September 26, 2017

Growing Fall Cucumbers

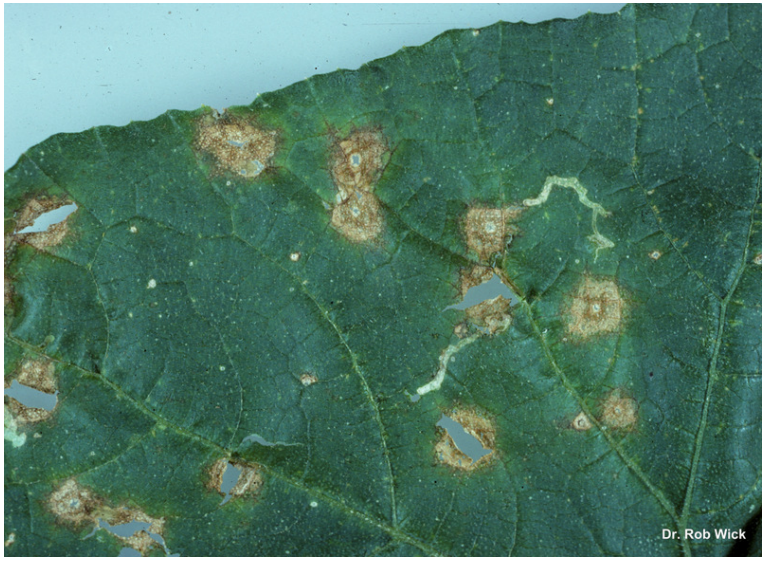
Efficacy and economics of downy mildew resistant varieties

2018 CCE ENYCHP Winter Conference
February 21, 2018

Susan B. Scheufele
UMass Extension Vegetable Program
sscheufele@umext.umass.edu

UMass Extension

Many pests have been building up…

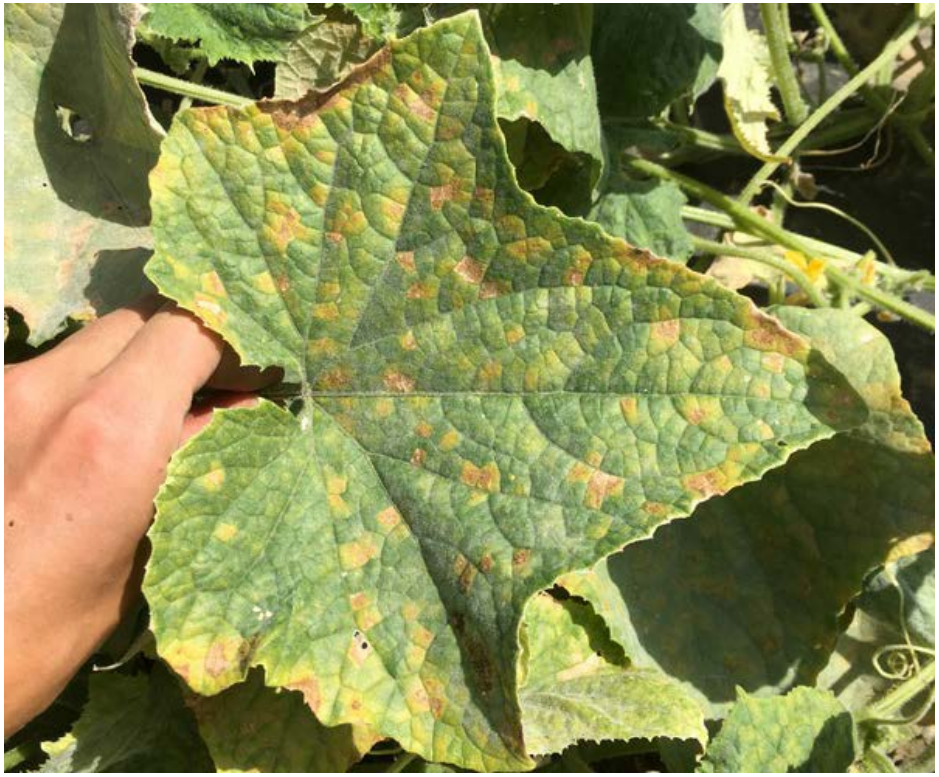


UMass Extension

Suddenly, plants appear scorched

UMass Extension

Cucurbit downy mildew



Cucumber

UMass Extension

Cucurbit downy mildew

Acorn squash

Butternut

Photos from cdm-ipm-pipe.org

UMass Extension

Cucurbit downy mildew

Melon

Watermelon

Photos from cdm-ipm-pipe.org

UMass Extension

Cucurbit downy mildew

Host	Pathotype				
	1	2	3	4	5
Cucumis sativus	+	+	+	+	+
C. melo var. *reticulatus*	+	+	+	+	+
C. melo var. *conomon*	—	+	+	+	+
C. melo var. *acidulous*	—	—	+	+	+
Citrullus lanatus	—	—	—	+	+
Cucurbita spp.	—	—	—	—	+

5 strains infect different host crops

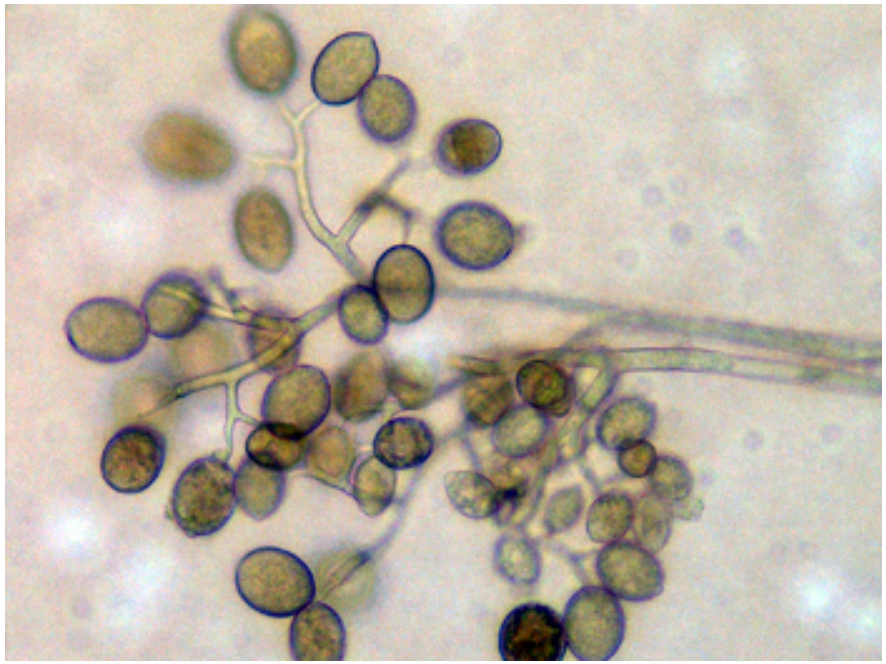
+ Highly compatible host interaction

— incompatible or very slightly compatible host interaction

https://www.apsnet.org

UMass Extension

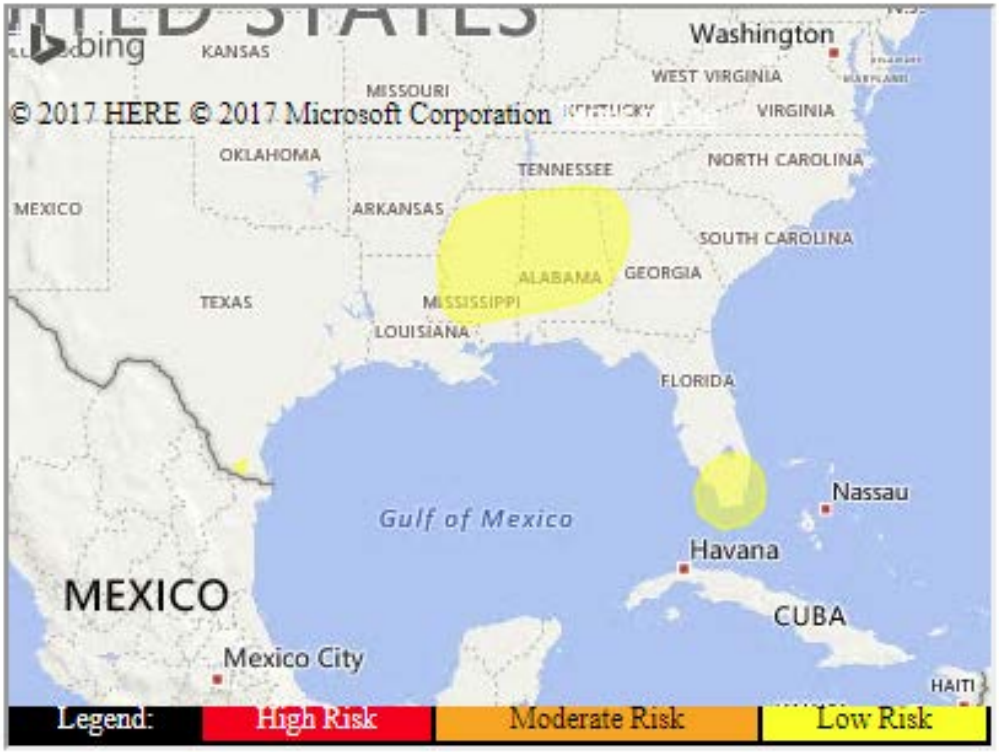
Cucurbit downy mildew

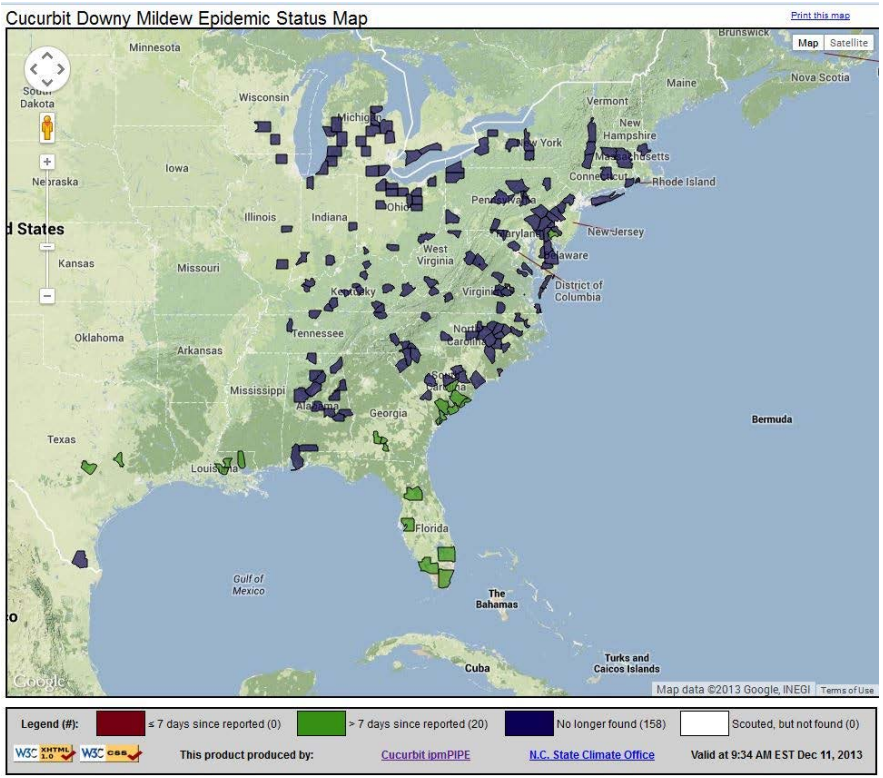


- Oomycete
- Produces many sporangia
- Wind dispersed great distances
- Living host to survive
- Does NOT overwinter

UMass Extension

Where does it come from?





cdm.ipm-pipe.org

- Blows up from FL each year
- Usually arrives in mid-August (MA)

UMass Extension

Control of Downy Mildew

Need to spray every 5-7 days once disease present and conditions favorable!!

