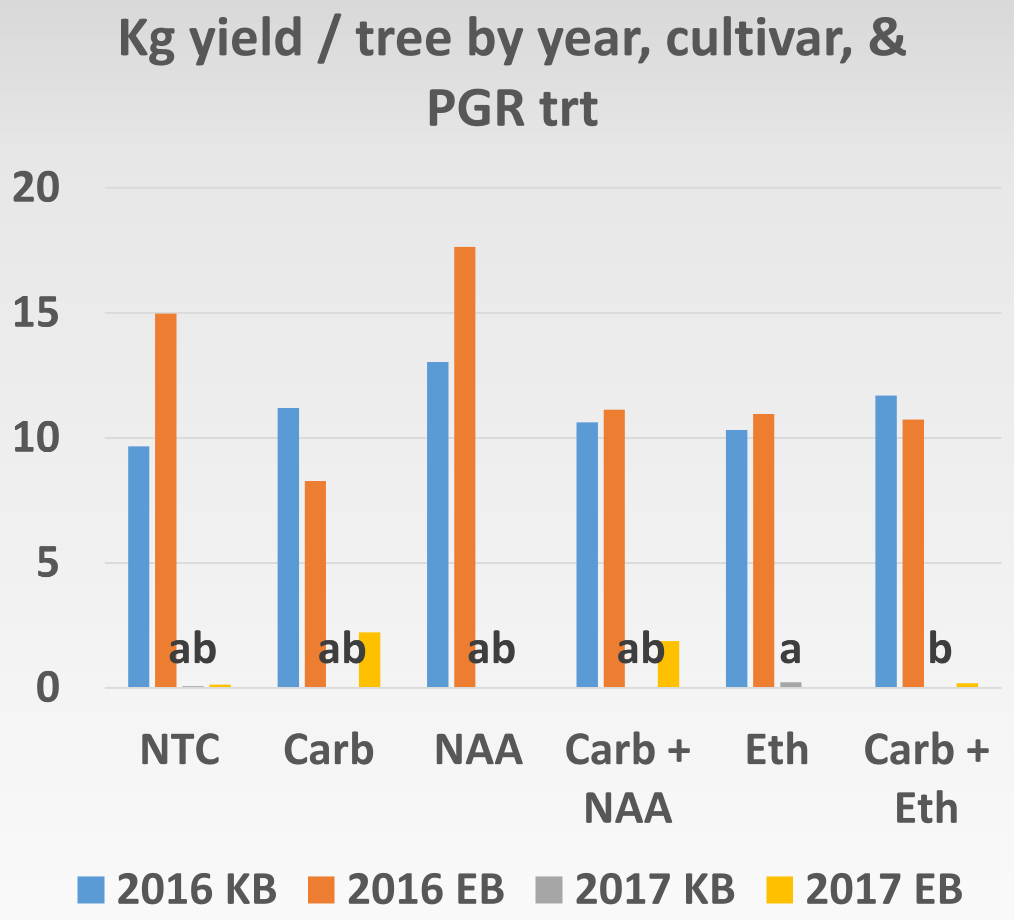
Two years: 2016, 2017

Six treatments:

1. NTC
2. Carbaryl
3. NAA
4. Carbaryl + NAA
5. Ethrel
6. Carbaryl + Ethrel

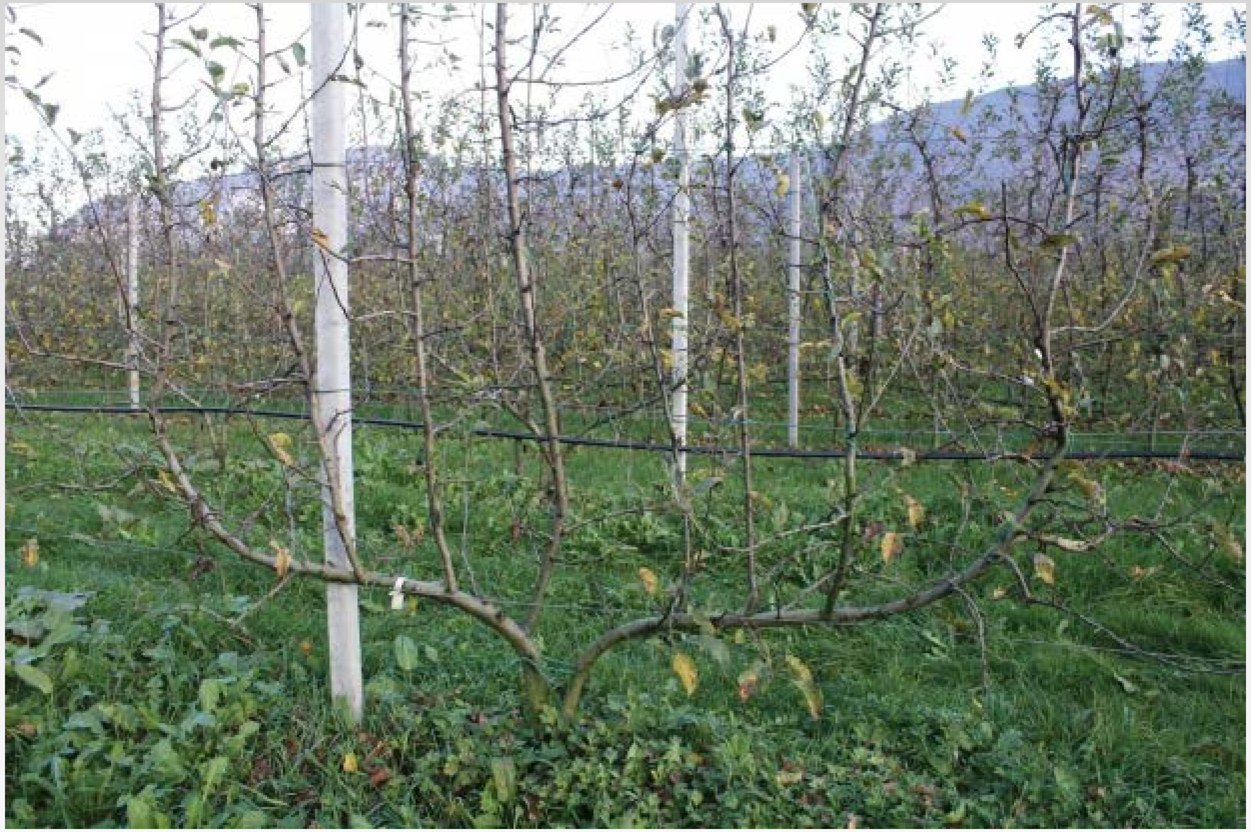
Preliminary analysis

- No juice chemistry data yet for 2017
- No return bloom data yet for 2017 (2018 collection)
- No effect on juice chemistry (2016)
- Inconsistent effects on yield
- Biennialism still an issue
- One orchard, one short trial



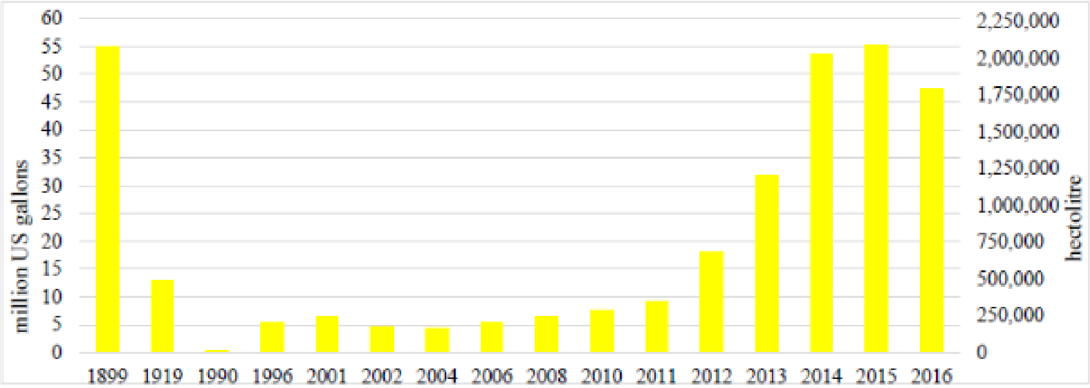
Cider Orchard Research: Continued Work

- Complete analysis of SARE/NEIPM project data
- Analyze packout/spray records from orchards involved with 2017 UVM Apple Scouting program to extend usefulness of 2016 data
- Continue Cider IPM education, inclusion in New England Tree Fruit Mgmt Guide
- Continue PGR trials?
- 2018-2021 Hatch Project “Rootstock and orchard architecture selection for unique apple production systems”



Latest Research…

http://jfr.ccsenet.org Journal of Food Research Vol. 7, No. 2; 2018



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Home > Vol 7, No 2 (2018) > **Fabien-Ouellet**

The Identity Crisis of Hard Cider

Nicolas Fabien-Ouellet, David Scott Conner

Abstract

In the past 5 years, the hard cider industry in the U.S. has undergone a sudden and dramatic growth period. This boom initially revealed challenges on the cider-specific apple supply side, but issues on the hard cider demand side have also emerged. This mixed methods study conducted in Vermont, a crucial player of the U.S. hard cider industry, addresses the gaps in the literature both on the apple supply side, and on the hard cider demand side. On the apple supply side, fourteen semi-structured interviews demonstrated that neither a long-term formalized contract nor a cooperative model (the two strategic partnership mechanisms used by world's leading industries to manage cider-specific apple production) are appropriate for the current Vermont industry context. On the hard cider demand side, cider makers expressed high interest in working under a geographical indication (GI) label to develop consumers' hard cider literacy and increase demand. This research further indicates that GIs can act as a powerful economic development tool. Introducing hard cider GIs could address current hard cider industry issues on both the supply side and the demand side.

Latest Research…

"…the core issue preventing cider-specific apple production in Vermont is on the **hard cider demand side, rather than on the apple supply side**"

Journal of Food Research

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Latest Research…

"…This research project has **identified the establishment of a hard cider geographical identity as the most promising strategy** …to tackle both cider-specific apple supply issues and hard cider demand challenges"

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Sunrise Orchards

Champlain Orchards

Northeast IPM Center

Northeast SARE ONE16-254

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