

World Class. Face to Face.

Oregon Winter Workshop 2018 'The Washington Report'

Kim Patten & Chase Metzger

Funding for research provided by :

- BC Cranberry Marketing Commission
- Washington State Cranberry Commission
- Oregon Cranberry Growers Association
- The Cranberry Institute
- Ocean Spray
- PCCRF



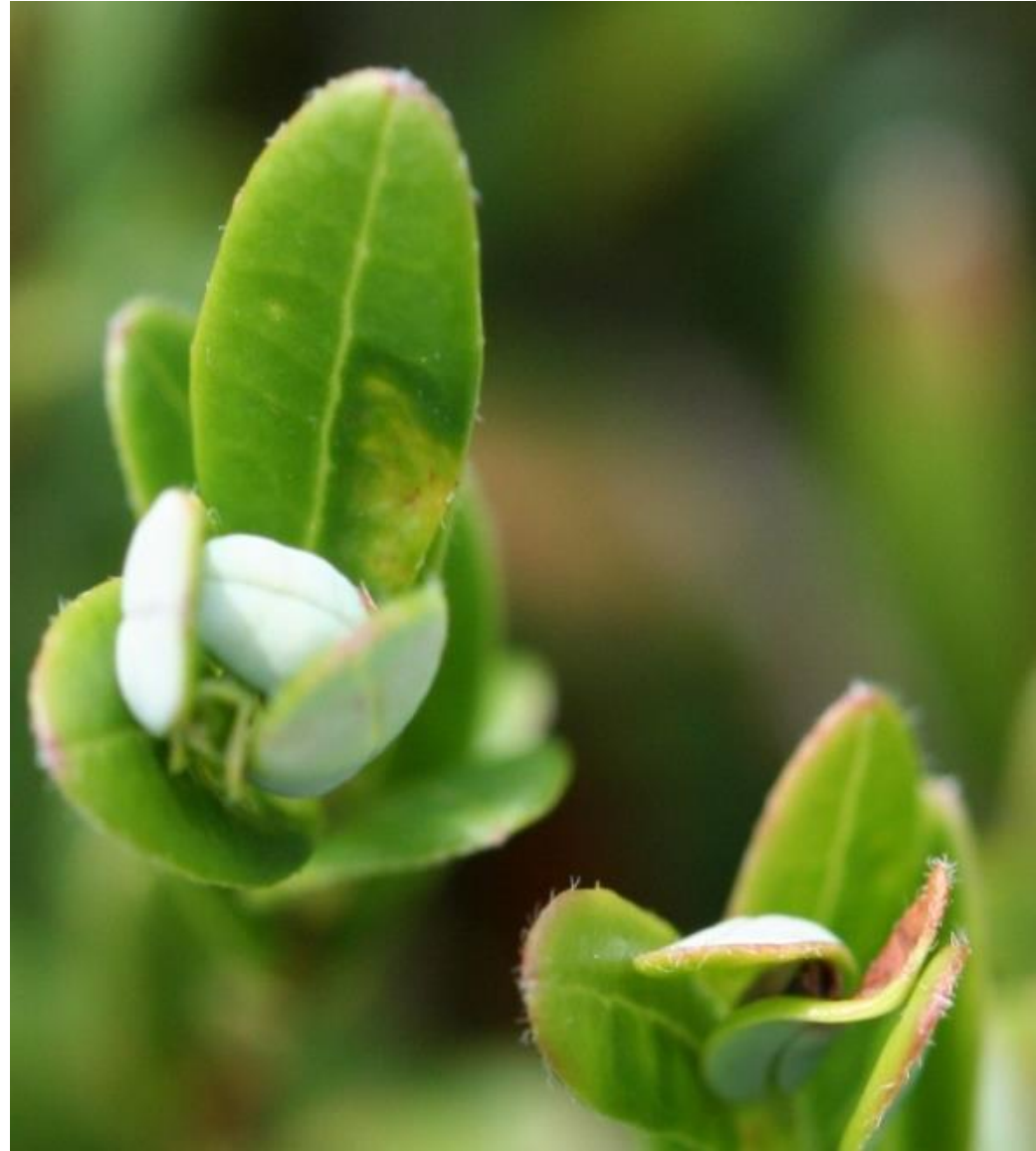
World Class. Face to Face.

WSU Pesticide Policy

"Some of the pesticides discussed in this presentation were tested under an experimental use permit granted by WSDA. Application of a pesticide to a crop or site that is not on the label is a violation of pesticide law and may subject the applicator to civil penalties up to \$7,500. In addition, such an application may also result in illegal residues that could subject the crop to seizure or embargo action by WSDA and/or the U.S. Food and Drug Administration. It is your responsibility to check the label before using the product to ensure lawful use and obtain all necessary permits in advance."

- Agenda
 - Tipworm
 - Fireworm, Fruitworm, Girdler
 - Weeds
 - Fruit Rot
 - Variety trial results

Tipworm





Bayer CropScience

Bayer CropScience LP
P.O. Box 12014
2 T.W. Alexander Drive
Research Triangle Park, North Carolina 27709
1-866-99BAYER (1-866-992-2937)

Real live
Cranberry
label

MOVENTO®

EPA Reg. No. 264-1050

For Use On: Bushberry; Carrot; Stone Fruits; Sugar Beet;
Tree Nuts

*This supplemental label expires on 06/26/2020 and
must not be used or distributed after this date.*

Supplemental Label

**KEEP OUT OF REACH OF CHILDREN
CAUTION**

DIRECTIONS FOR USE

It is a violation of Federal law to use this product in a manner inconsistent with its labeling. Do not apply this product in a way that will contact workers or other persons, either directly or through drift. Only protected handlers may be in the area during application. For any requirements specific to your State or Tribe, consult the agency responsible for pesticide regulation. Read this label and the product package label before using this product. This Supplemental Label must be in the possession of the user at the time of pesticide application. Follow all applicable directions, restrictions, Worker Protection Standard requirements, and precautions on the product label for MOVENTO® attached to the container.

**CHEMIGATION
- VEGETABLE
AND POTATO
CROPS ONLY**

BUSHBERRY SUBGROUP LOW GROWING BERRY SUBGROUP

Crops of Crop Subgroups 13-07B and 13-07H including: Aronia berry, Bearberry, Bilberry, Blueberry (highbush and lowbush), Chilean guava, Cloudberry, Cranberry, Currant (black, buffalo, native, and red), Elderberry, European barberry, Gooseberry, Edible honeysuckle, Jostaberry, Juneberry, Muntries, Lingonberry, Partridgeberry, Salal, Sea buckthorn, and cultivars, varieties, and/or hybrids of these.

Pests Controlled		Product Rate	
	(fl oz/A)	(lb ai/A)	
Aphids			
Blueberry Gall Midge			
Cranberry Tipworm	8.0 - 10.0	0.13 - 0.16	
Thrips (larvae)			
Pests Suppressed		Product Rate	
	(fl oz/A)	(lb ai/A)	
Blueberry Maggot			
Leafhoppers	10.0	0.16	

Foliar Application Restrictions:
Pre-Harvest Interval (PHI): 7 days
Minimum interval between applications: 7 days
Maximum MOVENTO allowed per calendar year: 30 fl oz/A
Maximum spirotetramat per crop season: 0.47 lb ai/A
Do not apply until after petal fall

10 oz/ac

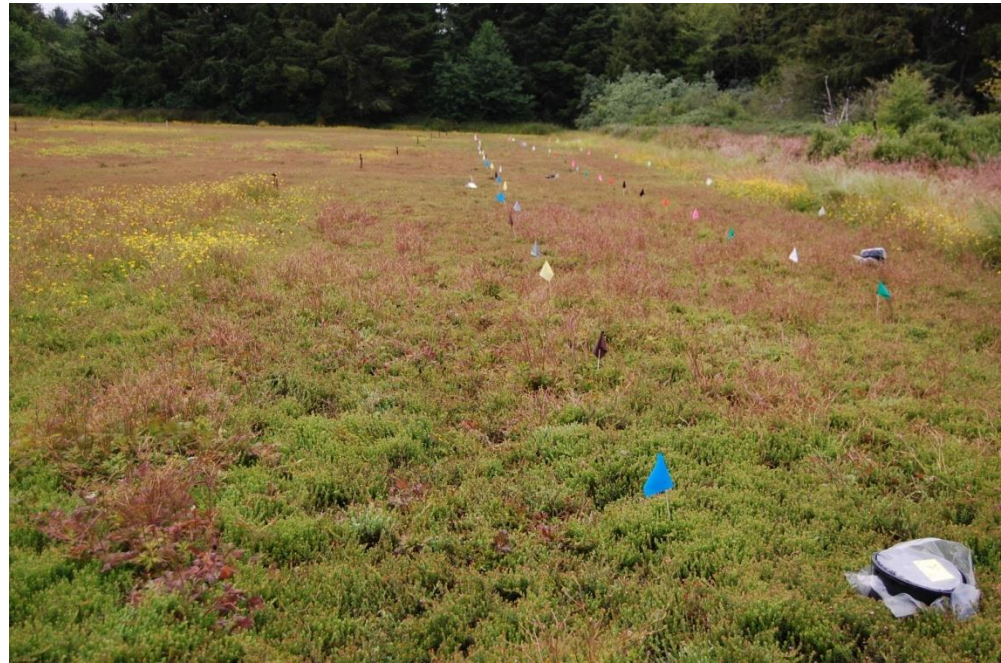
30 oz /yr

Why
should
you
care?

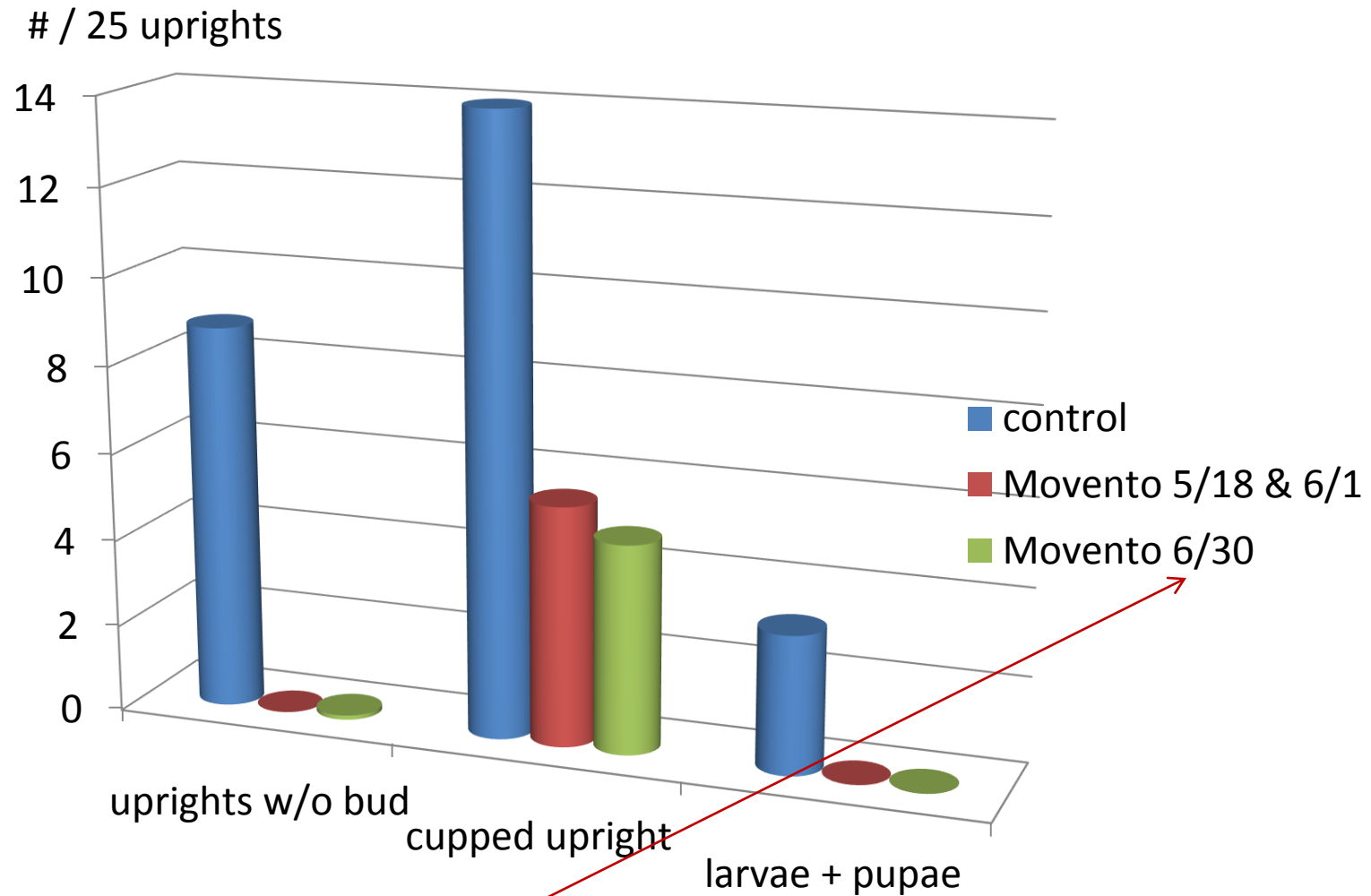
You will
get
tipworm
& it does
control
some
scale

