Alternate-Year Production in Raspberry - A Viable Labor-Saving Practice?

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Why Consider Alternative Systems?

- **Increasing production costs**, **decreasing availability of labor**, and **low fruit prices** are compromising the **economic viability** of red raspberry production

- Need for **alternative production systems** that **maximize efficiency**, **minimize labor needs**, **maintain productivity**, and are **economically viable**

- **Alternate-year (AY) systems** for floricane raspberry could be more economically viable than traditional systems

Alternate-Year Production Systems

Alternate-year (AY) production entails removal of spent floricanes and producing fruit on an **every-other-year cropping cycle**

Alternate-Year Production Systems in Trailing Blackberry

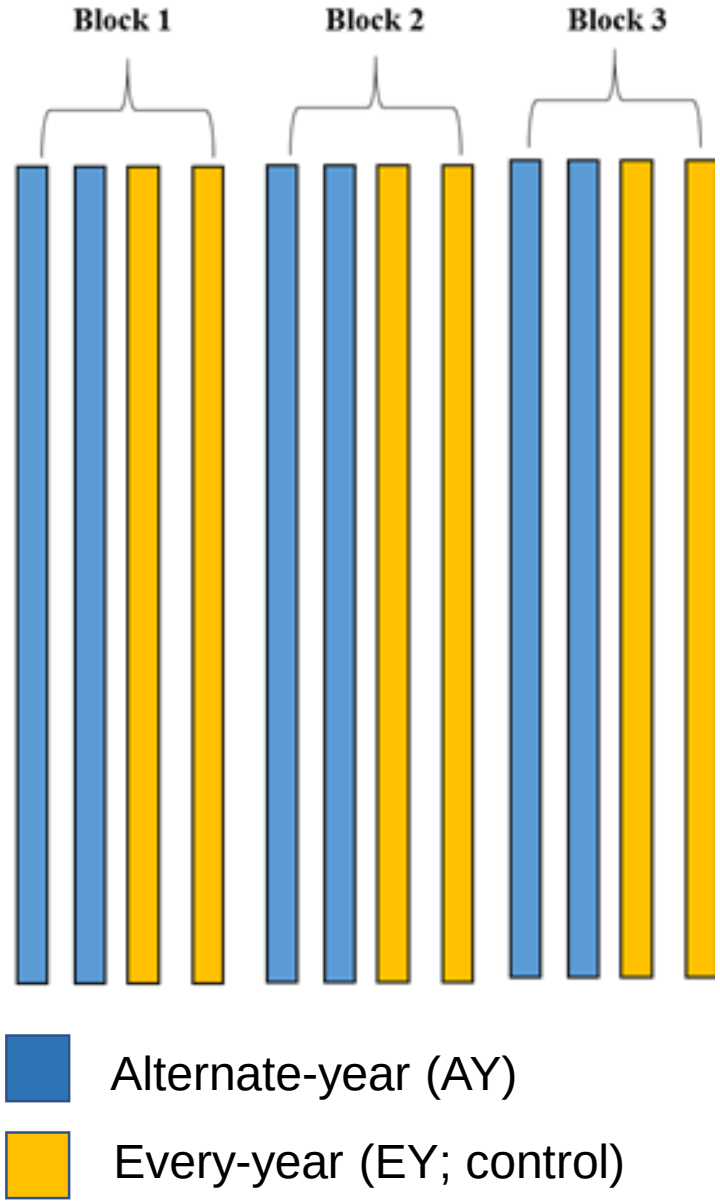
- Yang (OSU Berry Crops Extension Agent) estimates ~50% of **Oregon blackberry fields** are grown using AY
- Average 2-year yields may be **reduced by 10-30%** relative to traditional production (Bullock, 1963; Martin and Nelson, 1979)
- However, Strik (2018) found AY ‘Marion’ at 5-ft spacing yielded **66% of every-year yields**
- **Decreased labor costs**, **reduced pesticide applications**, and **increased cold hardiness** contribute towards adoption (Bell et al., 1992)
- **Limited research on AY systems in floricane raspberry**

Objective

Evaluate the economic viability of alternate-year (AY) production relative to traditional every-year (EY) production systems.

