The Economics of Mesh Bags for Protecting Young Citrus Trees

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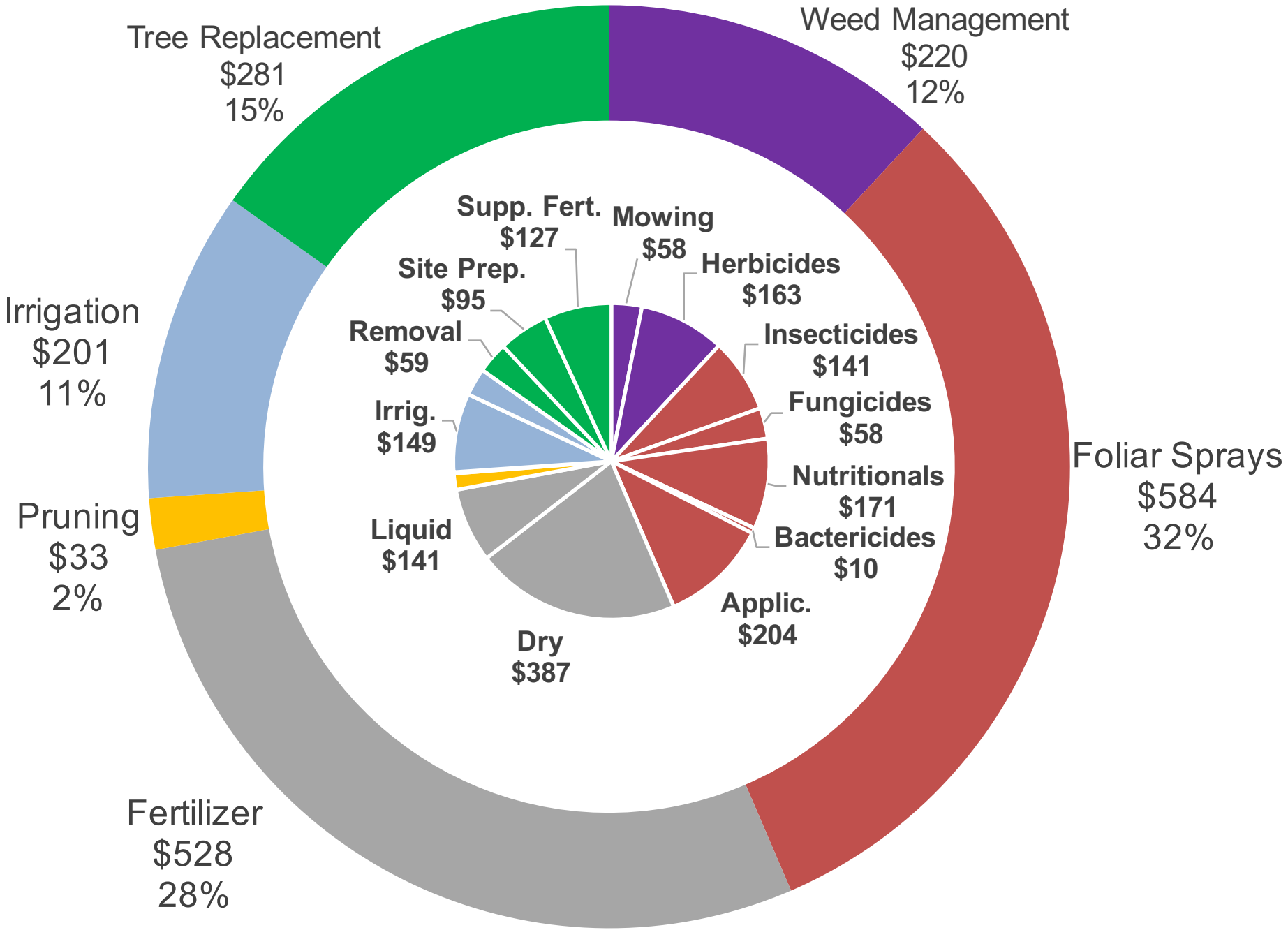
Cultural Cost of Production per Acre for Processed Oranges in Southwest Florida, 2018/19

