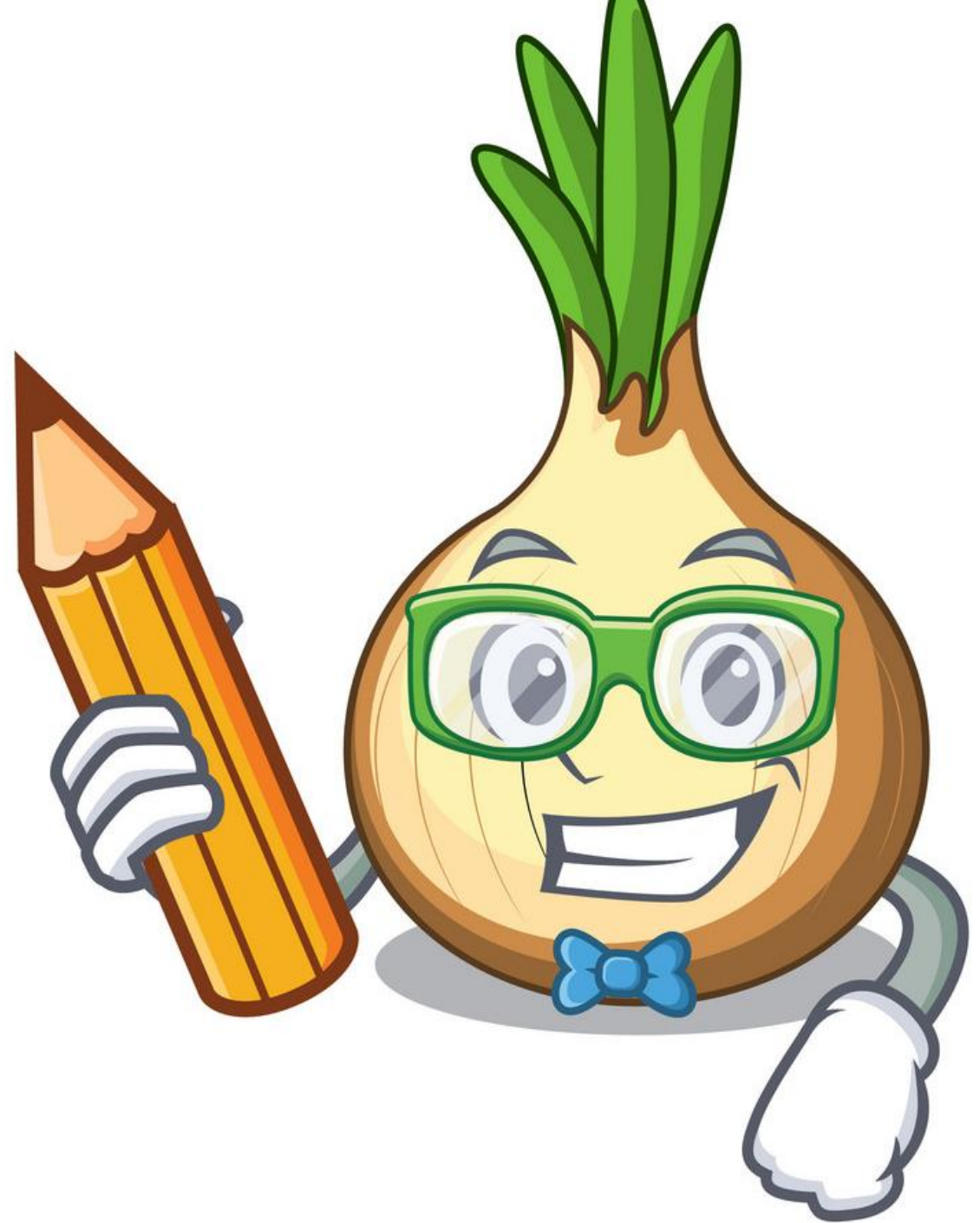


Economics of IPM

Gina Greenway



Disclaimer

The use of trade names in this presentation is for the information and convenience of the audience. Such use does not constitute an endorsement of any product to the exclusion of others that may be suitable.



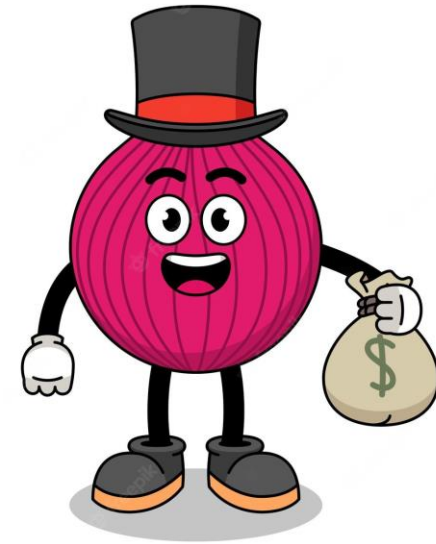


Outline

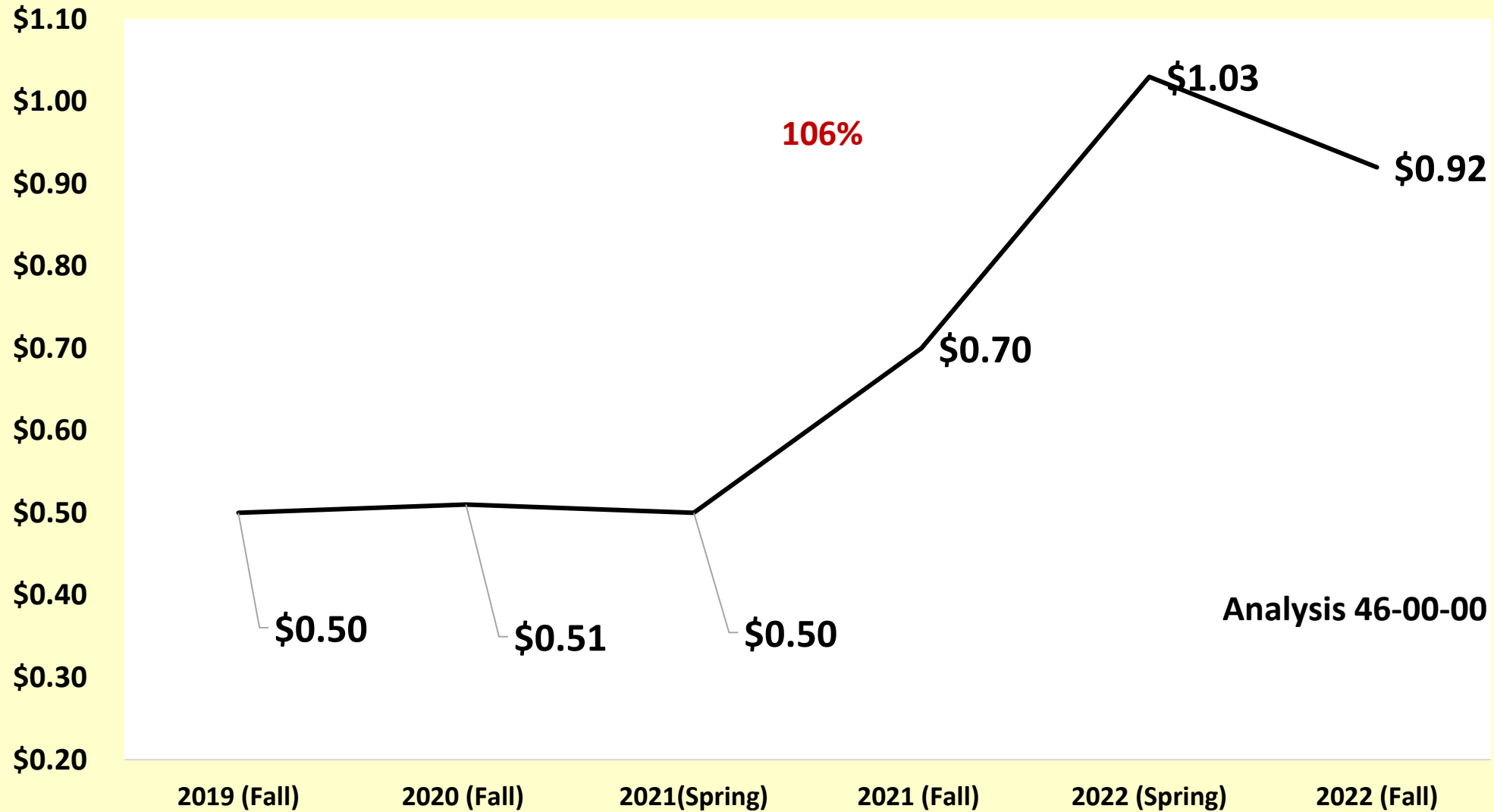
- Overview of Economic Impact of Thrips in PNW Onion Crops
- Farm Level Context for IPM: Rising Input Prices
- Analyze 3 years of IPM Data