Approach

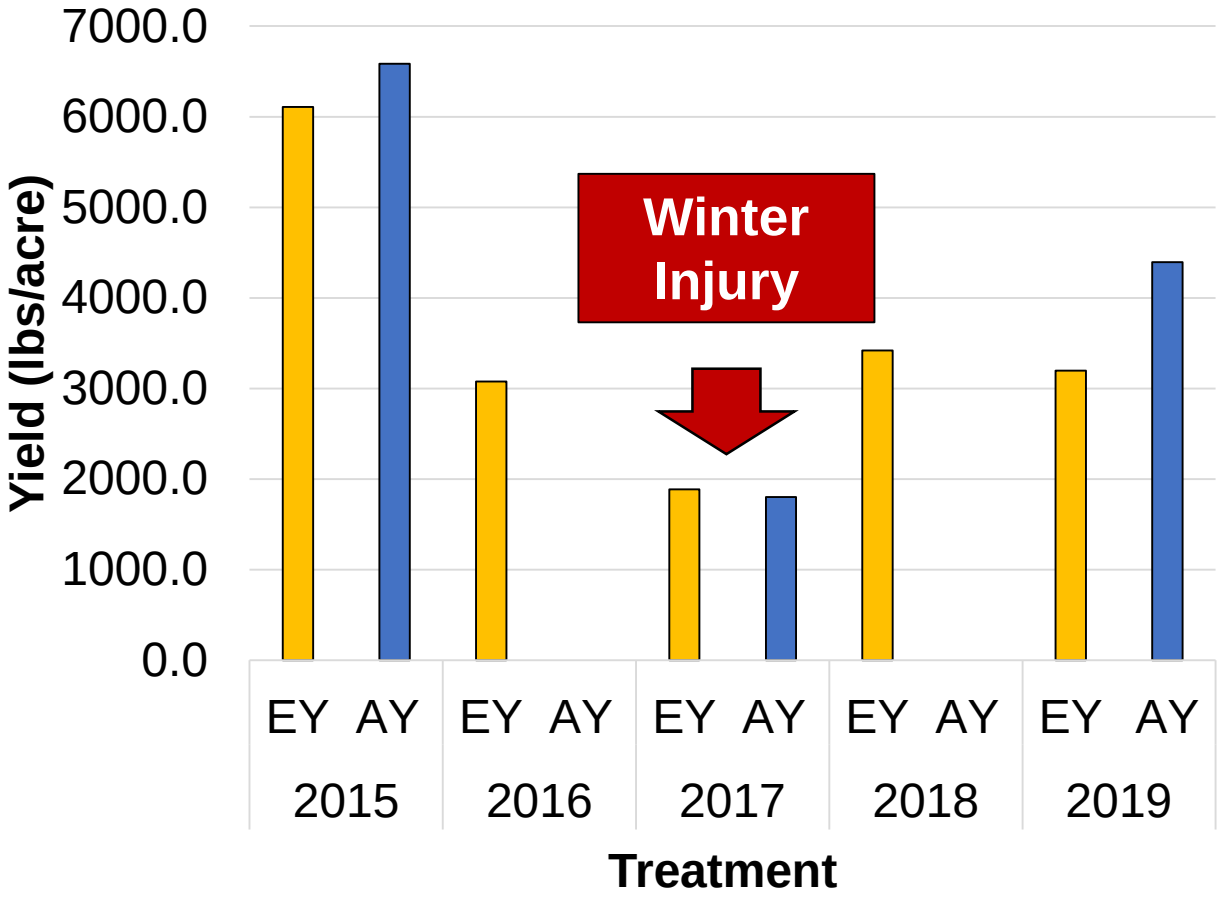
- Established a long-term study in Lynden, WA, in 2015
- Treatments [(**AY** vs. **EY (control)**] applied to 2, 700-ft rows per block with 3 blocks total
- AY treatments mowed after fruiting in winter
- Data collected includes: **yield**, **fruit quality**, **primocane growth**, and **costs**