- **Broad spectrum:** Bravo, Copper, Mancozeb

  +

- **Oomycete-specific:** e.g. Tanos, Ranman, Forum, Gavel, Previcur Flex, Zampro

- **Organic:** Copper, Oxidate, Biofungicides??

UMass Extension

So, what's the problem?

Market for cucumbers all year round but…

- So much time and $$ spraying
- Bravo is harmful to bees
  - Affects fungal gut symbiont
  - More susceptible to fungal parasite *Nosema*
- Organic spraying effective?
- Need new resistant varieties

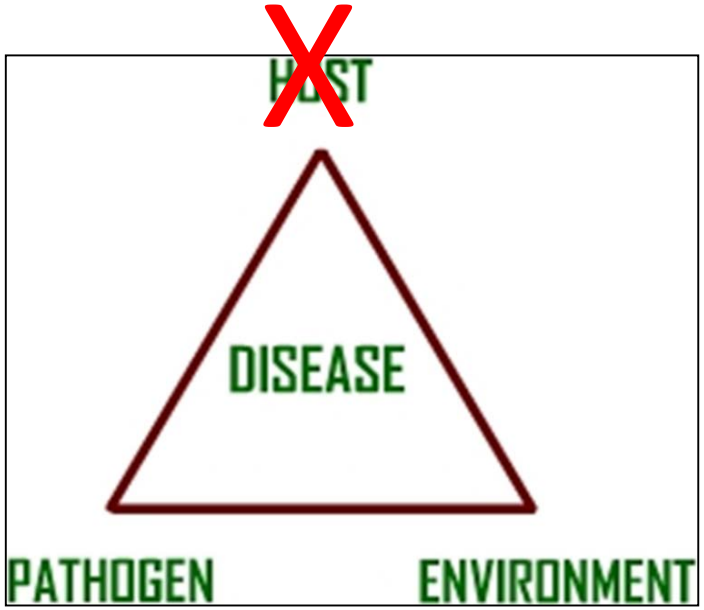
Photo by K. Keatley Garvey, UCANR

UMass Extension

Role of Resistant Varieties

Reduce need for fungicides

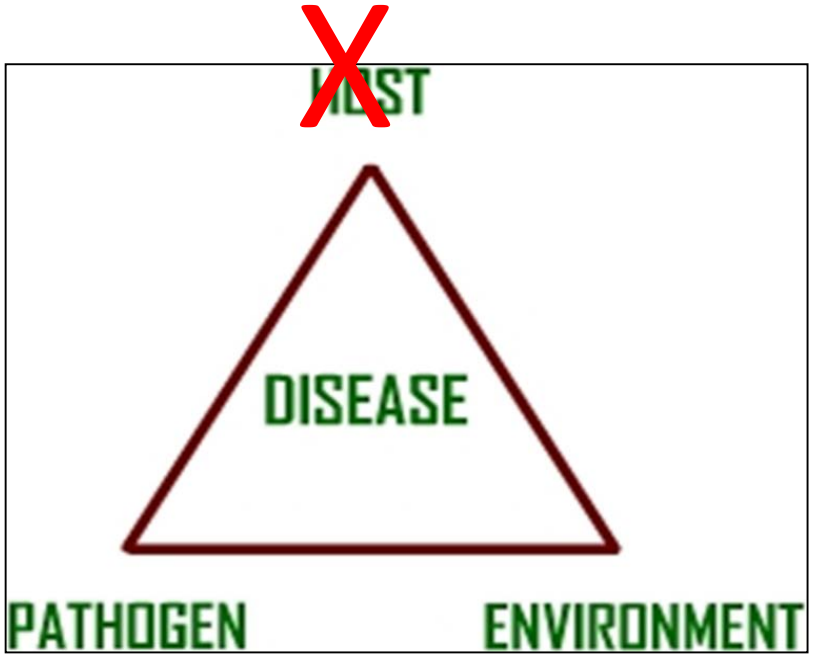
- Save time
- Save money
- Work for organic and conventional alike
- Durable solution
- New varieties coming on the market



UMass Extension

Research Questions

- How effective are new resistant varieties?
- Can we extend the cuke season?
- More profitable than spraying?
- More profitable to plant resistant variety AND spray?



UMass Extension

Resistant Variety Trials

Cultivar	2016	2017
Straight Eight (Susceptible control)	X	X
SV4719CS	X	X
Green Bowl	X	X
Bristol	X	X
DMR401	X	X
NY264	X	X
Diamondback		X
Python		X

UMass Extension

Straight 8 – Susceptible to EVERYthing!!

PROS

- Heirloom variety
- High yielding

CONS

- Susceptible to everything
- Monoecious

UMass Extension

SV4719CS – New standard of DM resistance

PROS

- Good resistance to DM, PM, other leaf spots, viruses
- Widely available

CONS

- Not very vigorous plants, brittle
- Attractive to beetles and so ↑ bacterial wilt

UMass Extension

Green Bowl – Great DM resistance, poor yields

PROS

- Strong resistance to DM, PM

CONS

- Very poor yield
- Off flavor
- Will not be marketed…

UMass Extension

Bristol – Great DM resistance, good yields

PROS

- Strong resistance to DM, PM, fungal diseases and viruses
- Vigorous, high yields
- Good looking and tasting

CONS

- Susceptible to anthracnose

UMass Extension

DMR401 – Great DM resistance, some off shapes

PROS

- Strong resistance to DM, PM, leaf spots, virus
- Vigorous
- Good looking and tasting

CONS

- Misshapen fruit--tapered, hooked, broken ends
- Not widely available: CommonWealth Seeds

UMass Extension

NY264 – Best DM resistance, short fruit

PROS

- Strongest resistance to DM, PM, virus
- Vigorous. Plants are huge, many flowers
- Good looking and tasting

CONS

- Not widely available
- Longer DTH (75)
- Unconventional shape, color

UMass Extension

Diamondback – Strong DM resistance

PROS

- Good resistance to DM, PM
- Strong yields
- Good looking and tasting

CONS

- Susceptible to anthracnose

Python – Strong DM resistance

PROS

- Good resistance to DM, PM
- Strong yields
- Good looking and tasting

CONS

- Susceptible to anthracnose

UMass Extension

2016 Season

- Hot
- Dry, drought
- Unfavorable conditions
- Disease came Aug 17
- Low DM pressure
- Virus affected control plots

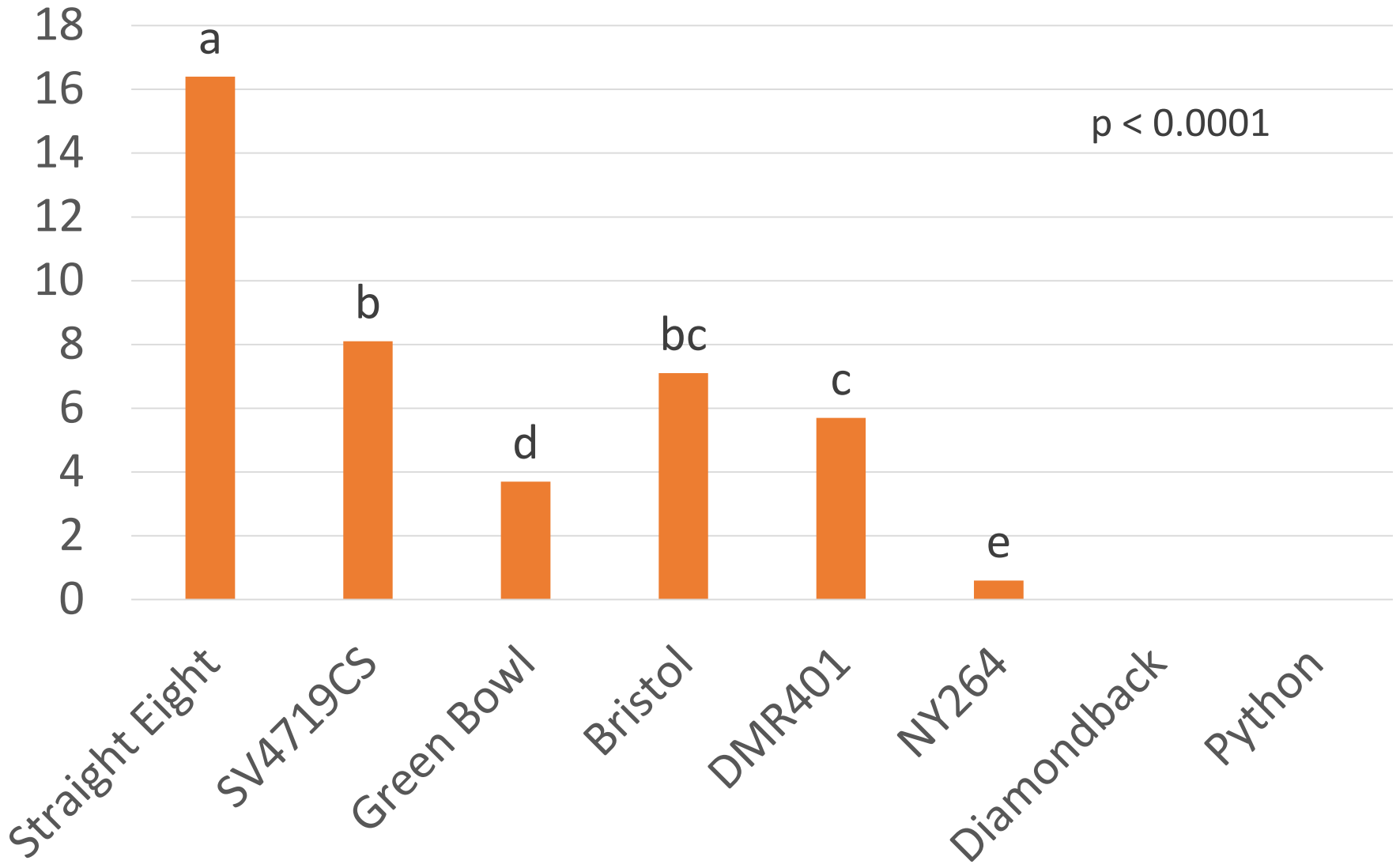
2017 Season

- Cool
- Wet
- Favorable conditions
- Disease came early Aug 2
- Very high DM pressure