Costs represent a mature grove (10+ years old) including resets

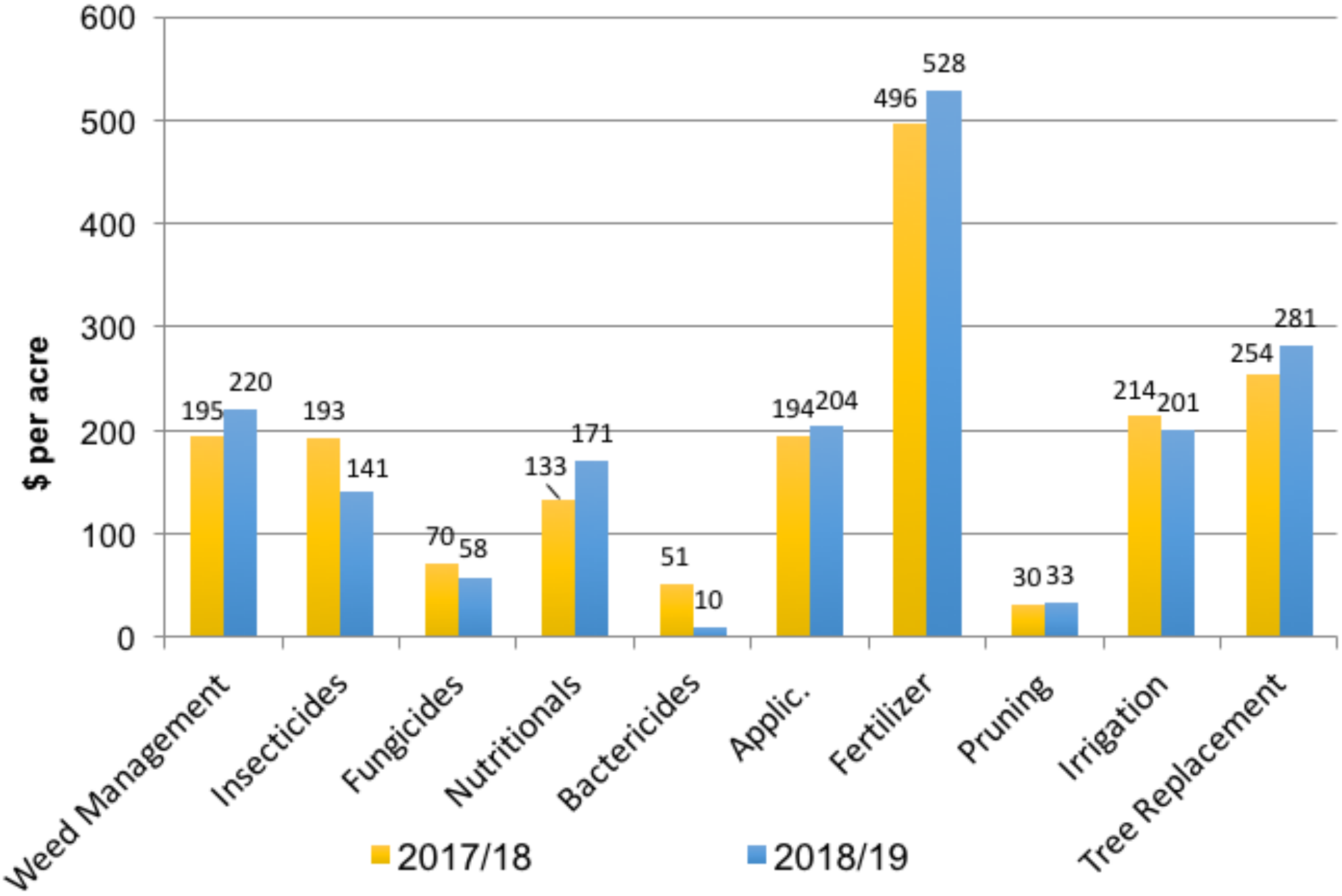
	Cost per acre ($)
Weed Management	220.35
Foliar Sprays	584.14
Fertilizer	528.01
Pruning (topping, hedging, chop/mow Brush)	33.23
Irrigation[1]	201.14
Total Cultural Costs without Tree Replacement	**1566.86**
Tree Replacement (7 trees)	280.96
Total Cultural Costs with Tree Replacement	**1847.82**

Source: University of Florida, IFAS, CREC

Cultural Cost of Production per Acre for Processed Oranges in Southwest Florida by Program



Cost of Production for Processed Oranges in Southwest Florida by Program



Total Cost of Production per Acre for Processed Oranges in Southwest Florida, 2018/19

