

Growing Fall Cucumbers

Efficacy and economics of
downy mildew resistant
varieties

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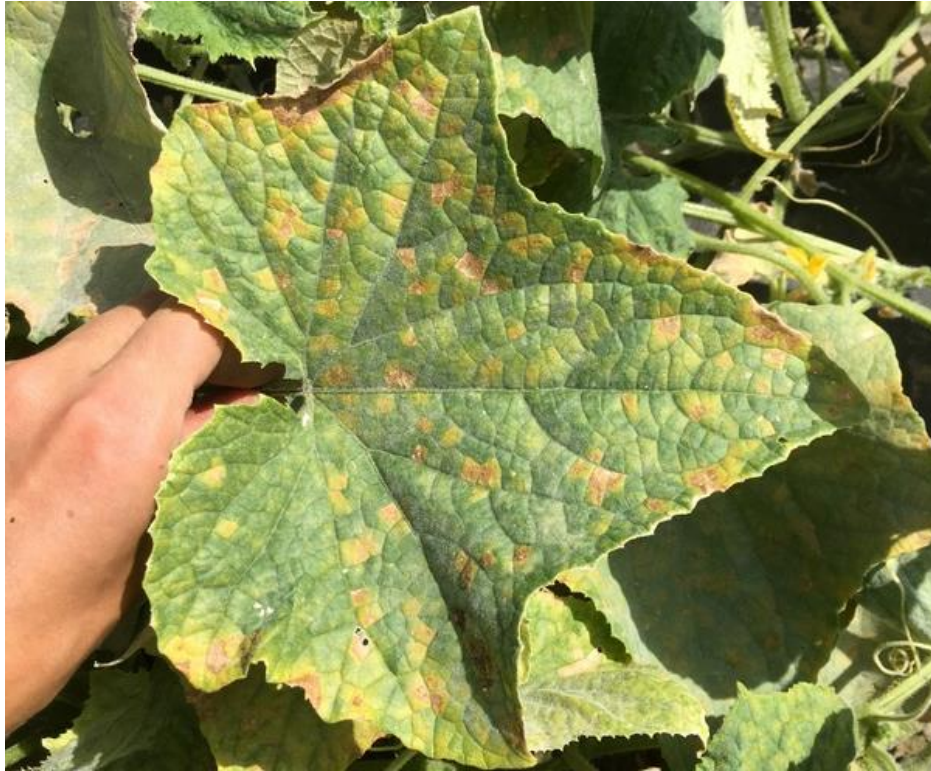
Many pests have been building up...



Suddenly, plants appear scorched



Cucurbit downy mildew



Cucumber

Cucurbit downy mildew



Acorn squash



Butternut

Cucurbit downy mildew



Melon



Watermelon

Cucurbit downy mildew

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

5 strains infect different host crops

+ Highly compatible host interaction

— incompatible or very slightly compatible host interaction

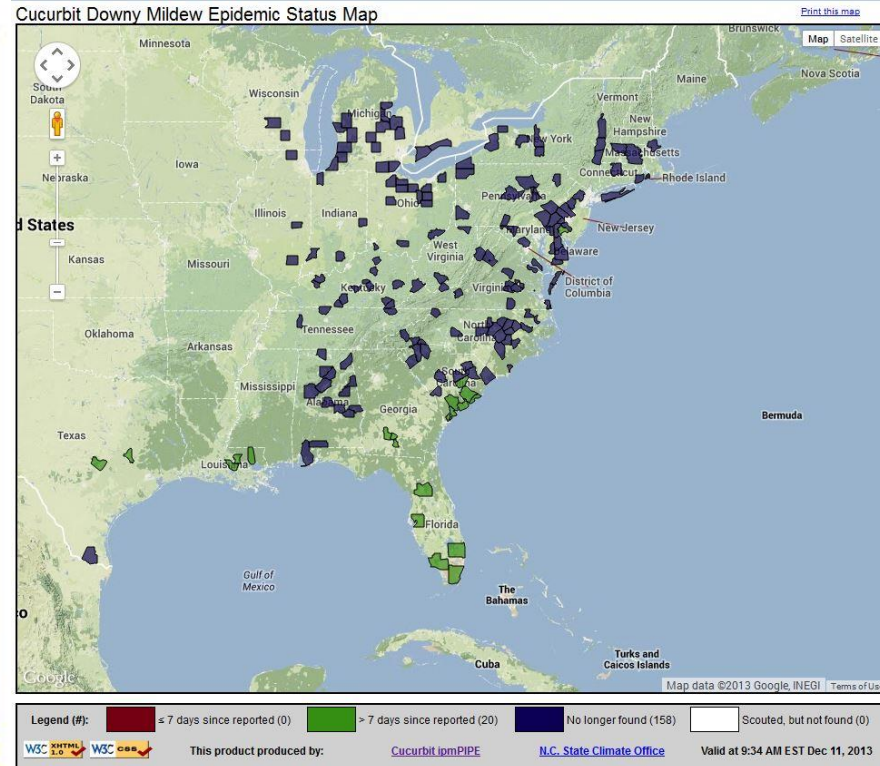
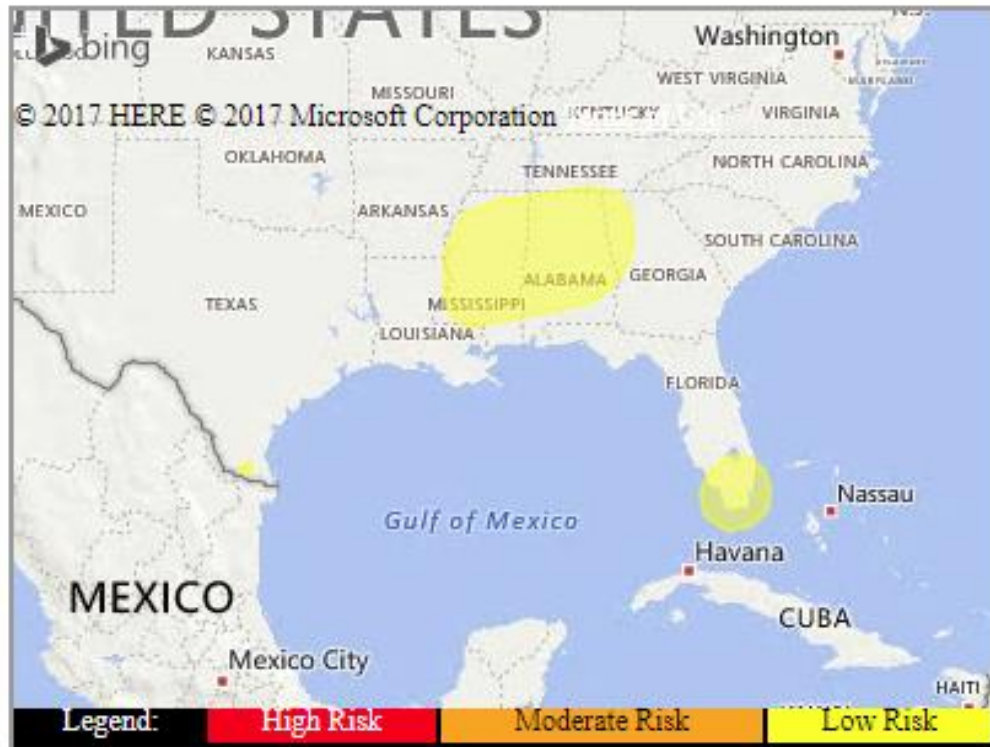
Cucurbit downy mildew



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



Where does it come from?



cdm.ipm-pipe.org

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

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??



So, what's the problem?

People love cucumbers all year round but...

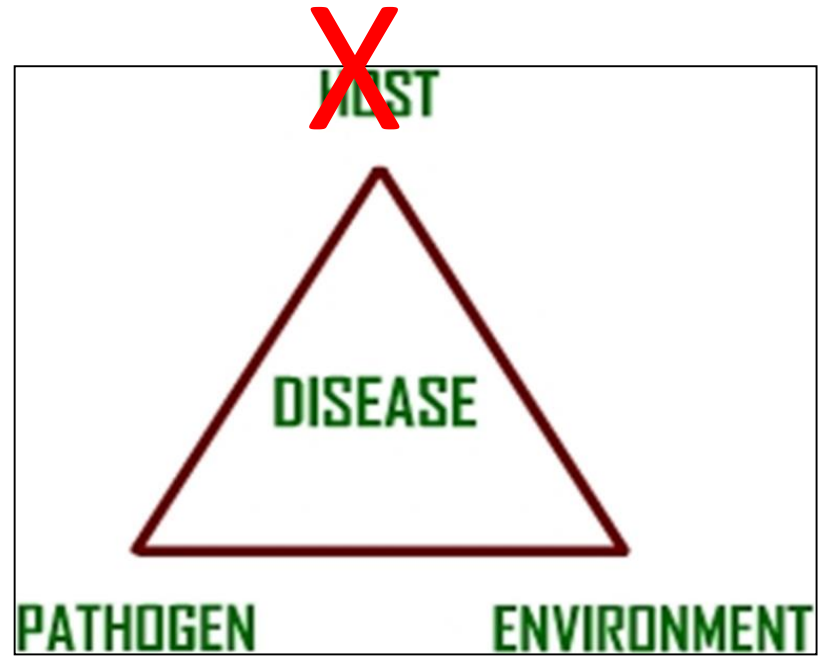
- So much time and \$\$ spraying
- Organic spraying effective?
- Bravo is harmful to bees
 - Affects fungal gut symbiont
 - More susceptible to fungal parasite *Nosema*
- Need new resistant varieties



Photo by K. Keatley Garvey, UCANR

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?



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

Straight 8 – Susceptible to EVERYthing!!