Economic Impact of Thrips

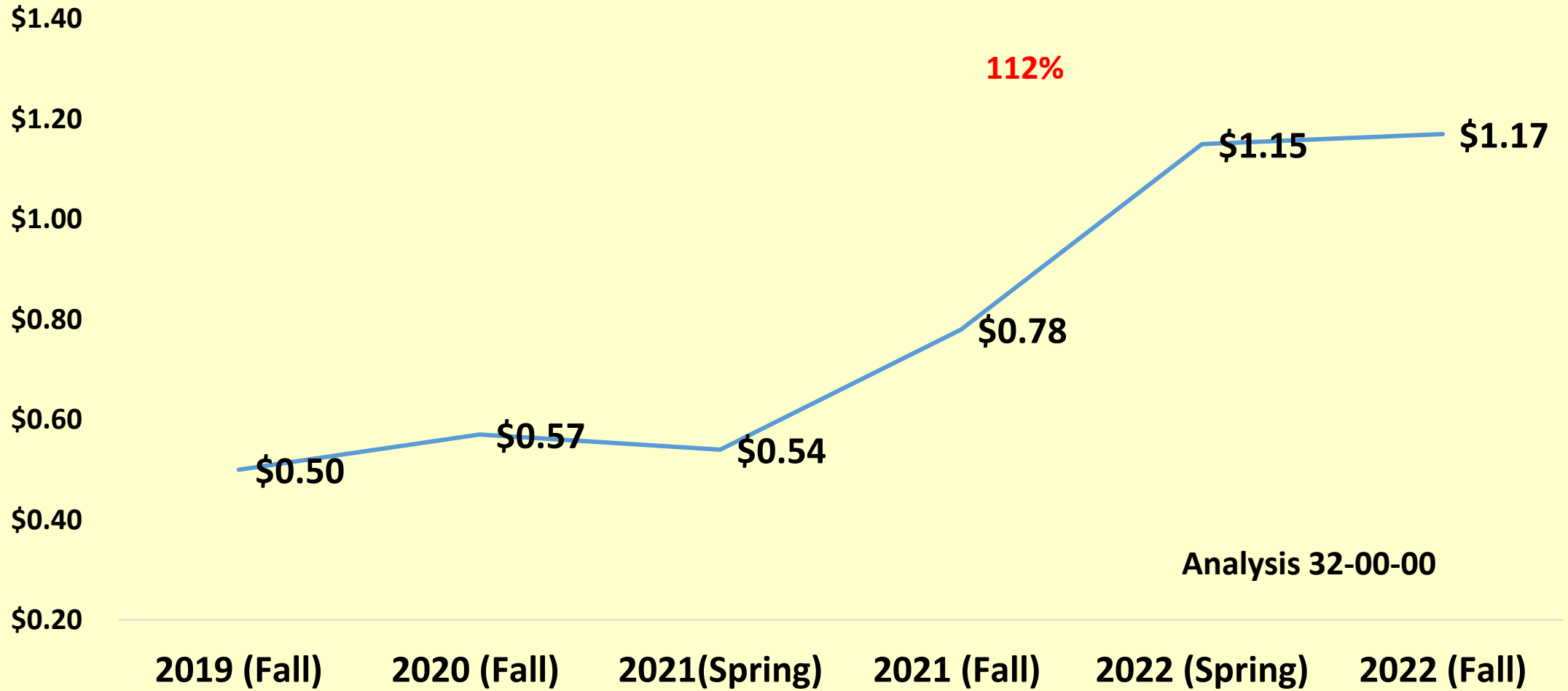
- ~\$13 M Total (Insecticides)
- ~11 M Thrips
- ~2 M (Use anyway)