		Cost per acre ($)
Total Cultural Costs		1847.82
Other Costs	Interest on Operating (Cultural) Costs	92.39
	Management Cost	130.12
	Property Tax/Water Management Assessment	28.73
	Interest on Average Capital Investment	165.57
Total Other Costs		416.81
Total Costs		**2264.63**

Source: University of Florida, IFAS, CREC

Using Mesh Bags: Costs and Benefits

Key variables: (1) Yield in years 3, 4, 5 and 6

(2) Price ($/ps). in years 3, 4, 5 and 6

(3) Cost of bag + labor

(4) Useful life of bag

(5) Savings in caretaking programs due to bag use

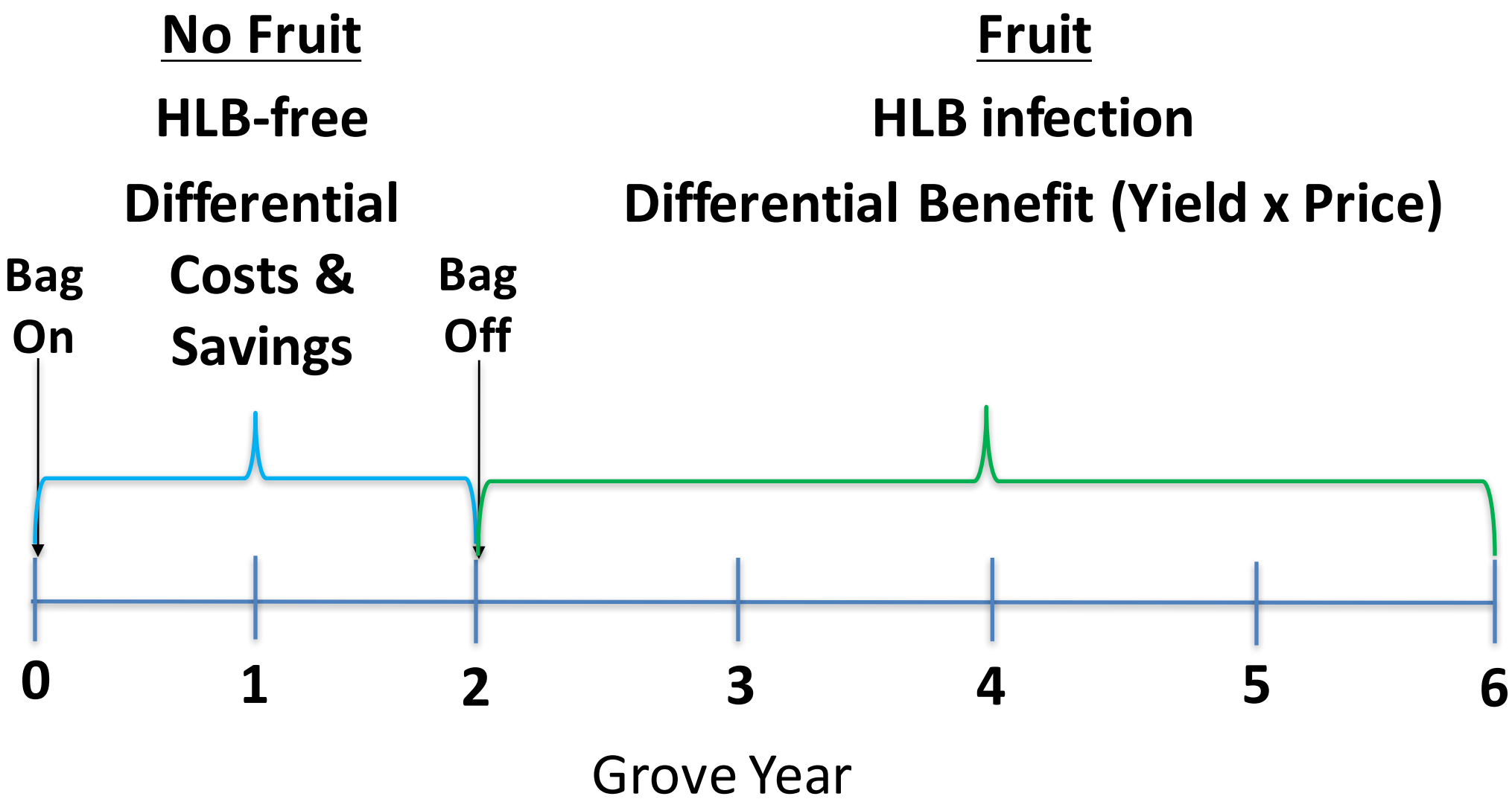
Variables growers know:

- Cost of bag + Labor
- Savings (costs not incurred in caretaking by using bags)

Variables growers do not know:

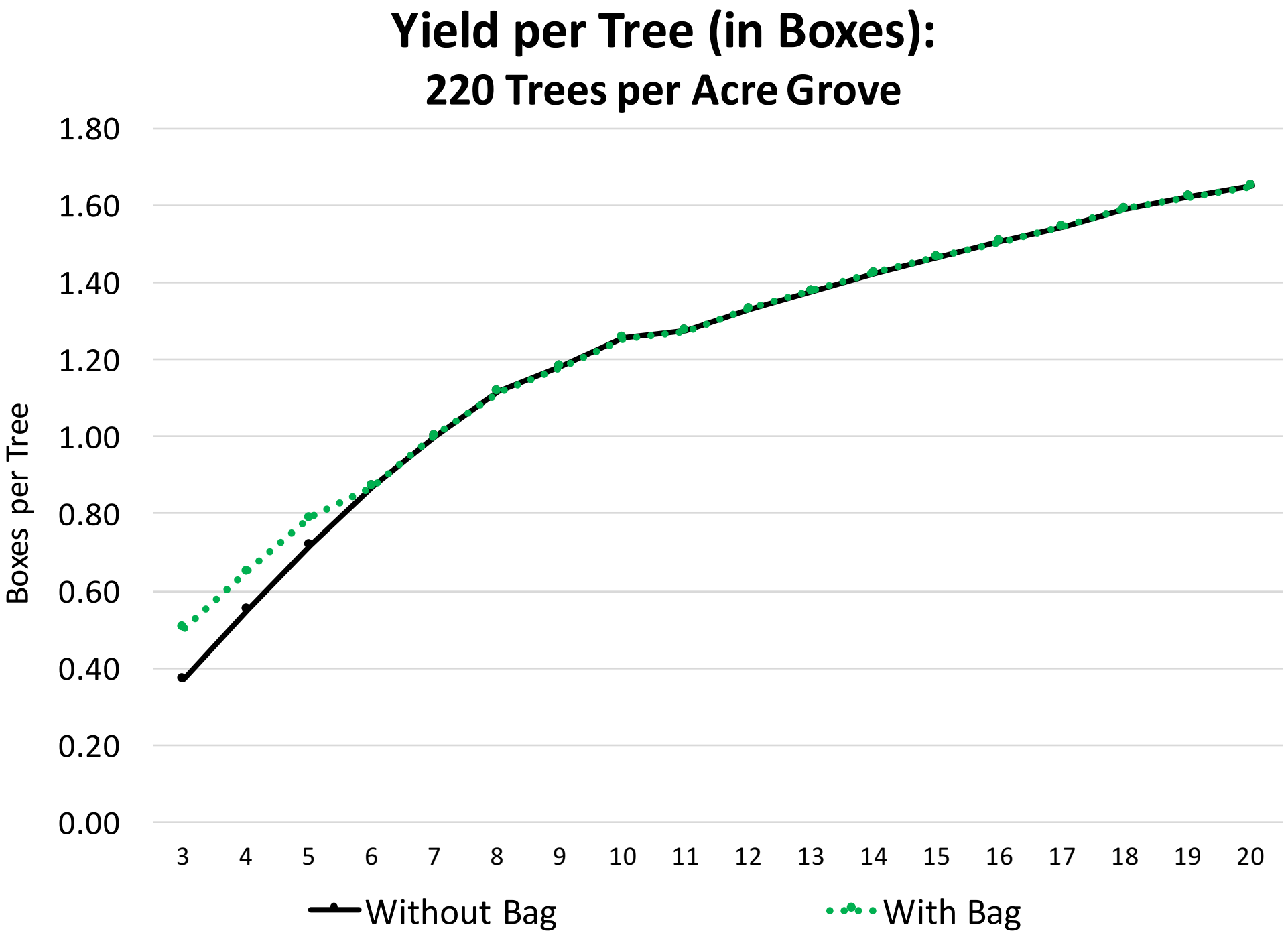
- Yield
- Price
- Useful life of bags (1-use or 2-use)

Costs and Benefits: Timeline



Assumptions: Yield (for Valencias)