PROS

- Heirloom variety
- High yielding

CONS

- Susceptible to everything
- Monoecious



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

Green Bowl – Great DM resistance, poor yields



PROS

- Strong resistance to DM, PM

CONS

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

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

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

NY264 – Best DM resistance, short fruit



PROS

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

CONS

- Susceptible to anthracnose
- Longer DTH (75)
- Unconventional shape, color

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

2016 Season

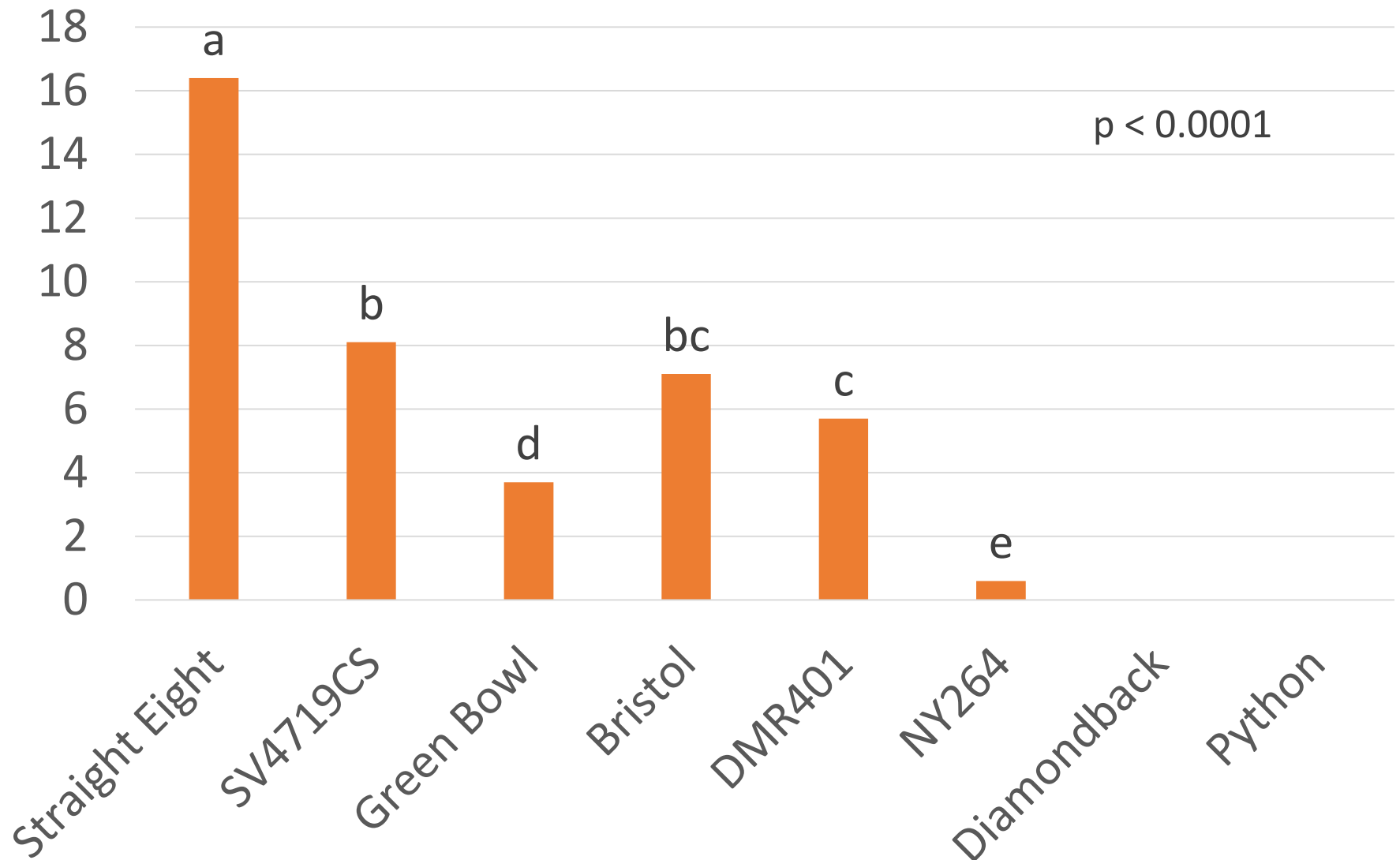
- Hot
- Dry, drought
- Unfavorable conditions
- Disease came Aug 17
- Low DM pressure
- Virus affected control plots

2017 Season

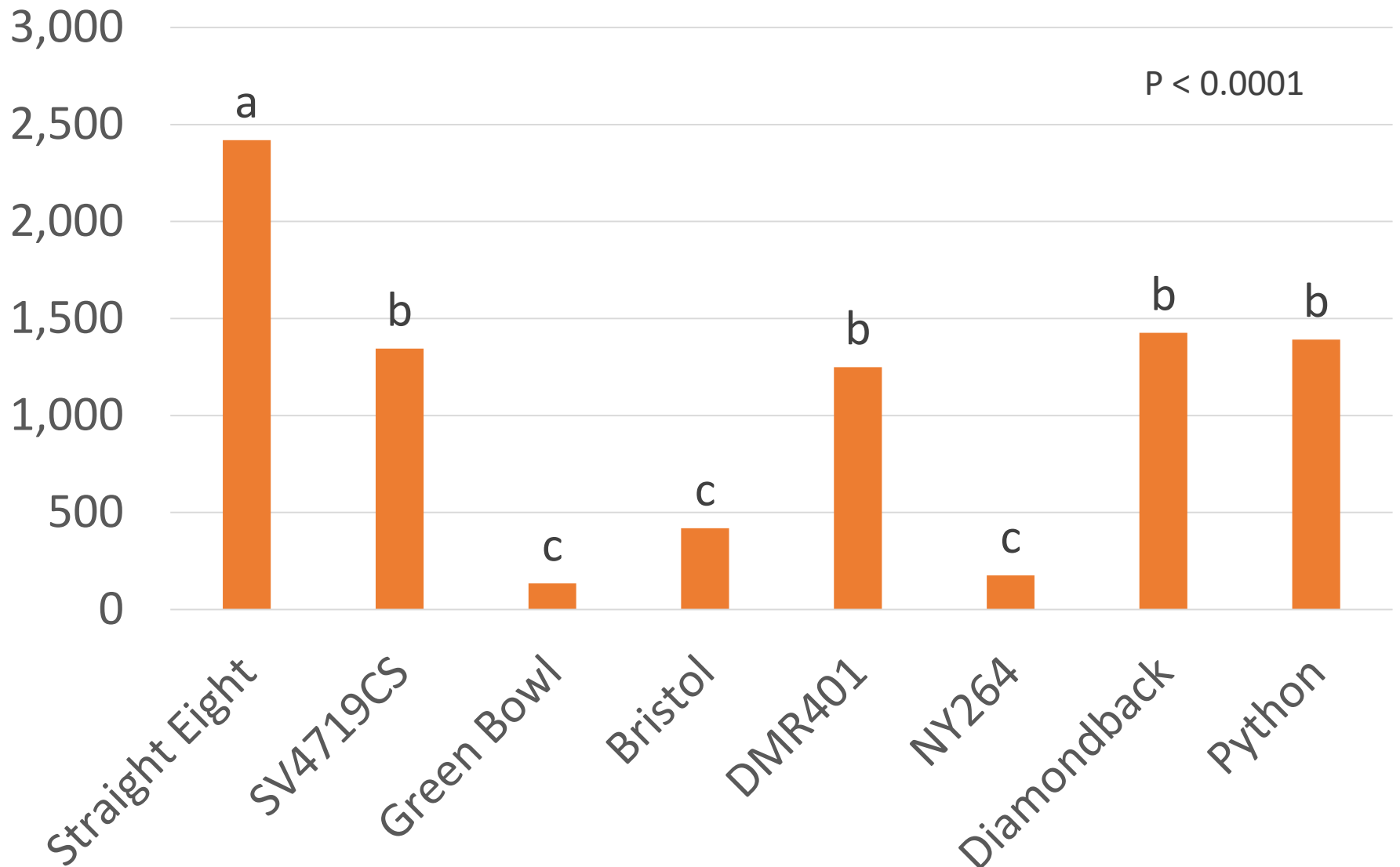
- Cool
- Wet
- Favorable conditions
- Disease came early Aug 2
- Very high DM pressure