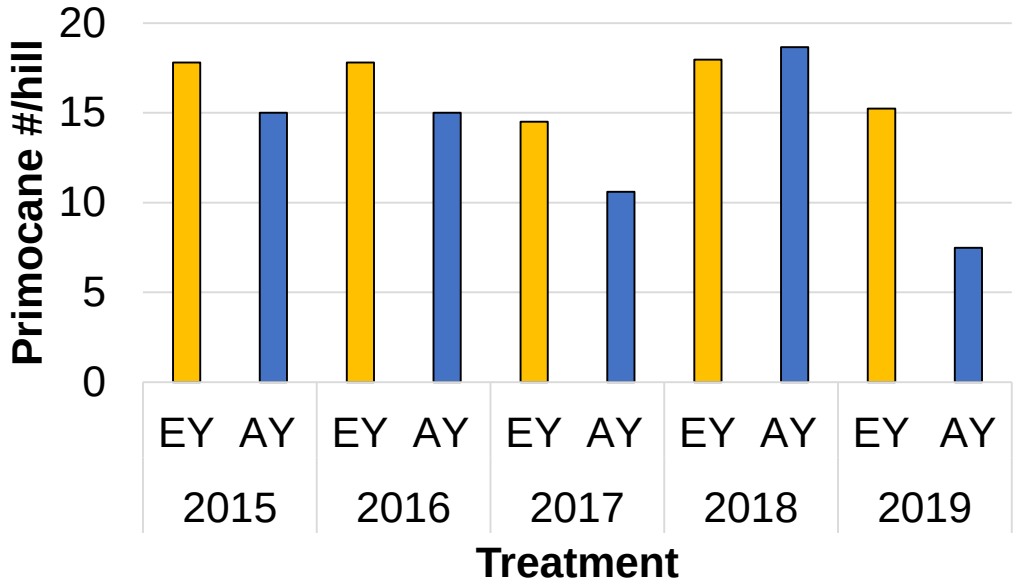


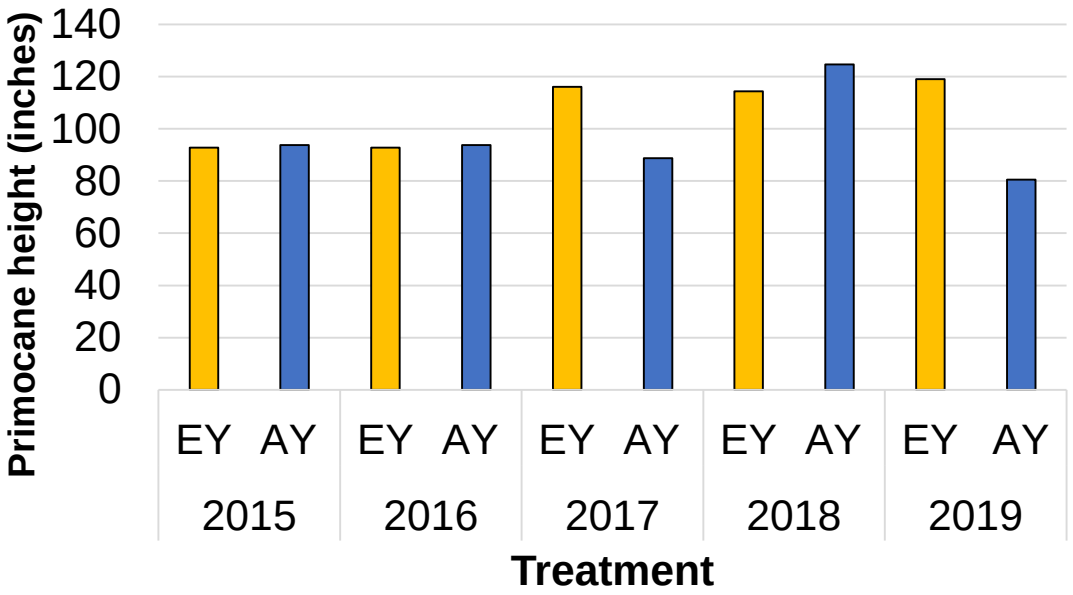
Production timeline:

Treatments	2015	2016	2017	2018	2019
AY	1st crop (baseline)	**No crop**	2nd crop	**No crop**	3rd crop
EY (control)	1st crop (baseline)	2nd crop	3rd crop	4th crop	5th crop