	Grove year			
	3	4	5	6
	Yield (boxes per tree)			
Pre-HLB	0.63	0.93	1.25	1.45
Current	0.37	0.55	0.72	0.87
% reduction	41%	41%	42%	40%


Yield per Tree (in Boxes):
220 Trees per Acre Grove
Boxes per Tree
1.80
1.60
1.40
1.20
1.00
0.80
0.60
0.40
0.20
0.00
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
Without Bag
With Bag

Assumptions: Price

- Constant price throughout investment

Delivered-In Price Scenarios					
Low		**Medium**		**High**	
$12.38/box	$2.25/ps	$13.75/box	$2.50/ps	$15.13/box	$2.75/ps

Assumptions: Differential Costs

- Cost of the bag: $7.10 (1-use and 2-use scenarios)
- Labor bag on/off: $1.25 (~5 min. task)

Assumptions: Differential Savings

High Savings Scenario

Low Savings Scenario

- Neonics: save on 7 drench applic. years 1+2: $2.53/tree
  save on 2 drench applic. years 1+2: $0.72/tree

- Insecticides: save 75%: $0.18/tree
  save 50%: $0.12/tree

- Bactericides: save 100%: $0.11/tree
  not applying Bactericides: save $0

- Foliar Nutritionals: save 33%: $0.06/tree
  save 20%: $0.03/tree

Scenario Analysis

Computed different scenarios combining number of bag uses, Prices, and Savings

Bag Use	Price ($)		Savings
	Delivered-In		
1- use	Low	12.38/box	Low
		2.25/ps	High
	Medium	13.75/box	Low
		2.50/ps	High
	High	15.13/box	Low
		2.75/ps	High
2- use	Low	12.38/box	Low
		2.25/ps	High
	Medium	13.75/box	Low
		2.50/ps	High
	High	15.13/box	Low
		2.75/ps	High

Reset Model Scenario:
1-use bag; $2.75/ps (high); high savings

Year	item	Cost CF	Revenue CF	Undiscounted Profit	PV	
					5%	10%
		dollars per tree				
0	Bag + labor on	-8.35		-8.35	-8.35	-8.35
1	Savings		2.88	2.88	2.74	2.62
2	Labor off + savings	-1.25	2.88	1.63	1.48	1.35
3	Diff. yield and revenue		1.53	1.53	1.32	1.15
4	Diff. yield and revenue		1.18	1.18	0.97	0.80
5	Diff. yield and revenue		0.82	0.82	0.65	0.51
6	Diff. yield and revenue		0.00	0.00	0.00	0.00
			Total	**-0.30**	**-1.19**	**-1.92**
					IRR=	**-1.50%**

Preliminary Profitability Analysis for Reset Model

Bag Use	Price ($)		Savings	IRR
	Delivered-In			
1- use	Low	12.38/box	Low	-23.90%
		2.25/ps	High	-6.03%
	Medium	13.75/box	Low	-21.12%
		2.50/ps	High	-3.67%
	High	15.13/box	Low	-18.60%
		2.75/ps	High	-1.50%
2- use	Low	12.38/box	Low	-11.24%
		2.25/ps	High	21.29%
	Medium	13.75/box	Low	-7.93%
		2.50/ps	High	23.77%
	High	15.13/box	Low	-4.93%
		2.75/ps	High	26.09%