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

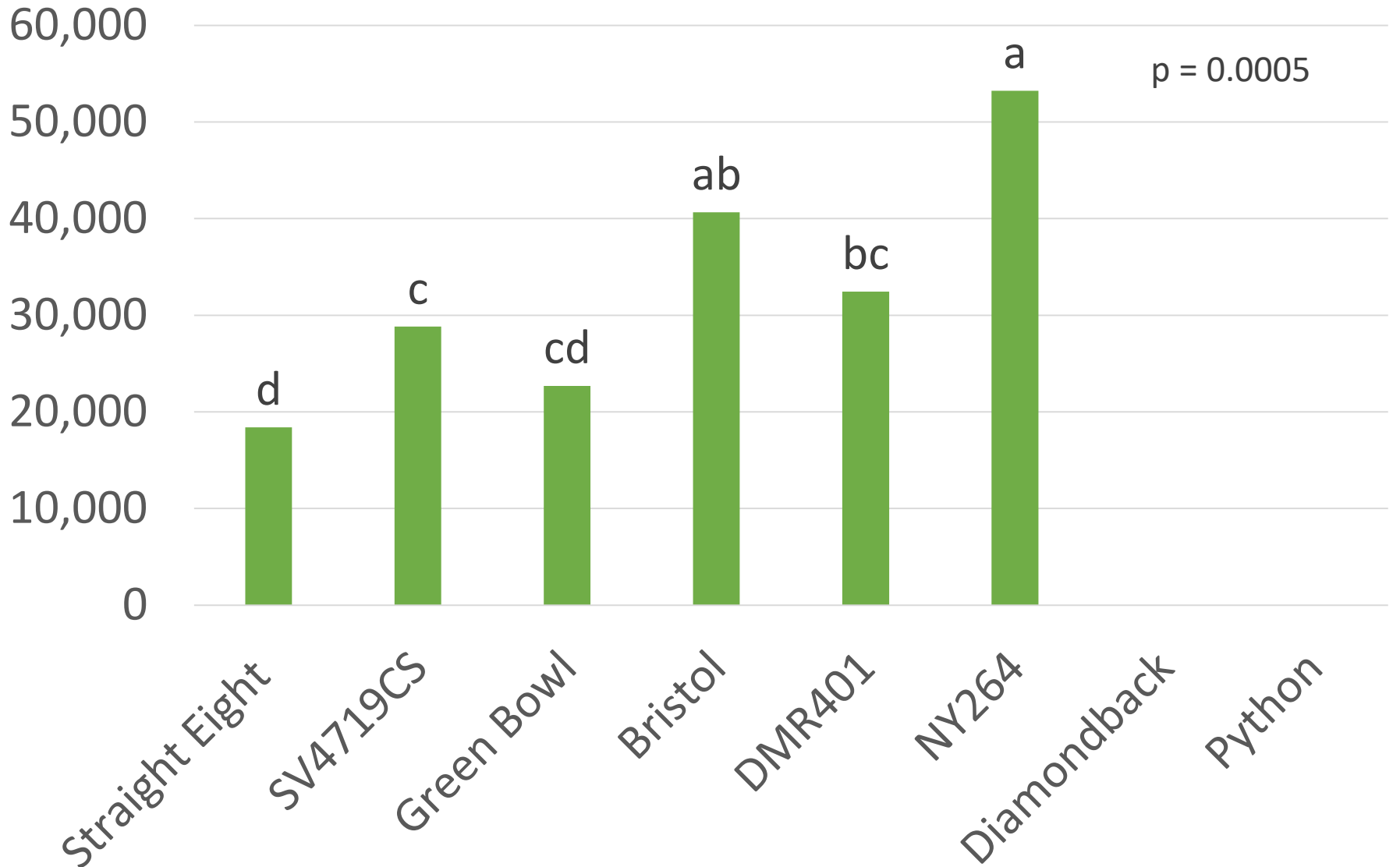
2016 Downy Mildew over Time (AUDPC)



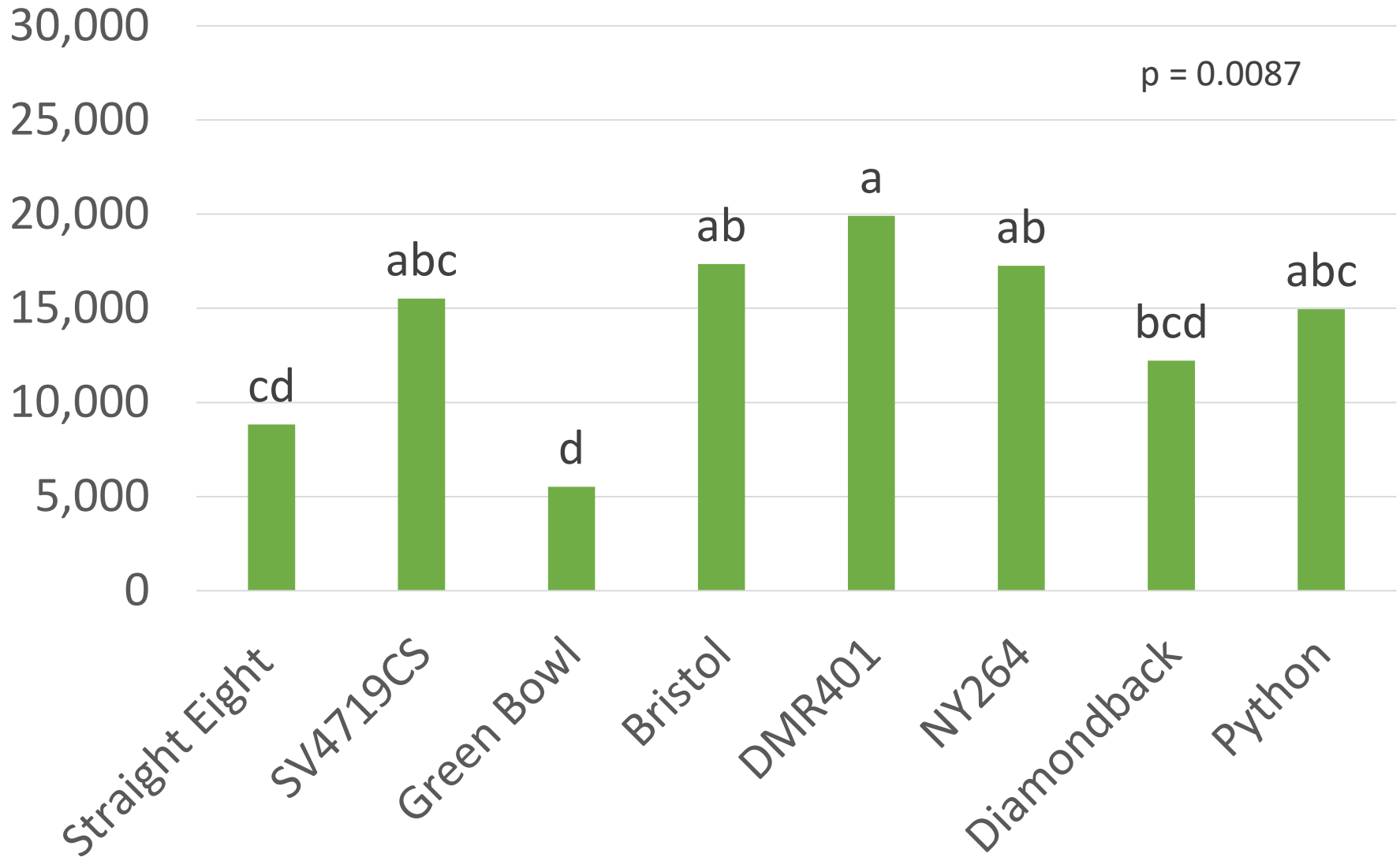
2017 Downy Mildew over Time (AUDPC)



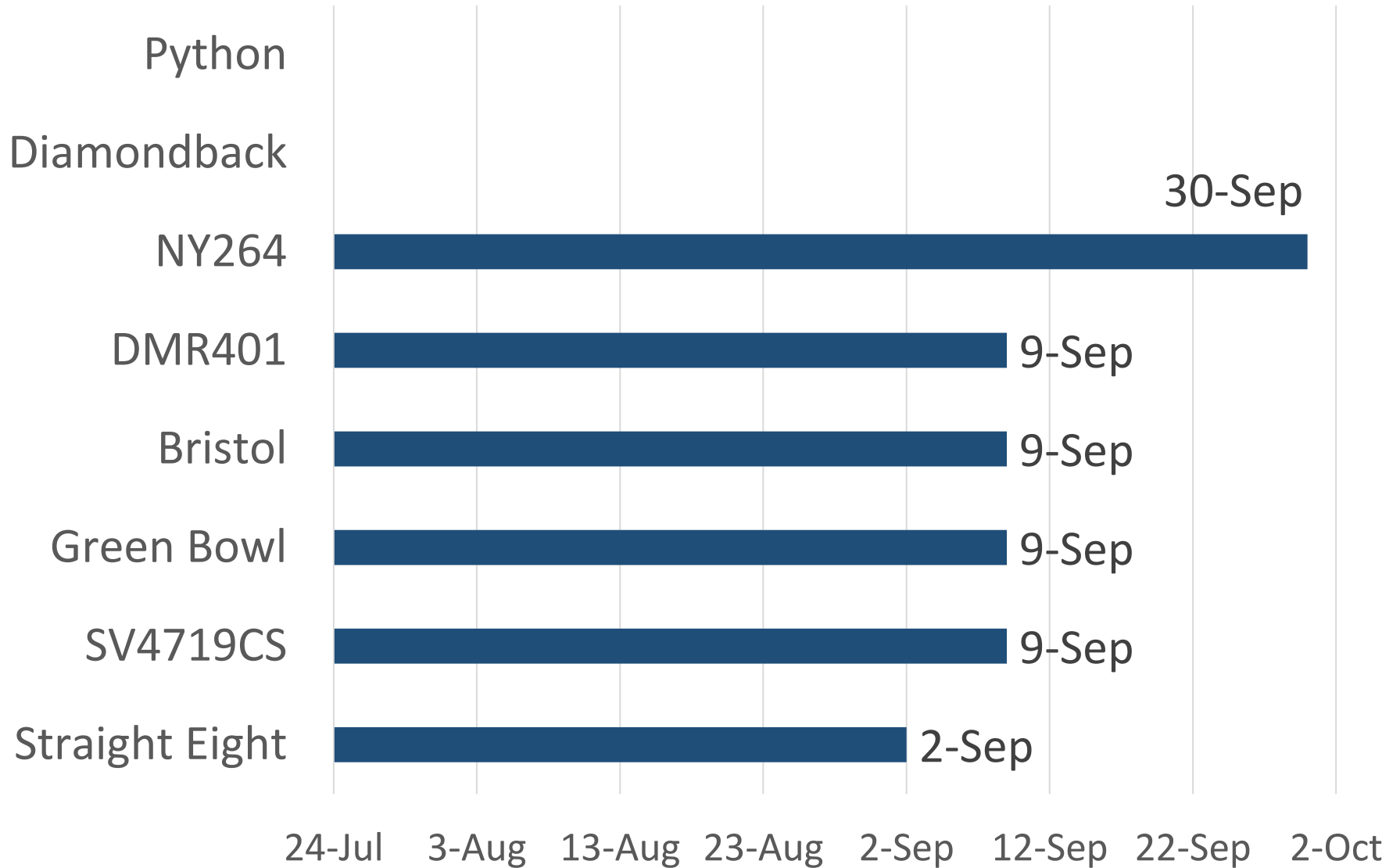
2016 Marketable Yield (lb/A)