Results – Yield and Vegetative Growth

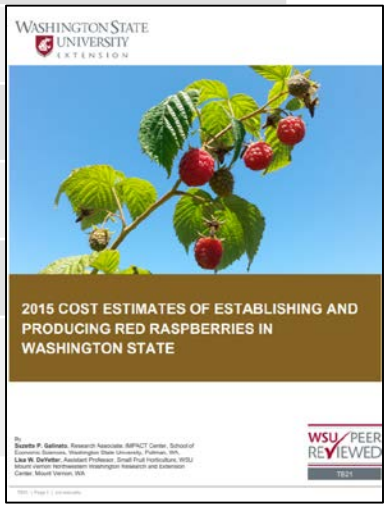






Economic Assessment Assumptions – Production Values for 'Meeker' Red Raspberry in Western Washington

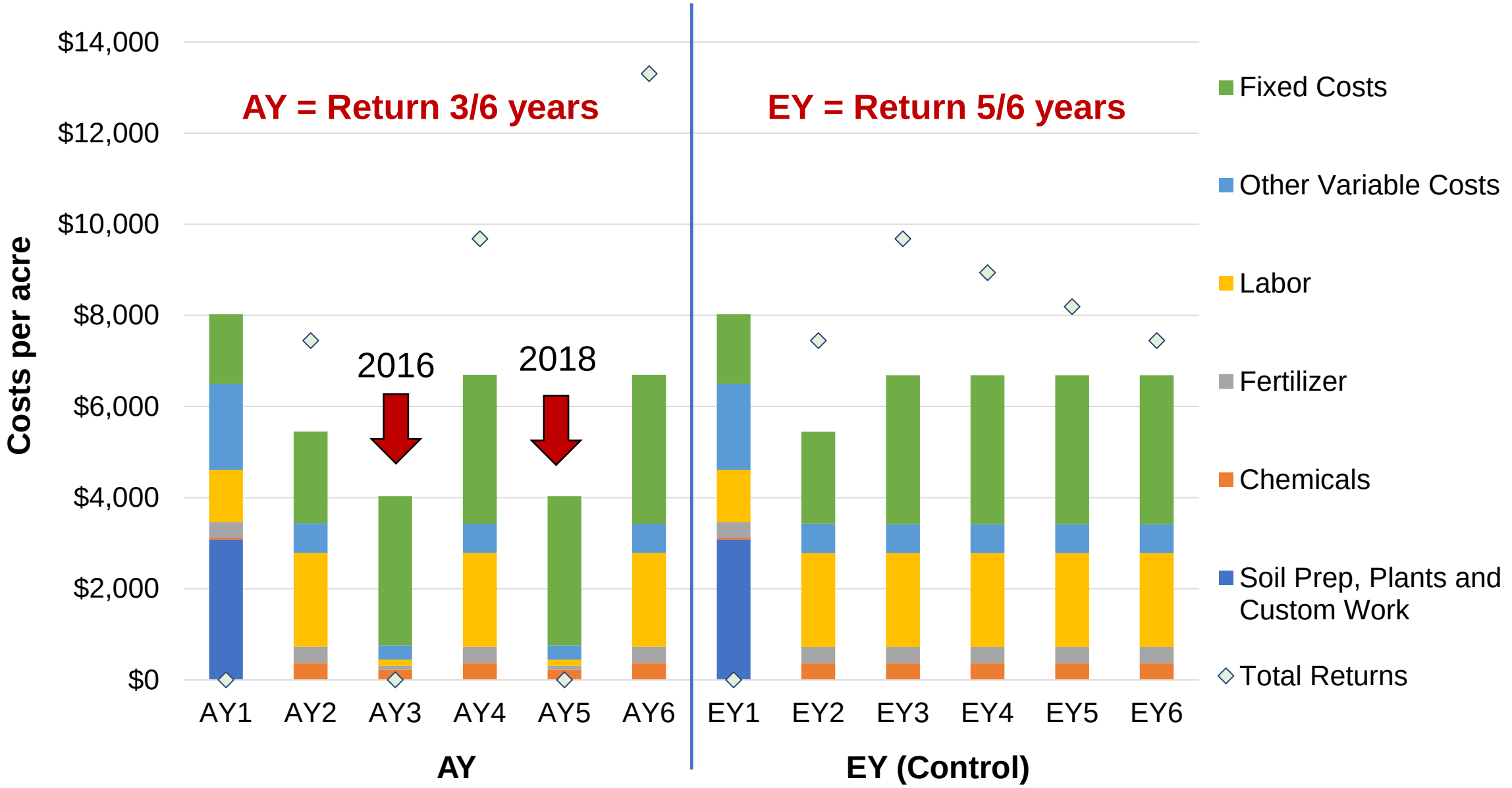
Field specification	Assumed values
Total farm operation	90 acres
Red raspberry production area	60 acres
Commercial life of planting	6 years Establishment = 2 years Full production = 4 years
In-row spacing	28 inches
Row width	10 feet
Density	2,000 plants/acre
Horticultural practices	Manual labor
Plant protective practices and harvest	Machine