Review of old Tipworm research with Movento

Started in 2006



2010 study
Movento applied with chemigation assessed 8/16/10

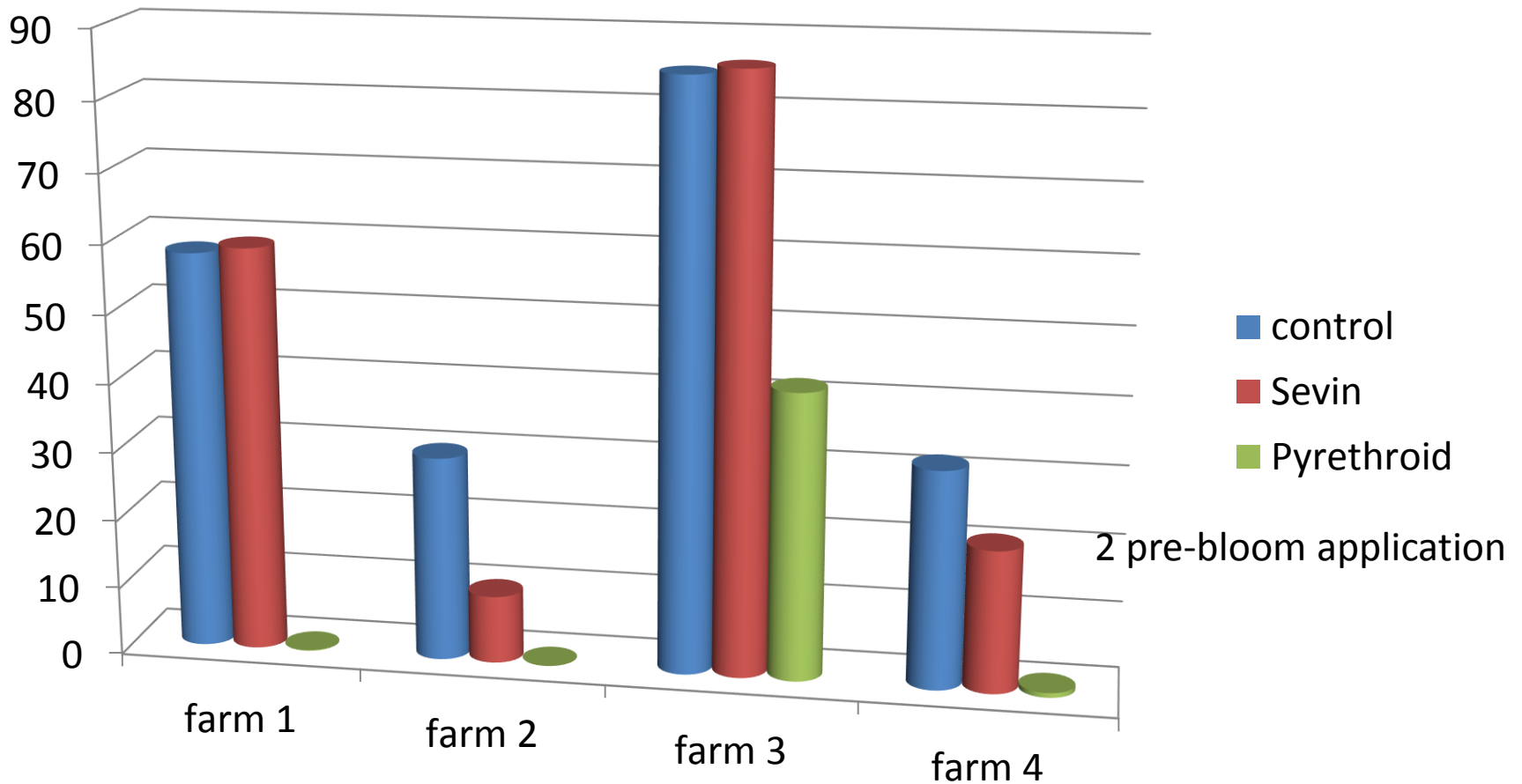


Well timed application at fruit set very effective

Almost perfect Control

Tipworm Control 2017

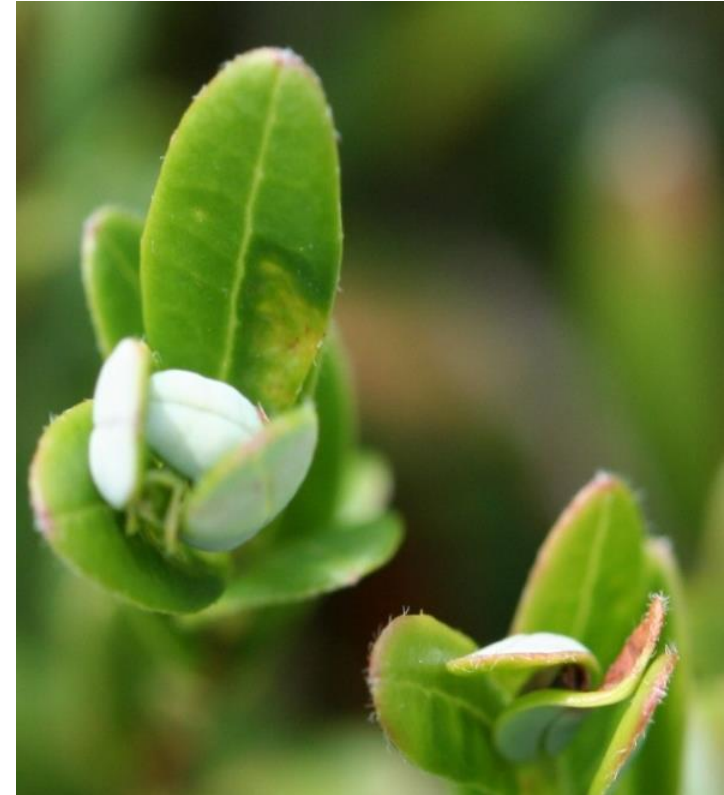
% cupping 7/7/17



Pyrethroid – “Fanfare” schedule for registration October 2017, we may or may not have it for 2018.

Movento vs. Fanfare

- Movento
 - post-bloom only
 - ~\$50/ac
 - 2 applications if bad
 - 1 application if not so bad
- Fanfare
 - **Restricted used**
 - ~\$5/ac
 - Pre-bloom only
 - Continue to check for registration (target date Oct 2017)



Movento

- Doesn't kill
 - Fireworm
 - Girdler
 - Fruitworm
 - Weevil (adult or larvae)
 - Beneficial insects (predator wasp)
- Does kill
 - Tipworm
 - Aphids
 - Some scales
- May impact
 - Honeybees

Fanfare

- Doesn't kill
 - Weevil -larvae
- Does kill
 - Tipworm
 - Fireworm/Fruitworm
 - Weevil adults
 - Bees
 - Aquatic insects
 - Beneficial insects



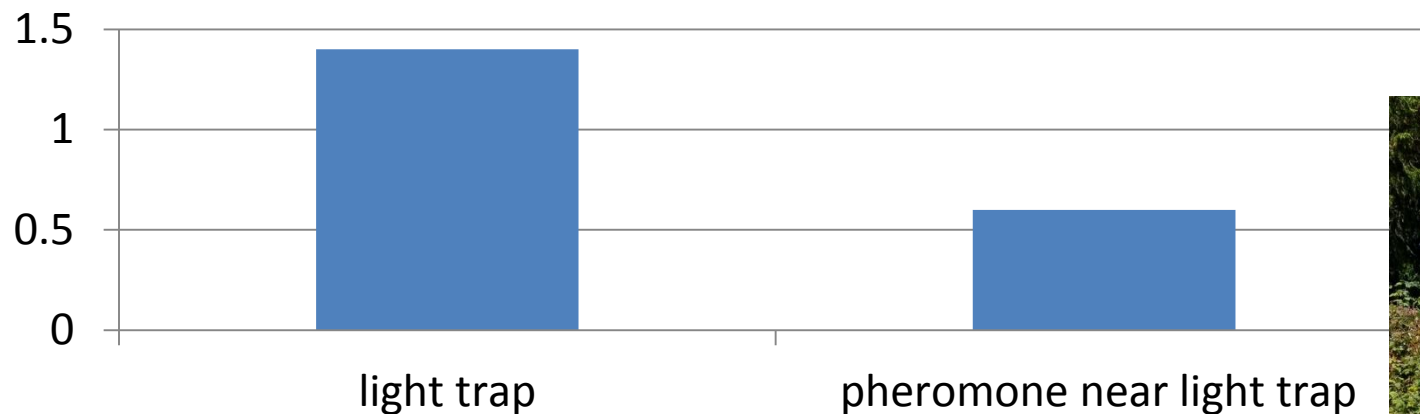
Solar powered light trap

- Employed 3 to 7 days at 3 cranberry beds between late July to Early September
- Conditions not ideal
- Temperature and moisture settings need adjustment
- Trapped ample fireworm, tipworm and girdler relative to other traps
- Don't know if it is a useful management tool or not (more research needed)
- Cost -1 trap/5 acres suggested @ \$700 each

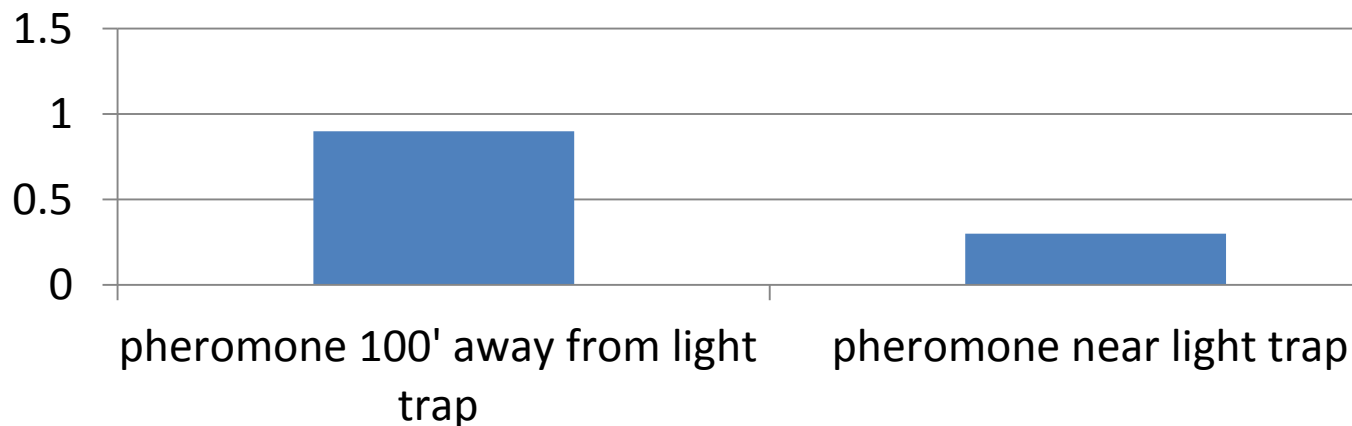


Cranberry Girdler Control with light trap

moth/trap



moth/trap





Maybe for cutworms,
but not fireworm,
tipworm, girdler or
fruitworm

Fungicides and Fruit rot



Fungicide effects on fruit rot, yield, fruit size & fruit set

- Different fungicides
- Different timing
- Different combinations

**Is there a special secret fungicide sauce
(combination/timing of fungicides)
that reduces rot and increases fruit size
and yield?**