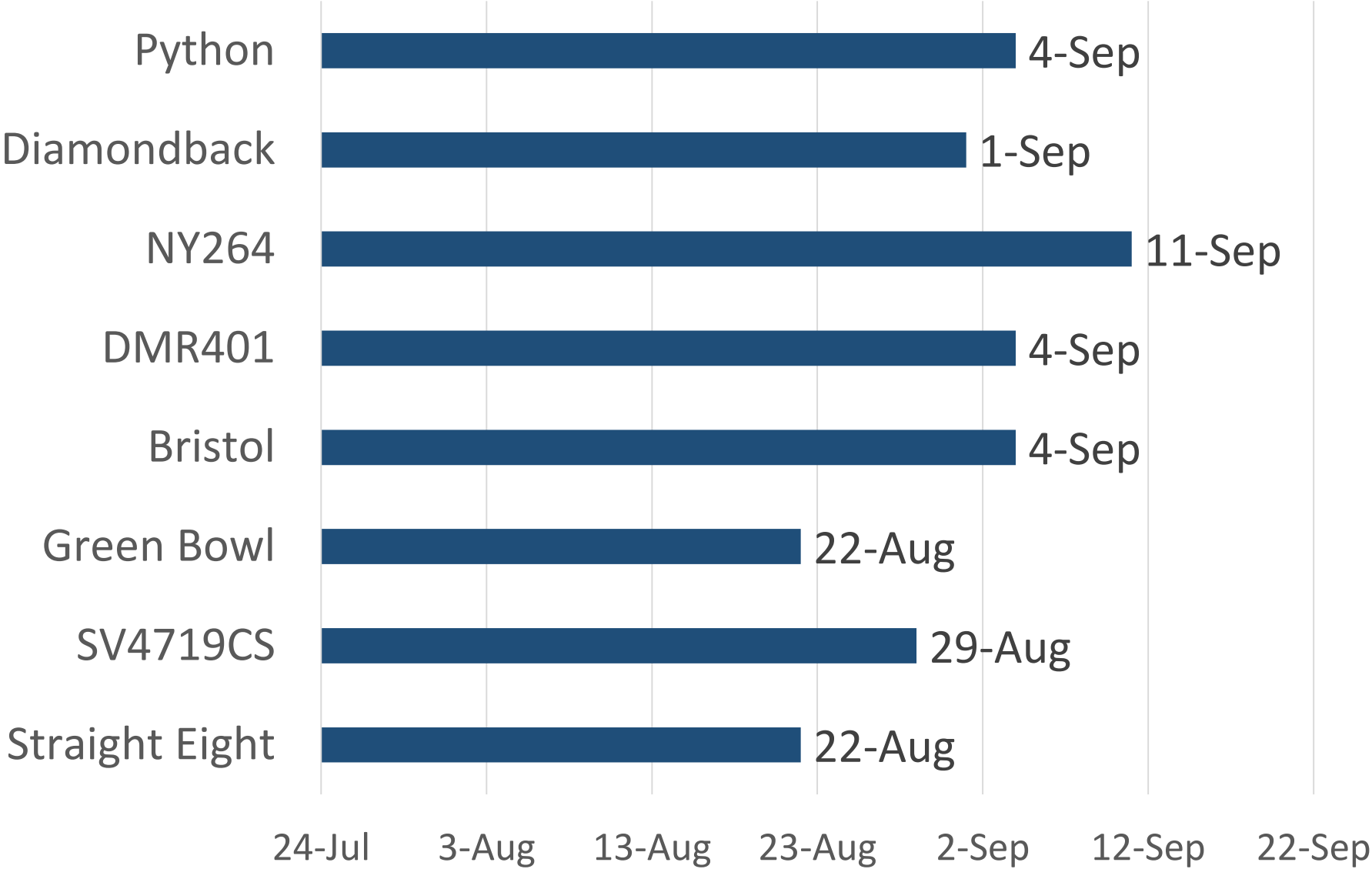
2017 Marketable Yield (lb/A)



Last Harvest Date 2016



Last Harvest Date 2017



Variety Trial Conclusions



NY264

Susceptible

NY264 (Commonwealth Seeds)

Bristol (Seminis)

DMR401 (Commonwealth Seeds)