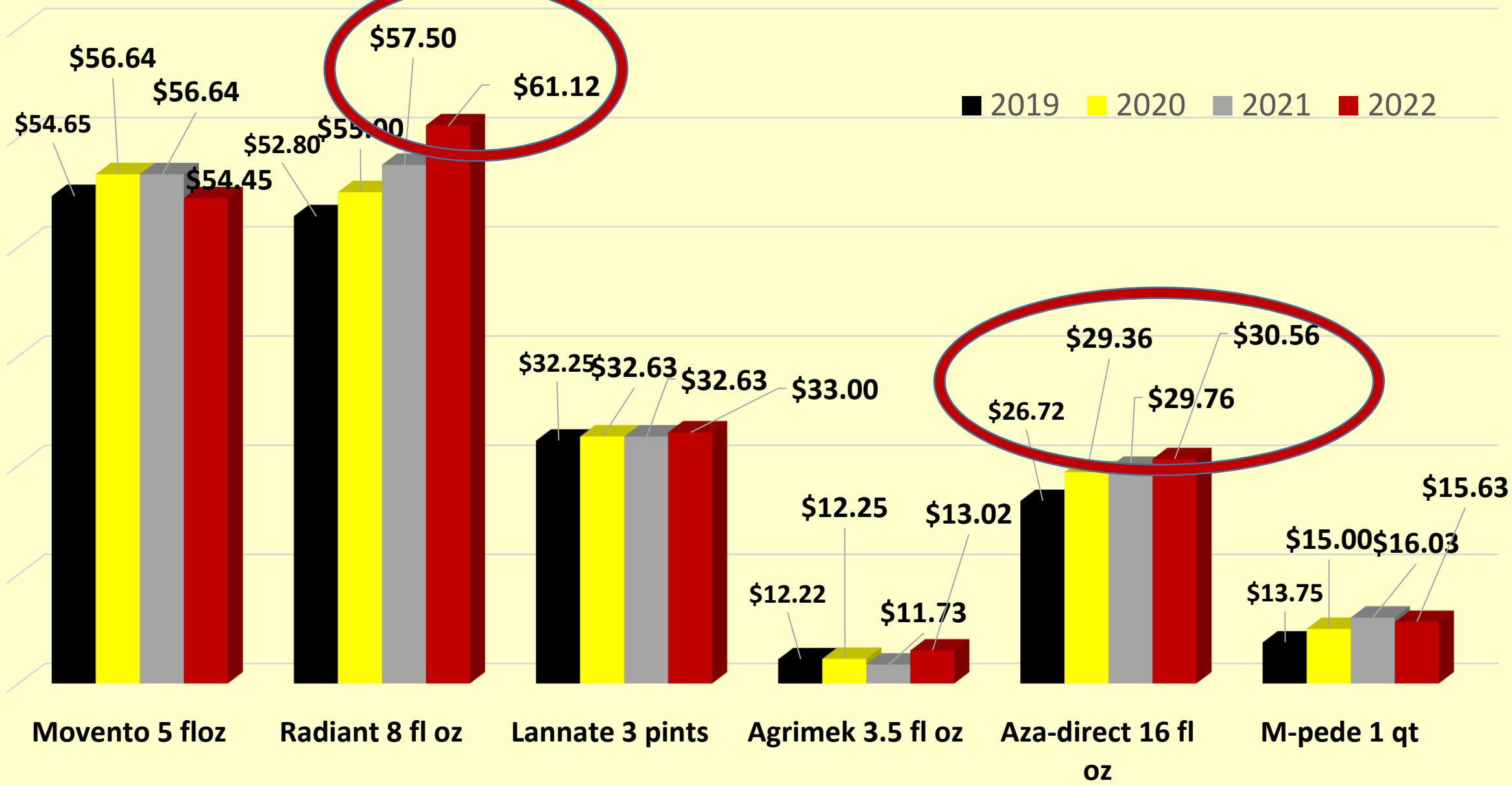
Dry Nitrogen



Liquid Nitrogen

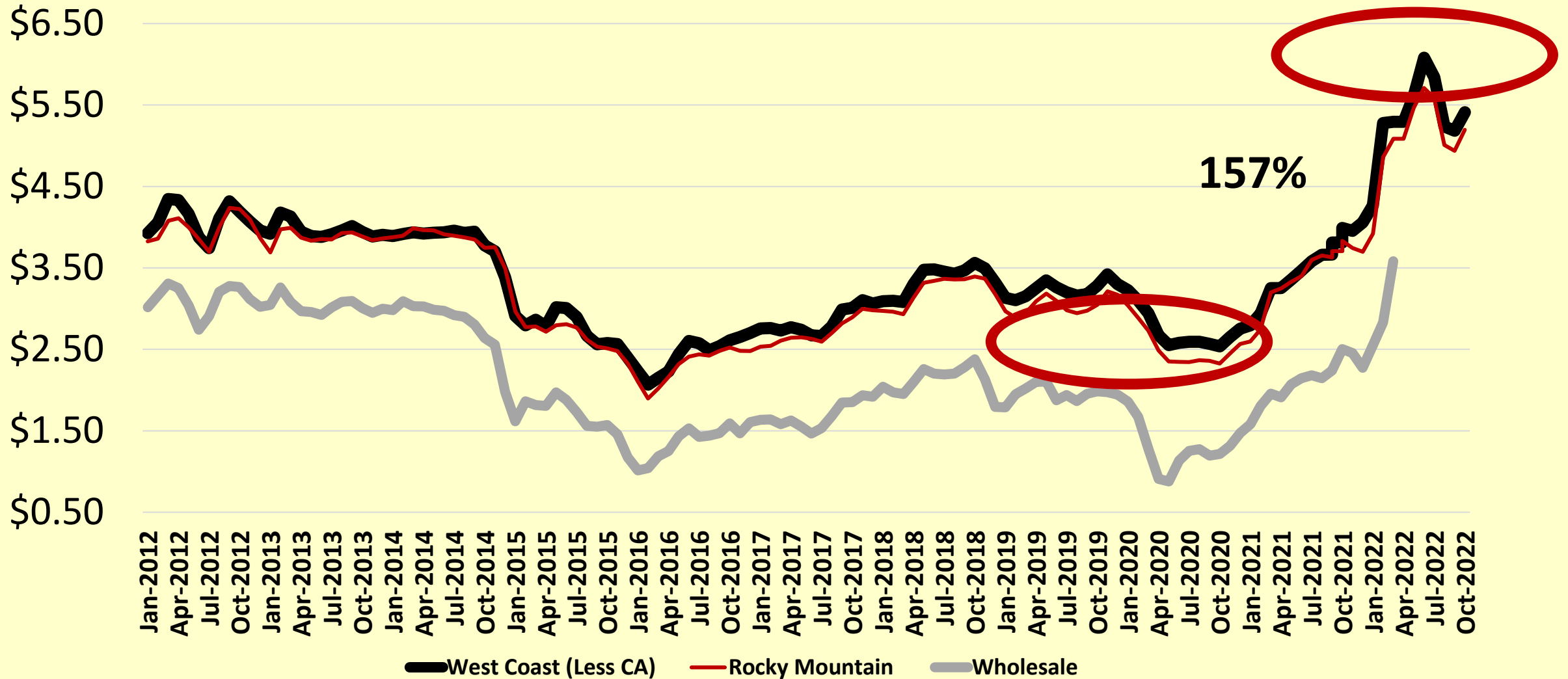


Insecticides 4 Year Comparison



Fuel

Diesel Retail (On Road) Price (Rocky Mountain, & West Coast) vs Wholesale



Effective Wage Rates Labor 2022

Labor Type	Payroll Overhead
H2A-\$17.41 (WA) +overhead \$22.63	+30% (Meal, Transportation Housing)
Equipment Operators \$22.50 (WA)+overhead \$28.13	+25% (FICA, SUTA, FUTA Workman's Comp)
Other \$18.00 (WA) + overhead \$20.70 \$21.00 Trucking (WA)+ overhead\$24.15	+15% (FICA, SUTA, FUTA Workman's Comp)

IPM

- **Can threshold based insecticide treatments and reduced nitrogen fertilization improve thrips management w/o impacting yield?**

Data

- **Malheur Experiment Station 2019, 2020, 2021**
- **Anitha Chitturi, Erik B. G. Feibert, Kyle Wieland, Ian Trenkel, Alicia Rivera, and Stuart Reitz**
- **Evaluate (1) insecticide programs at three levels and (2) N fertilization at two levels.**

Methods

- **Partial Budgeting**
- **Standard (Recommended) N Fert-Calendar, IPM, Control**
- **Reduced N Fert-Calendar, IPM, Control**
- **6 Budgets X 3 years=18 Budgets**
- **Historical COP Estimates for each year (2019,2020,2021)**
- **Marketing Year Average Price (by sz. class) FOB**
- **Yields by size class for each treatment**
- **All other factors constant**
- **B/C Ratios**

2019 N. Fertilization Rates

Recommended	Reduced
152 (lbs/acre)	76 (lbs/acre)

2019 N Fert. Costs



Calendar 2019

Movento 2.5 fl. oz

Aza-Direct 16 fl. oz

Movento 2.5 fl. oz

Aza-Direct 16 fl. oz

Agrimek 3.5 fl. oz

Dyn-amic 0.25% V/V

Agrimek 3.5 fl. oz

Dyn-amic 0.25% V/V

Exirel 20.5 fl. oz

Dyn-amic 0.25% V/V

Exirel 20.5 fl. oz

Dyn-amic 0.25% V/V

Radiant 10 fl. oz

Dyn-amic 0.25% V/V

Radiant 10 fl. oz

Dyn-amic 0.25% V/V

Total Number of Insecticide Apps

8

Total Cost (Insecticides)