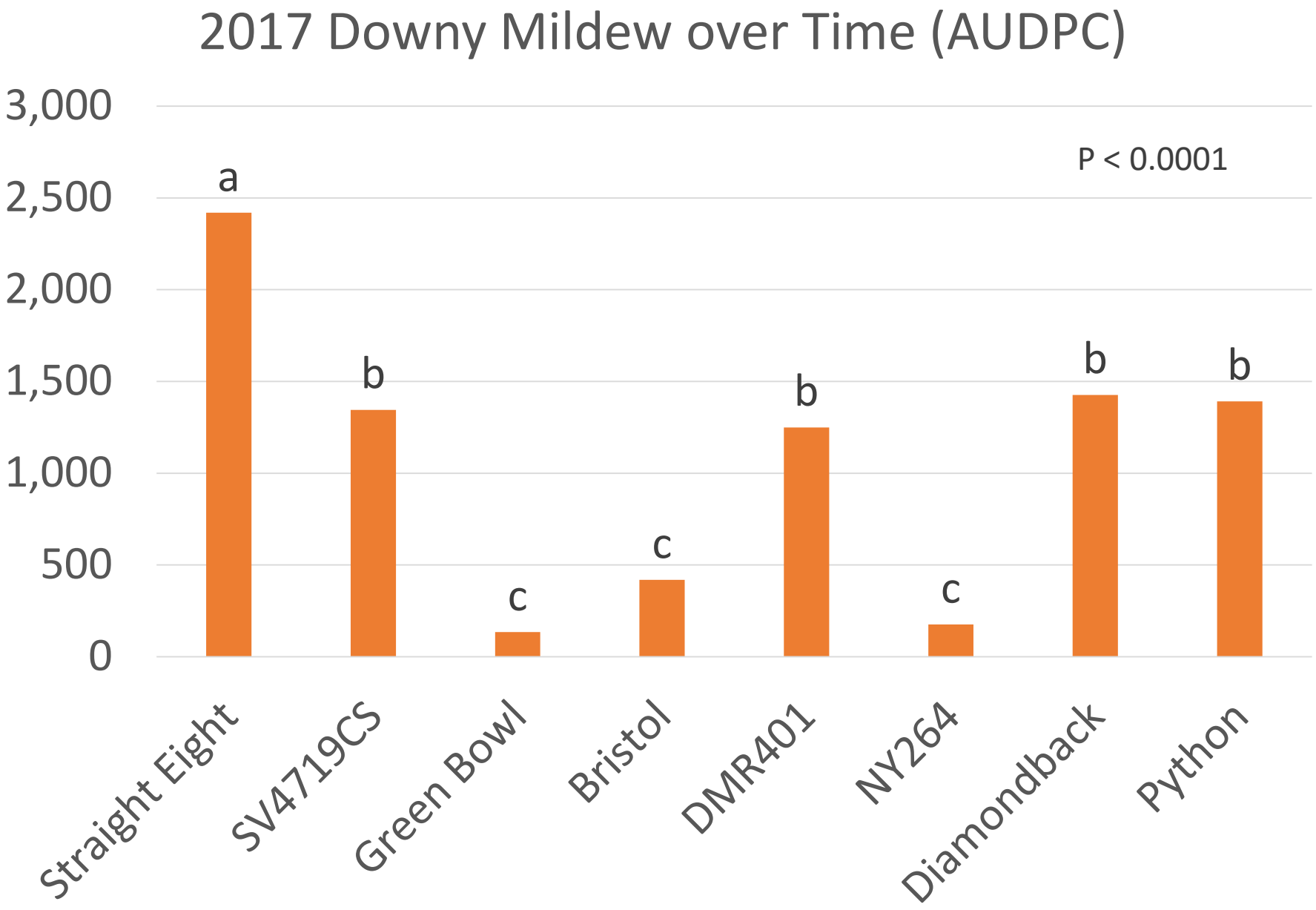
***use white mulch when planting in July!!*