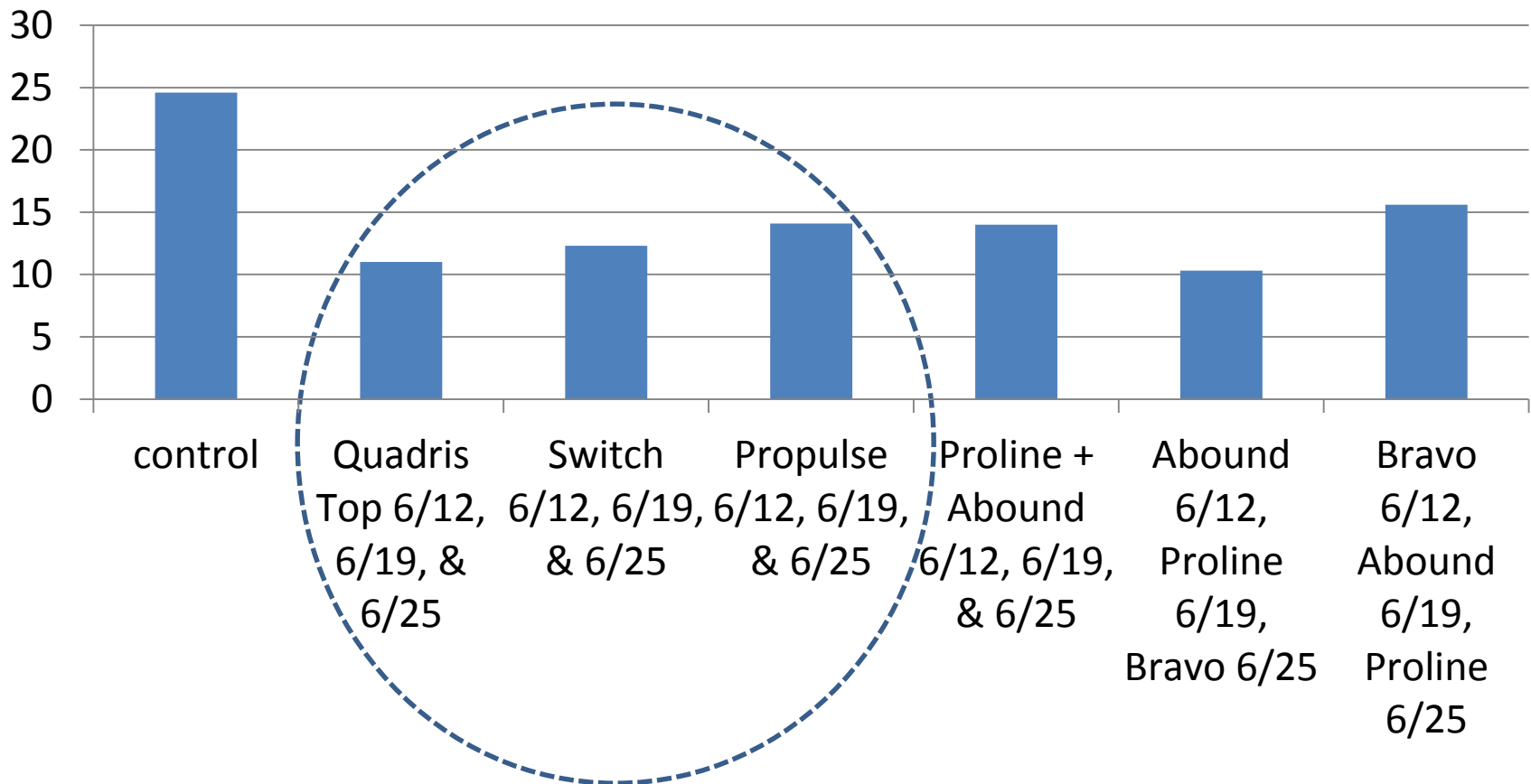
Finding the secret sauce:

Fungicide effects on yield, field rot, storage rot, fruit size and fruit set

- 13 separate studies in 2017
 - Different fungicides
 - Different timing
 - Different combinations

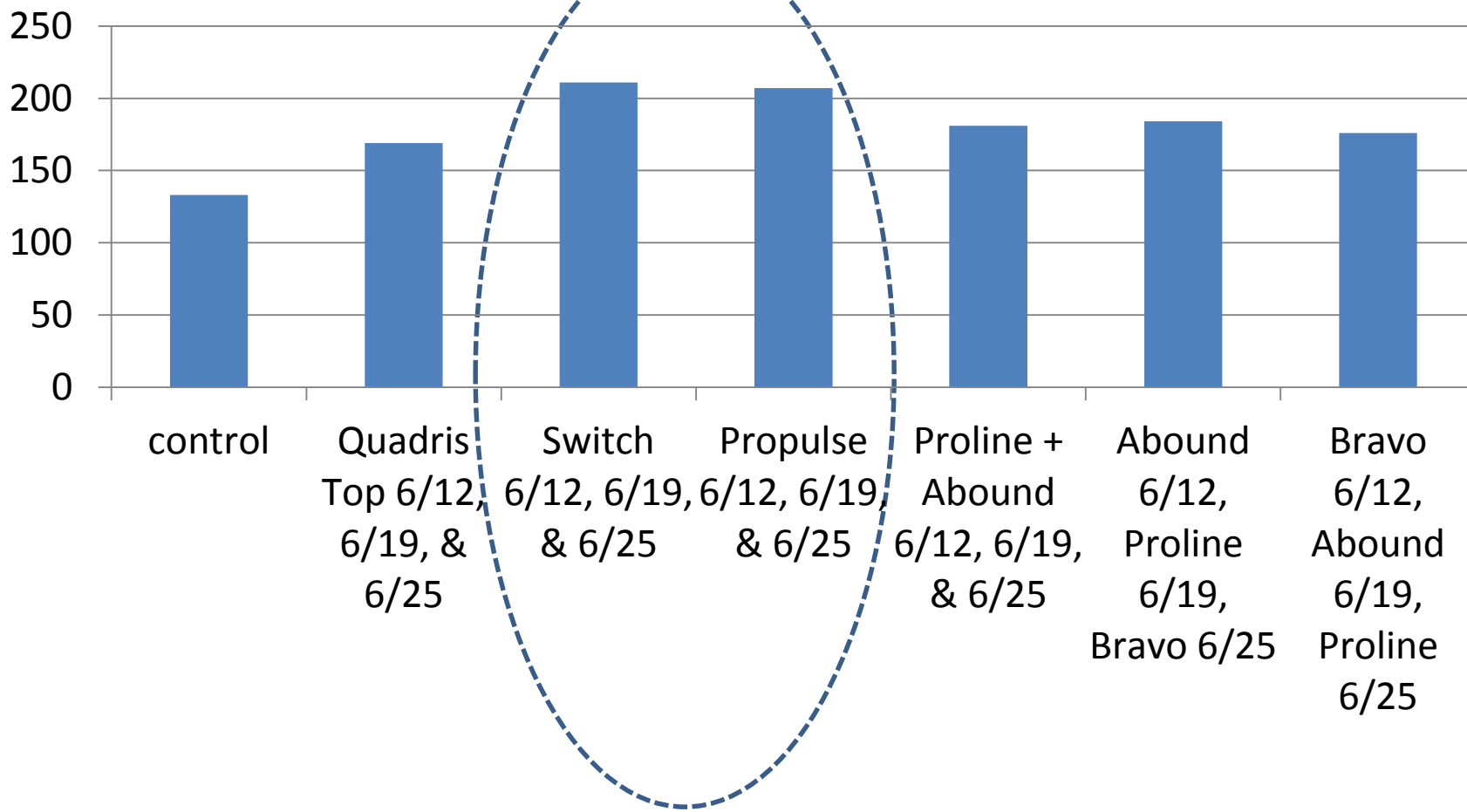
Different fungicide effects – fungicide screening

Stevens - field rot %



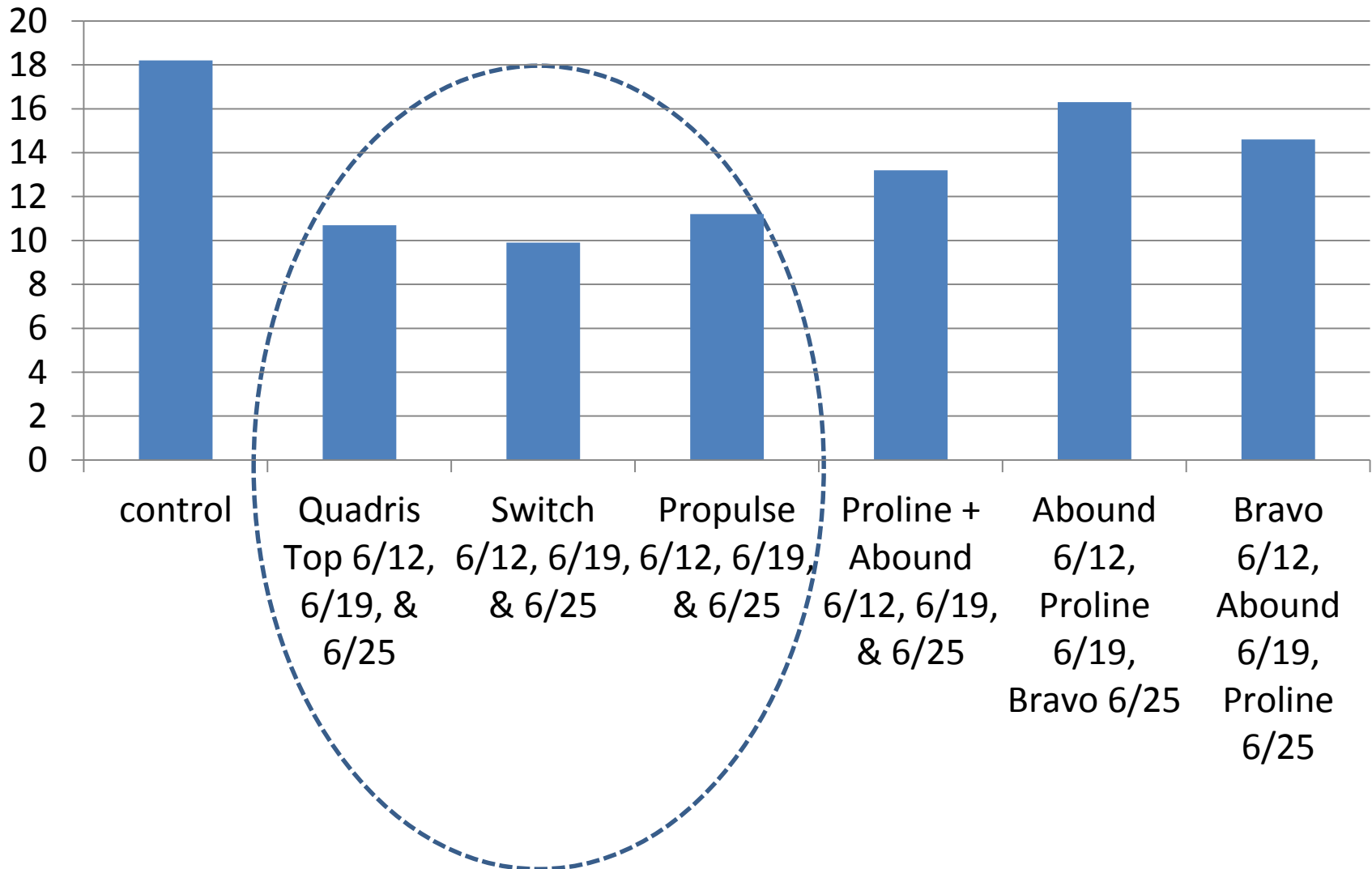
fungicide screening

bbl/ac of good fruit



Fungicide screening

Stevens - storage rot %



Fungicide screening

- Three new fungicides in que for registration work as good or better than what we are now using.
 - Switch
 - Quadris Top
 - Propulse