\$ 513.79

IPM (threshold based) Insecticides Standard N	Rate	2019
Movento	2.5 fl. oz	
Aza-Direct	16 fl. oz	
Movento	2.5 fl. oz	
Aza-Direct	16 fl. oz	
Agrimek	3.5 fl. oz	
Dyn-amic 0.25 V/V		
Agrimek	3.5 fl. oz	
Dyn-amic 0.25 V/V		
Exirel	20.5 fl. oz	
Dyn-amic 0.25% V/V		
Radiant	10 fl. oz	
Dyn-amic 0.25 V/V		
Total Number of Insecticide Apps		6
Total Cost	\$329.58	

IPM (threshold based) Reduced N

2019

Movento

2.5 fl. oz

Aza-Direct

16 fl. oz

Movento

2.5 fl. oz

Aza-Direct

16 fl. oz

Agrimek

3.5 fl. oz

Dyn-amic 0.25 V/V

Agrimek

3.5 fl. oz

Dyn-amic 0.25 V/V

Exirel

20.5 fl. oz

Dyn-amic 0.25% V/V

Radiant

10 fl. oz

Dyn-amic 0.25 V/V

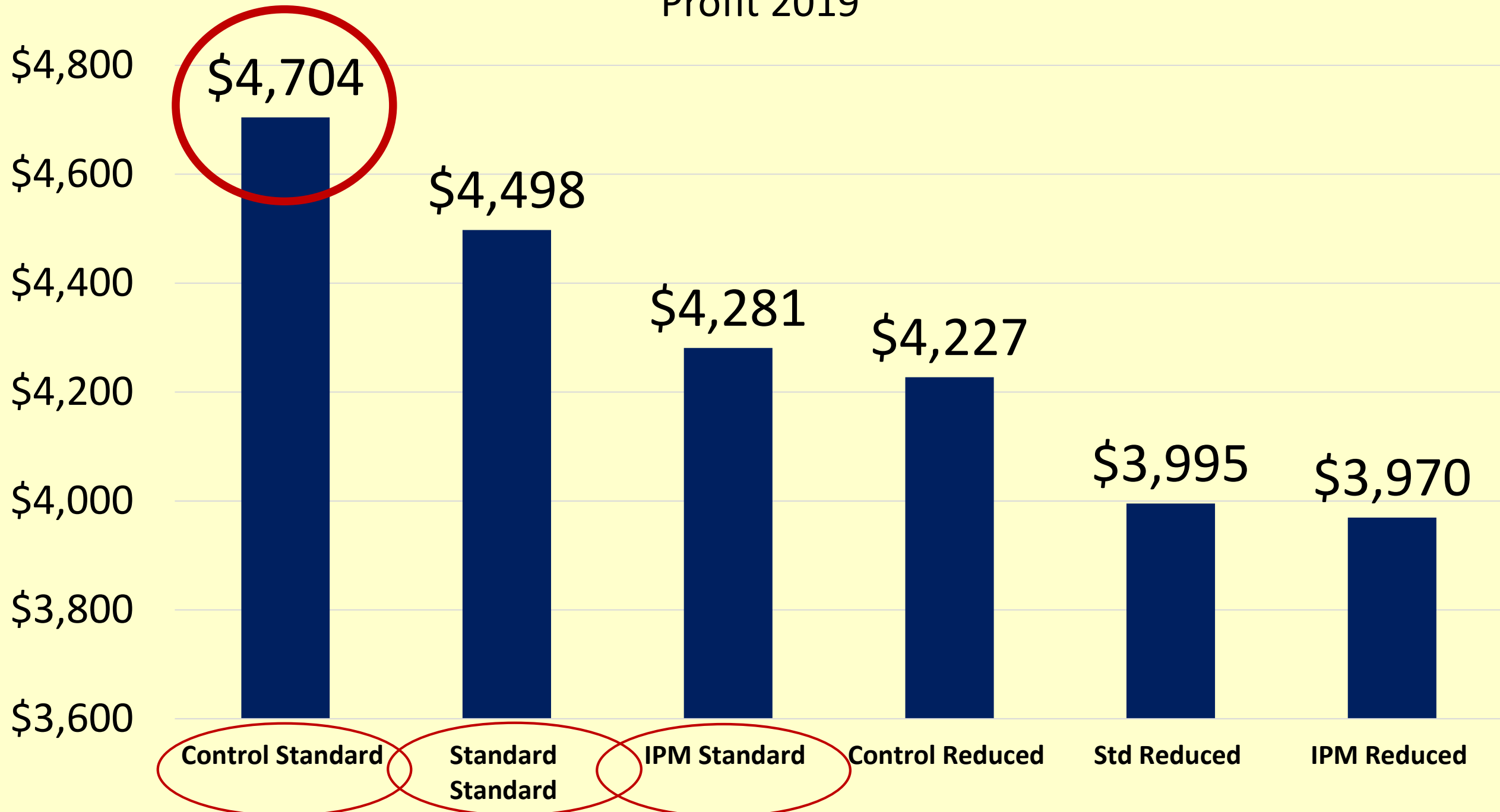
Total Number of Insecticide Apps

6

Total Cost

\$329.58

Profit 2019



Isolating the Benefits of Insecticides for each Fertilizer Regime



- Δ Total Revenue/ Δ TC (compared to the control)
- \$ value of benefits from every dollar spent on insecticide

Limitations of B/C Analysis

- Relative Measure
- Bang for Buck (single input)
- **Not an Absolute Measure**
- Profit= $TR-TC$ (Net Benefits)

2019 B/C Insecticides Standard Fertilizer

	Profit	TR	TC	(B/C)
Control Standard	\$4,704.45	\$19,567.70	\$14,863.25	
Standard(calendar) Standard	\$4,497.61	\$19,783.49	\$15,285.88	0.51
IPM Standard	\$4,280.88	\$19,304.67	\$15,023.80	-1.64

Calendar 2019

Movento 2.5 fl. oz

Aza-Direct 16 fl. oz

Movento 2.5 fl. oz

Aza-Direct 16 fl. oz

Agrimek 3.5 fl. oz

Dyn-amic 0.25% V/V

Agrimek 3.5 fl. oz

Dyn-amic 0.25% V/V

Exirel 20.5 fl. oz

Dyn-amic 0.25% V/V

Exirel 20.5 fl. oz

Dyn-amic 0.25% V/V

Radiant 10 fl. oz

Dyn-amic 0.25% V/V

Radiant 10 fl. oz

Dyn-amic 0.25% V/V

Total Number of Insecticide Apps 8

Total Cost (Insecticides) \$ 513.79

2019 B/C Insecticides Reduced Fertilizer

	Profit	TR	TC	
Control Reduced	\$ 4,227.10	\$ 18,782.49	\$ 14,555.38	
Std Reduced	\$ 3,995.36	\$ 19,114.37	\$ 15,119.01	0.59
IPM Reduced	\$ 3,969.54	\$ 18,798.02	\$ 14,828.48	0.06

