



# Fresh Fruit and Fungicide Use

**Problem:** What's the best way to control rot in cranberries grown on the West Coast?

- In WA and OR, several common fungicides are available for use, while in BC, three fungicides are routinely used.
- Which fungicide or combination of fungicides produce the best rot control?
- What is the optimal timing for application to control field rot?

# Statistical Analysis

- Determine if differences exist between research results and real life usage
  - Most fungicide research done on small scale plots under controlled conditions
  - Much of the research is done in NJ, MA, and WI
  - Still exists a need to do large scale fungicide research in WA, OR, and BC
- Hasn't been done before because it is complicated (yields, grower practices, etc.)
- **DISCLAIMER: We are looking at 2 yr span from WA...** it will become more robust as we add years and locations to the data set

# Outline

1. WA fresh fruit history for 2015-16
2. What research told us to do (2015)...
3. WA fungicide programs – what looks to work and what doesn't
4. Why do fungicide uses differ so much in practice?
5. Summary/Review



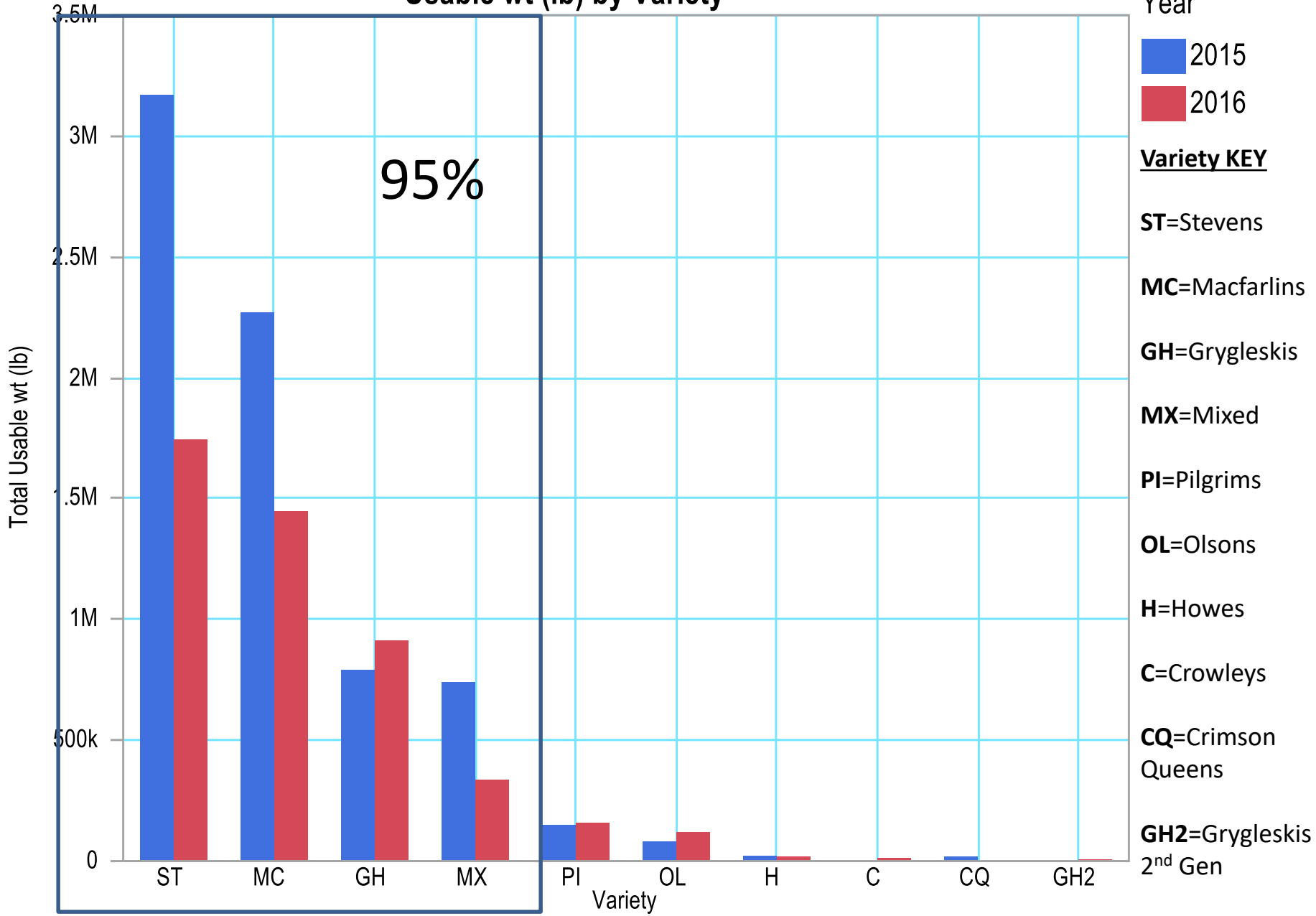
Section 1

# WA FRESH FRUIT HISTORY FOR 2015-2016

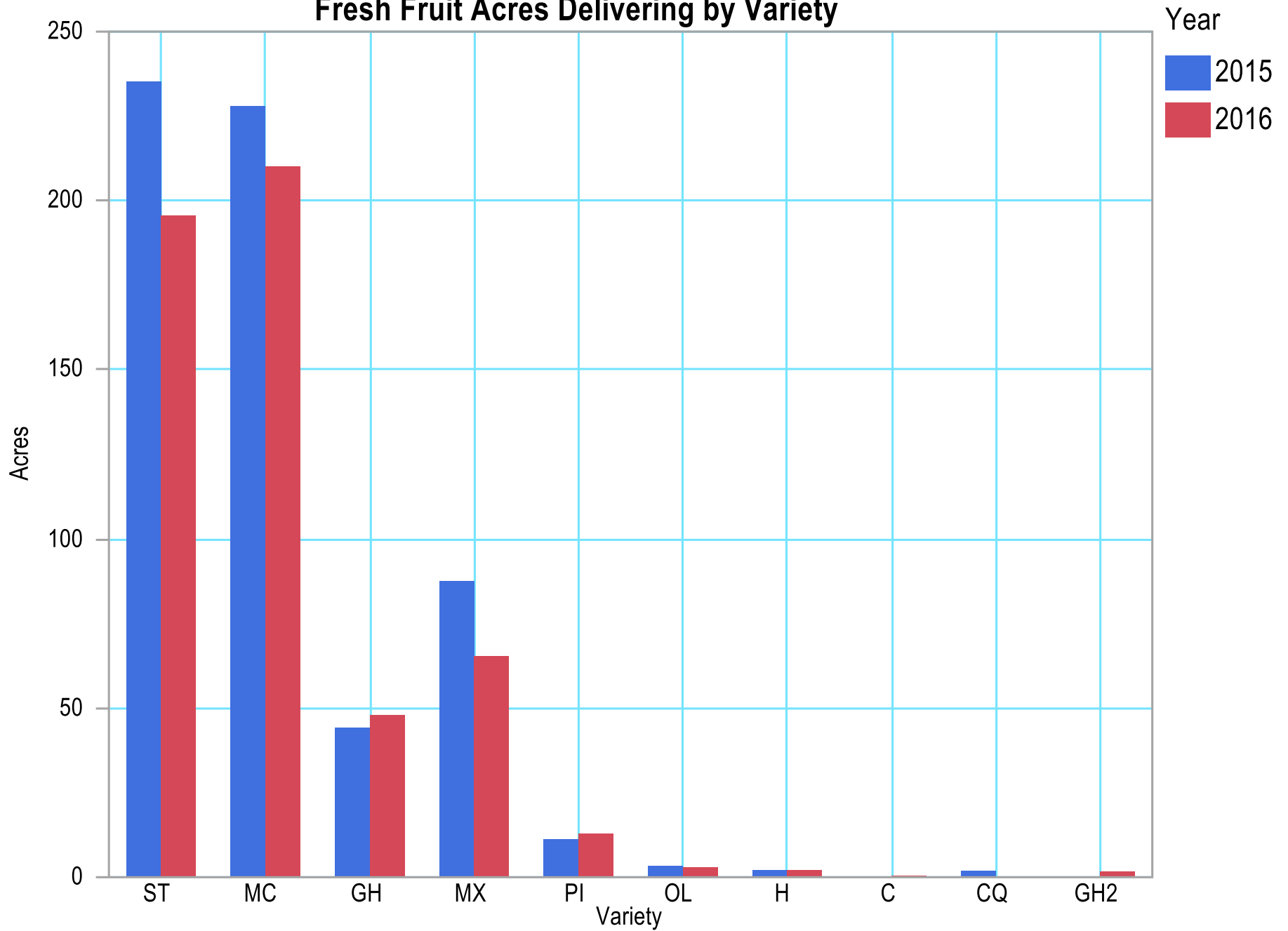
# 2015-2016 WA Fresh Fruit

	2015	2016
# of beds delivered	249	213 ↓
Usable Wt (lbs)	6,391,301	4,762,724 ↓
% Usable (Total delivered minus % moist, % trash, % poor)	96.81%	95.48% ↓
% Poor (smalls, rot, damaged)	0.95%	1.12% ↑
Mean number of fungicides applied	4.7	4.9 ↑
Mean KQ at delivery	0.95%	1.12%
Mean KQ at 3 weeks	5.33%	4.17%
Mean KQ at 6 weeks	8.32%	6.97%