Different Fungicide Timing Effects

- Post-bloom fungicide effect – 3 trials

Bloom	Set	Post-set
Proline + Abound	Bravo	Mankocide

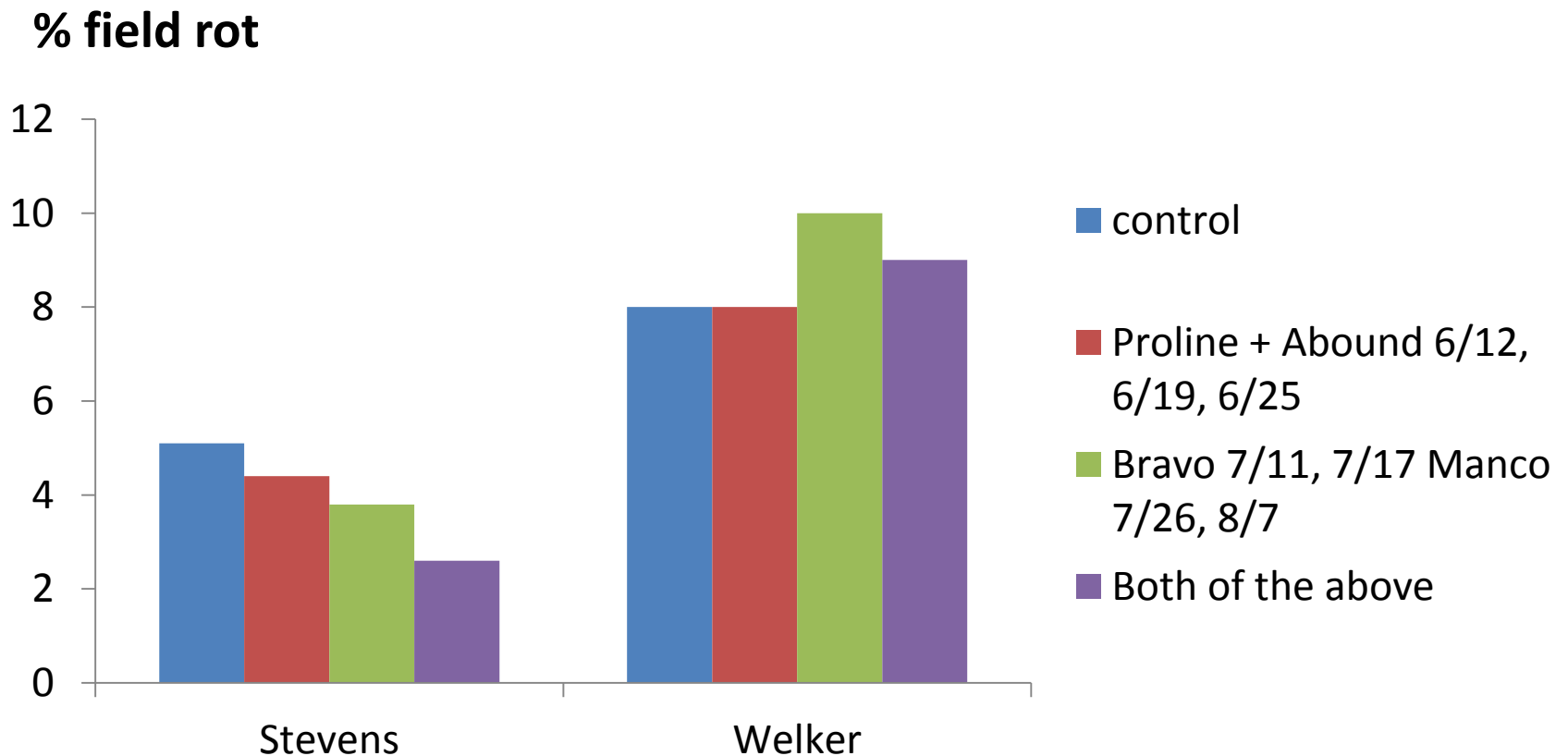


Does this do any good

Treatment	Proline + Abound @ bloom	Bravo @ Set & Mankocide @post-set
1		
2	x	
3		x
4	x	x

Different Fungicide Timing Effects

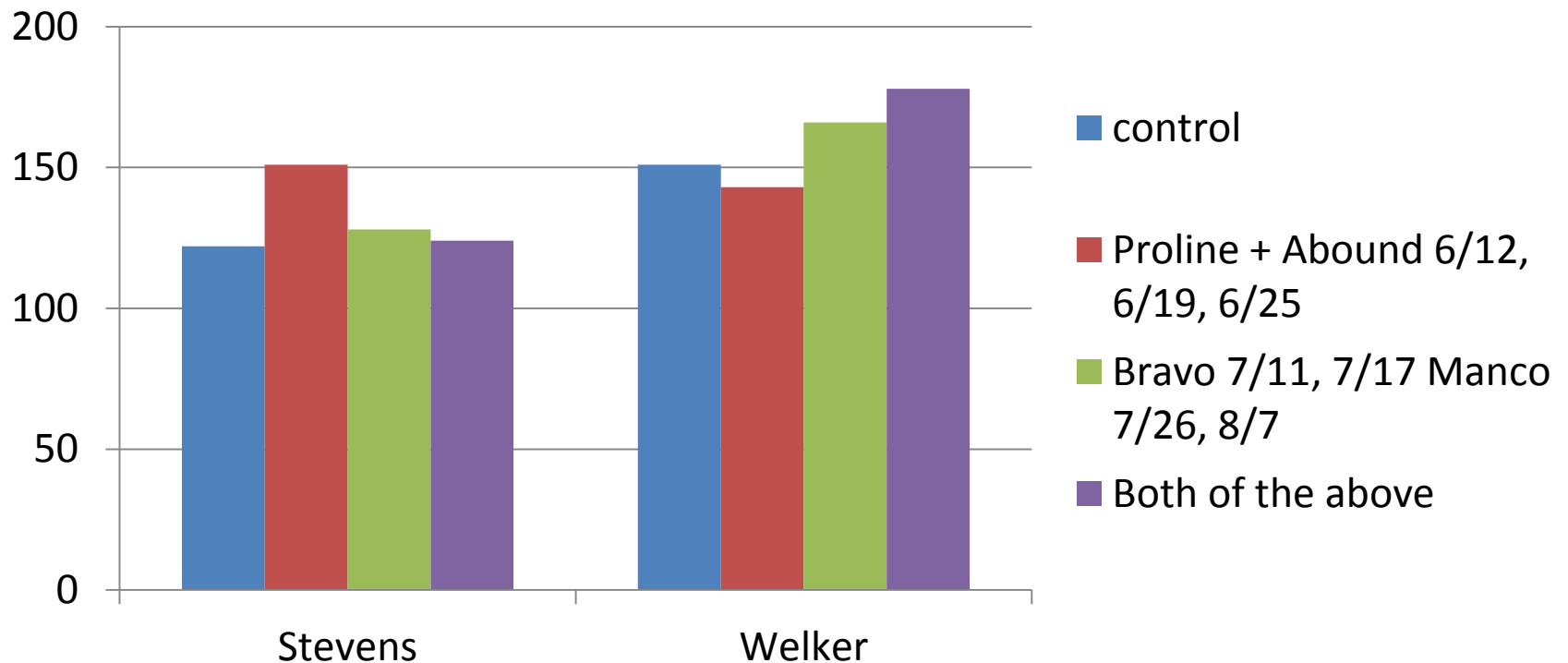
- Post-bloom fungicide effect = no consistent treatment effect on field rot



Different Fungicide Timing Effects

- Post-bloom fungicide effect = no advantage of post-bloom fungicide on yield

bbf/ac good fruit



Different Fungicide Timing Effects

- Number of spray during bloom

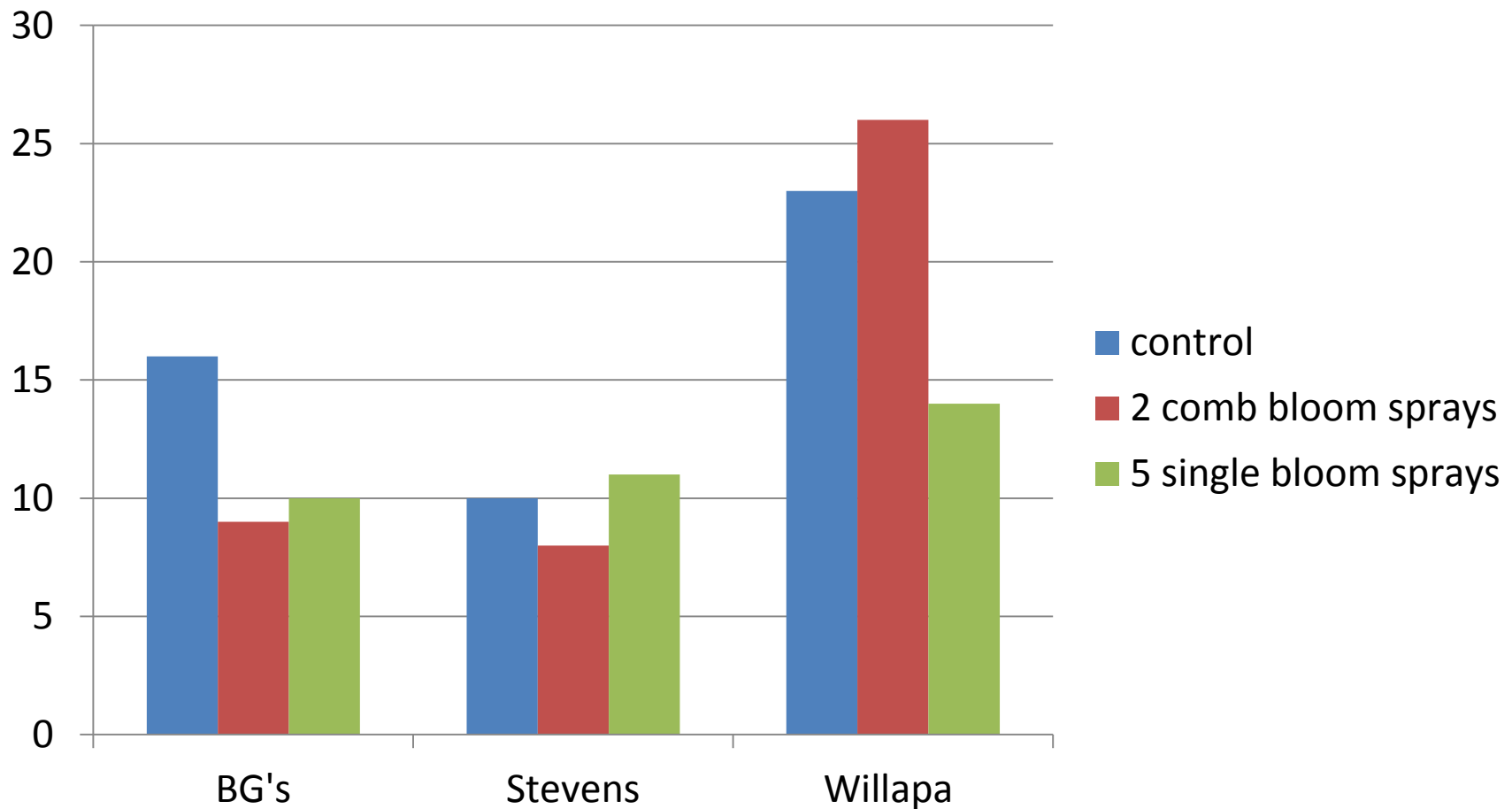
10 -20% Bloom	30 - 40 % bloom	50 - 60 % bloom	70 – 80 % bloom	Last bloom
x	x	x	x	x
x		x		