UMass Extension

2016 Downy Mildew over Time (AUDPC)

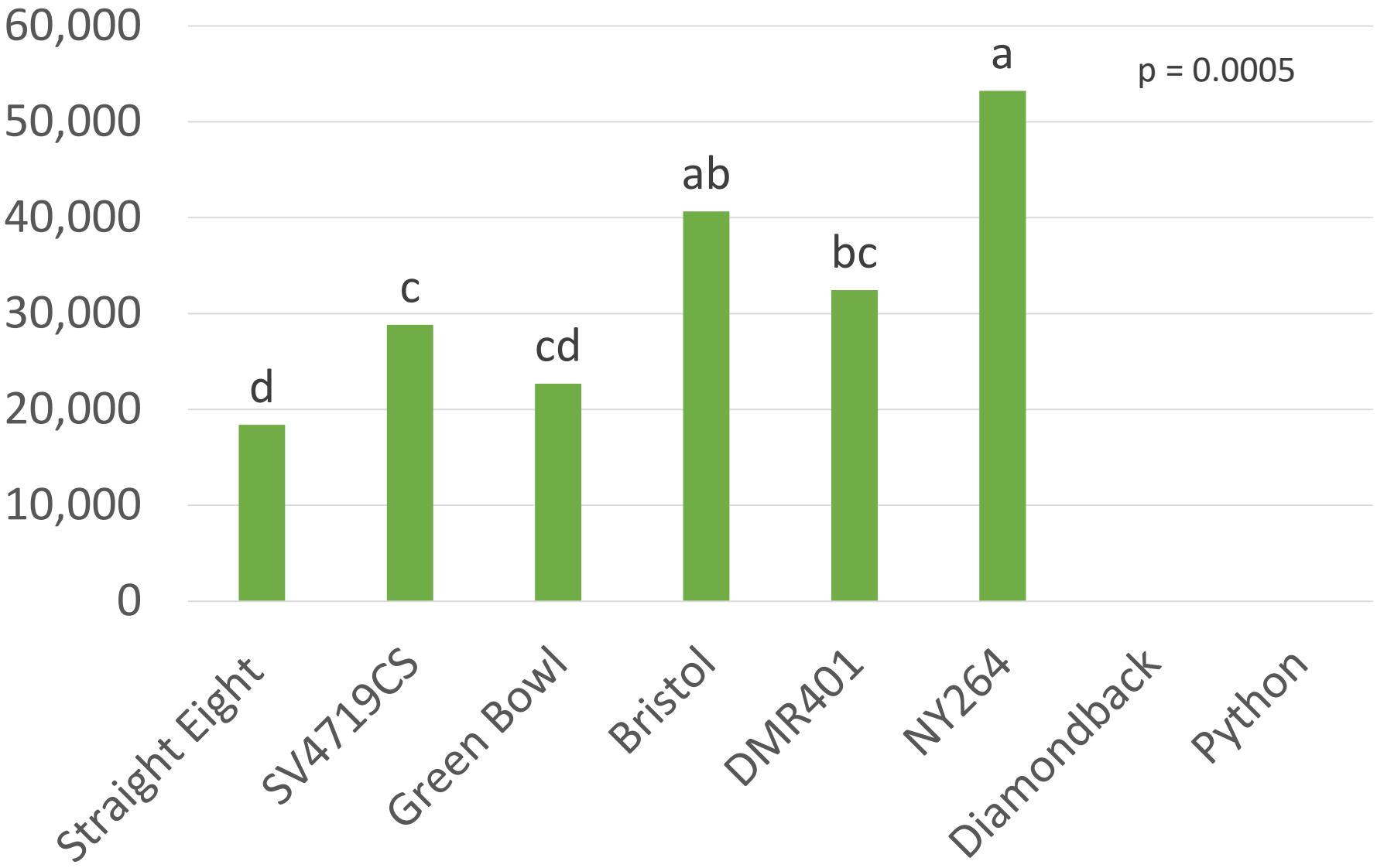


UMass Extension

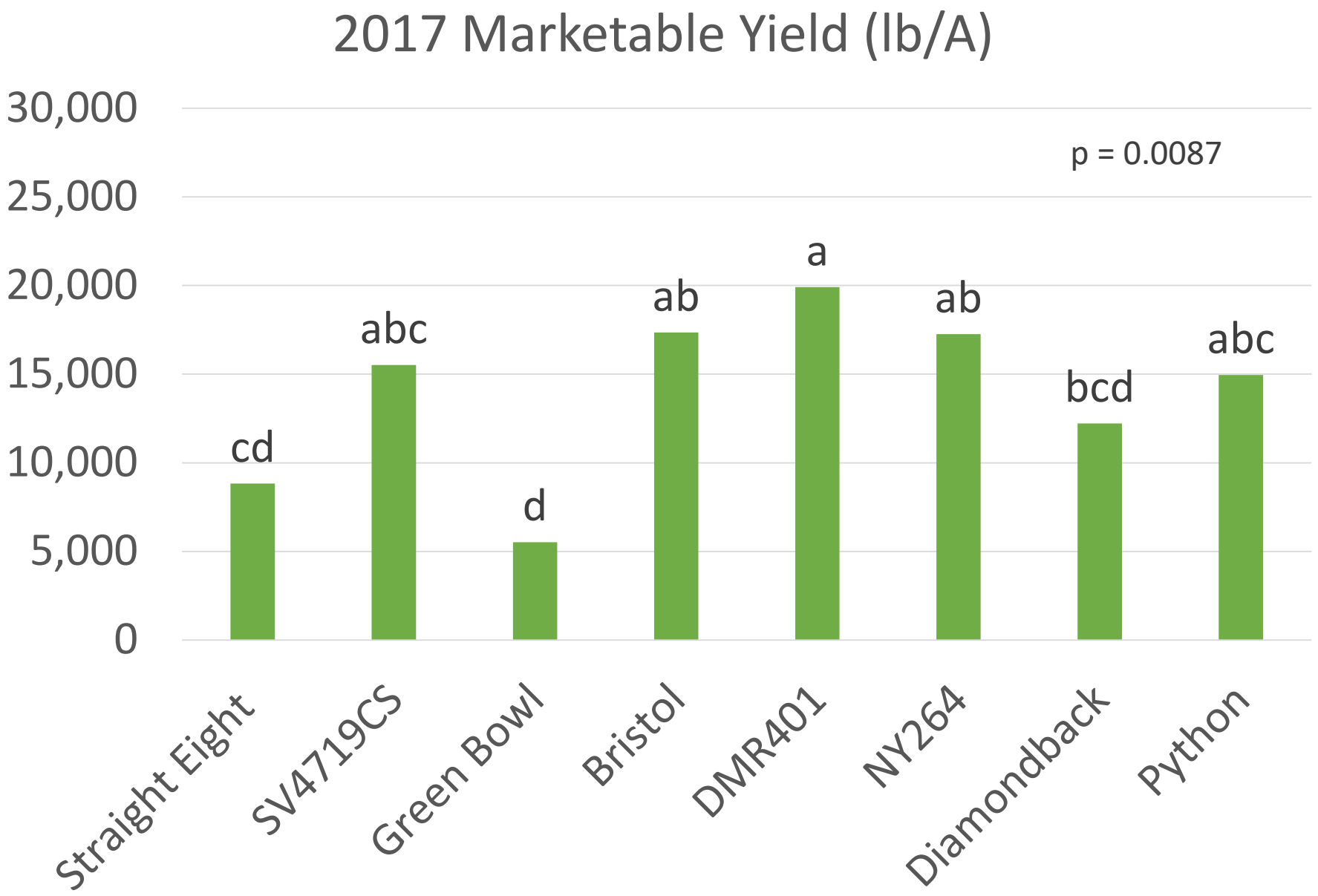


UMass Extension

2016 Marketable Yield (lb/A)

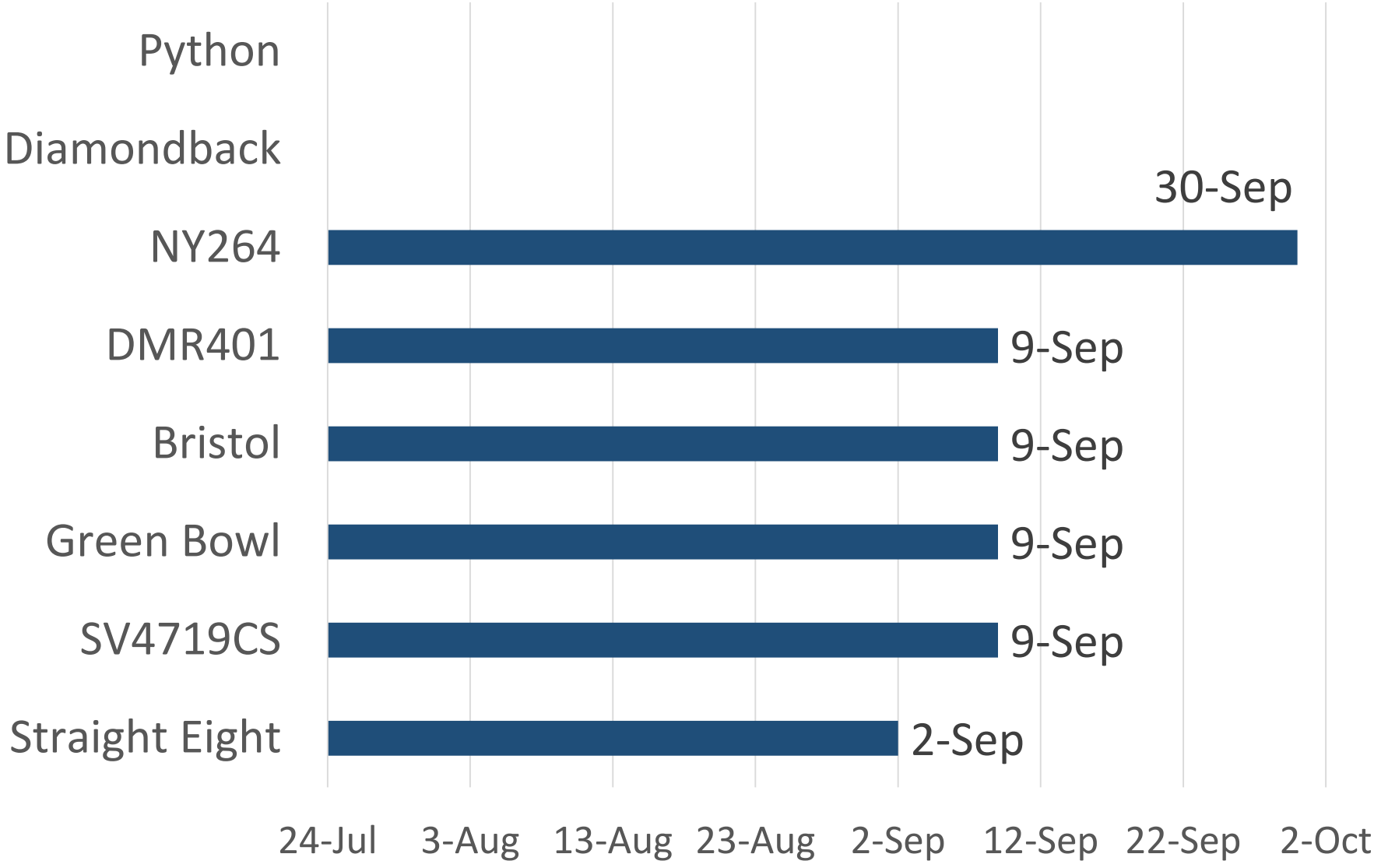


UMass Extension

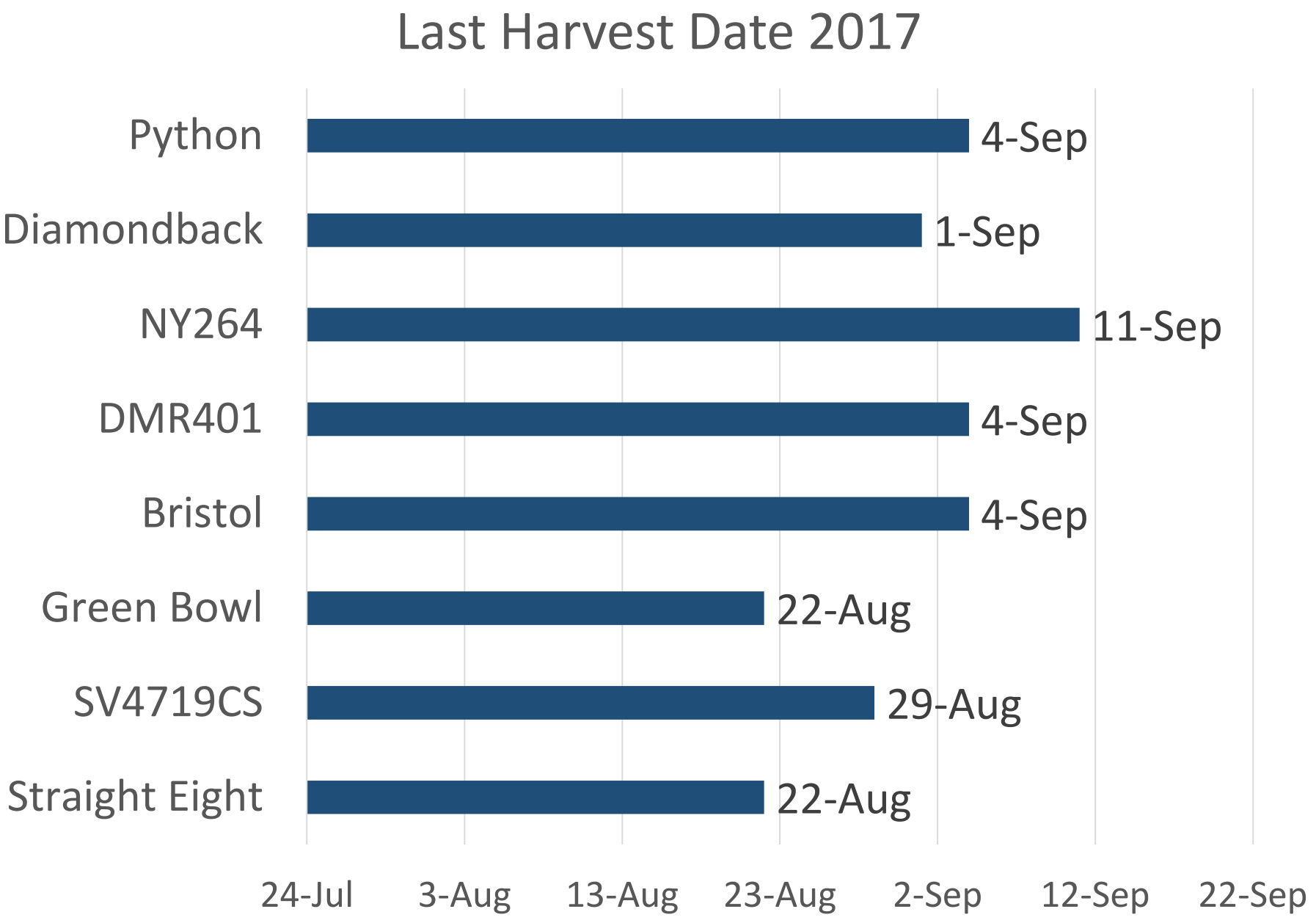


UMass Extension

Last Harvest Date 2016



UMass Extension



UMass Extension

Variety Trial Conclusions

NY264

Susceptible

NY264 (Commonwealth Seeds)

Bristol (Seminis)

DMR401 (Commonwealth Seeds)

UMass Extension

Next Questions…

Does it help to spray the resistant varieties?

Can we extend the season further?

What is the most profitable approach?