Isolate Benefits of N Fertilization

- Δ Total Revenue/ Δ TC (compared to?)
- Standard N Control to Reduced N control
- Thrips damage mitigate N Impact?
- Standard (Calendar) based insecticide program with Recommended N fertilizer program vs Standard (Calendar) based insecticide program using Reduced Fertilizer program
 - more accurately parse out N impacts from thrips
- Standard (calendar) insecticide program-consistent thrips mitigation effort
- \$ value of benefits from every dollar spent on in season N Fertilization

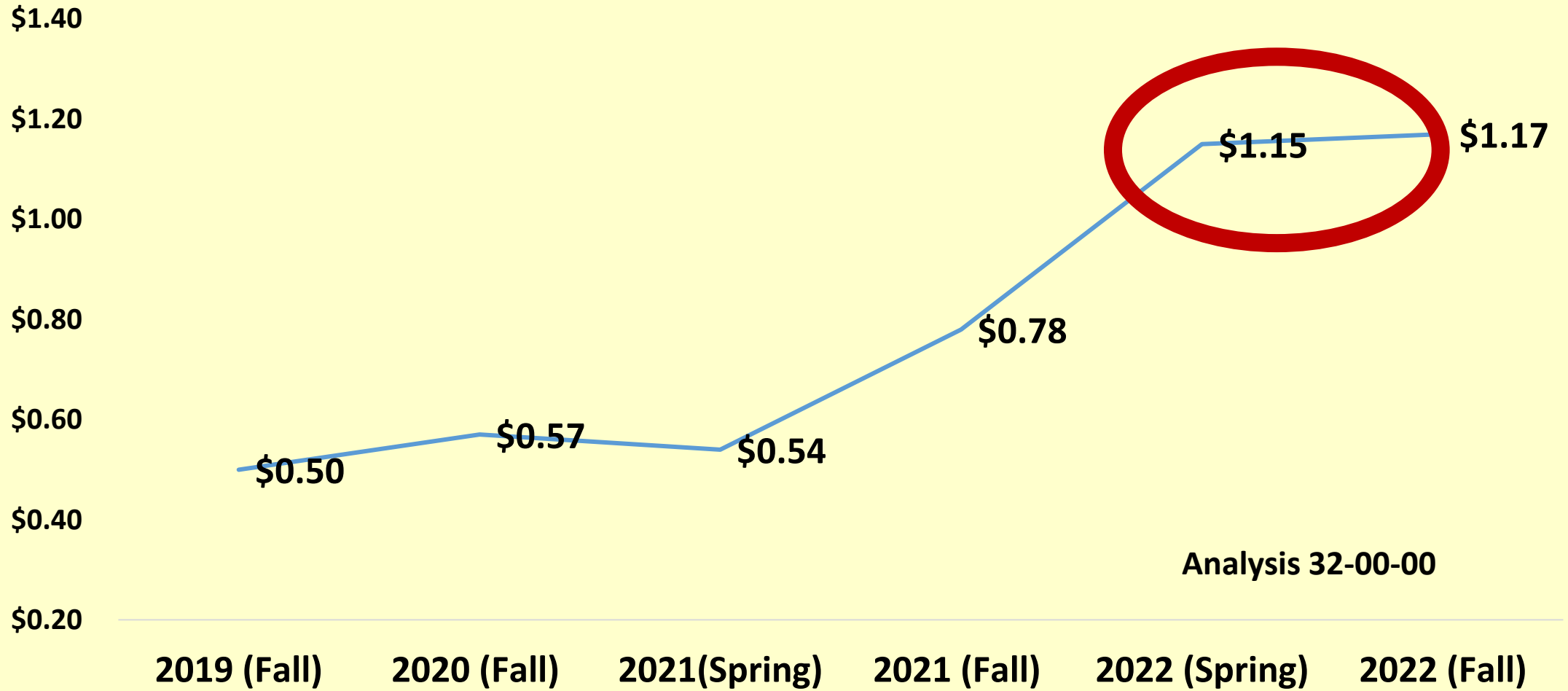
Benefit/Cost of N Fertilizer Relative to Calendar based (standard) Insecticide Applications

	Profit	TR	TC	B/C
Standard (Calendar) Standard	\$4,497.61	\$19,783.49	\$15,285.88	
Standard(Calendar) Reduced	\$3,995.36	\$19,114.37	\$15,119.01	4.01

C/B Nitrogen Fertilizer Relative to Control

	Profit	TR	TC	B/C
Control Reduced	\$4,227.10	\$18,782.49	\$14,555.38	
Control Standard	\$4,704.45	\$19,567.70	\$14,863.25	2.55

Liquid Nitrogen



B/C Nitrogen Fertilizer

- **2.55-4.01**

2020 Nitrogen Fertilization Rates

Recommended	Reduced
120 lbs/acre	50 lbs/acre

2020 Nitrogen Fert Costs

\$80.00
\$70.00
\$60.00
\$50.00
\$40.00
\$30.00
\$20.00
\$10.00

\$68.14



Recommended

\$28.48



Reduced

Calendar 2020	Rate
Movento	2.5 fl. oz
Aza-Direct	16 fl. oz
Movento	2.5 fl. oz
Aza-Direct	16 fl. oz
Agrimek	3.5 fl. oz
Dyn-amic 0.25% V/V	
Agrimek	3.5 fl. oz
Dyn-amic 0.25% V/V	
Radiant	8 fl. oz
Dyn-amic 0.25% V/V	
Radiant	8 fl. oz
Dyn-amic 0.25% V/V	
Exirel	20.
Dyn-amic 0.25% V/V	5 fl. oz
Total Number of Insecticide Apps	
Total Cost (Insecticides)	

7

\$390.79

IPM (threshold based) Insecticides Standard N	Rate
Movento	2.5 fl. oz
Aza-Direct	16 fl. oz
Movento	2.5 fl. oz
Aza-Direct	16 fl. oz
Agrimek	3.5 fl. oz
Dyn-amic 0.25 V/V	
Agrimek	3.5 fl. oz
Dyn-amic 0.25 V/V	
Radiant	8 fl. oz
Dyn-amic 0.25 V/V	
Radiant	8 fl. oz
Dyn-amic 0.25 V/V	
Total Number of Insecticide Apps	
Total Cost	