# Usable wt (lb) by Variety

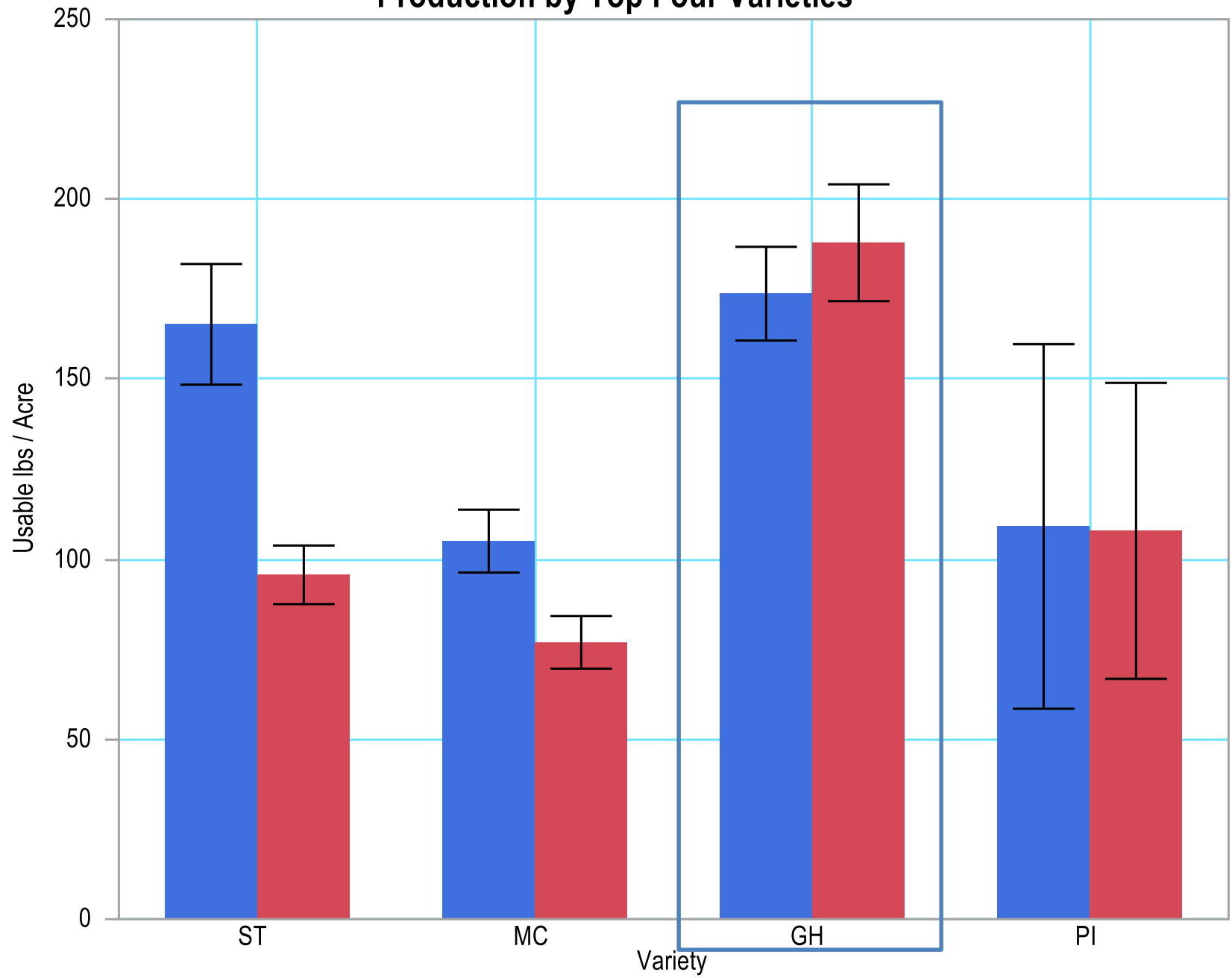


# Fresh Fruit Acres Delivering by Variety

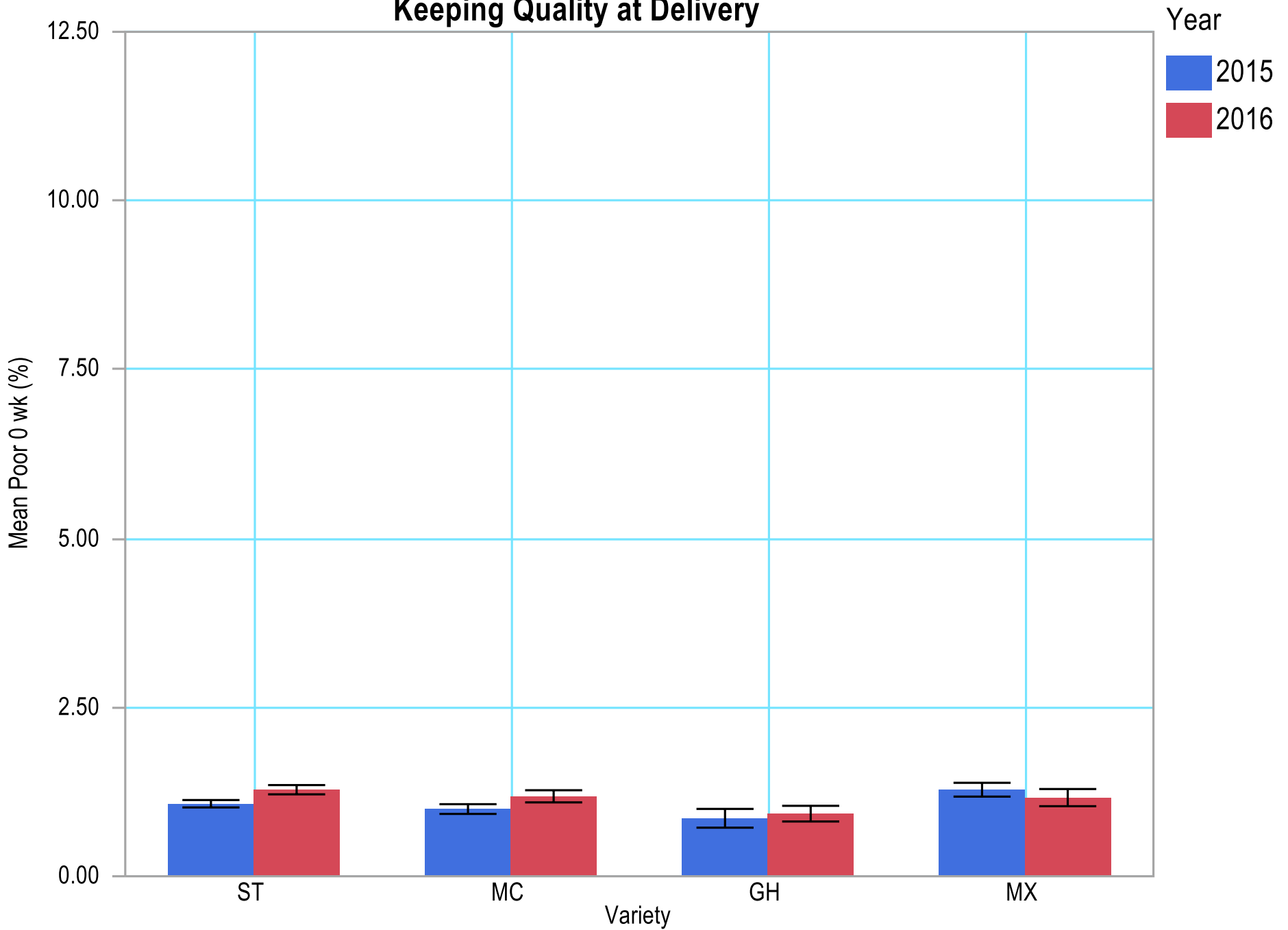


# Production by Top Four Varieties

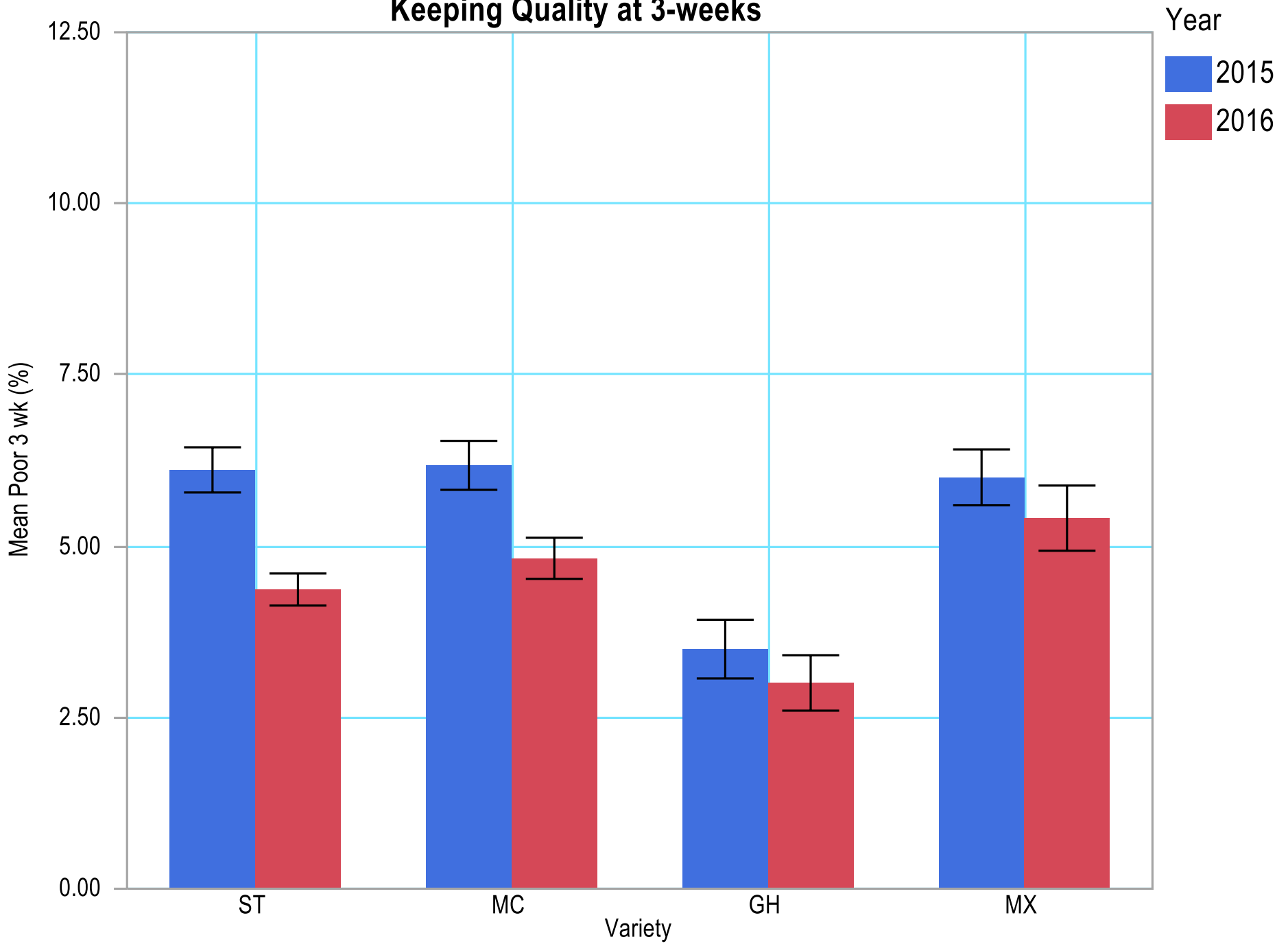
Year  
2015  
2016



# Keeping Quality at Delivery

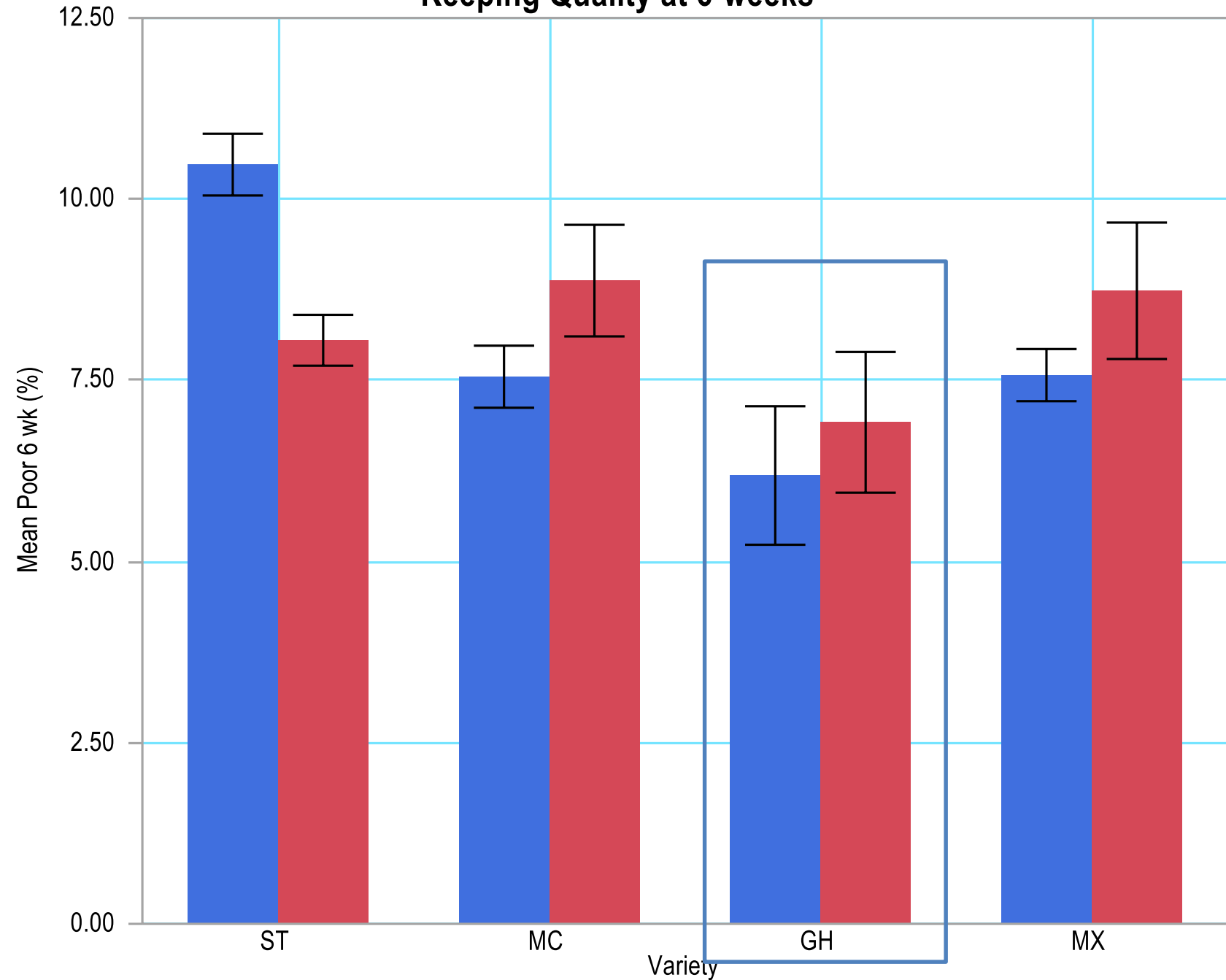


# Keeping Quality at 3-weeks



# Keeping Quality at 6-weeks

Year  
2015  
2016





Section 2: Slides from North America Fruit Rot Working Group

Peter V. Oudemans (Rutgers University) and Erika S. Rojas (University of Massachusetts)

# WHAT RESEARCH TOLD US TO DO (2014-5)

## For areas with **moderate** to **high** fruit rot pressure Standard Approach

- Indar/Abound combination – make two applications at 7-10 day intervals ending before termination of bloom
- May substitute Indar with Proline
- Apply 1-3 applications of Bravo (**non-export qualified at that time**) or Mancozeb at 10 -14 day intervals (start counting after the final Indar/Abound treatment)

# Fungicide scenarios for 2015

In bloom 1	In bloom 2	Out of bloom 1	Out of bloom 2	Out of bloom 3	Scenario
Indar/Abound or Proline/Abound	Indar/Abound or Proline/Abound	Dithane	Dithane	Dithane	Fruit rot plus <b>severe</b> twig blight
Indar/Abound or Proline/Abound	Indar/Abound or Proline/Abound	Dithane	Dithane		Fruit rot plus <b>mild-moderate</b> twig blight
Indar/Abound or Proline/Abound	Indar/Abound or Proline/Abound	Dithane			Fruit rot plus <b>resistance</b> <b>management</b>