Treatment	5 sprays (rotation of Proline and Abound)	2 sprays (Proline + Abound)
1		
2	x	
3		x

Different Fungicide Timing Effects

- # of bloom sprays = no advantage of overkill on # of bloom sprays on field rot unless you have high rot

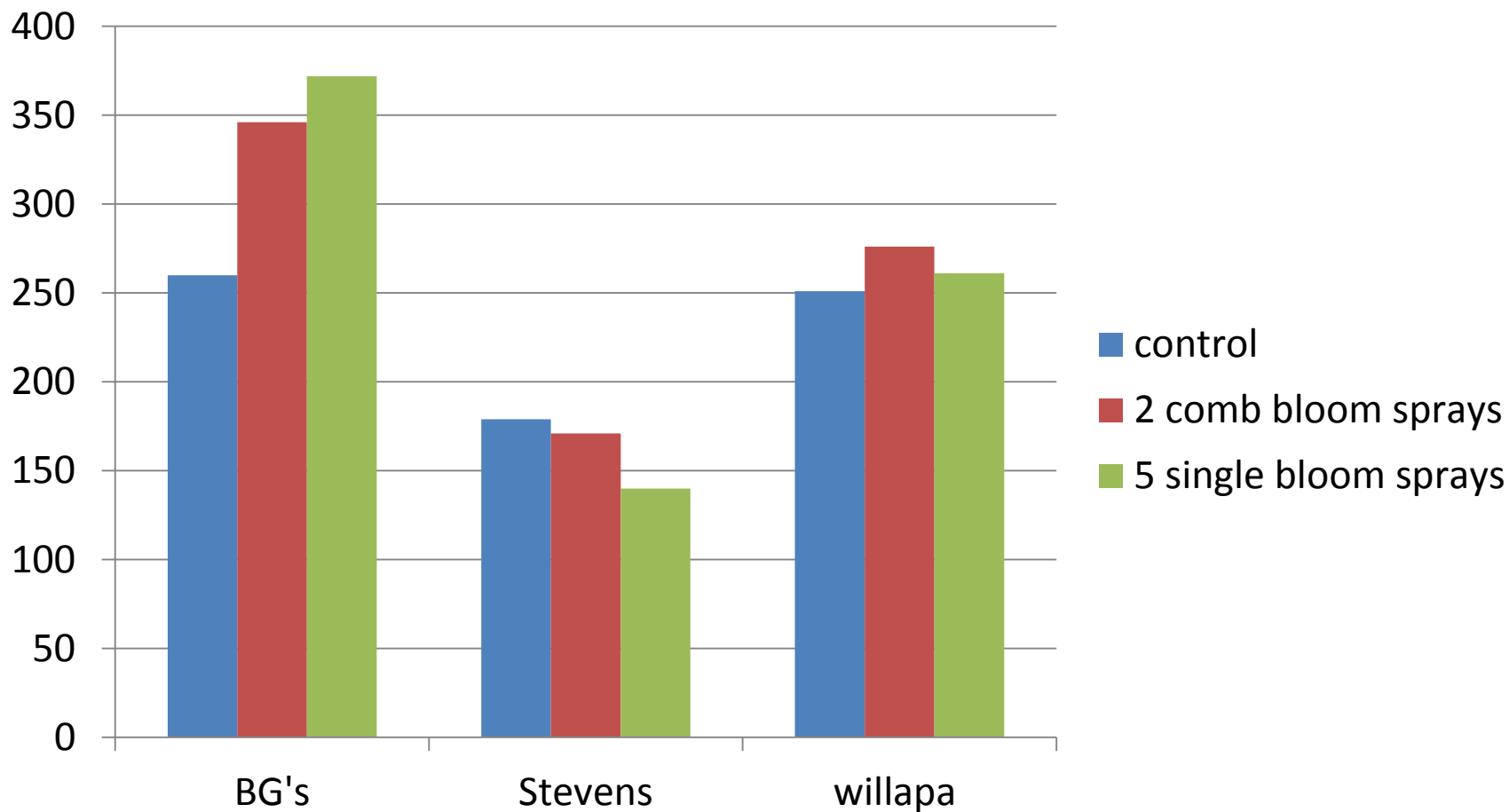
% field rot



Different Fungicide Timing Effects

- # of bloom sprays = no advantage of overkill on # of bloom sprays on field rot

bbl/ac of good fruit

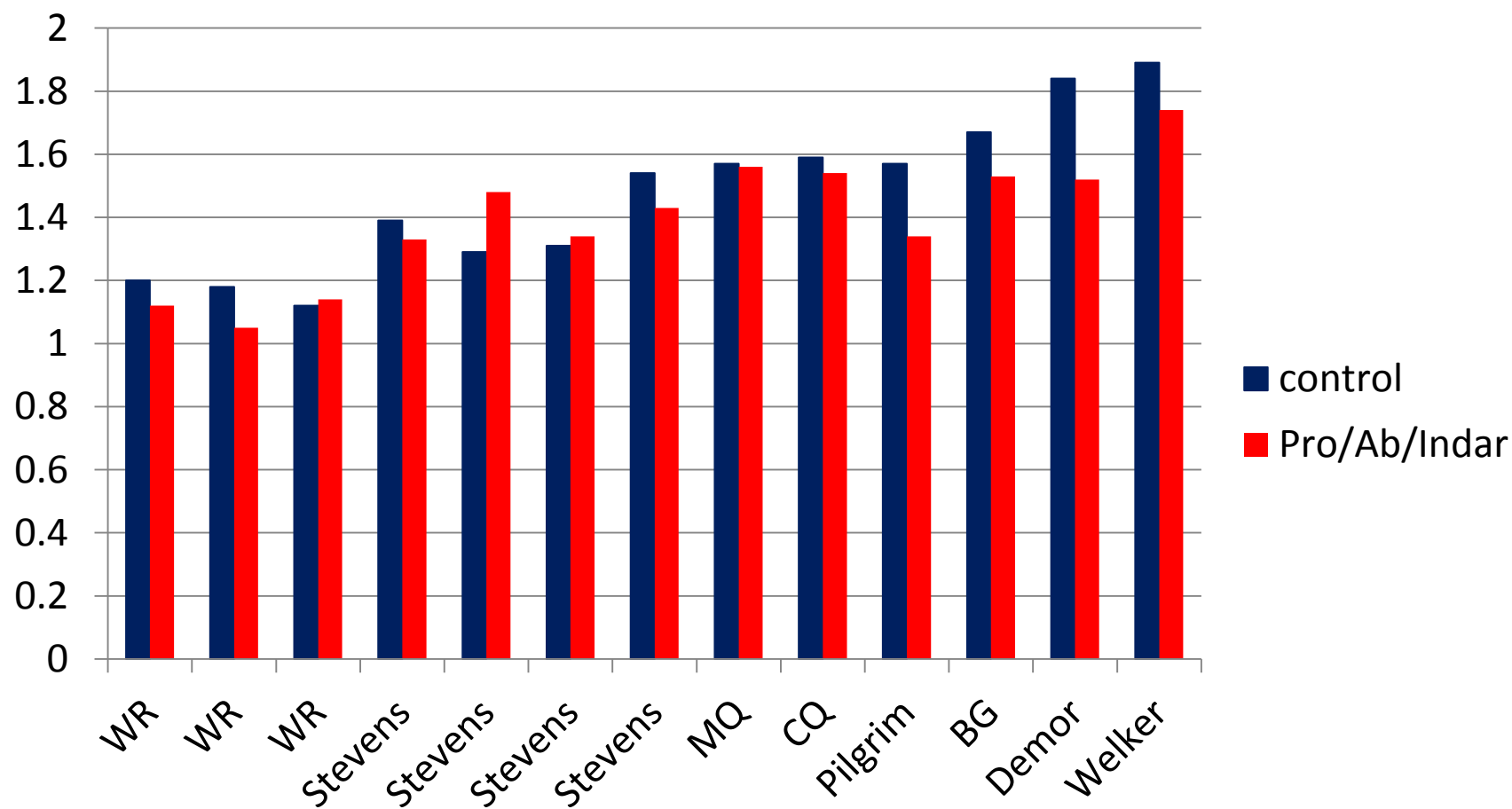


Fungicide effect on yield?

- 7 of the 13 studies – examined
 - Fruit size
 - Fruit set
 - % pinheads
 - Fruit/upright

In 9 of 13 studies fruit size was slightly (8%) reduced by fungicide during bloom

Fruit size (g/fruit)



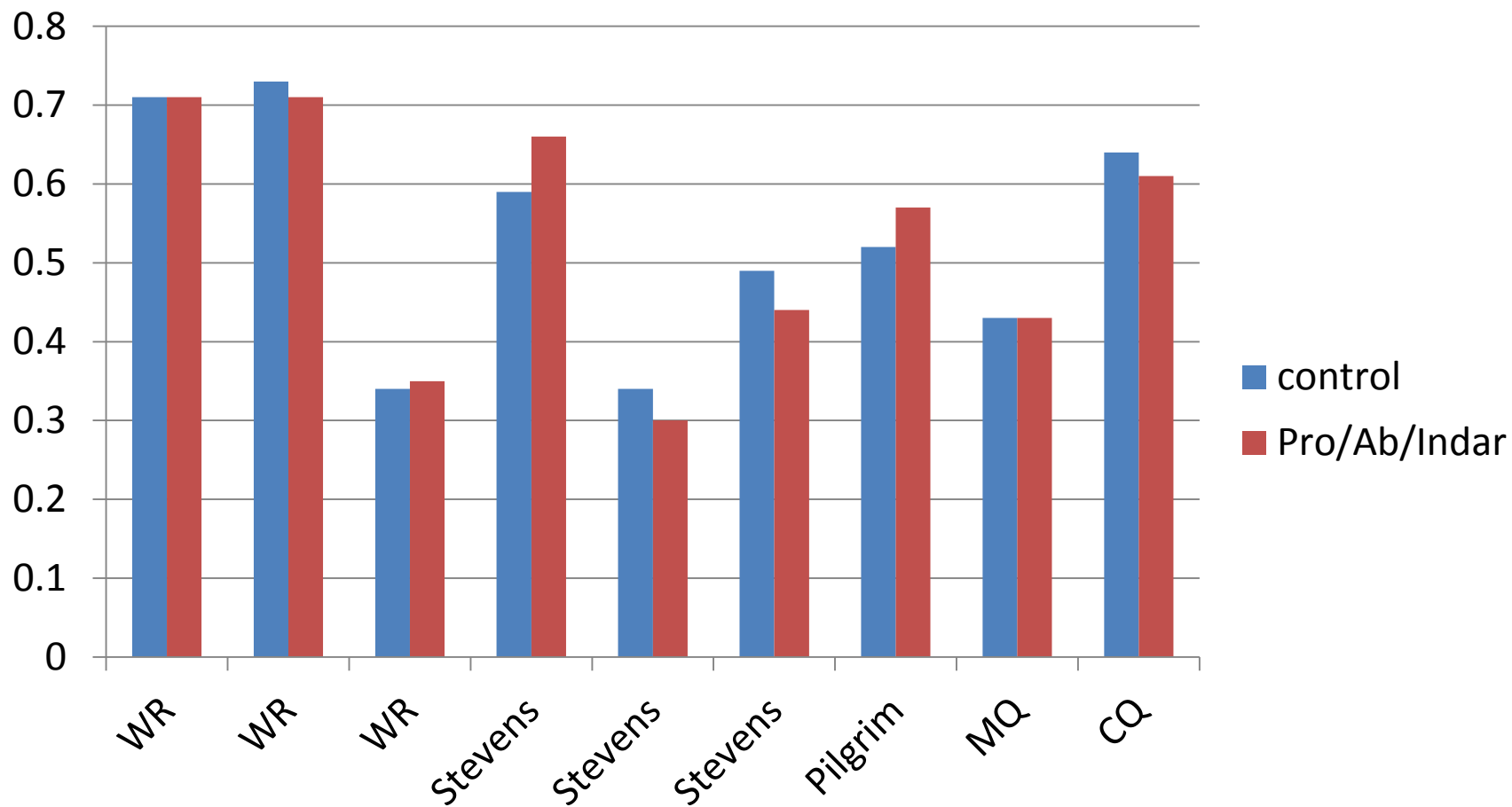
A fruit size reduction of 0.1 g/fruit (~ 8%) is ~ 5 to 10 bbl/ac

Do fungicide affect fruit set?