6

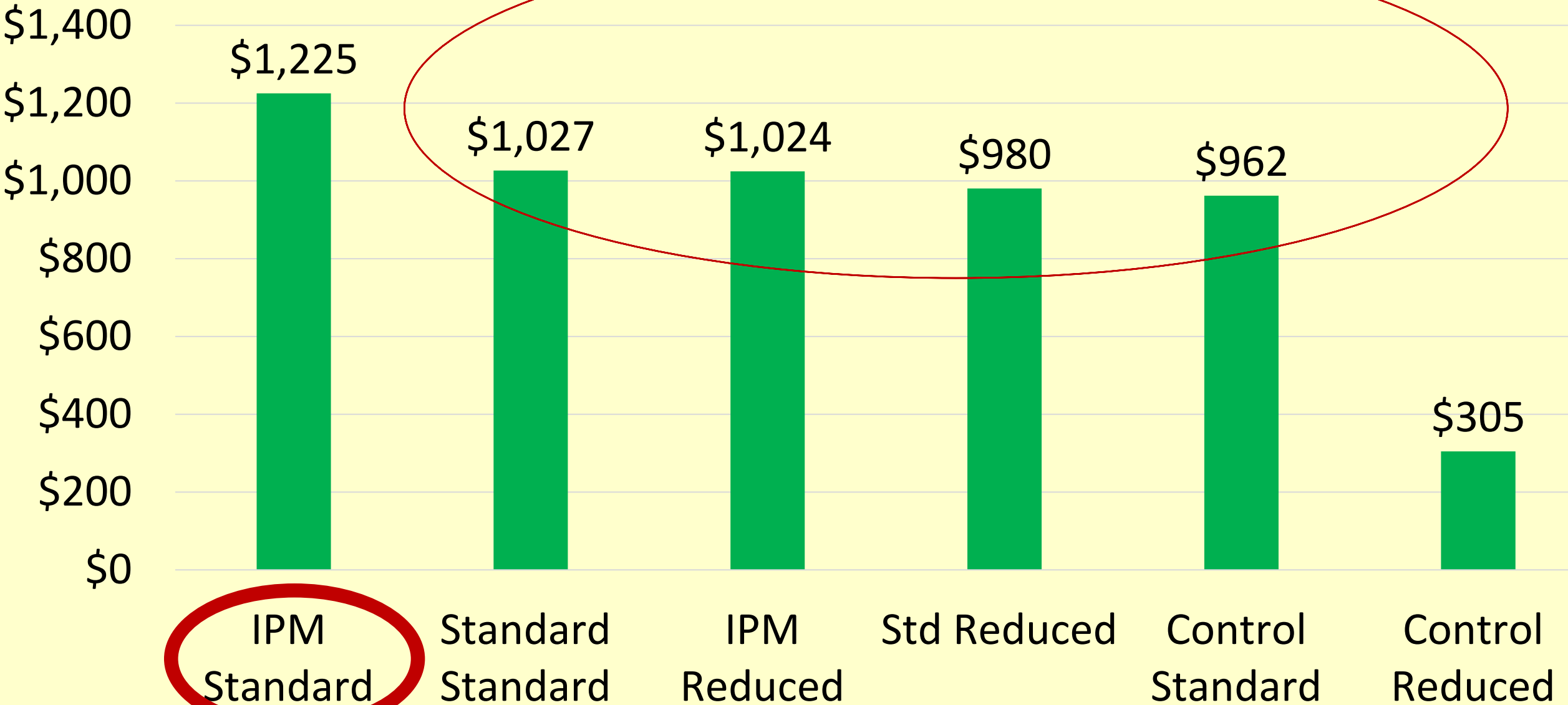
\$293.79

IPM Reduced	Rate
Movento	2.5 fl. oz
Aza	16 fl. oz
Movento	2.5 fl. oz
Aza	16 fl. oz
agrimek	3.5 fl. oz
Dynamic 0.25 V/V	
agrimek	3.5 fl. oz
Dynamic 0.25 V/V	
Radiant	8 fl. oz
Dynamic 0.25 V/V	
Total Number of Insecticide Apps	
Total Cost	

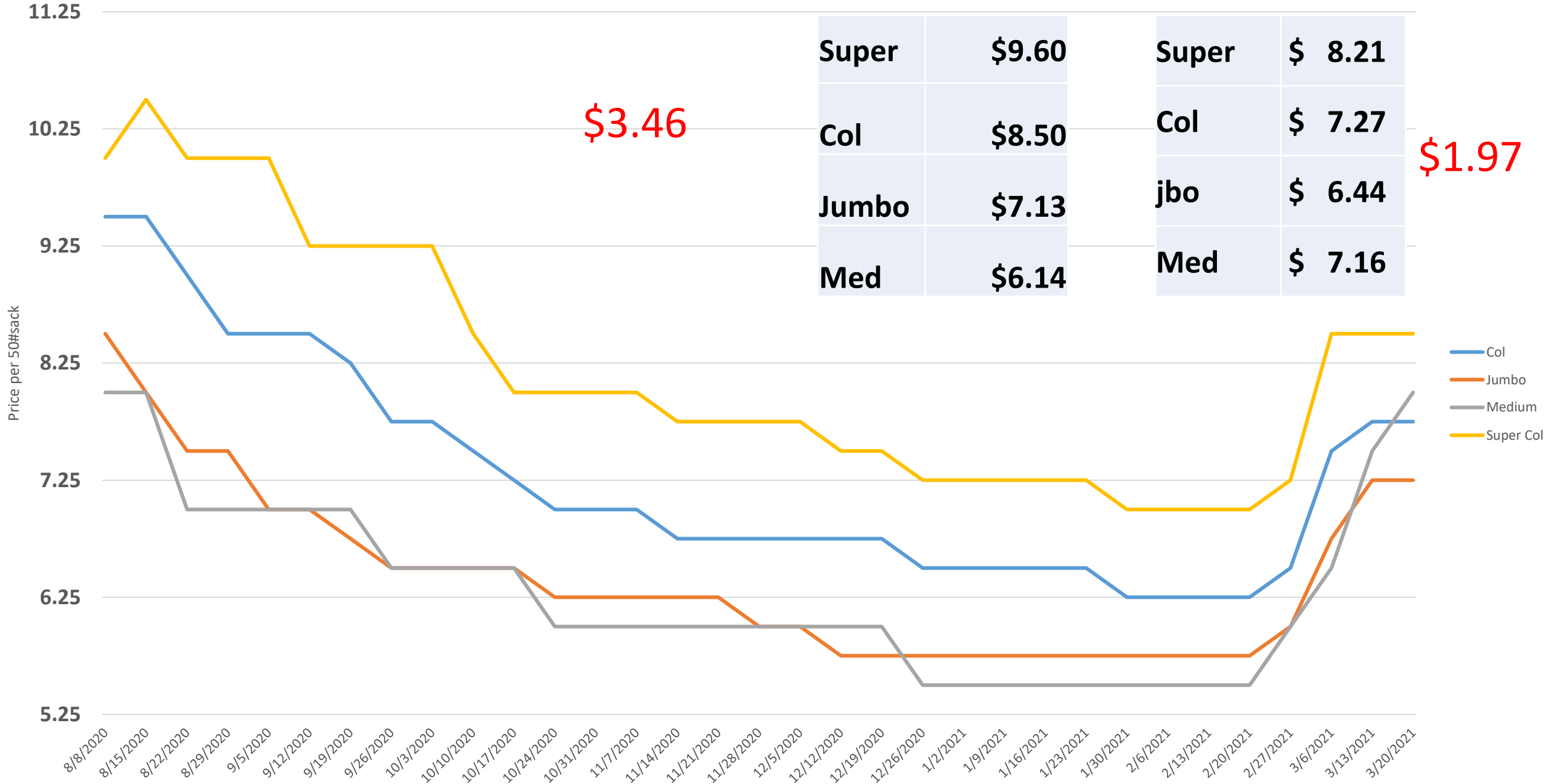
5

226.87

2020



2020 Price by Size Class



2020 B/C Insecticides Standard Fert.

	Profit	TR	TC	B/C
Control Standard	\$ 961.94	\$ 13,127.99	\$ 12,166.04	
Standard (Calendar) Standard	\$ 1,026.57	\$ 14,075.04	\$ 13,048.47	1.07
IPM Standard	\$ 1,224.96	\$ 14,143.08	\$ 12,918.11	1.35