# Fungicide Resistance Risk

DMI FRAC Code 3
Indar <b>Proline</b> <b>Quadris Top</b> Orbit

QoI FRAC Code 11
<b>Abound</b> Evito

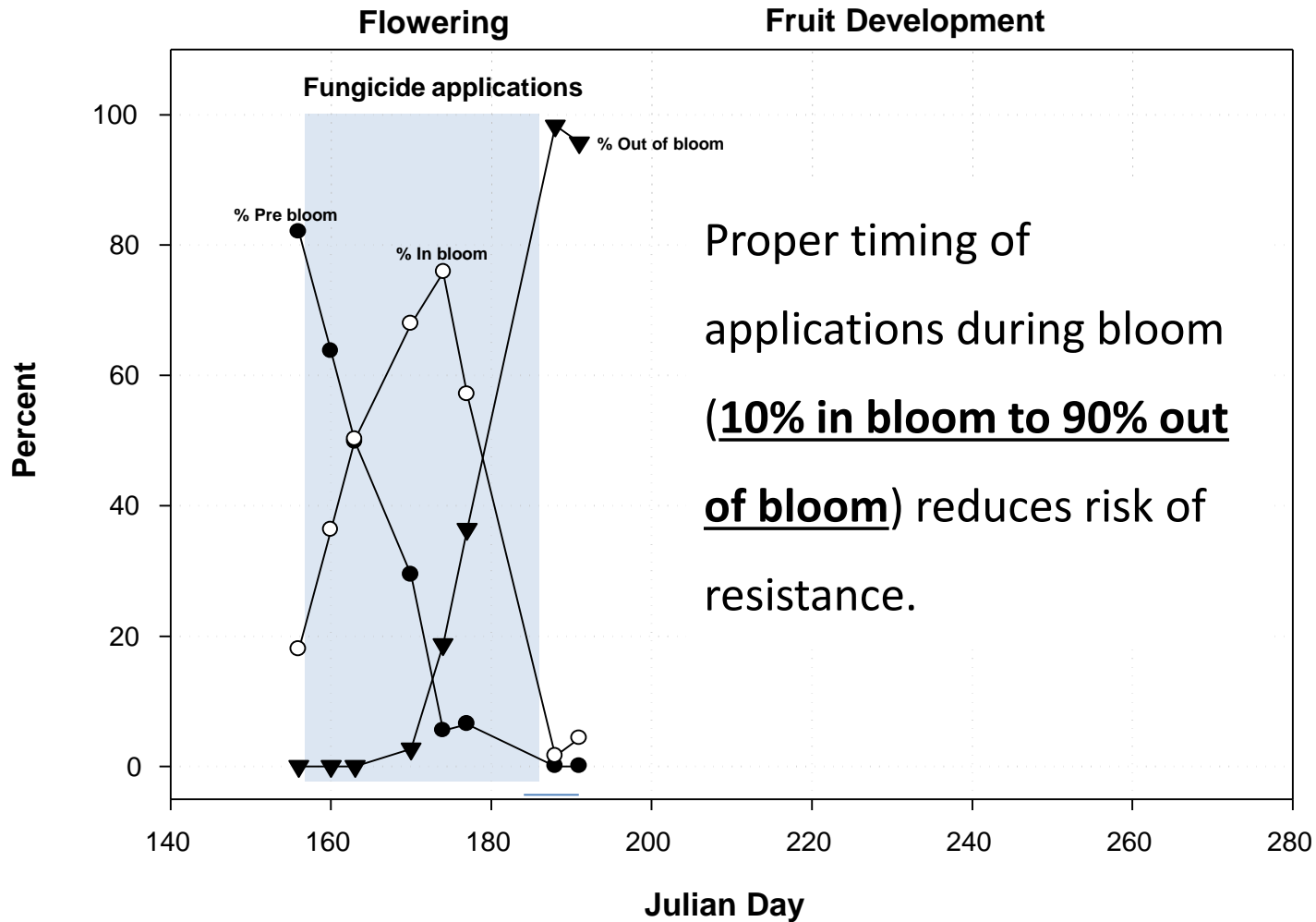
polyoxins FRAC Code 19
Tavano

chloronitriles FRAC Code M5
<b>Bravo</b> (and many others)