Fungicide Efficacy and Economics Study

Susceptible (Straight 8)

Resistant (SV4719CS)

——— No Spray ———

—— Conventional Spray ——

——— Organic Spray ———

UMass Extension

Fungicide Efficacy and Economics Study

2016 Season

- Hot
- Dry, drought
- Unfavorable conditions
- Disease came Aug 17
- Low DM pressure
- Virus affected control plots

6 sprays

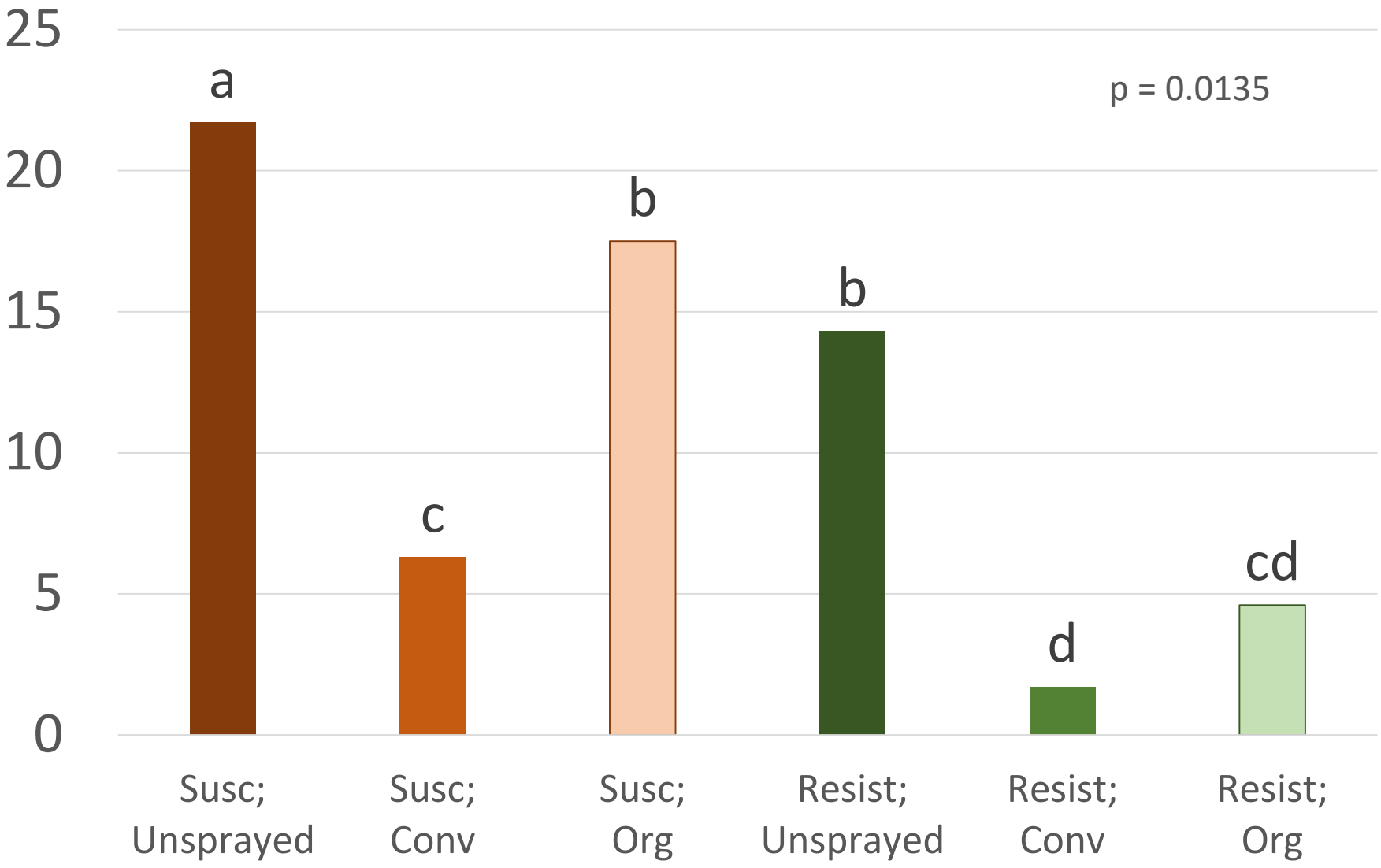
2017 Season

- Cool
- Wet
- Favorable conditions
- Disease came early (Aug 2)
- Very high DM pressure