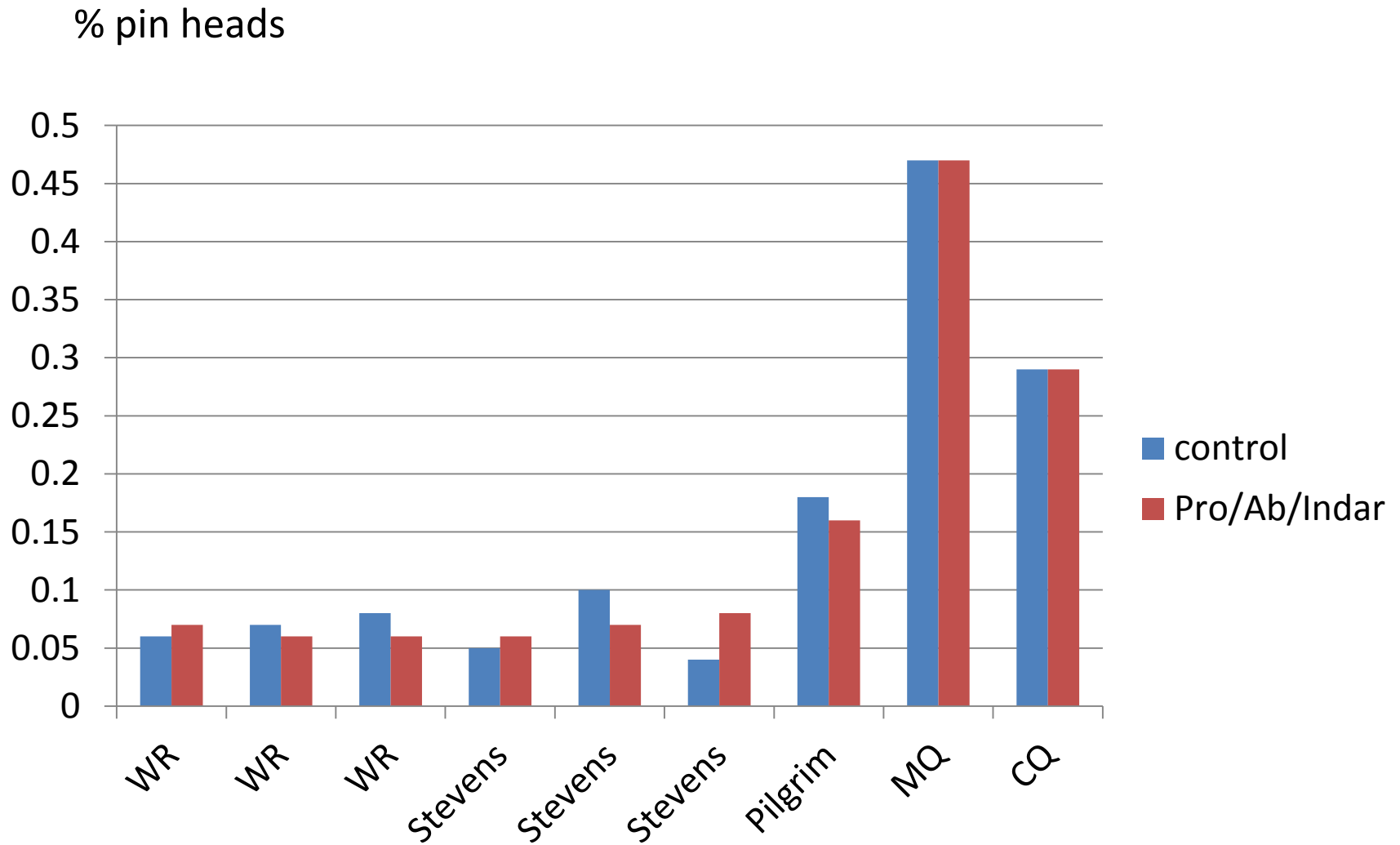


No trend for fungicide effect on fruit set.

% fruit set

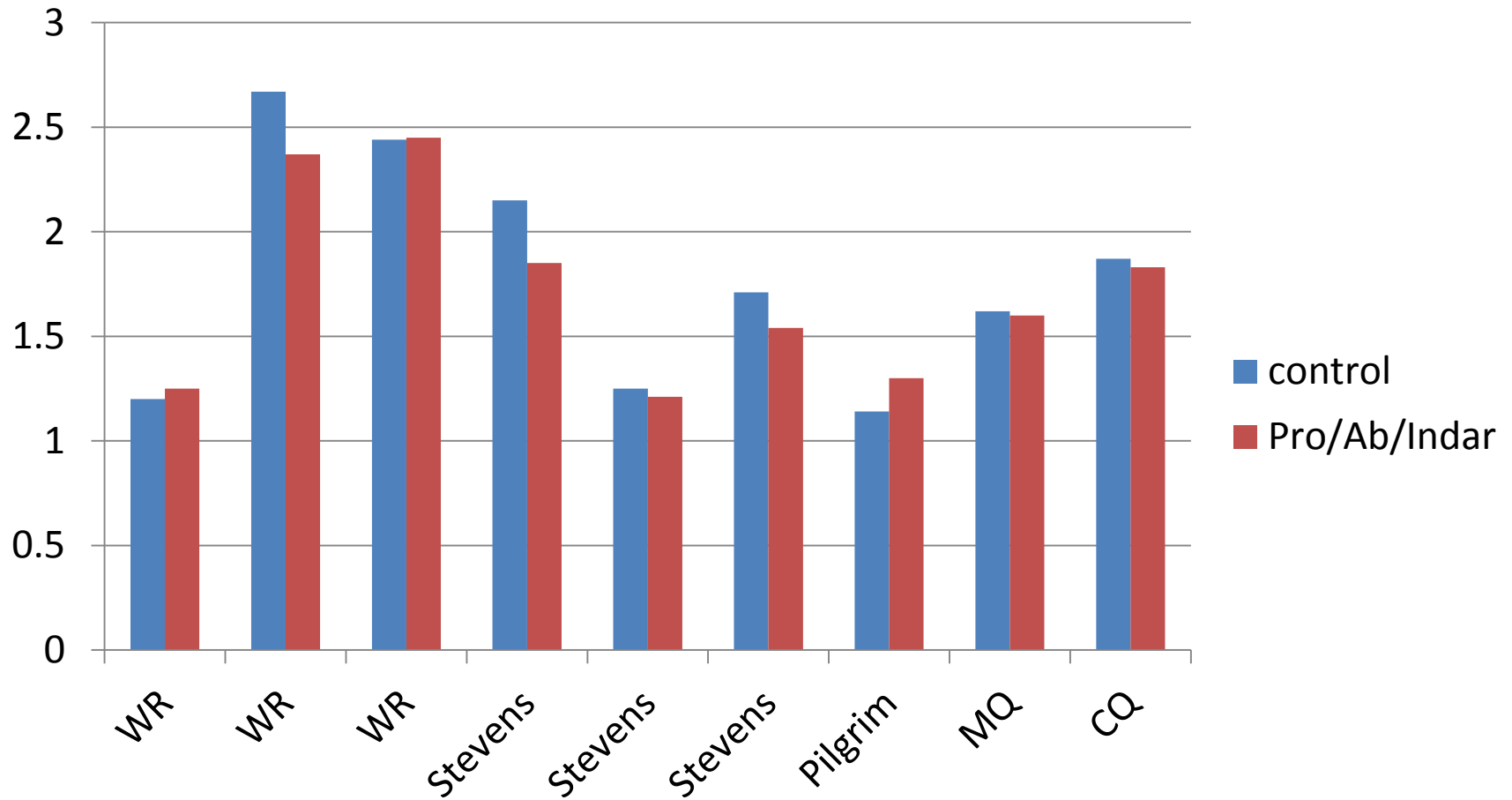


No trend for fungicide effect on
pin heads.

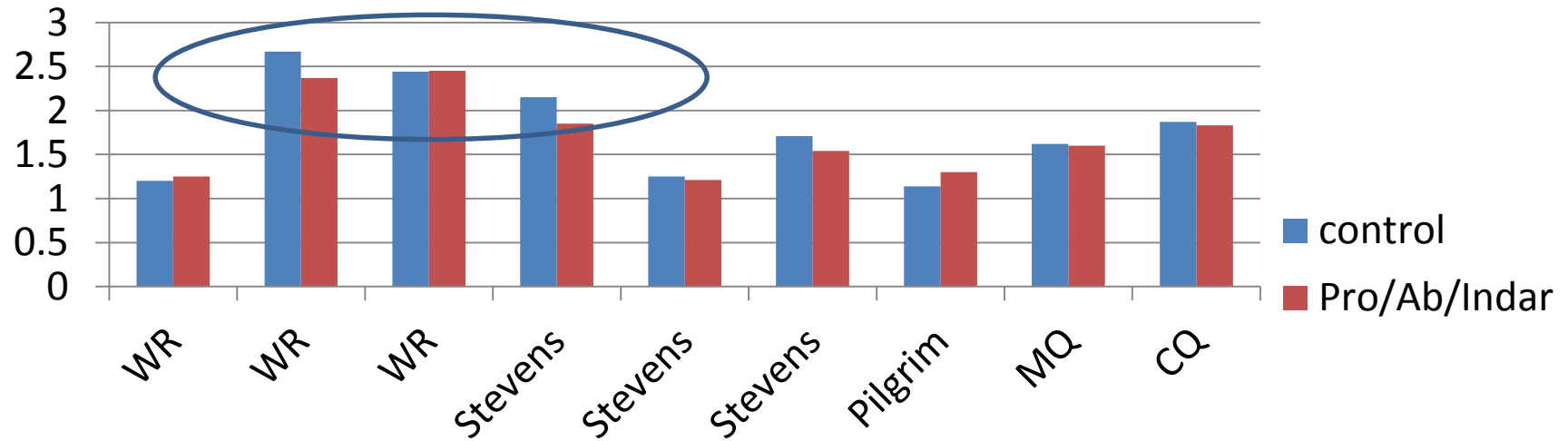


No significant trend for fungicide
effect on # fruit / upright

Fruit /upright

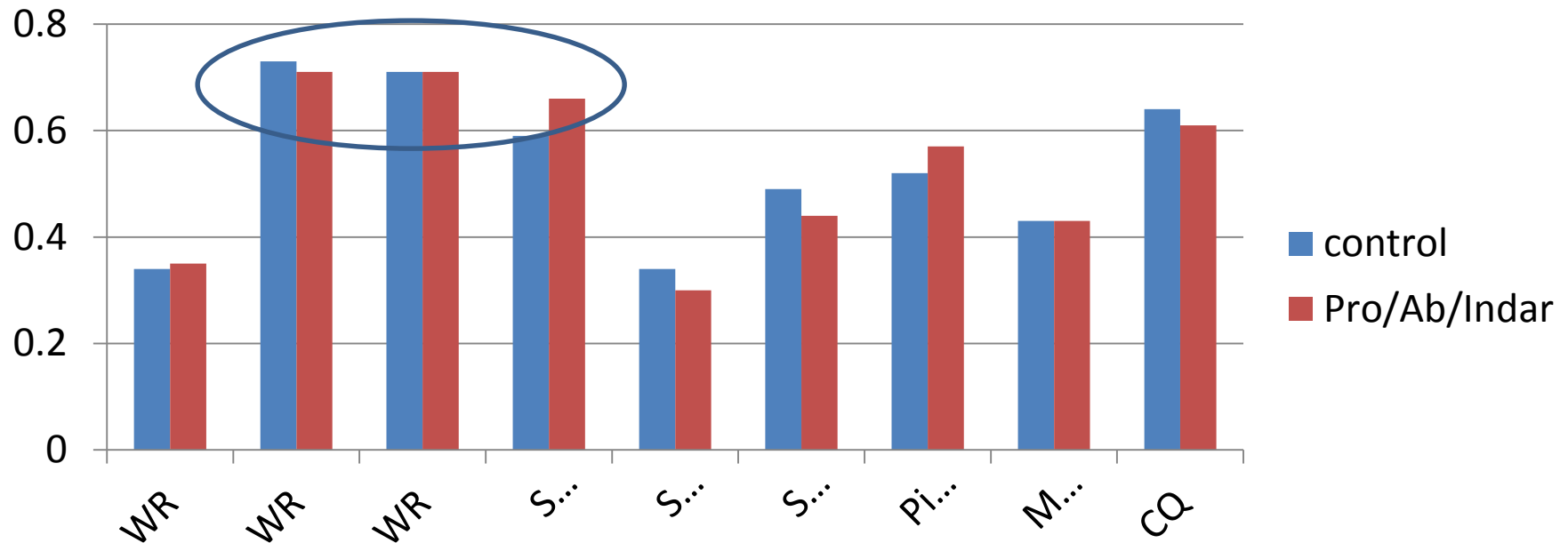


Fruit /upright



Why are these so much higher?