dithiocarbamates FRAC Code M3
Mancozeb Ferbam

High risk
Medium risk
Low risk

# Impact of timing fungicide applications

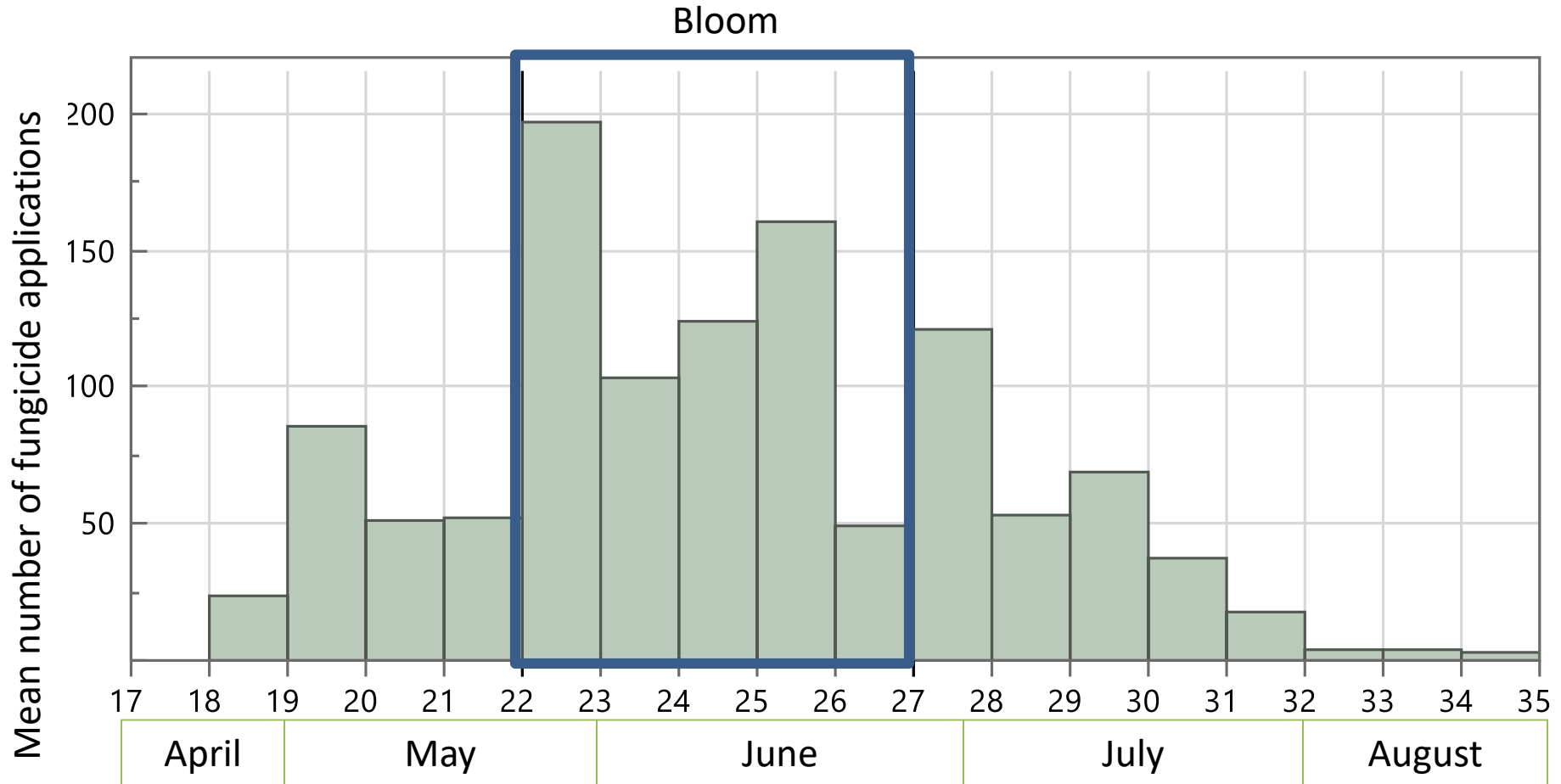




Section 3

# **WA FUNGICIDE PROGRAMS – WHAT LOOKS TO WORK AND WHAT DOESN'T**

# WHEN: *When are fungicides being applied?*



71 different fungicide application rotations  
using 9 fungicides

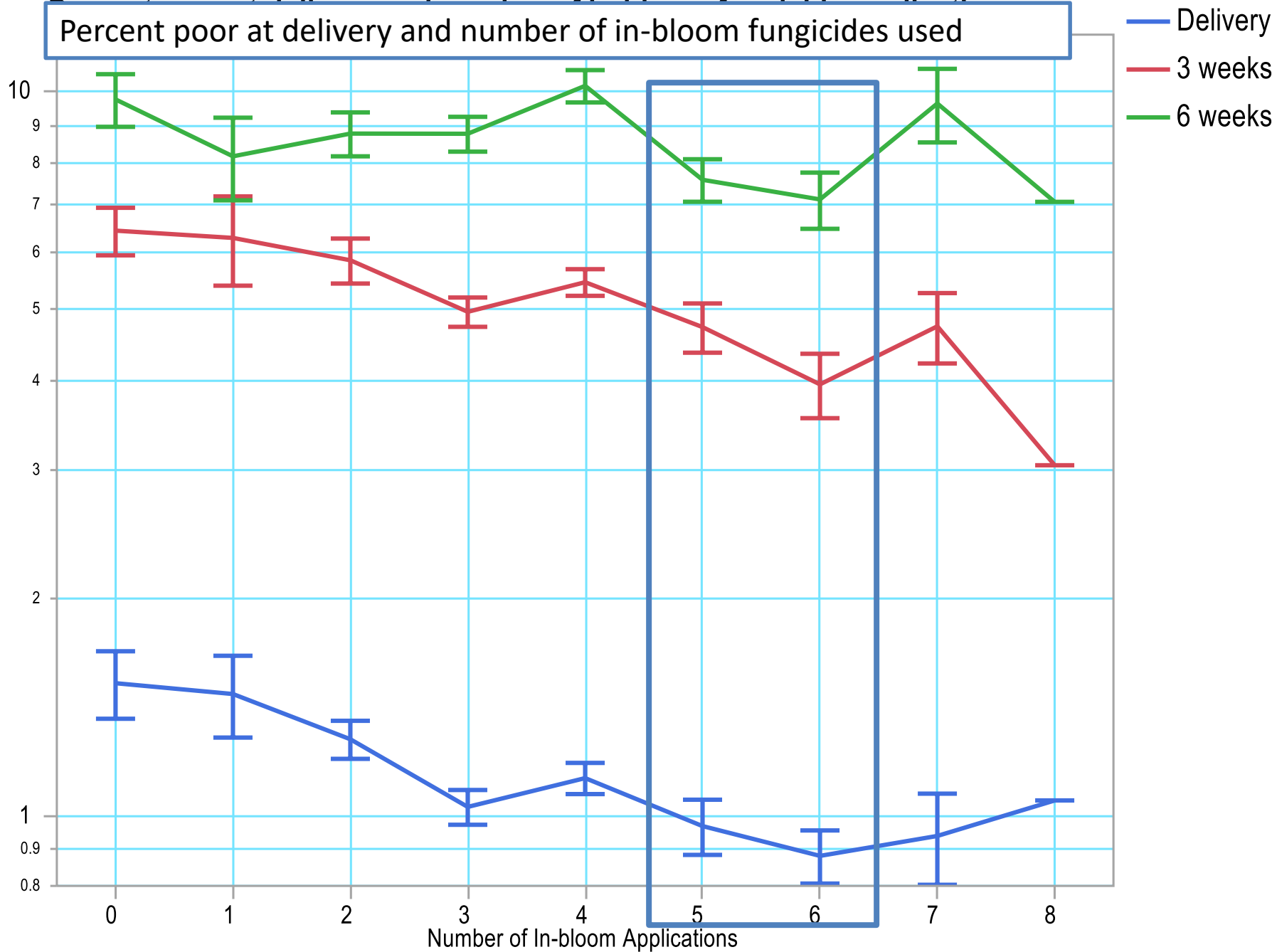
# WHAT: *What is being applied?*

IN BLOOM Fungicide use for Top Four Varieties