9 sprays

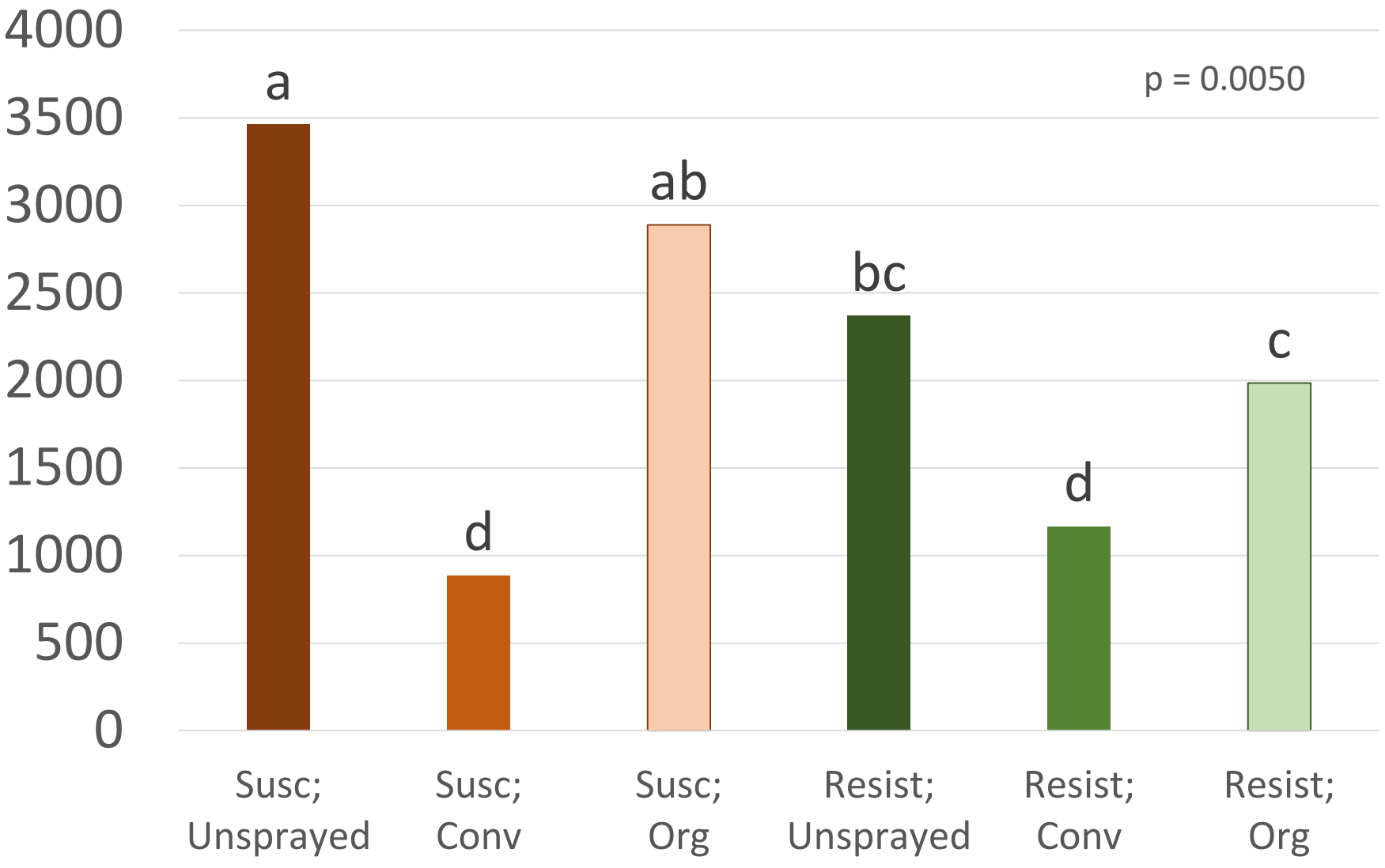
UMass Extension

2016 DM over Time (AUDPC)

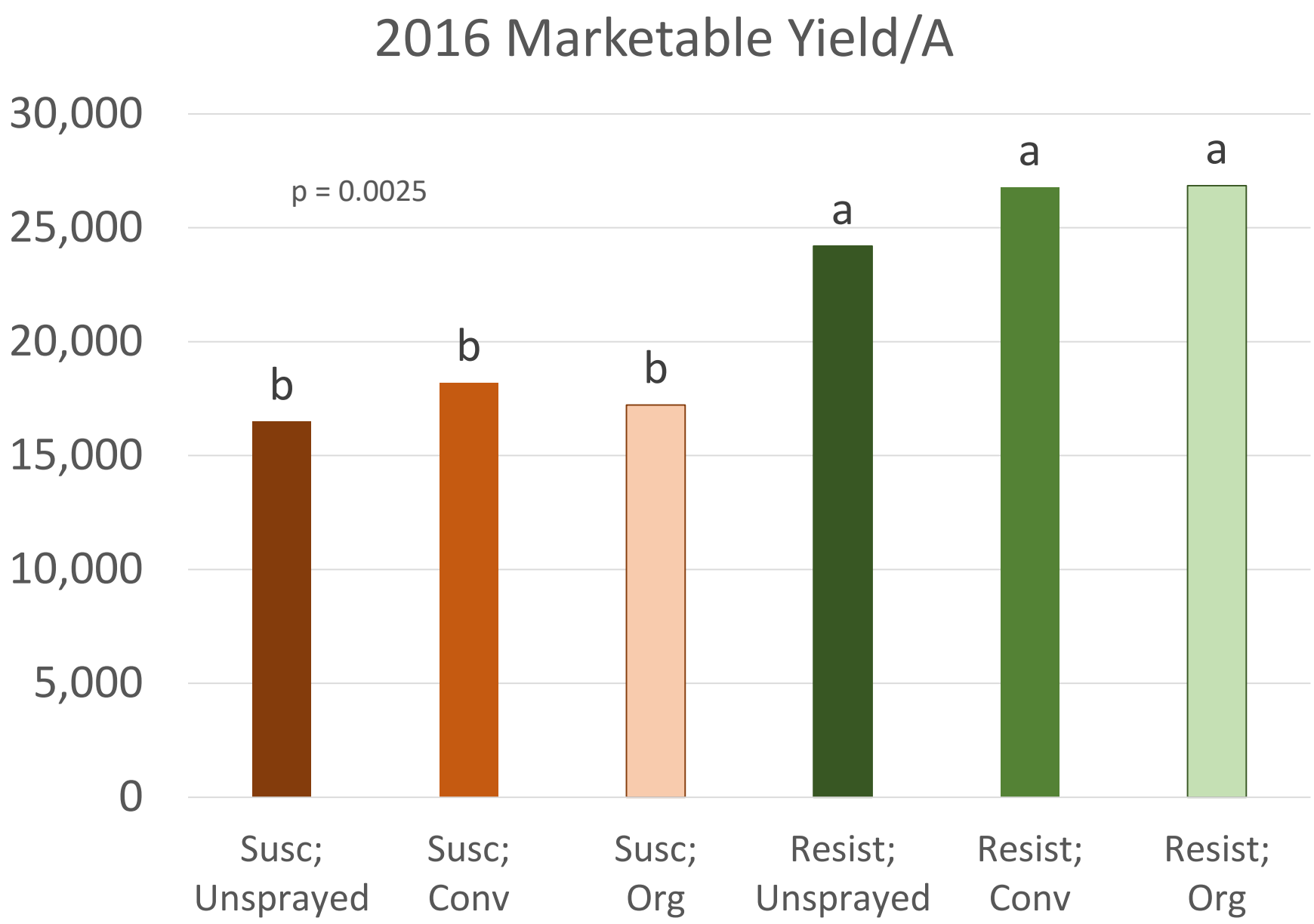


UMass Extension

2017 DM over Time (AUDPC)

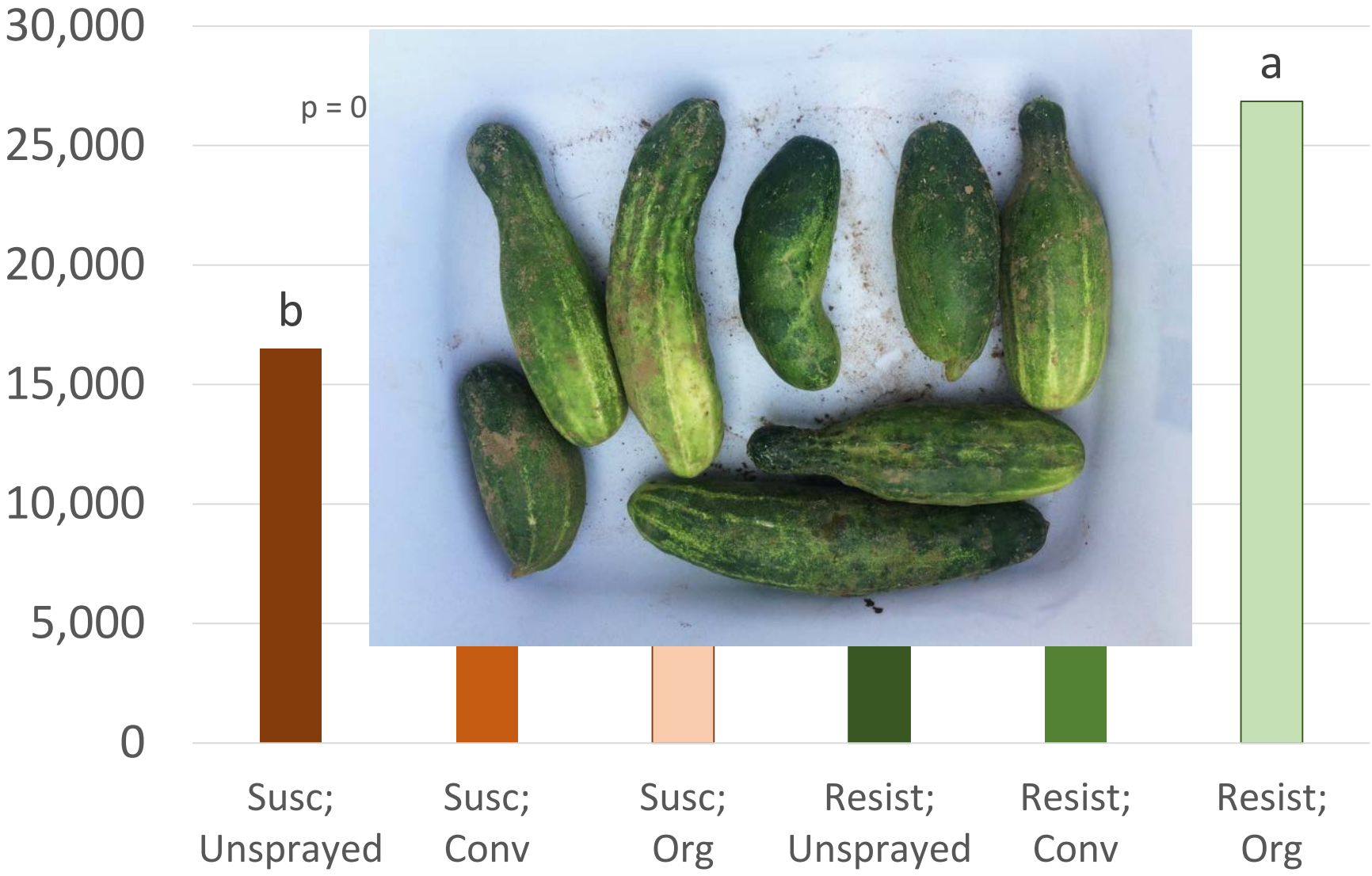


UMass Extension



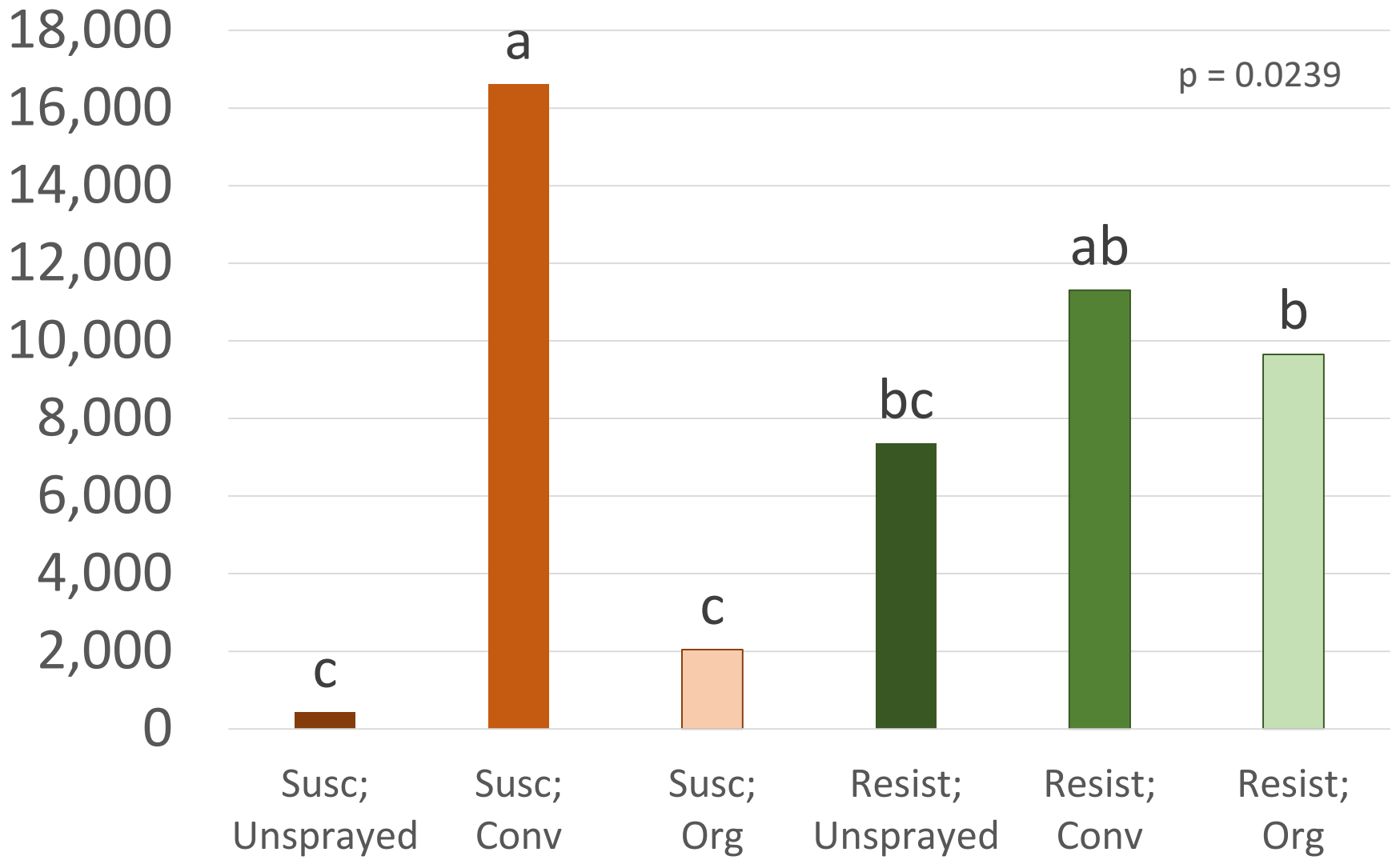
UMass Extension

2016 Marketable Yield/A