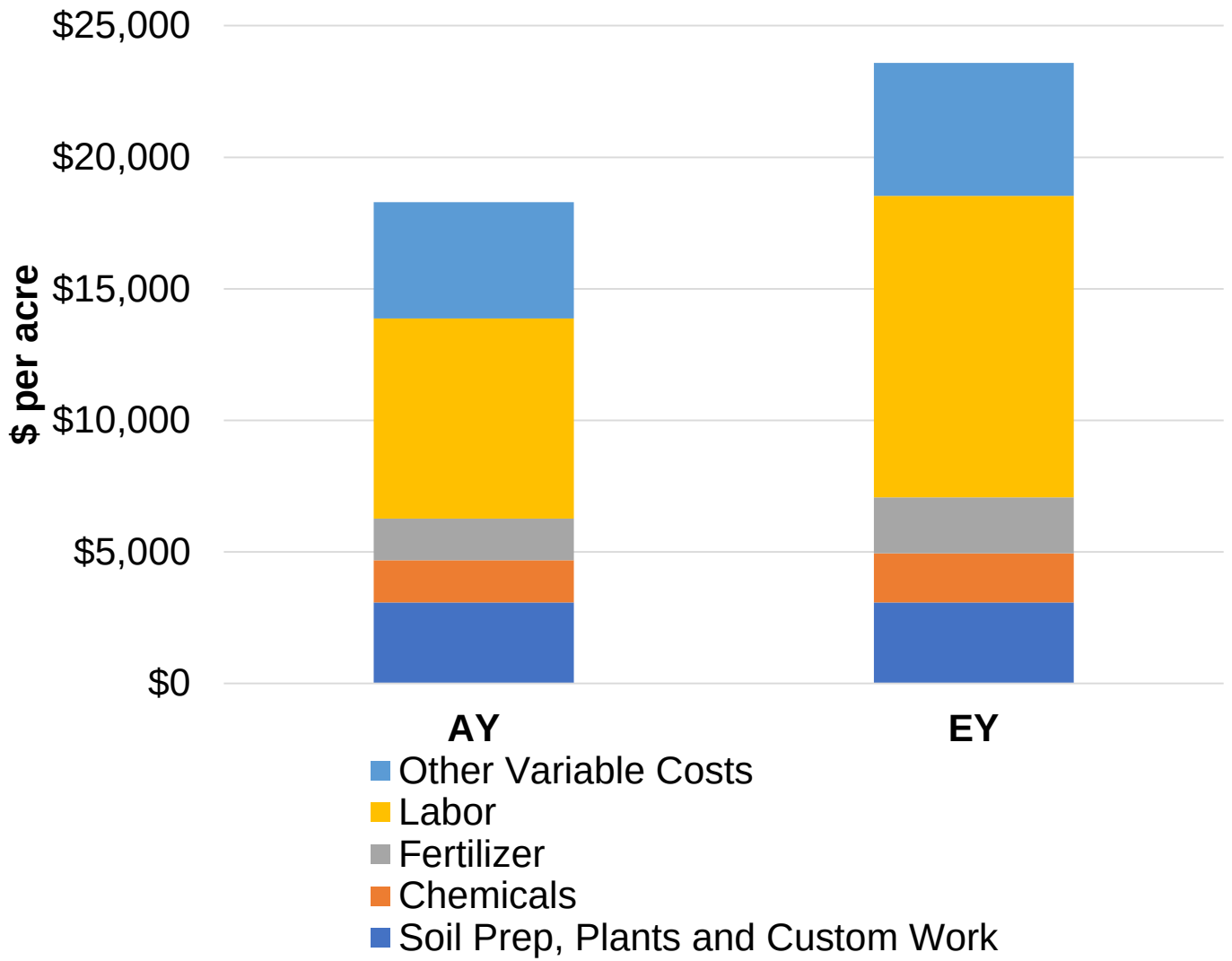
- **AY yields** are based on yield growth rates in the field experiment
- **EY yields** based on enterprise budget and grower-collaborator yield model