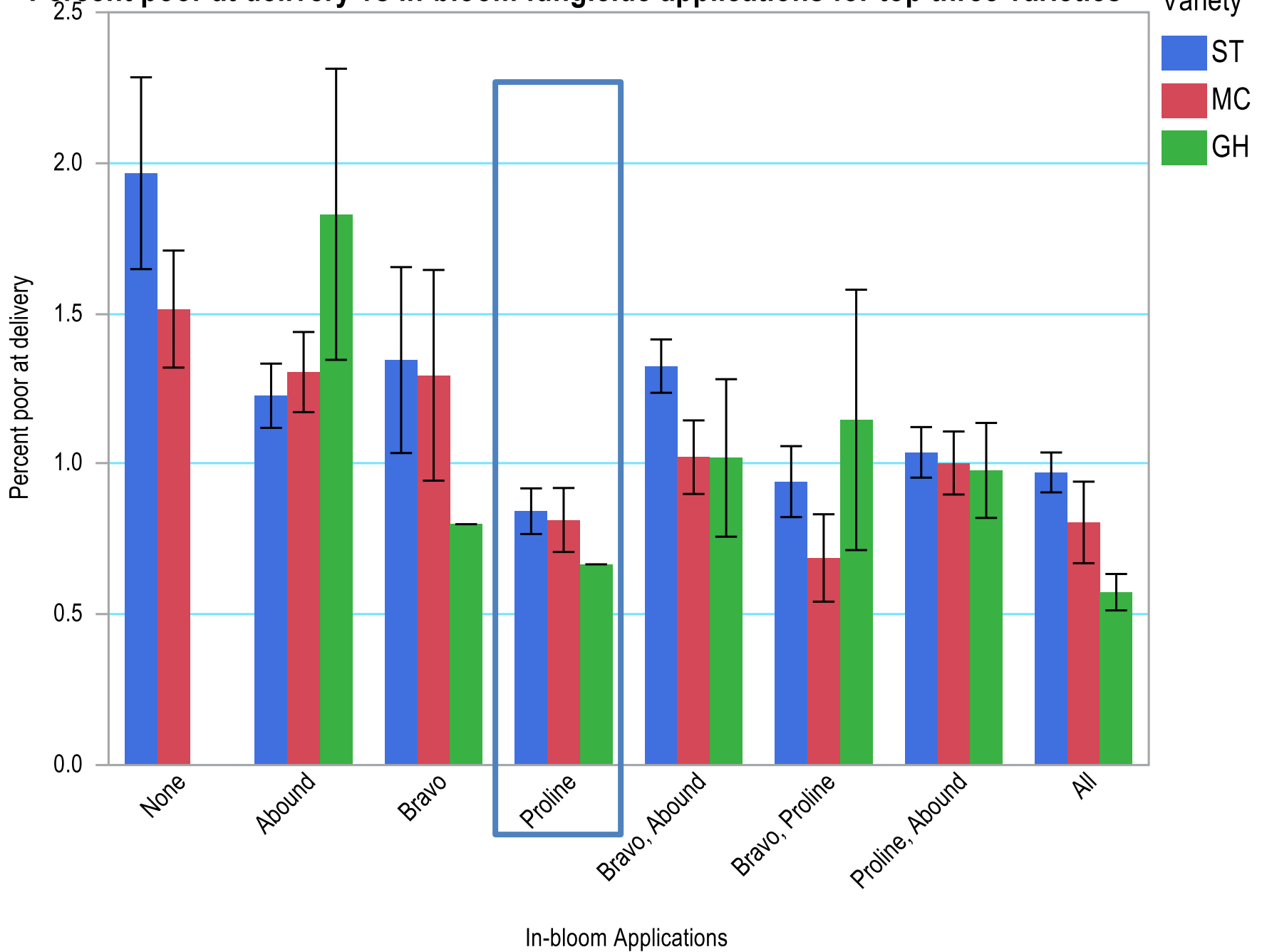
FRAC Code	Stevens		Macfarlins		Grygleskis		Mixed		Total all varieties	
	2015	2016	2015	2016	2015	2016	2015	2016	2015	2016
11 (Abound)	103	87	56	61	22	50	26	16	214	226
3 (Indar, Proline)	120	127	81	79	45	57	21	23	279	301
M1 (Nucop, Kocide)	19	5	12	4	2	1	3	0	36	10
M3 (Dithane, Manzate)	75	49	55	39	10	24	24	18	172	133
M5 (Bravo)	60	50	35	33	6	24	13	11	119	125
<b>Totals</b>	<b>377</b>	<b>318</b>	<b>239</b>	<b>216</b>	<b>85</b>	<b>156</b>	<b>87</b>	<b>68</b>	<b>820</b>	<b>795</b>