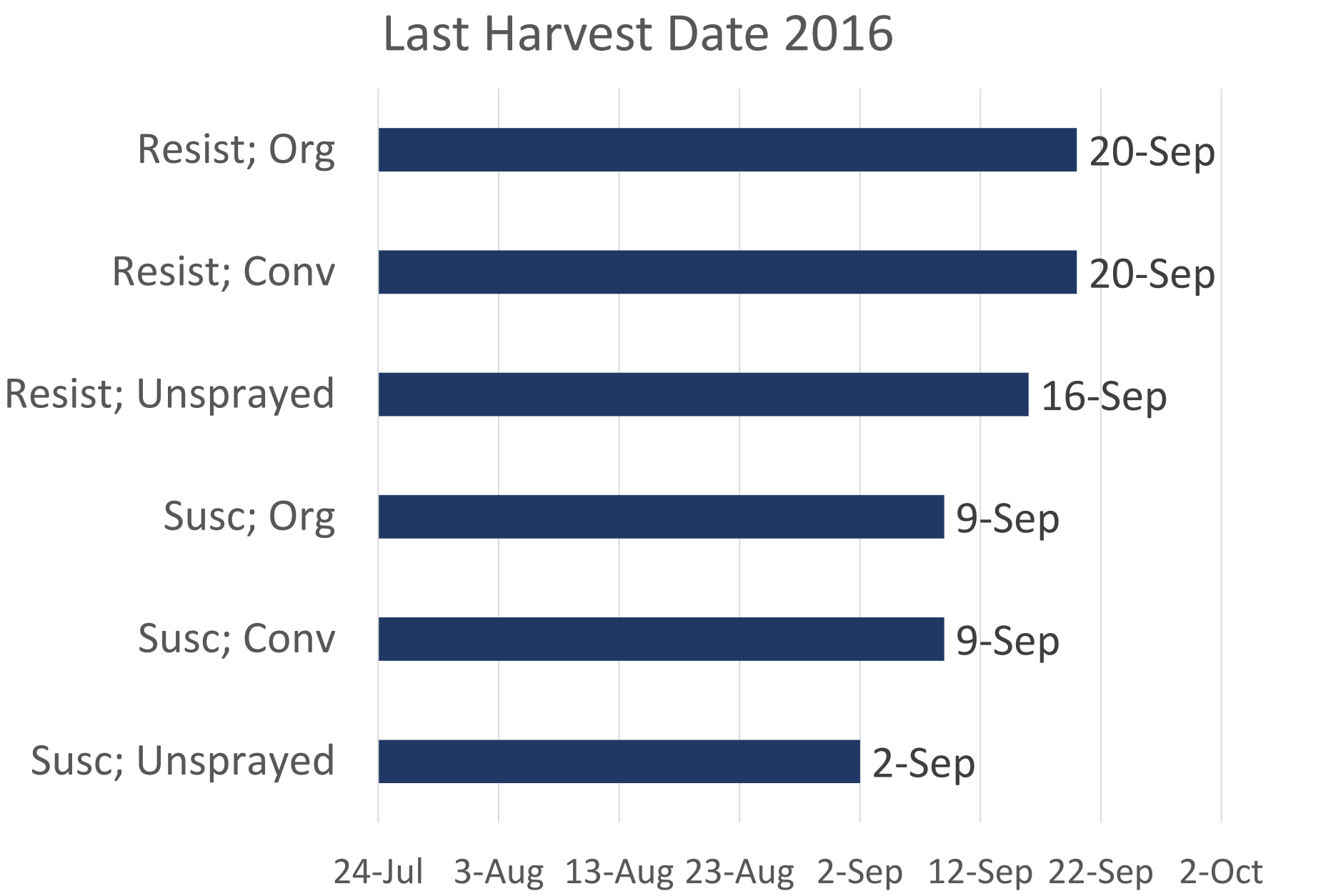


UMass Extension

2017 Marketable Yield/A

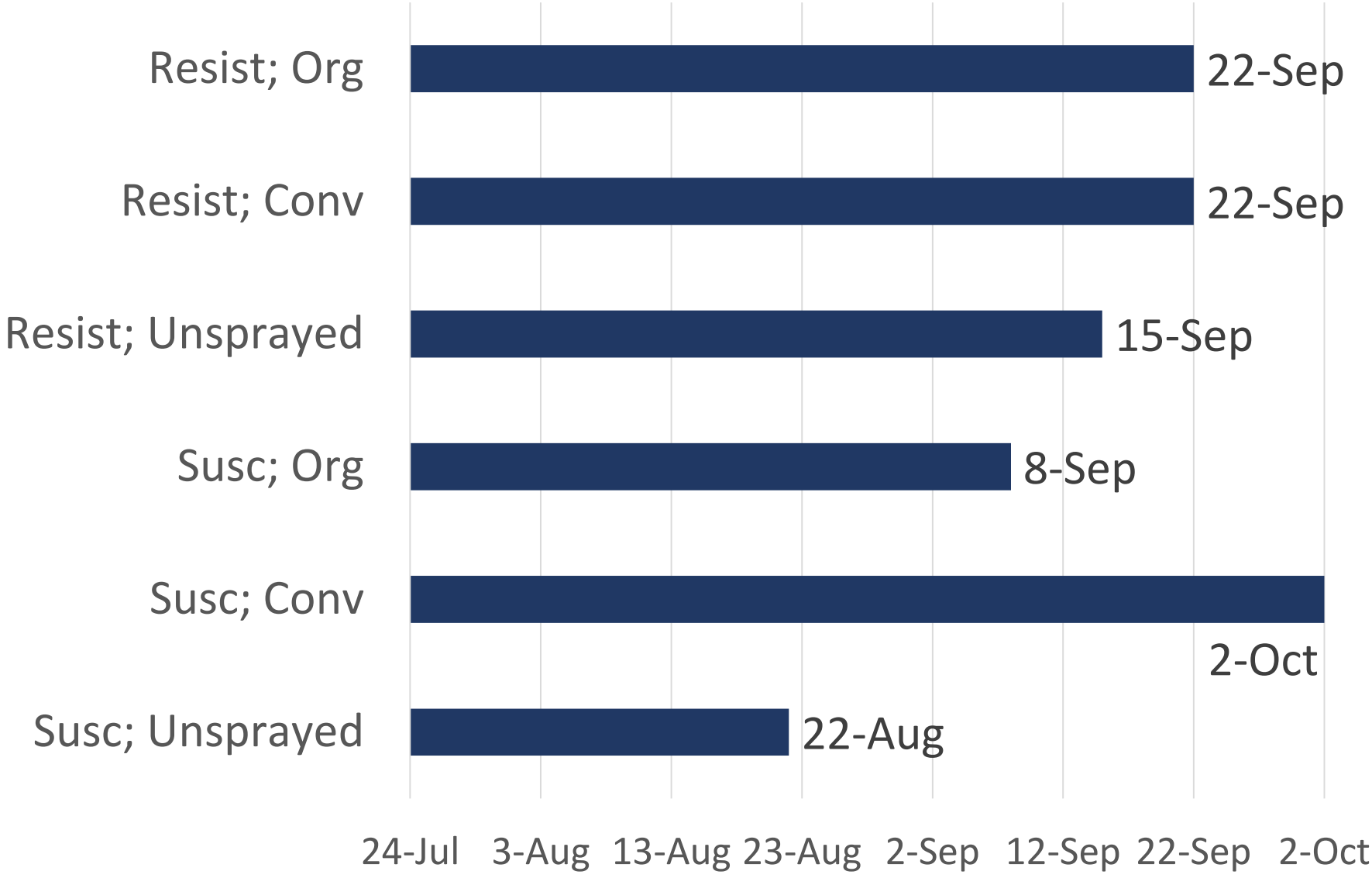


UMass Extension



UMass Extension

Last Harvest Date 2017



UMass Extension

Calculating Sales & Profits

Cost of Materials

- 6 sprays in 2016 **$411** (C) $37 (O)
- 9 sprays in 2017 **$702** (C) $40 (O)