% fruit set

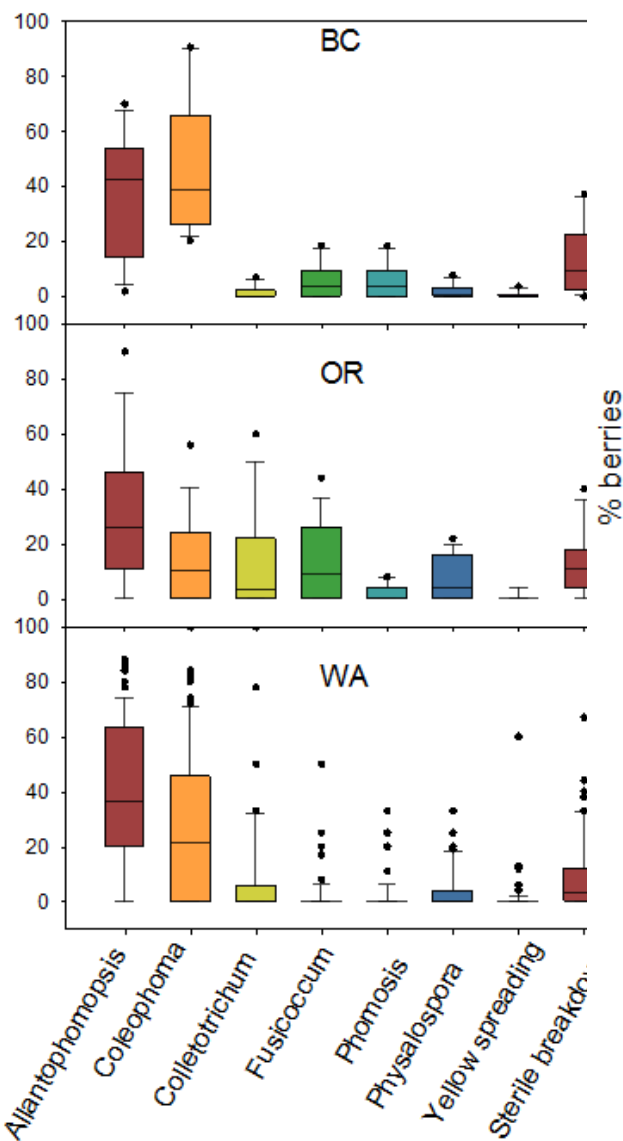


the secret sauce:

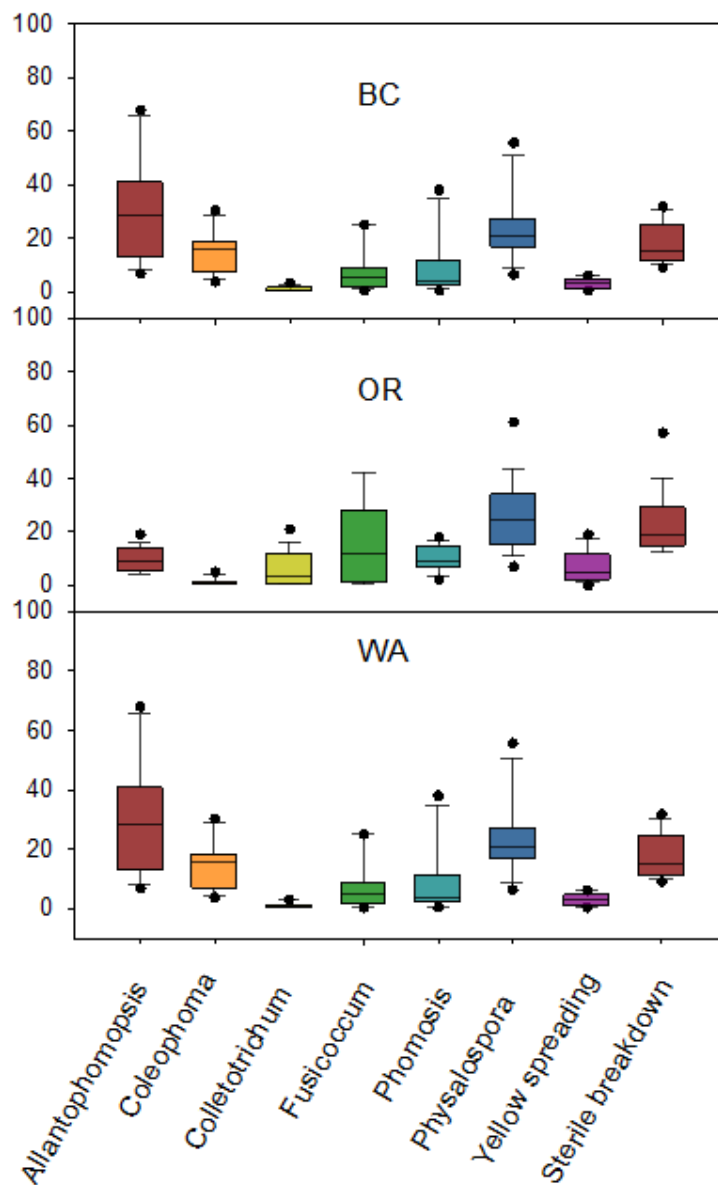
Fungicide effects on yield, field rot, storage rot, fruit size and fruit set

- Different fungicides: some better than others, some new ones coming that will be good
- Different timing: early to mid- bloom important, post bloom not important
- Different combinations: resistance management important for long term
- Number of application: based on efficacy and cost: two is likely adequate

Rotted Berries



Latent unaffected berries



Pathogen in order of importance

- Allantophomopsis
- Coleophoma
- Colletotrichum
- Physalospora
- Cadophora
- Cryptosporiopsis
- Fusicoccum
- Botryosphaeria
- Penicillium
- Pestalotia
- Phomopsis
- Phyllosticta
- Synchronoblastia
- Botrytis

FRAC Group	Fungicide	Fruit Rot Pathogens																			
		Inhibition of Mycelial Growth										Inhibition of Spore Germination									
		<i>Alternaria phoma</i> s. <i>lycopodina</i>	<i>Botrytis cinerea</i>	<i>Colletophoma empetri</i>	<i>Colletotrichum acutatum</i>	<i>Colletotrichum gloeosporioides</i>	<i>Fusicladium putreficiens</i>	<i>Glomerella cingulata</i>	<i>Phomaopsis vaccinii</i>	<i>Phyllactinia elongata</i>	<i>Phytophthora variacii</i>	<i>Alternaria phoma</i> s. <i>lycopodina</i>	<i>Botrytis cinerea</i>	<i>Colletophoma empetri</i>	<i>Colletotrichum acutatum</i>	<i>Colletotrichum gloeosporioides</i>	<i>Fusicladium putreficiens</i>	<i>Glomerella cingulata</i>	<i>Phomaopsis vaccinii</i>	<i>Phyllactinia elongata</i>	<i>Phytophthora variacii</i>
Gp. M	Bravo (chlorothalonil)																				
	Copper 53W (copper sulphate)																				
	Cueva (copper octanoate)																				
	Guardian (copper oxychloride)																				
	Kocide (copper hydroxide)																				
	Maestro (captan)																				
Gp. 3	Fullback (flutriafol)																				
	Funginex (triforine)																				
	Inder (fenbuconazole)																				
	Inspire (difenoconazole)																				
	Proline (prothioconazole)																				
	Tilt / Tops (propiconazole)																				
Gp. 7	A196488 / Adepidyn (pydiflumetofenil)																				
	Aprovia (benzovindiflupyr)																				
	Fontelis (penthiopyr)																				
	Kenja (isofetamid)																				
	Serenis / Xenium (fluspyrox)																				
Gp. 9	Sala (pyrimethanil)																				
	Vanguard (cyprodinil)																				
Gp. 11	Evito (flusoxystrobin)																				
	Flint (trifloxystrobin)																				
	Quadris (azoxystrobin)																				
Gp. 12	Medallion / Scholar (fludioxonil)																				
Gp. 17	Elevate (fenhexamid)																				
Gp. 19	OSD (Polyoxin D)																				
Gp. 33	Aliette (fosetyl-Al)																				
Biological	Regalia Maxx (Reynoutria sp. extract)																				
	TimorexGold (Tea tree oil)																				
		highly effective moderately effective less effective not effective										inhibition at either rate inhibition at maximum rate no inhibition data not available									

highly effective
moderately effective
less effective
not effective

inhibition at either rate
inhibition at maximum rate
no inhibition
data not available

I know you can't read this slide but it is the most important slide I have.

Fruit Rot Pathogens and their Impact on Cranberry Production in British Columbia:
Efficacy of potential fungicides against cranberry fruit-rot pathogens

Authors:

Siva Sabaratnam, Ethan McBride, Taylor Griffin and Brandon Wood

Abbotsford Agriculture Centre, Ministry of Agriculture, Abbotsford, B.C.