- 58 Grower contracts
- 249 Fresh Fruit beds delivered in 2015; 213 in 2016 (ST even, MC GH up, MX Down)
- **3.3** in bloom fungicides per bed in 2015; **3.7** in 2015
- 13 Delivery beds had no reported fungicide applications in each year!
- Max of 7 in bloom fungicides on a bed in 2015; 8 in 2016

Percent poor at delivery and number of in-bloom fungicides used

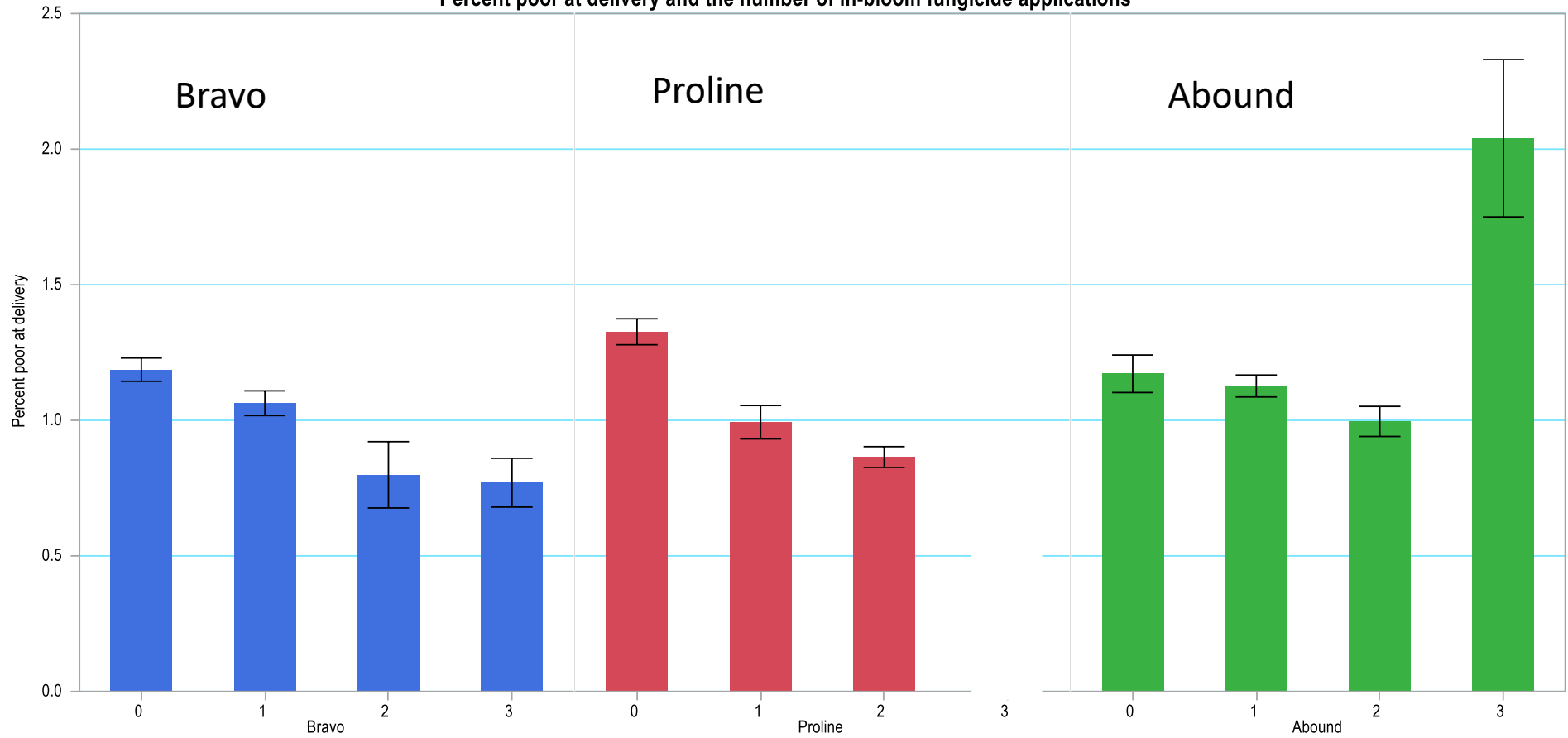


Percent poor at delivery vs in-bloom fungicide applications for top three varieties