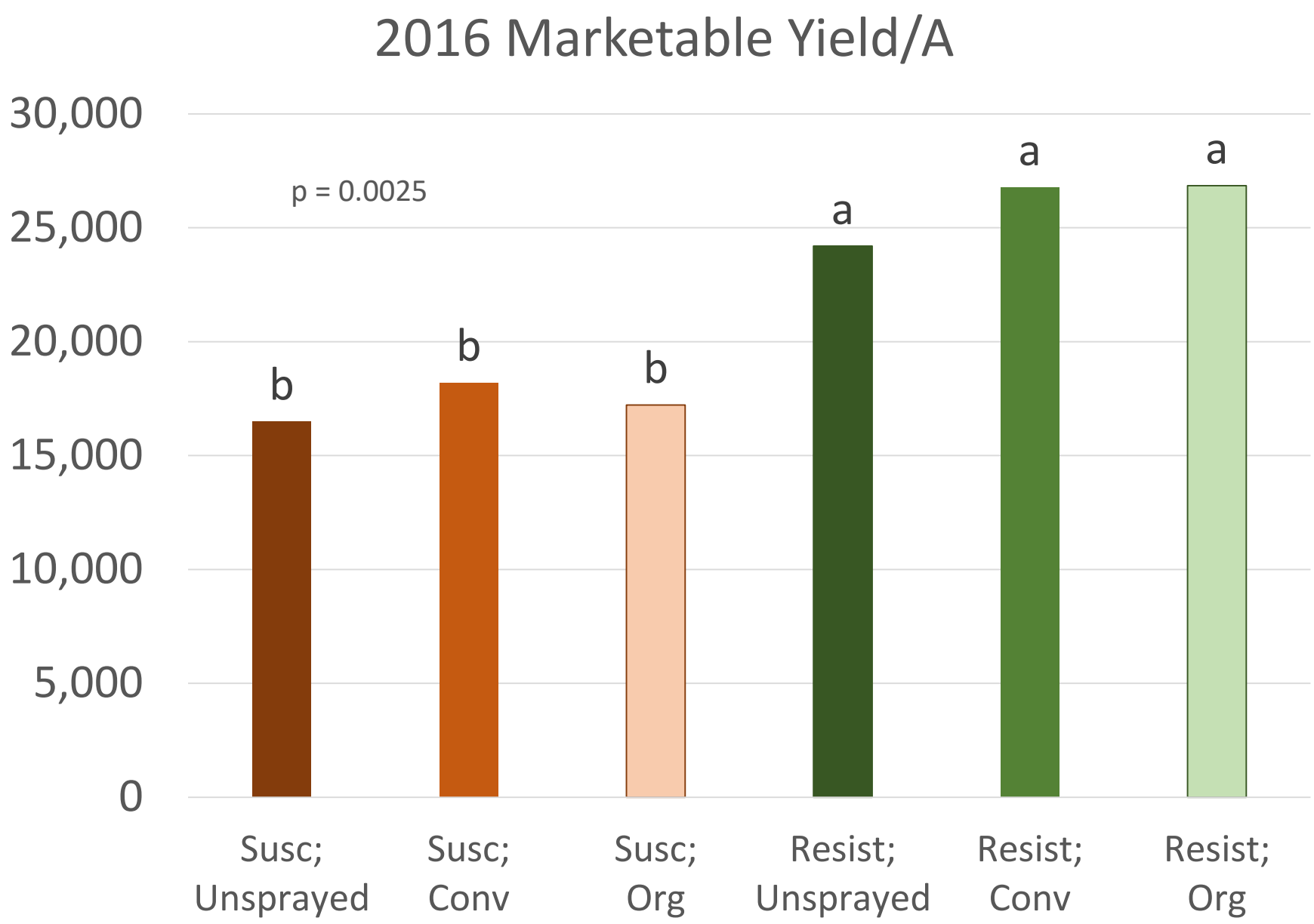
Price/lb

- Conventional: Retail $2.00/pound
- Organic: Retail $2.50/pound

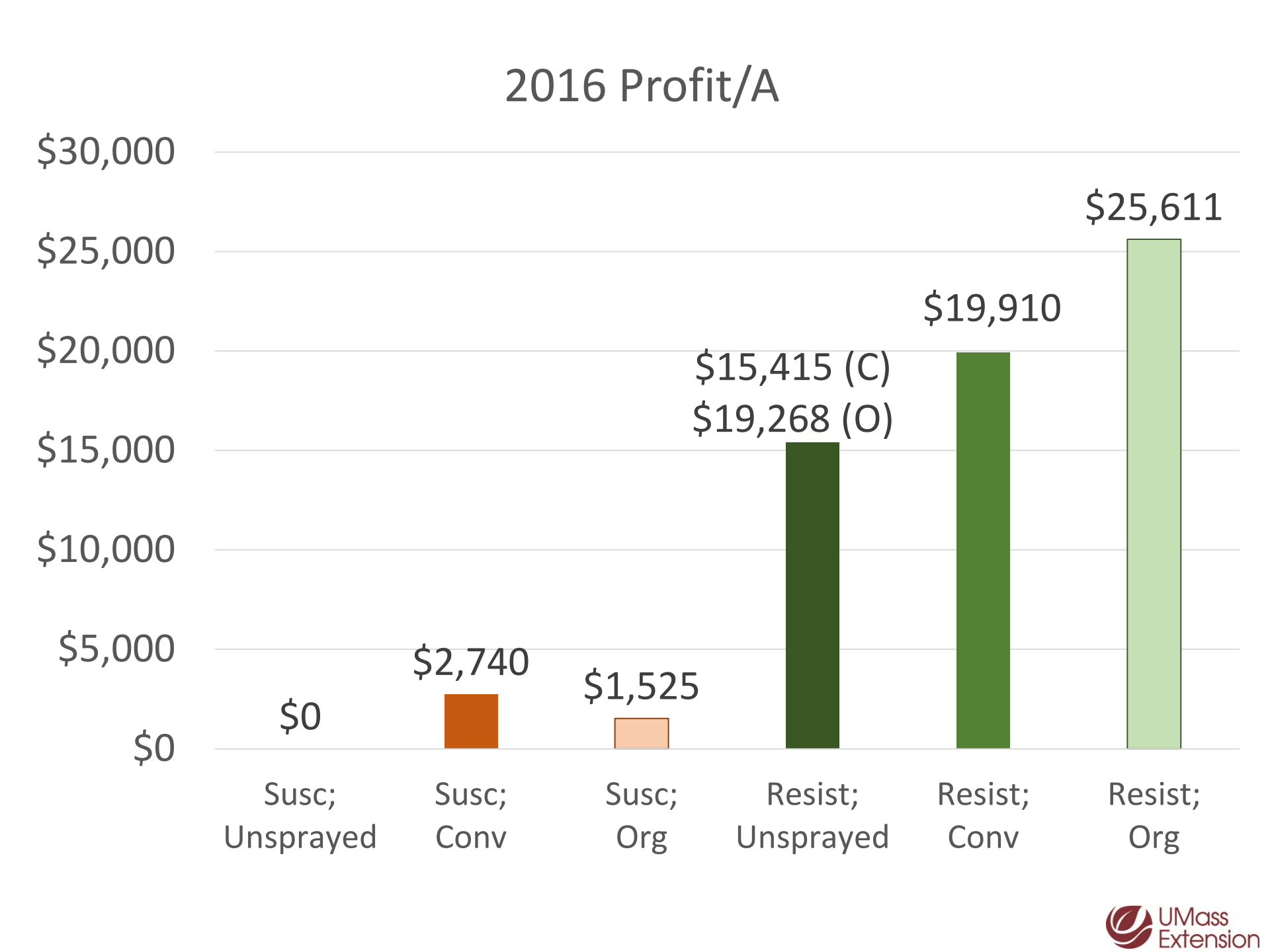
Cost of Spraying…

- $24/hour
- **1.0 hours /A** to mix, spray, clean up
- Tractor maintenance, repair, depreciation = $20/acre (http://www.beetclock.com/NOFA_workbook.html)

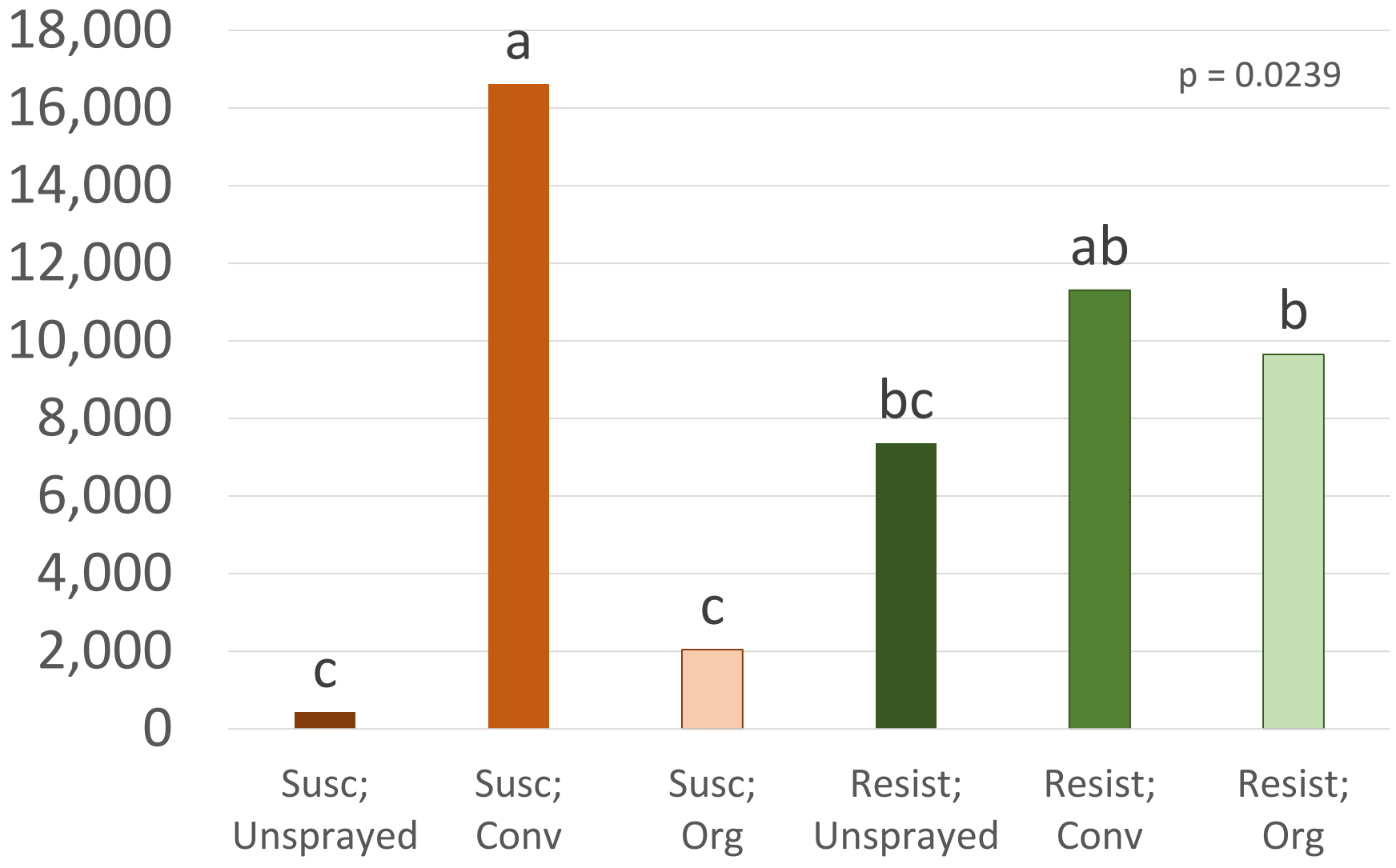
UMass Extension



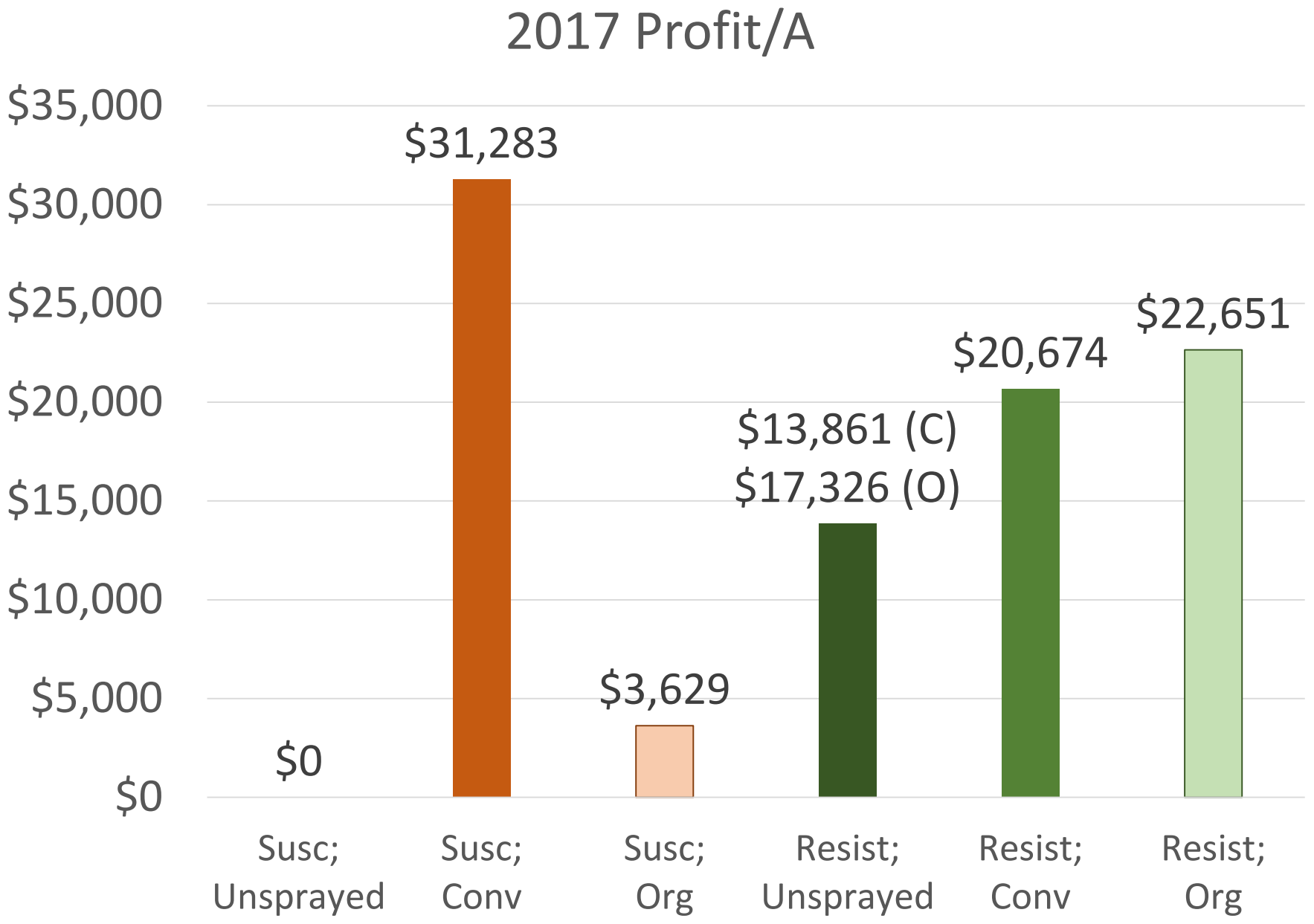
UMass Extension


2016 Profit/A
$30,000
$25,000
$20,000
$15,000
$10,000
$5,000
$0
$0
$2,740
$1,525
$15,415 (C)
$19,268 (O)
$19,910
$25,611
Susc; Unsprayed
Susc; Conv
Susc; Org
Resist; Unsprayed
Resist; Conv
Resist; Org

2017 Marketable Yield/A



UMass Extension



UMass Extension

Economics Study Conclusions

- Conventional fungicides are very effective, if you use them choose high yielding variety
- Resistant varieties yield better even if lower yield potential
- Resistance to other diseases → **more reliable, consistent yield**
- Spraying can improve yield and profitability
- **Choose a better yielding resistant variety e.g. NY264 or Bristol and spray to get maximum benefit**

UMass Extension

Thanks!!!

Thanks to my colleagues in the UMass Extension Vegetable Program:

- Katie Campbell-Nelson
- Lisa McKeag
- Genevieve Higgins
- Michele Meder
- Ben Jankowski
- Farm Crew: Neal Woodard and Zack Zenk

Sue's Contact Info:

sscheufele@umext.umass.edu

This project was supported by the Specialty Crop Block Grant Program at the U.S. Department of Agriculture

UMass Extension