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 — — — — —

Fungicide Efficacy and Economics Study

2016 Season

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

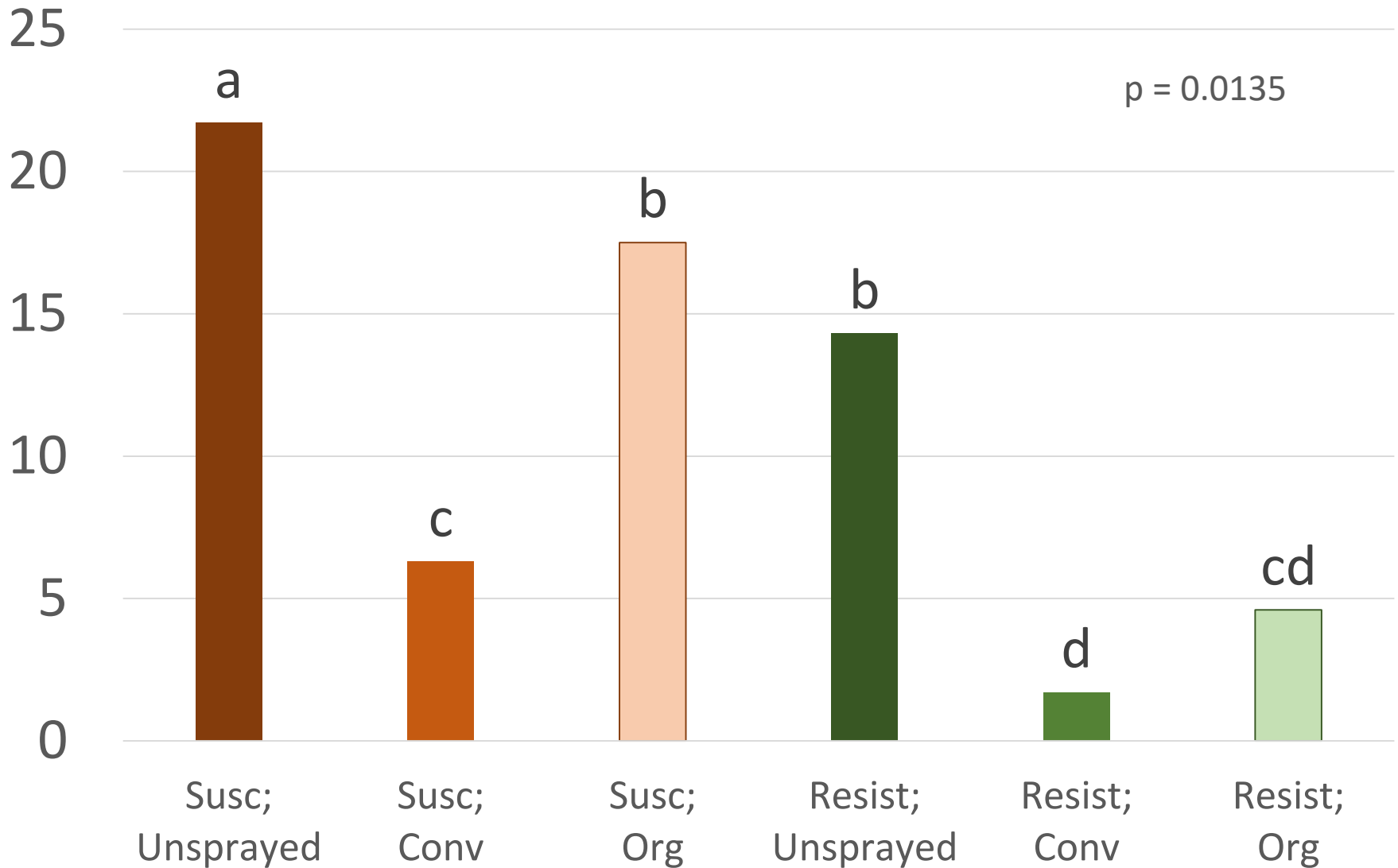
6 sprays from Aug-Oct

2017 Season

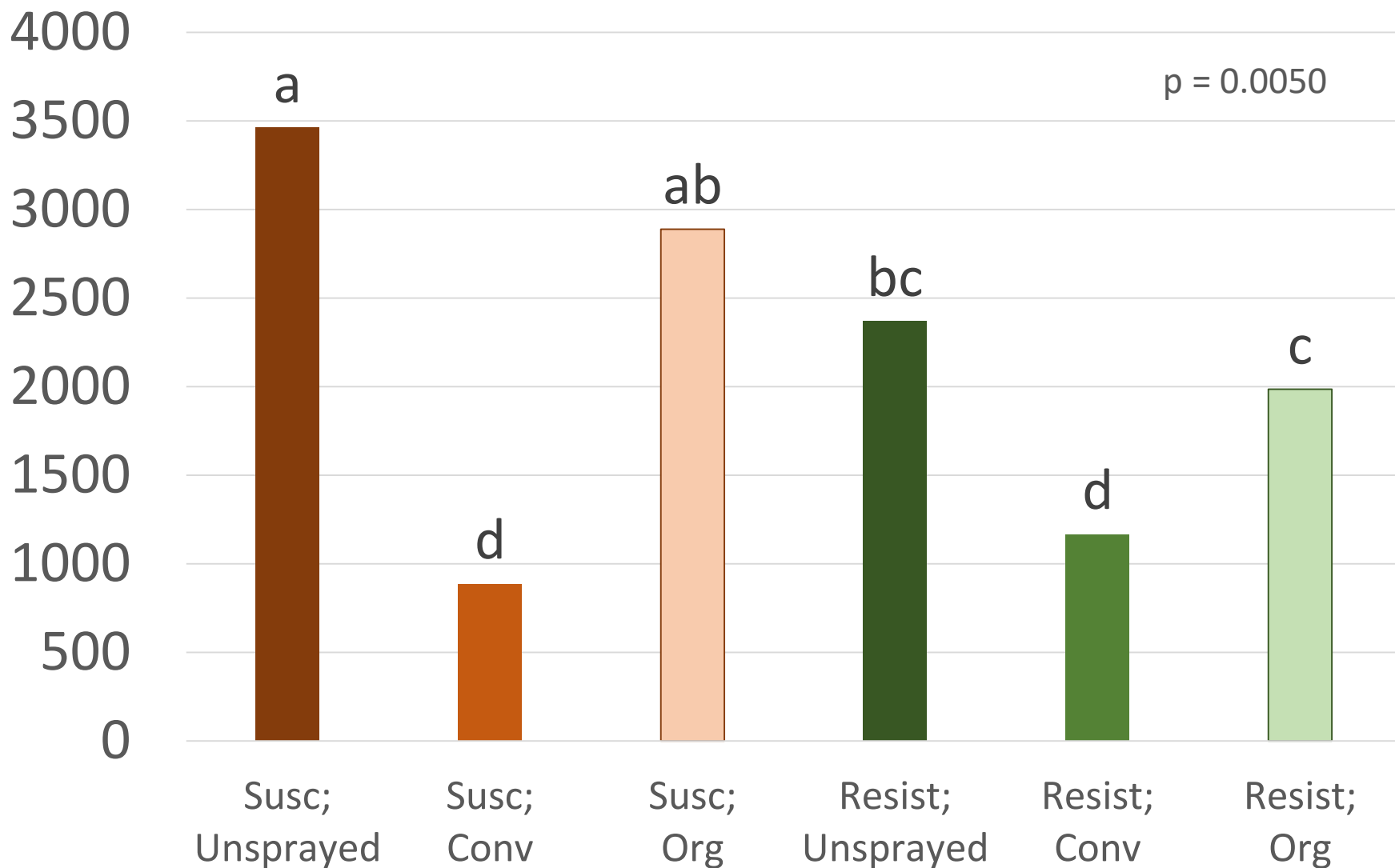
- Cool
- Wet
- Favorable conditions
- Disease came early (Aug 2)
- Very high DM pressure

9 sprays from Aug-Oct

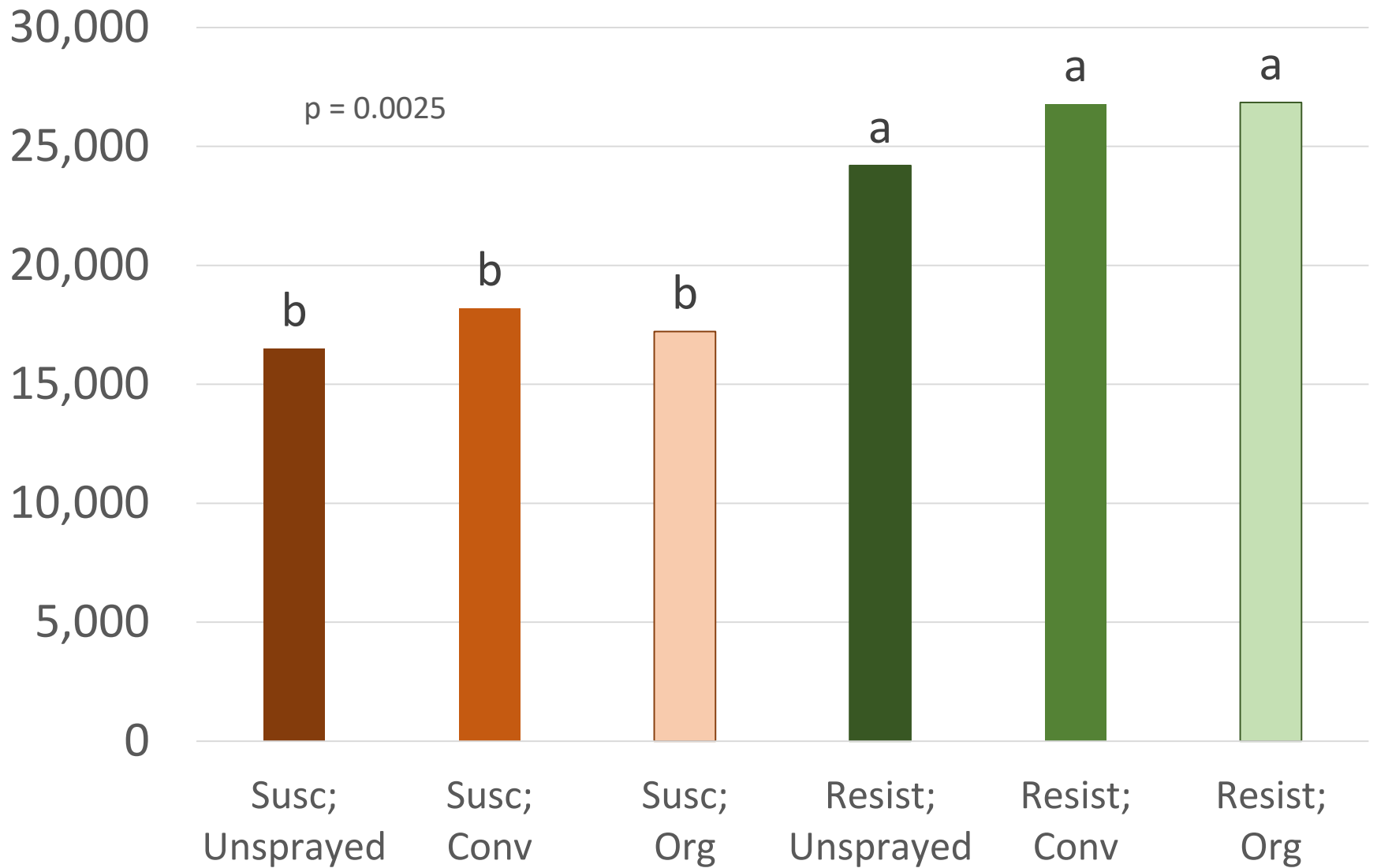
2016 DM over Time (AUDPC)



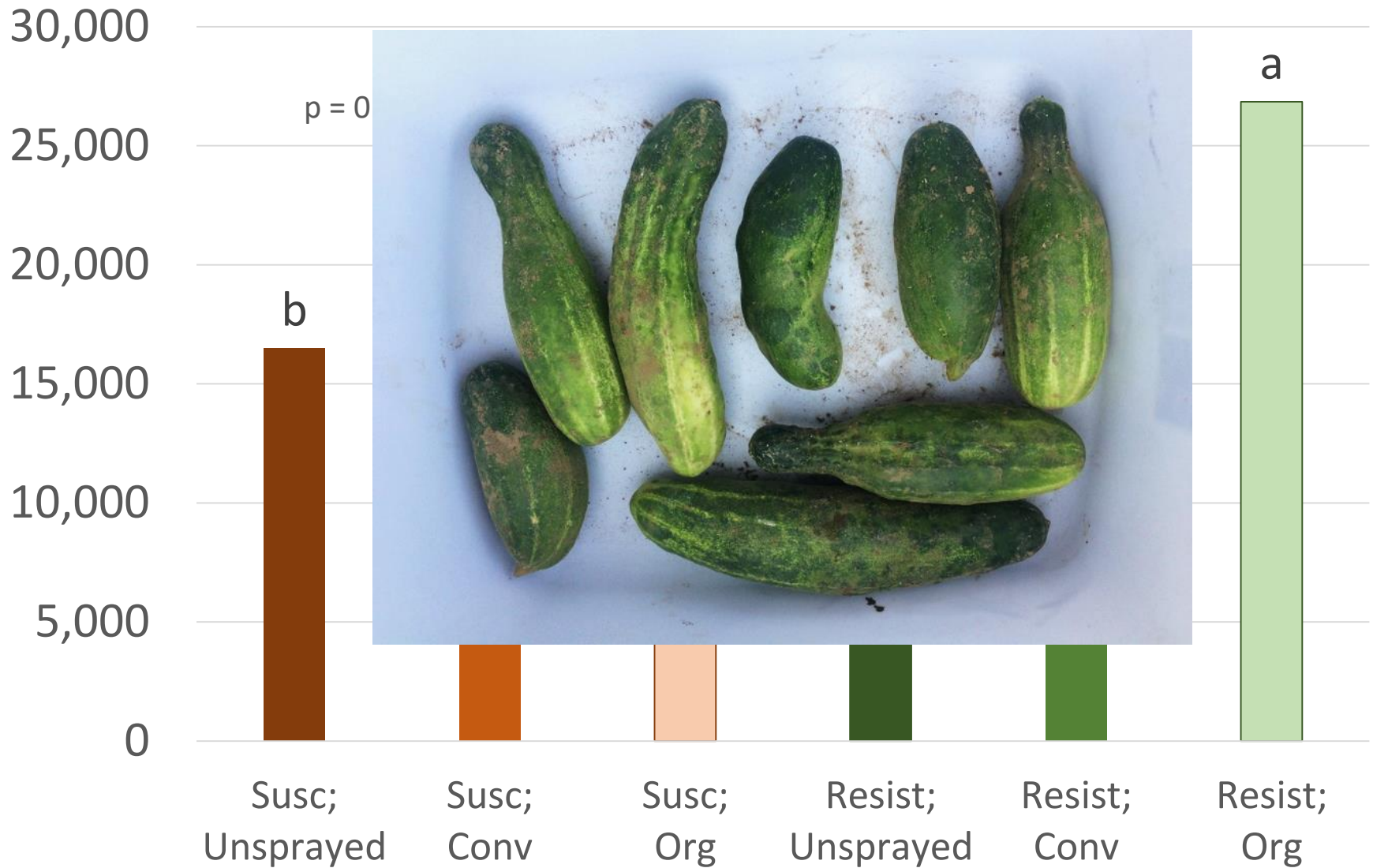
2017 DM over Time (AUDPC)