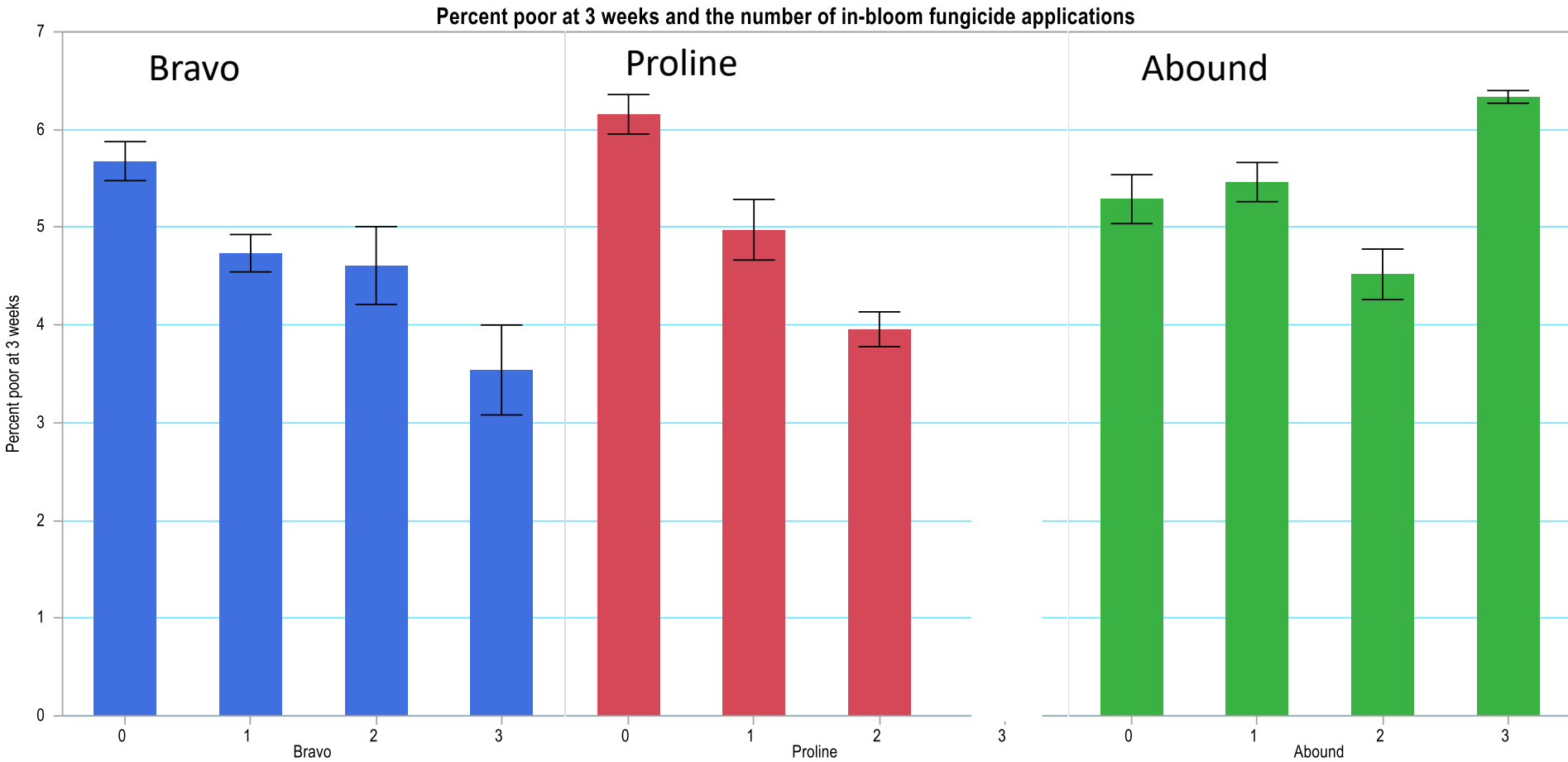


# Percent poor at delivery

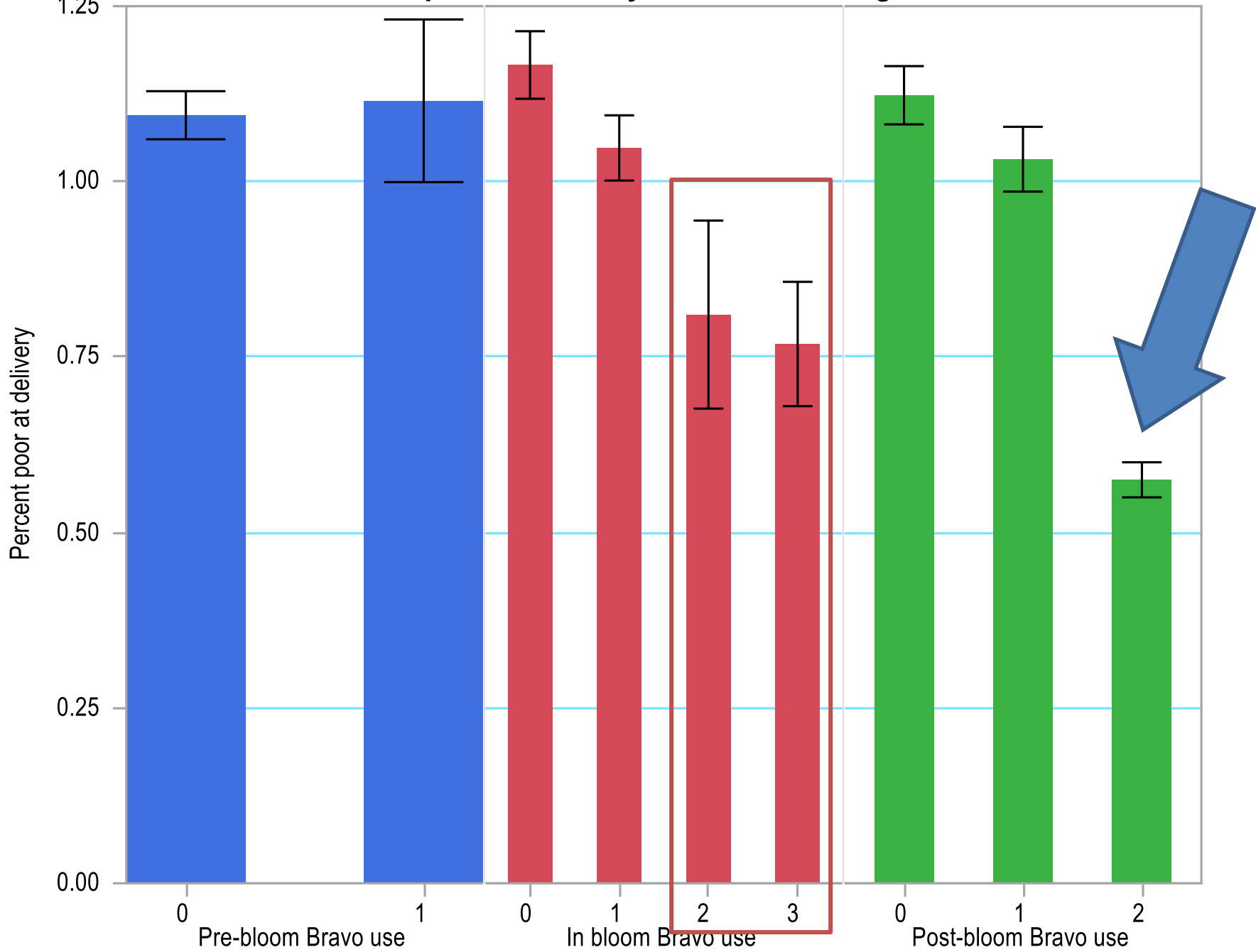
Percent poor at delivery and the number of in-bloom fungicide applications



# Percent poor at 3 weeks



# Percent poor at delivery and Bravo timing



Section 4

# WHY DO FUNGICIDE USES DIFFER SO MUCH IN PRACTICE?



# What's going on?

- 78 different fungicide application patterns used by 58 growers on 213-249 beds...
- If we truly knew what worked, this number would be substantially reduced
- Yes, variation exists between growers, acreage, manner of application (boom vs chemigation), harvesting, fertilizers, etc.
- With all these differences, however, we can still see some useful patterns...



Section 5

# SUMMARY/REVIEW

# What the data tells us for fresh fruit

- Pre-bloom
  - No clear fungicide preferences – in fact, pre-bloom applications appear to have little impact on rot.
- In bloom
  - 5-6 fungicides (likely used in combination) for best delivery, 3-week, and 6-week quality evaluations.
  - Proline appears to be the most effective in-bloom fungicide, **although it must be coupled** with Abound or Indar to minimize rot resistance!
- Post-bloom
  - Bravo >> Manzate > Dithane. One or **two** applications. Watch PHI and potential risk of pesticide residue at time of harvest!

# Questions