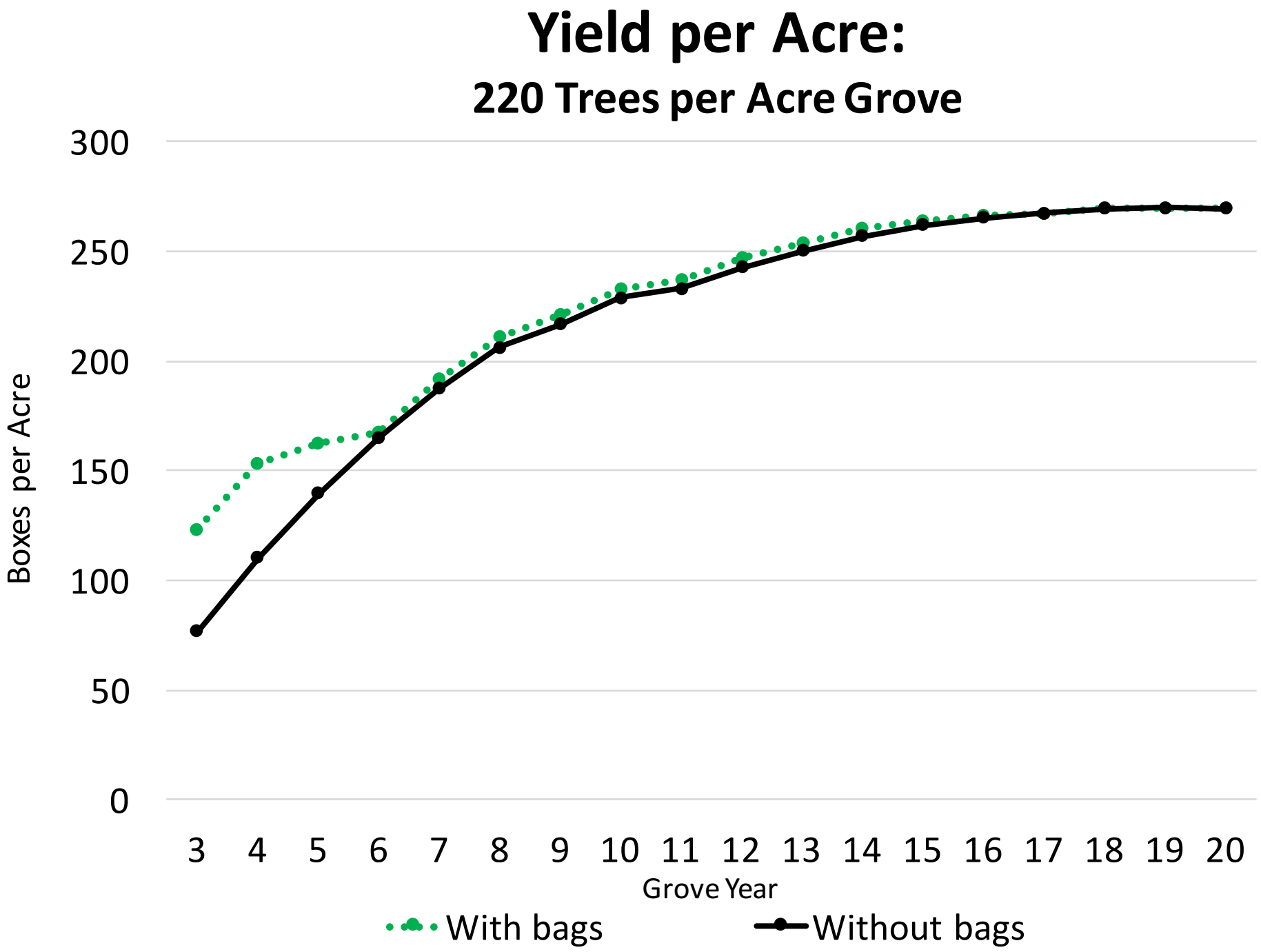
Note: Obtained positive returns for 2-season use bag and high savings scenarios

Solid Set Model: Additional assumptions

- Tree mortality: 1% years 0 through 2; 4% year 3+
- Savings:
  - On 2 ground applications: $46/acre
  - On aerial applications: $40/acre (in High Savings only)

- Infection progression:

Grove year			
3	4	5	6
30%	60%	90%	100%


Yield per Acre:
220 Trees per Acre Grove
300
250
200
150
100
50
0
Boxes per Acre
3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20
Grove Year
With bags
Without bags

Preliminary Profitability Analysis for Solid Set Model

Bag Use	Price ($) Delivered-In		Savings	IRR
1- use	Low	12.38/box	Low	-11%
		2.25/ps	High	7%
	Medium	13.75/box	Low	-8%
		2.50/ps	High	9%
	High	15.13/box	Low	-5%
		2.75/ps	High	12%
2- use	Low	12.38/box	Low	4%
		2.25/ps	High	38%
	Medium	13.75/box	Low	8%
		2.50/ps	High	41%
	High	15.13/box	Low	12%
		2.75/ps	High	43%

Summary

- Showed the basis for computing the benefits, costs and profitability of using mesh bags for protecting young trees
- The profitability of the use of bags depends on key variables, some are known today whereas others are not
- Growers can improve their decision-making process by making their own calculations to decide whether to use the bags
- For reset model: found much of the benefits depend on how much caretaking savings a grower can achieve by using bags
- For solid set model: Found bags to be profitable even with 1 use bags but still need high savings scenario

Thank you for attention

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