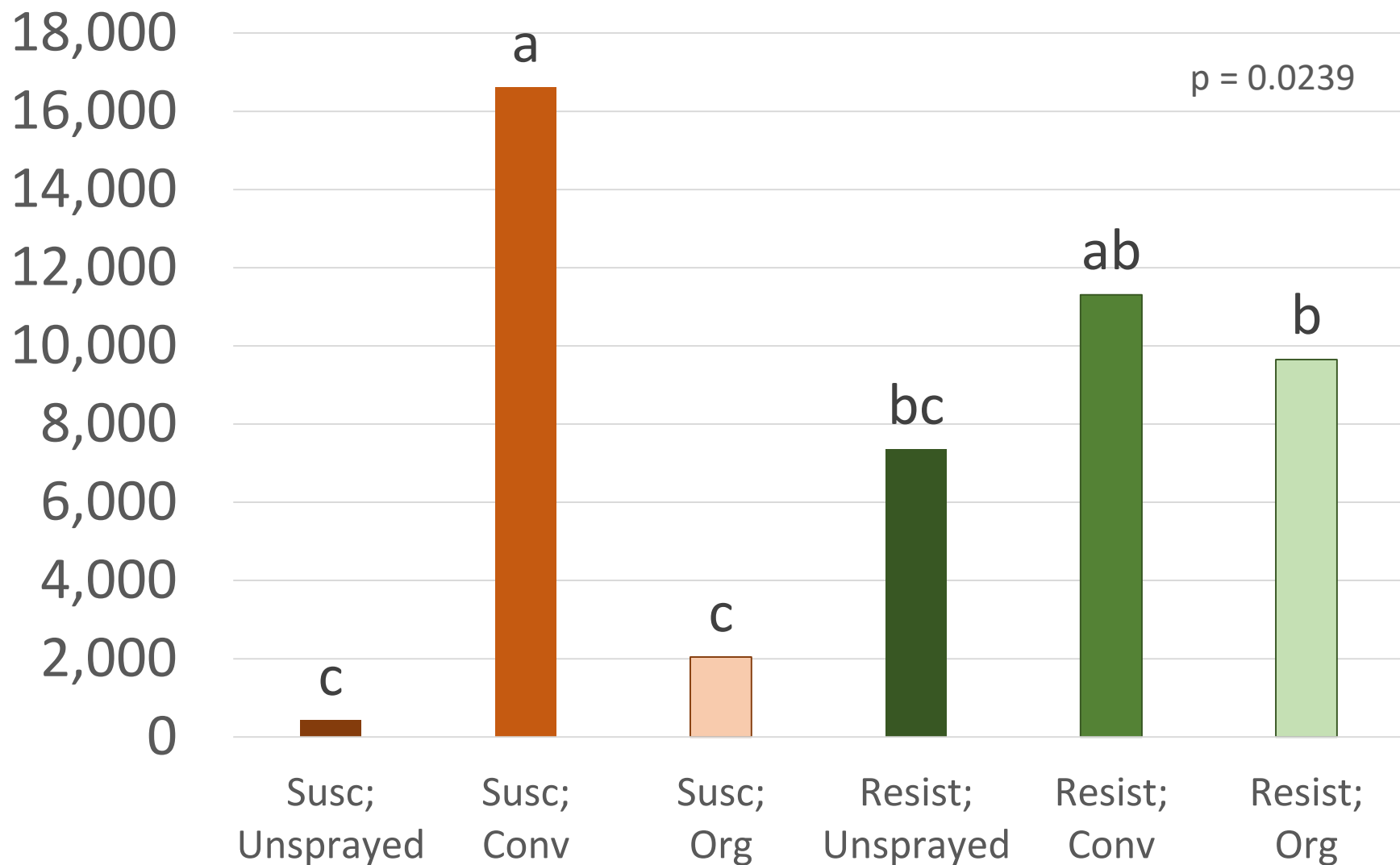
2016 Marketable Yield/A



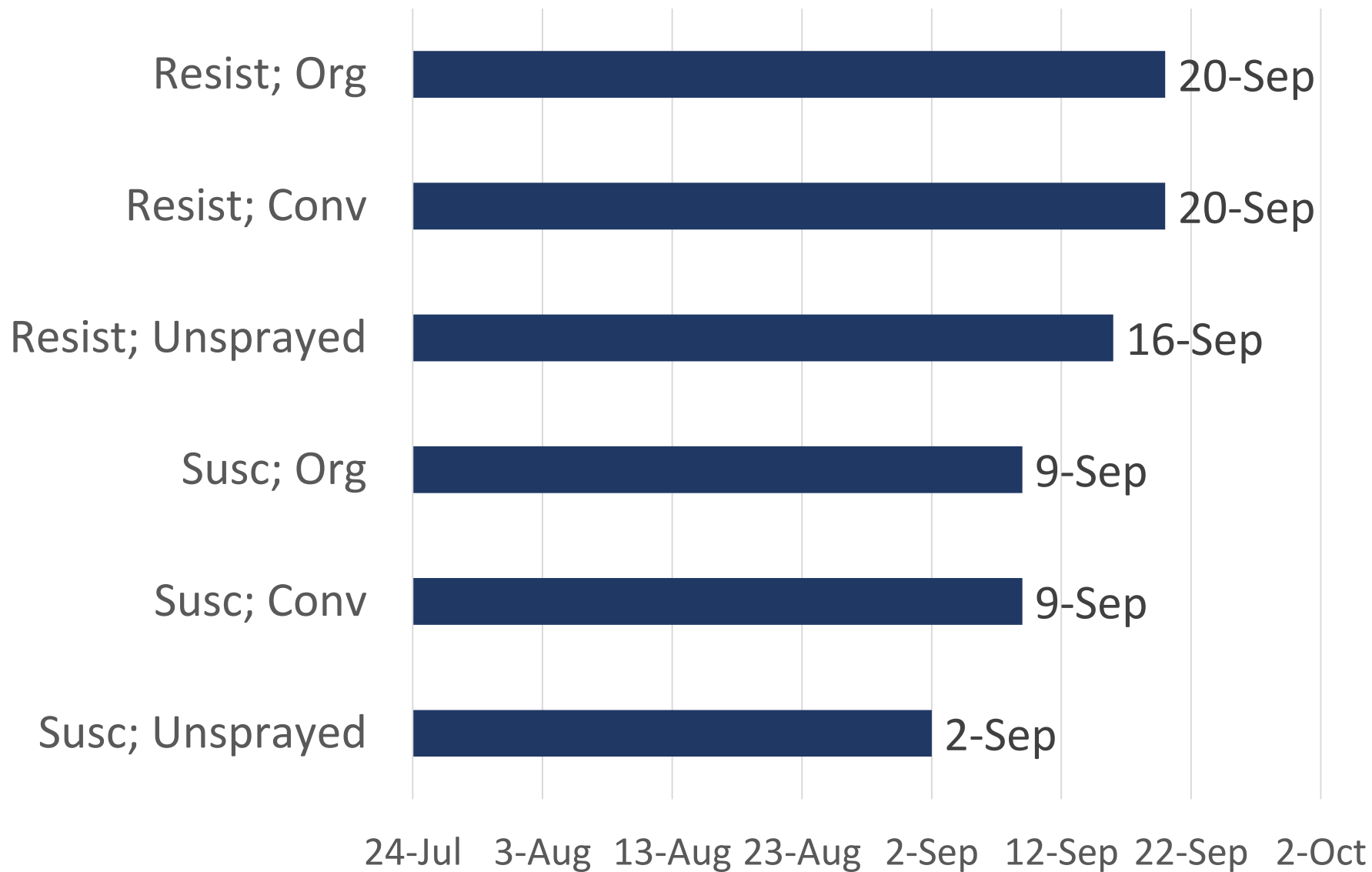
2016 Marketable Yield/A



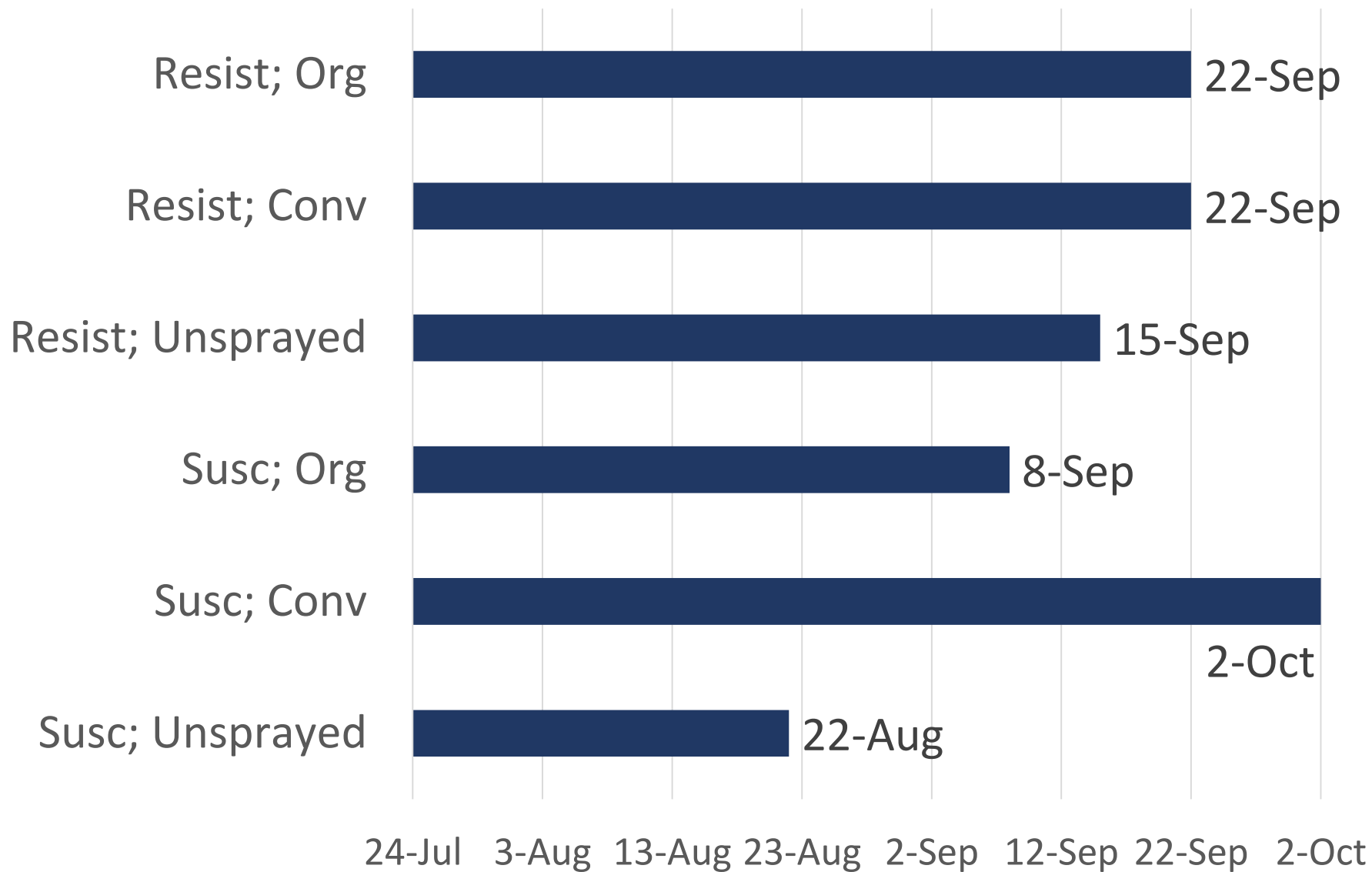
2017 Marketable Yield/A



Last Harvest Date 2016



Last Harvest Date 2017