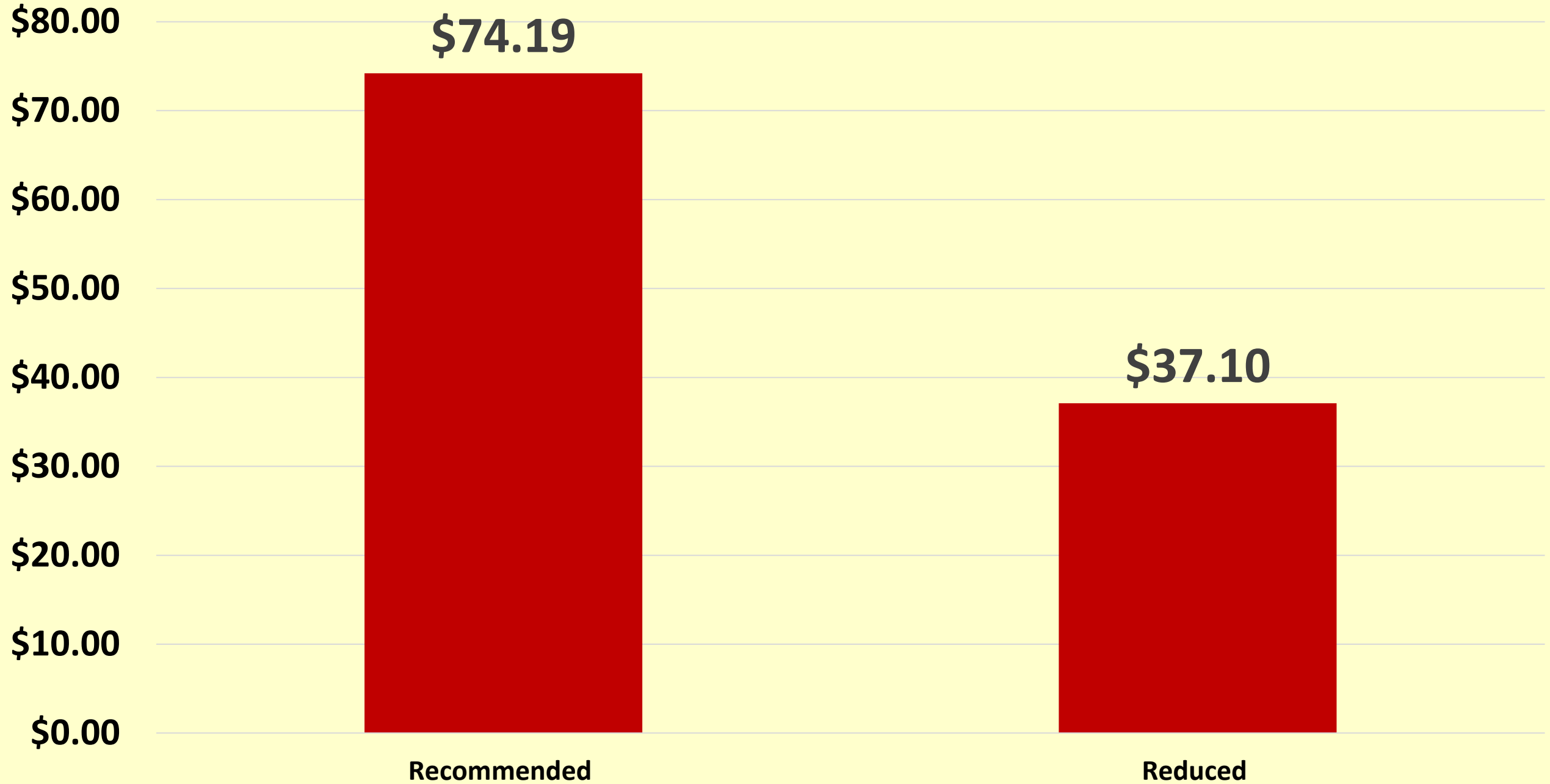
2020 B/C Nitrogen Fertilizer

	Profit	TR	TC	B/C
Standard(calendar) Standard	\$1,026.57	\$14,075.04	\$13,048.47	
Standard (calendar) Reduced	\$980.42	\$13,936.57	\$12,956.15	1.49

2021 N. Fertilization Rates

Recommended	Reduced
112 lbs/acre	56 lbs/acre

2021 N Fertilization Costs



Calendar 2021		IPM (threshold based) Standard		IPM (threshold based) Reduced N 2021	
Movento	2.5 fl. oz	Insecticides Standard N 2021	Rate	Movento	2.5 fl. oz
Aza-Direct	16 fl. oz	Movento	2.5 fl. oz	Aza-Direct	16 fl. oz
Movento	2.5 fl. oz	Aza-Direct	16 fl. oz	Movento	2.5 fl. oz
Aza-Direct	16 fl. oz	Movento	2.5 fl. oz	Aza-Direct	16 fl. oz
Exirel	20.5 fl. oz	Aza-Direct	16 fl. oz	Exirel	20.5 fl. oz
Dyn-amic 0.25% V/V		Exirel	20.5 fl. oz	Dyn-amic 0.25% V/V	
Exirel	20.5 fl. oz	Dyn-amic 0.25% V/V		Exirel	20.5 fl. oz
Dyn-amic 0.25% V/V		Exirel	20.5 fl. oz	Dyn-amic 0.25% V/V	
Agrimek	3.5 fl. oz	Dyn-amic 0.25% V/V		agrimek	3.5 fl. oz
Dyn-amic 0.25% V/V		Agrimek	3.5 fl. oz	Dynamic 0.25 V/V	
Agrimek	3.5 fl. oz	Dyn-amic 0.25 V/V		Total Number of Insecticide Apps	5
Dyn-amic 0.25% V/V		Radiant	10 fl. oz	Total Cost	\$345.85
Radiant	10 fl. oz	Dyn-amic 0.25 V/V			
Dyn-amic 0.25% V/V		Total Number of Insecticide Apps	6		
Radiant	10 fl. oz	Total Cost	\$373.31		
Dyn-amic 0.25% V/V					
Total Number of Insecticide Apps	8				
Total Cost (Insecticides)	\$538.37				

2021 C/B Insecticides Standard N Fert.

	Profit	TR	TC	B/C
Control Standard	\$ 15,610.17	\$ 30,043.50	\$ 14,433.33	
Standard (Calendar) Standard	\$ 20,547.74	\$ 38,000.95	\$ 17,453.21	2.64
IPM Standard	\$ 19,431.29	\$ 35,738.63	\$ 16,307.34	3.03

2021 C/B Nitrogen Fertilizer

	Profit	TR	TC	B/C
Standard (calendar) Standard	\$ 20,547.74	\$ 38,000.95	\$ 17,453.21	
Standard Reduced	\$ 18,766.20	\$ 35,118.62	\$ 16,352.42	2.62