Galinato and DeVetter, 2016

Results – Costs and Revenues per Acre



Results – Comparison of Operating Costs



- AY has **lower operating costs** than EY
- **Labor** accounted for the **largest cost** over life of planting (42% in AY; 48% in EY)
- **Chemical** and **fertilizer** costs comprised 17% of the operating expense in the EY production system

Results – Partial Budget Analysis of AY Red Raspberry Production ($/acre)

Additional Returns	**$0.00**	**Additional Costs**	**$9.64**
Current assumption: No changes in output price and yield.		*Amortized establishment cost*	$9.64
Reduced Costs	$5,291.29	Reduced Returns	$11,273.08
Chemicals	$260.93	*Revenue foregone due to alternate year production*	$11,273.08
Fertilizer	$549.50		
General farm supplies	$17.00		
Labor	$3,844.60		
Other	$619.26		
A. Total additional revenue and reduced costs =	$5,291.29	**B. Total additional costs and reduced revenue =**	$11,282.72
Net Change in Profit (A minus B) = - $5,991.43			

Given the assumptions, there will be a loss of ~$6,000/acre mainly due reduced returns in AY systems

Results – Breakeven Price ($/lb) for Different Levels of Enterprise Costs over the Life of the 'Meeker' Red Raspberry Planting (6 years)

Levels of enterprise costs	EY	AY
Total variable cost	$0.43/lb	$0.46/lb
Total cash cost = *Total variable cost + Land rent*	$0.48/lb	$0.53/lb
Total cash cost + Depreciation cost	$0.54/lb	$0.60/lb
Total cost = *Total cash cost + Depreciation cost+ Interest cost+ Management cost*	$0.73/lb	$0.87/lb

Notes:
Breakeven return = Cost/Yield
Baseline total yield (5 years of production) = 54,880 lb/acre for EY; 40,047 lbs/acre for AY
Field price = $0.76/lb (average of IQF and blend)

Results – Breakeven Yield (lbs/acre) for Different Levels of Enterprise Costs over the Life of the 'Meeker' Red Raspberry Planting (6 years)

Levels of enterprise costs	EY	AY
Total variable cost	31,035	24,073
Total cash cost = *Total variable cost + Land rent*	34,983	28,020
Total cash cost + Depreciation cost	38,666	31,703
Total cost = *Total cash cost + Depreciation cost+ Interest cost+ Management cost*	52,916	45,966

Notes:
Breakeven yield = Cost/Field price
Baseline total yield (5 years of production) = 54,880 lb/acre for EY; 40,047 lbs/acre for AY
Field price = $0.76/lb ((average of IQF and blend)

Summary

- AY production is **not economically profitable**
- Price of raspberries must be **$0.73/lb in the EY system** in order to recover the total cost of production and **$0.87/lb in the AY system**
- The total cost breakeven yield is **52,916 lb/acre in the EY system** and **45,966 lb/acre in the AY system**
- Varying price while holding all else the same, AY profit = EY profit when the price of raspberries in AY is **~$0.91/lb**
- Varying yield while holding all else the same, AY profit = EY profit when AY yield is **47,930 lbs/acre**
- **Market price has to be higher** and/or **yields increased** to make AY more profitable (e.g., spacing, training, plant number, primocane suppression, etc.)
- **Other efficient production systems should be investigated in raspberry**

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Thank you!
Any Questions?