Calculating Sales & Profits

Cost of Materials

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

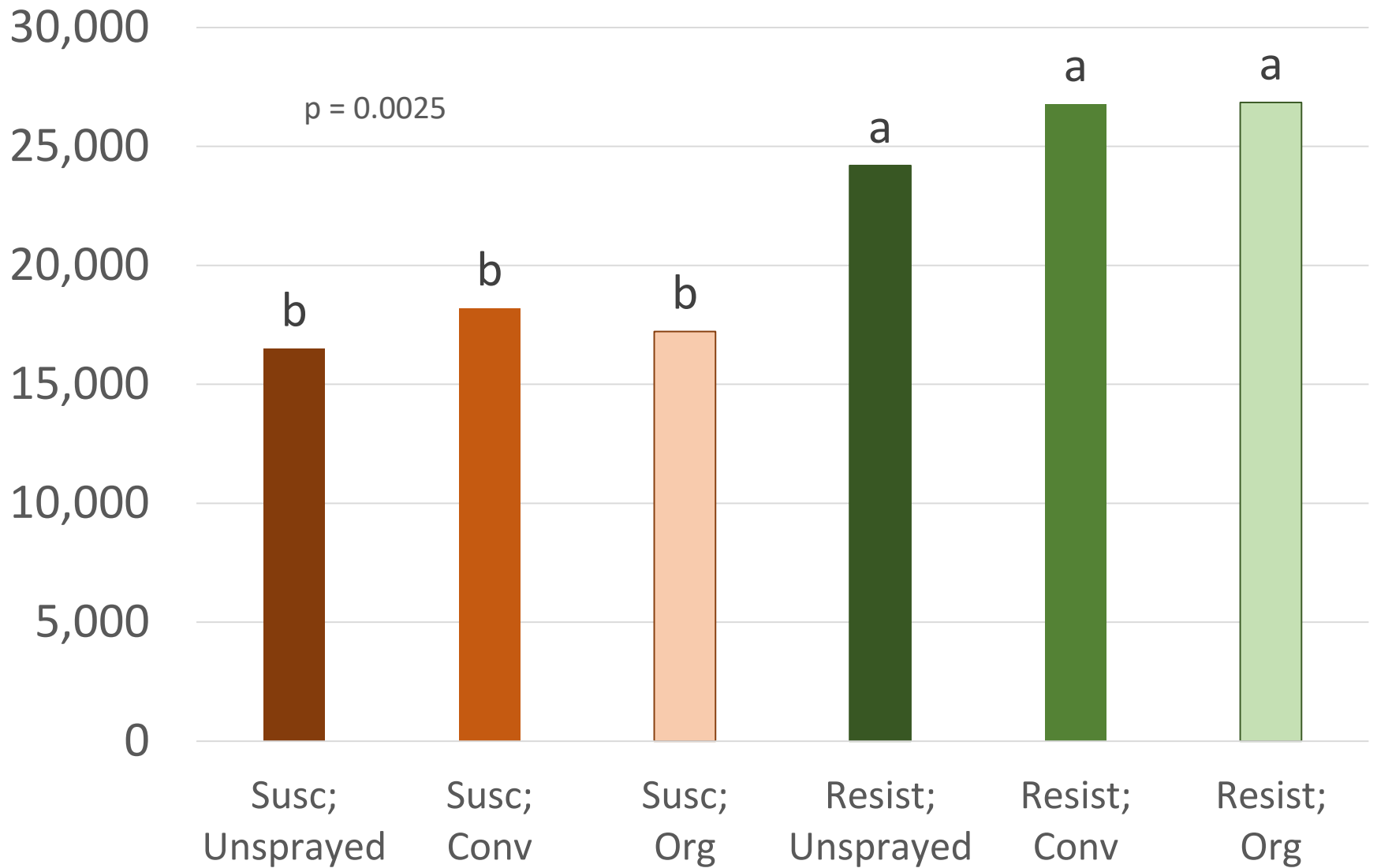
Price/lb

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

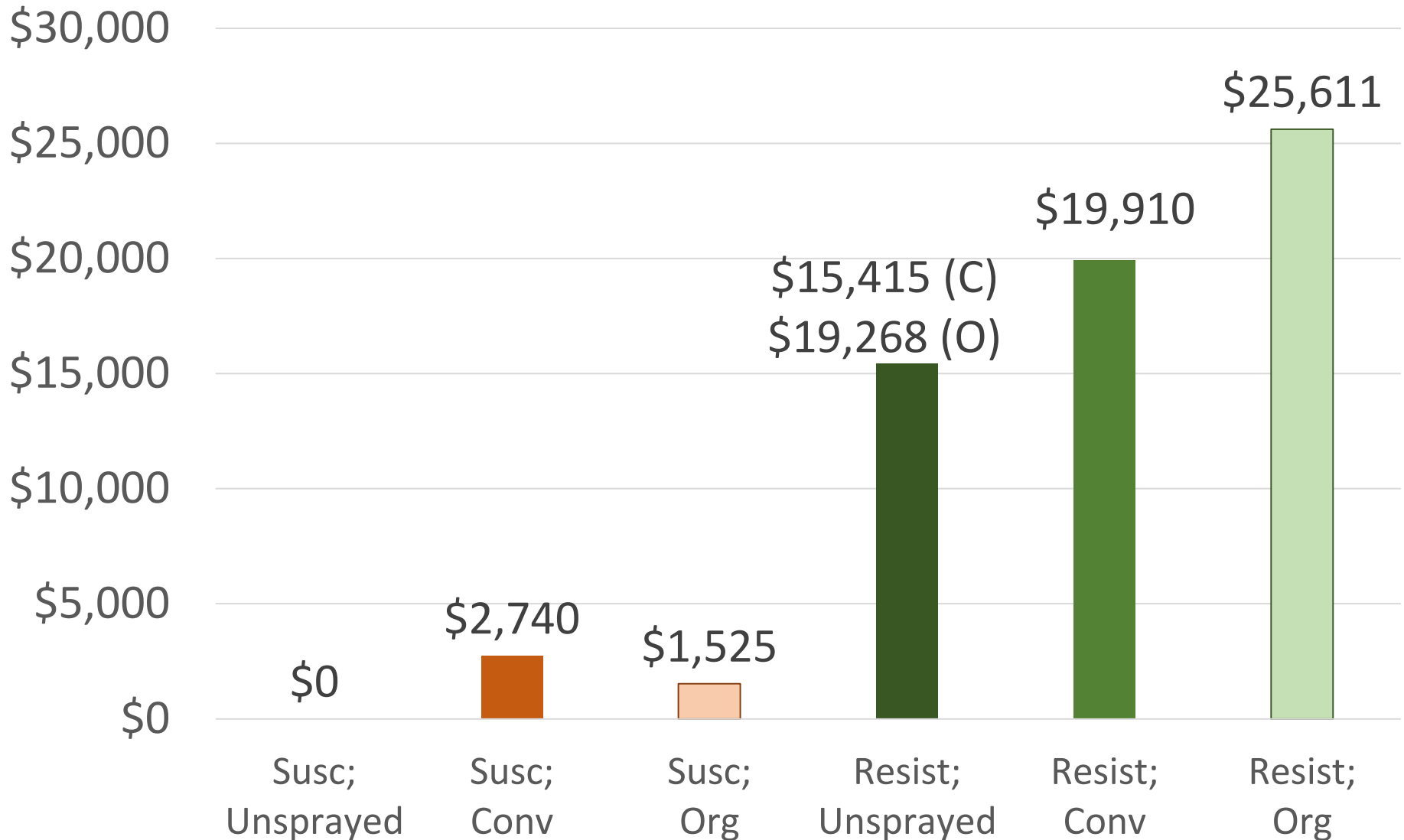
Cost of Spraying...