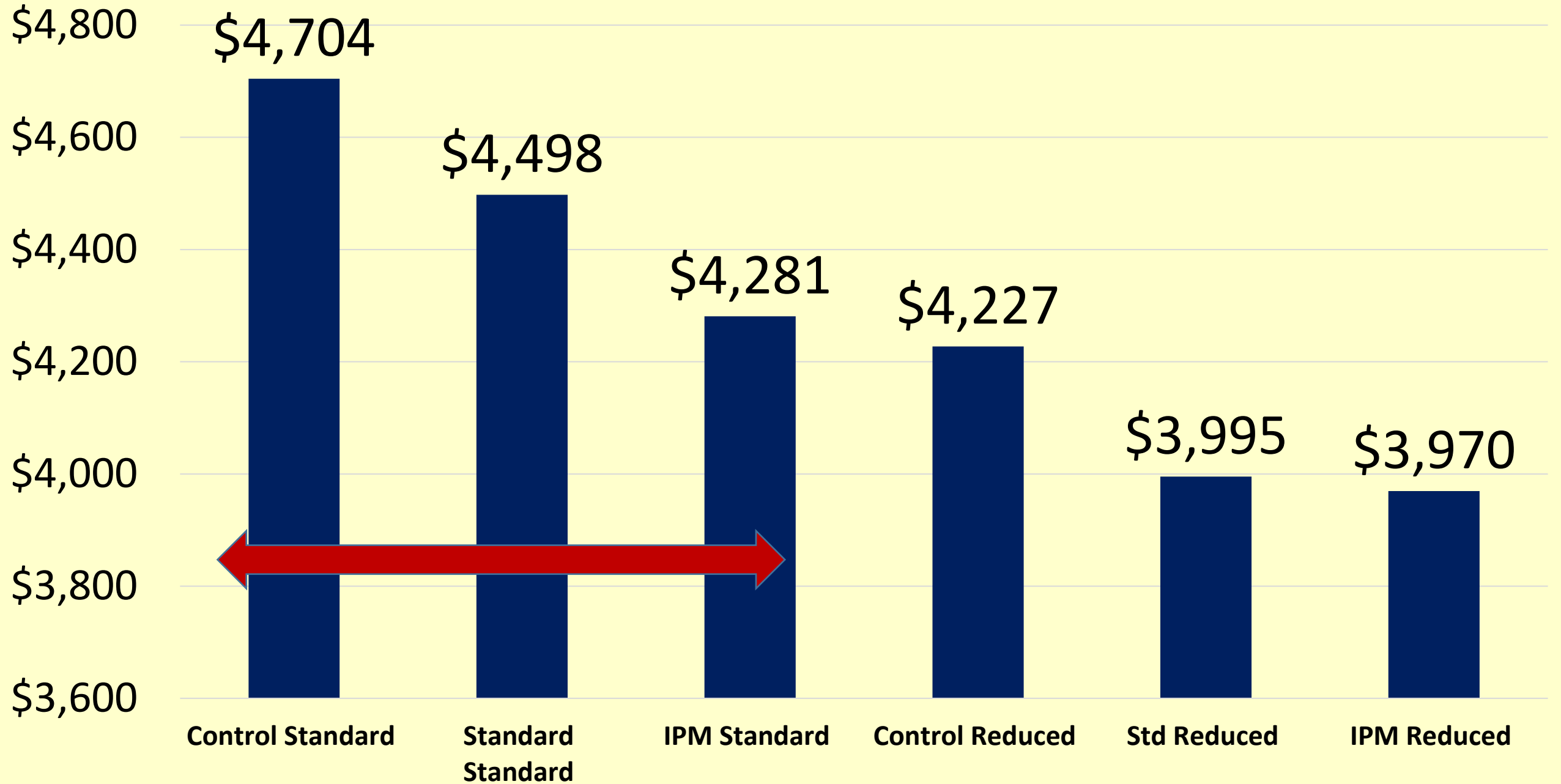
Conclusions

Purely Profit Driven Perspective

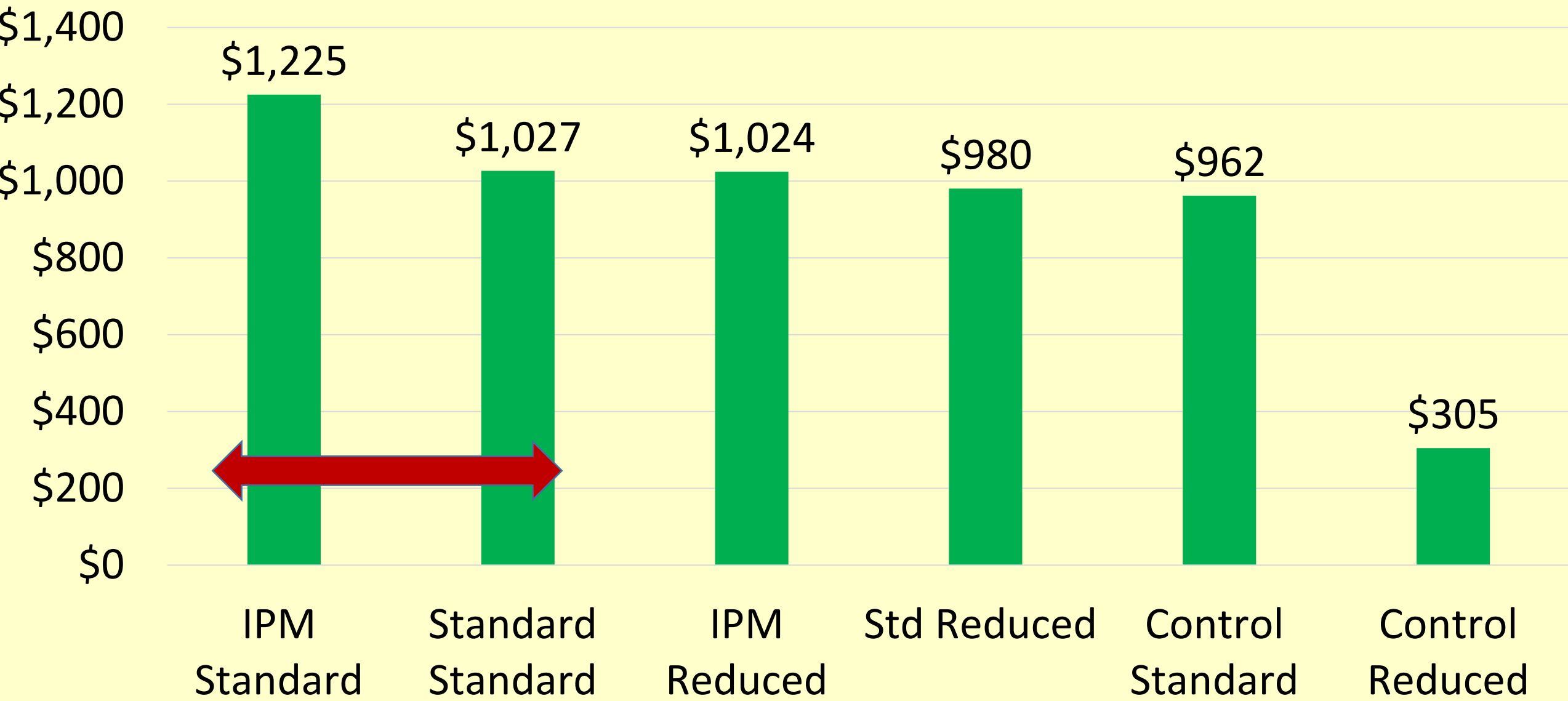
Standard N Fertilization (Based on Tissue and Soil Tests)

Produced Better Outcomes

Profit 2019



2020



Acknowledgement

- **Malheur Experiment Station**



Acknowledgement

- **SCRI- Development and delivery of IPM packages for the most serious pests and diseases impacting the US Allium Industries**
- **PD Hanu Pappu**
- **Tammy Cunningham (WSU Grants)**
- **University Collaborators**
 - **WSU**
 - **OSU**