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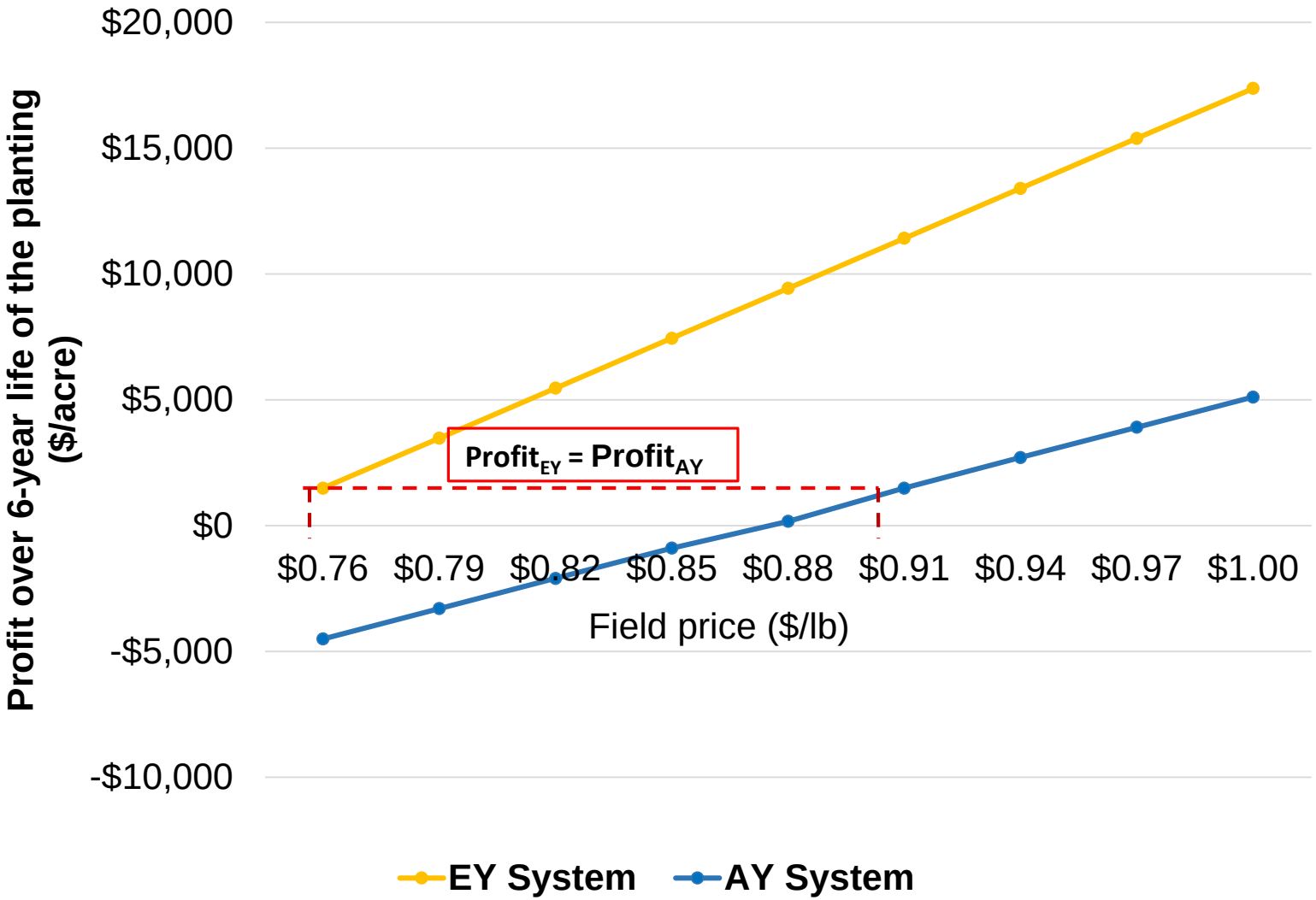
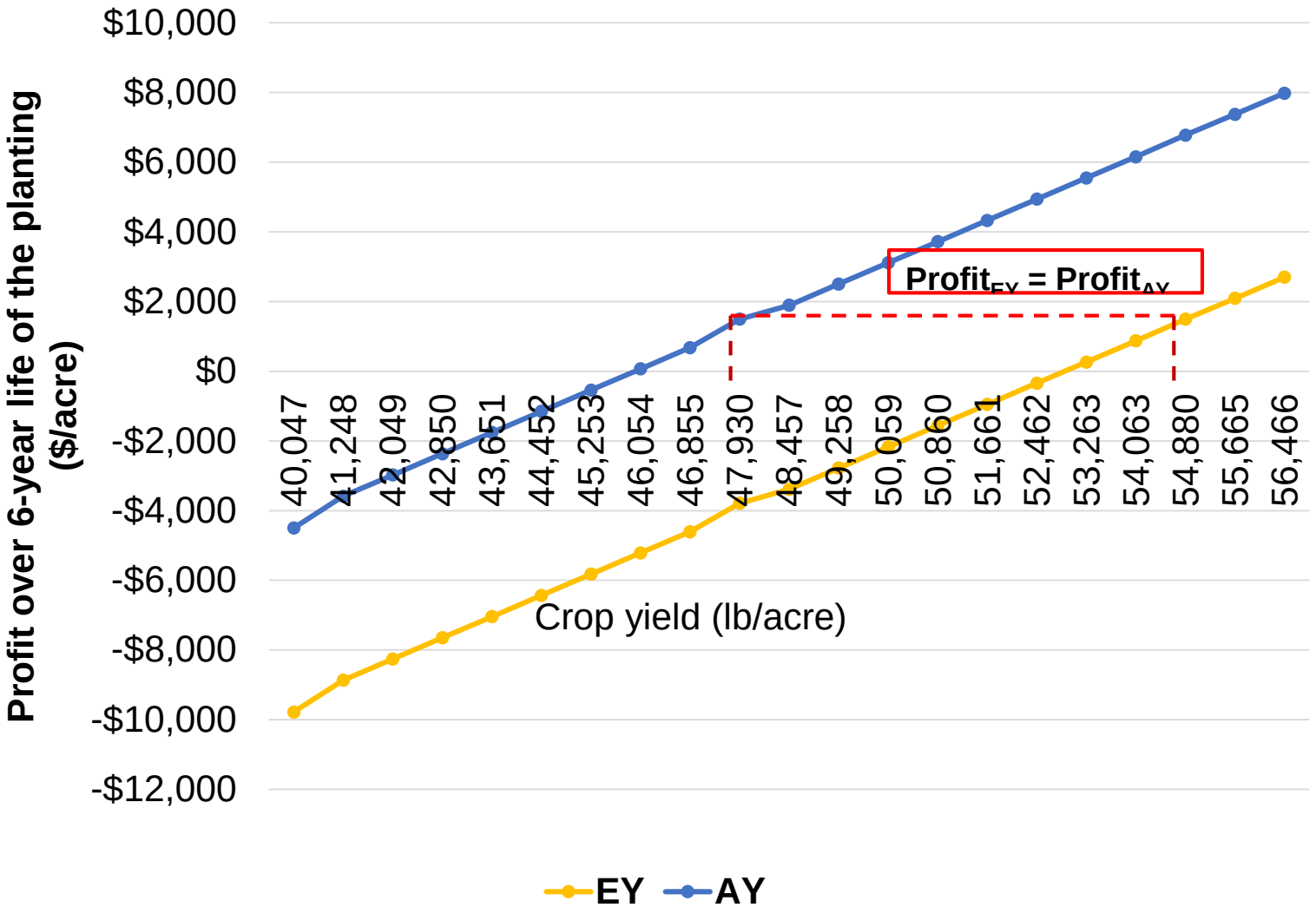
Sensitivity Analysis: Changes in Price



- Holding all else the same but field price, **expected profit increases** as **field price increases**
- Baseline: At $0.76/lb, estimated profit of EY = $1,493/acre
- AY Profit = EY Profit if the price of raspberries in AY is about $0.91/lb

Sensitivity Analysis: Changes in Yield



- Holding all else the same, **expected profit** increases as **crop yield increases**
- Baseline crop yield over 6-year life of planting:
  - EY = 54,880 lb/acre
  - AY = 40,047 lb/acre
- AY Profit = EY Profit if crop yield in AY is about 47,930 lb/acre
- Due to **lower production costs** in AY, **profit curve of AY is greater than that of EY**