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

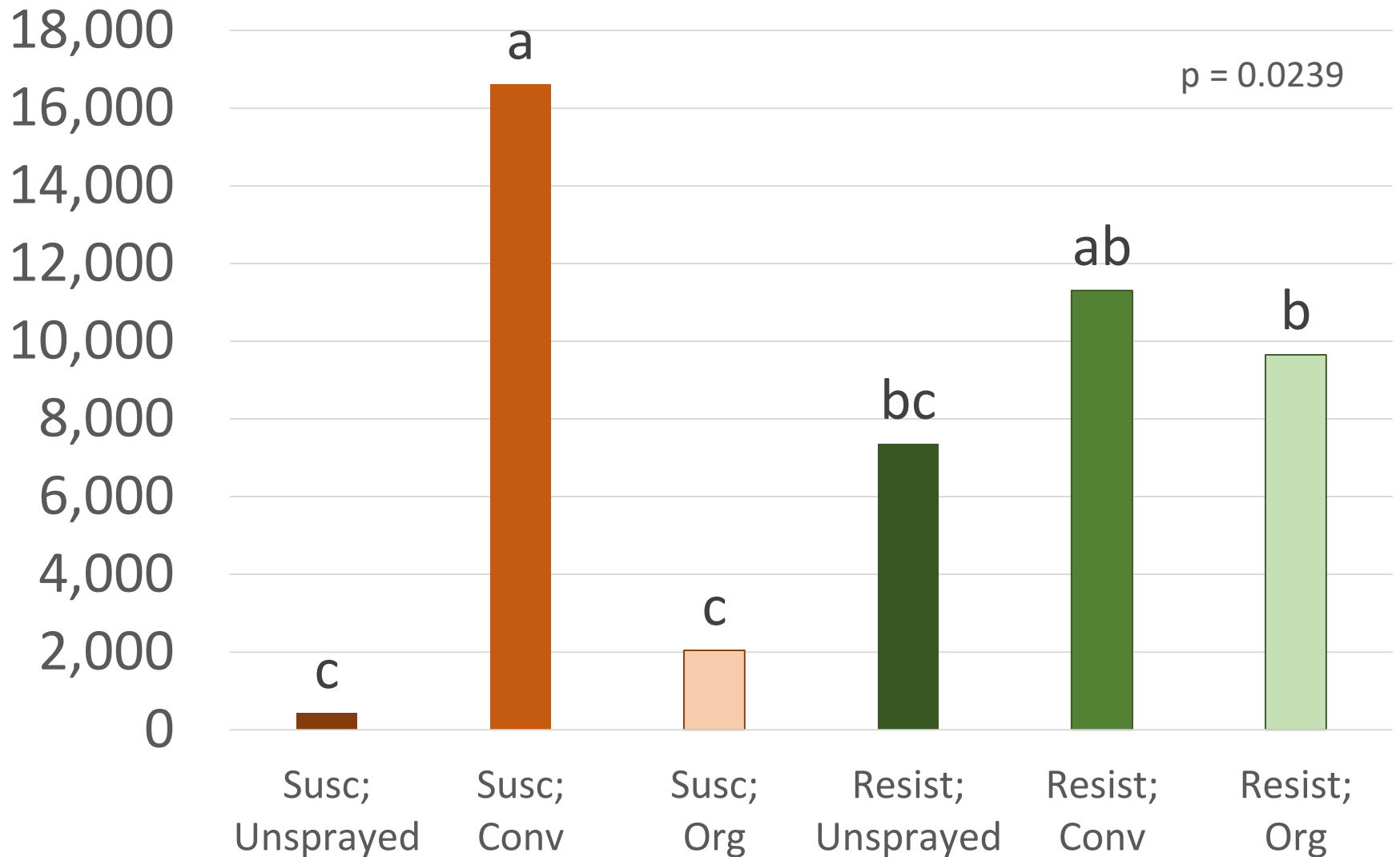
2016 Marketable Yield/A



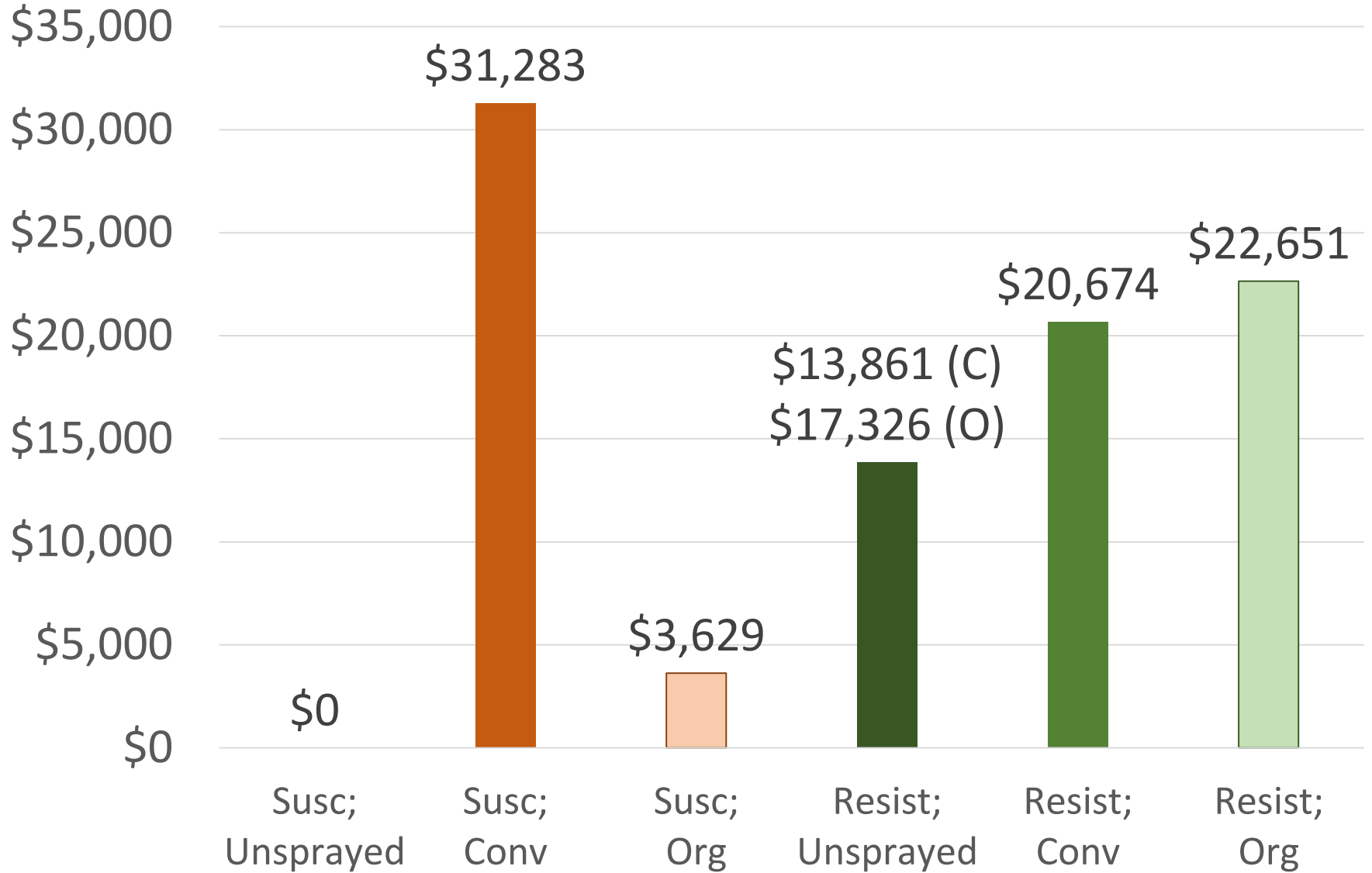
2016 Profit/A



2017 Marketable Yield/A



2017 Profit/A



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**



Other Issues when Growing Fall Cukes

Anthracnose



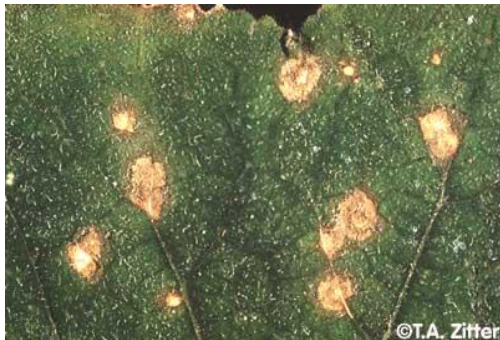
Alternaria



Angular leaf spot



Ulocladium



Scab



Septoria

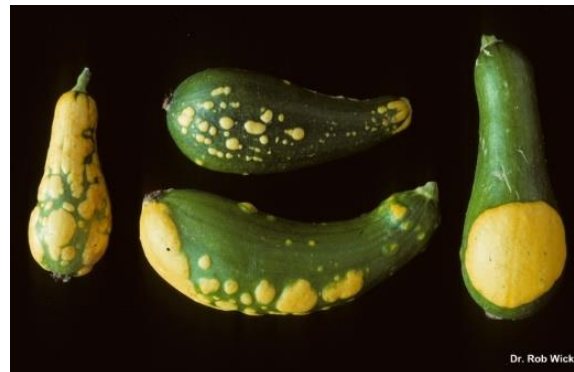


- Overwinter in soil/crop debris or are seed-borne
 - Thrive in moist, humid conditions
 - Spread by wind, rain splash

Other Issues when Growing Fall Cukes

Viruses

- Use disease free seed
- Monitor plants for symptoms
- Rogue out affected plants
- Control aphids
- Use reflective mulch



Other Issues when Growing Fall Cukes

Cuke Beetles

- Present all summer and fall
- Bacterial wilt kept spreading
- Tricky to control when crop is flowering
- Organic control???



Other Issues when Growing Fall Cukes

White Mulch??

- Planting in July
- Reduce transplant stress
- Reduce stem burn
- Plants grow more quickly



Photo by H.Y. Hanna, LSU Ag Center

Thanks!!!

Thanks to my colleagues in the UMass Extension Vegetable Program:

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- Michele Meder
- Ben Jankowski
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