Inhibition of spore germination

	Allantophomopsis	Colletotrichum	Physalospora	Fusicoccum
Bravo				
copper				
Indar				
Proline				
Abound				

Inhibition of mycelial growth

	Allantophomo..	Coleophoma	Colletotrichum	Physalospora	Fusicoccum
Bravo					
copper					
Indar					
Proline					
Abound					

From:
Sarabaratnam
et al. 2017

Highly effective

Moderately effective

Less effective

- Based on Dr. Siva Sabaratnam's very cool data
 - Bravo, Indar and Proline highly effective against our main pathogens
 - Abound only marginally effective against our main pathogens
 - Copper is a fungicide of interest for fruit rot

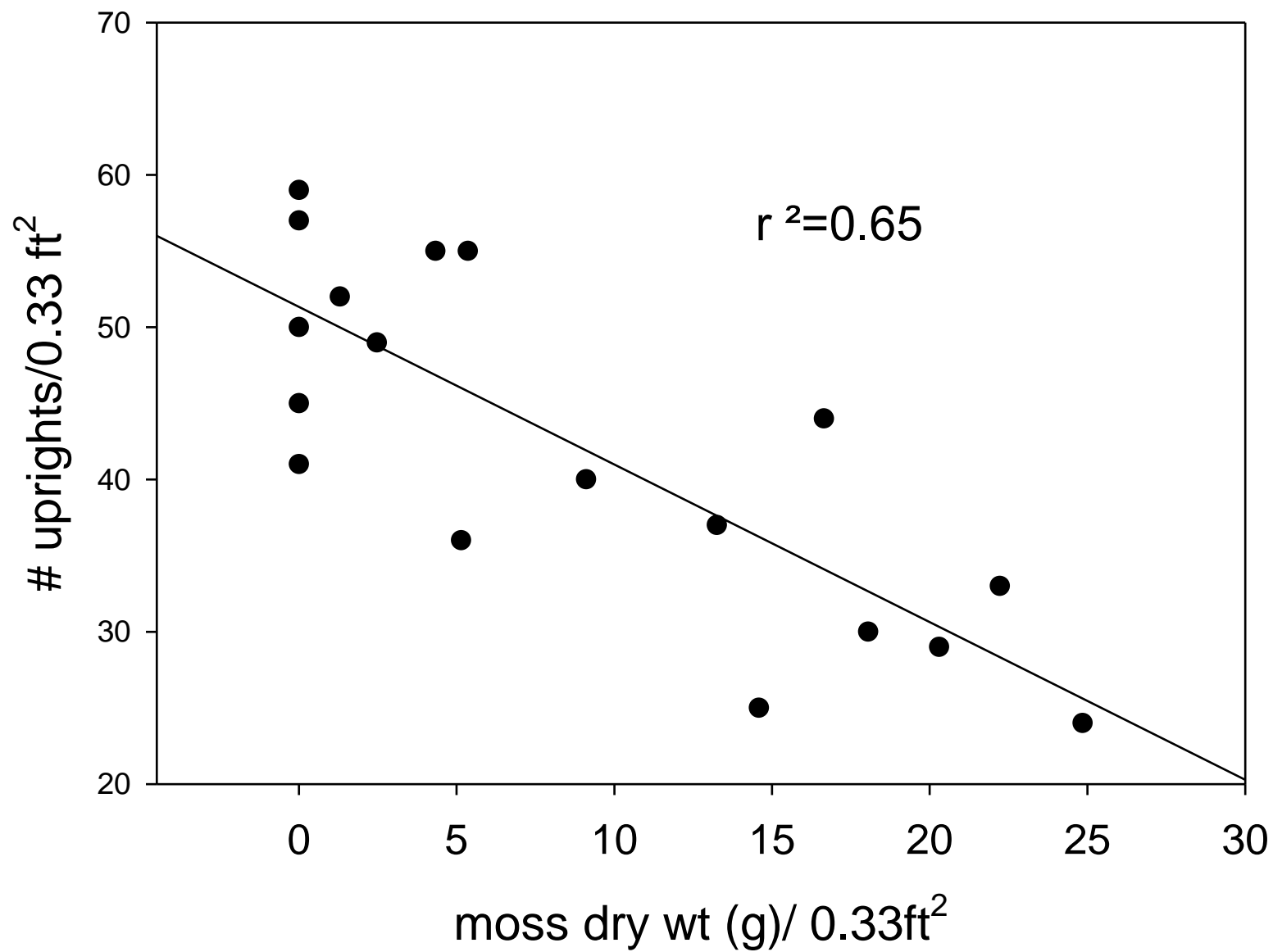
How to save money on Fungicide for 2018

Product	\$/ac
Proline	\$20
Indar	\$22
Abound	\$27
Bravo alter.	\$16
Manzate	\$16

- Proline / Proline / Bravo = \$56/ac
- Proline / Indar / Bravo = \$64 /ac
- Indar / Indar / Bravo = \$ 72/ac
- Proline / Bravo = \$36 /ac
- Proline = \$ 20 /ac

Moss Control





Moss Control

Product	Control – short term	Control – long term	Crop phytotoxicity	Comments
FeSo ₄	50 to 100 %	10 to 60 %	No- early, yes- late	Pain to use, fertilizer – not herbicide
Vinegar	50 to 100 %	10 to 60 %	No-early, yes-late	Pain to use, \$
Bluestone copper	20 to 60 %	10 to 30 %	No-early, no-late	Easy, poor control
Herbicide Suppress	30 to 80%	10 to 30 %	Too much!	Organic, too hot
Herbicide F	0 to 10 %	100 %	No-early, yes-late	Easy, good control, not registered yet!

Moss Control w/ Herbicide F

two applications (Dec and January)

Product	% long term control
Broadcast 1x rate	85- 90
Chemigation 1x rate	80-90
Broadcast ¼ rate	75-80
Chemigation ¼ rate	75-80

- Herbicide F works on moss via chemigation and doesn't result in any crop damage.
- It is IR4 now. Section 18 maybe be feasible within a few years.

Herbicide F for moss control

- What is it?
 - Contract herbicide
 - IR4 program 2017
 - Possible Section 18 in 2019

Dormant broadcast application of Roundup and Weedar

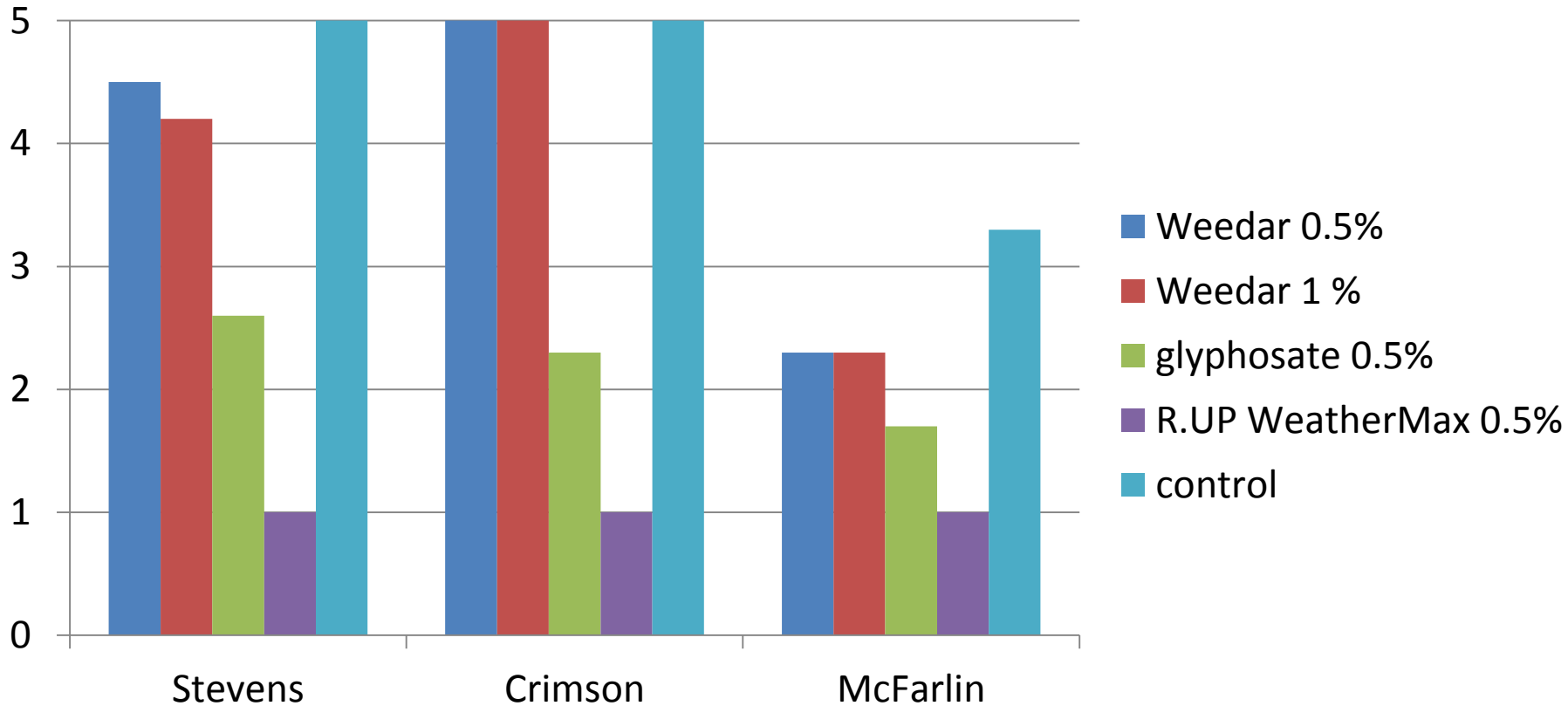
Is it safe? maybe

Is it legal? Roundup is

Bloom Density 6/22/17

1- no viable bloom

5- thick bloom



Treated on 11/14/2016 at 100 gpa

Dormant broadcast application of Roundup and Weedar

Is it safe?

Is it legal?

bbf/ac

300

250

200

150

100

50

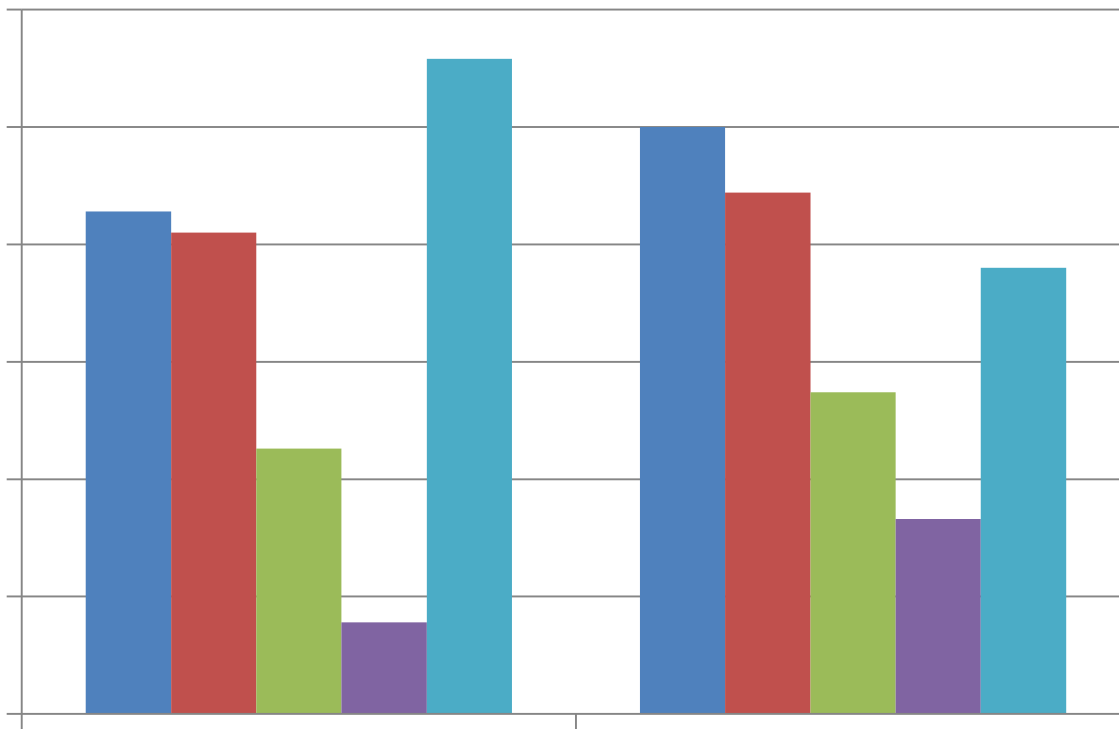
0

Stevens

Crimson

Treated on 11/14/2016 at 100 gpa

- Weedar 0.5%
- Weedar 1 %
- glyphosate 0.5%
- R.UP WeatherMax 0.5%
- control



Roundup on Cranberries

- Dormant broadcast now on some labels
- Narrow timing window for avoiding crop damage (December to early February)
- 0.25 % to 0.5% maximum by volume assuming 50 gpa spray rate (~3 tablespoon/3 gal)
- New hybrids too sensitive to risk treatment
- What weeds
 - sedge (cutgrass)
 - Sheep sorrel (sourgrass)
 - Other perennials showing green tissue
- What happens in Bandon during a warm winter will be much different!

Weedar 64 on Cranberries

- Broadcast not on label
- Safe during dormant winter @ 0.5%

Grass control: lots of new options

- New plantings
- New recommendation for perennial grasses
- New labels pending

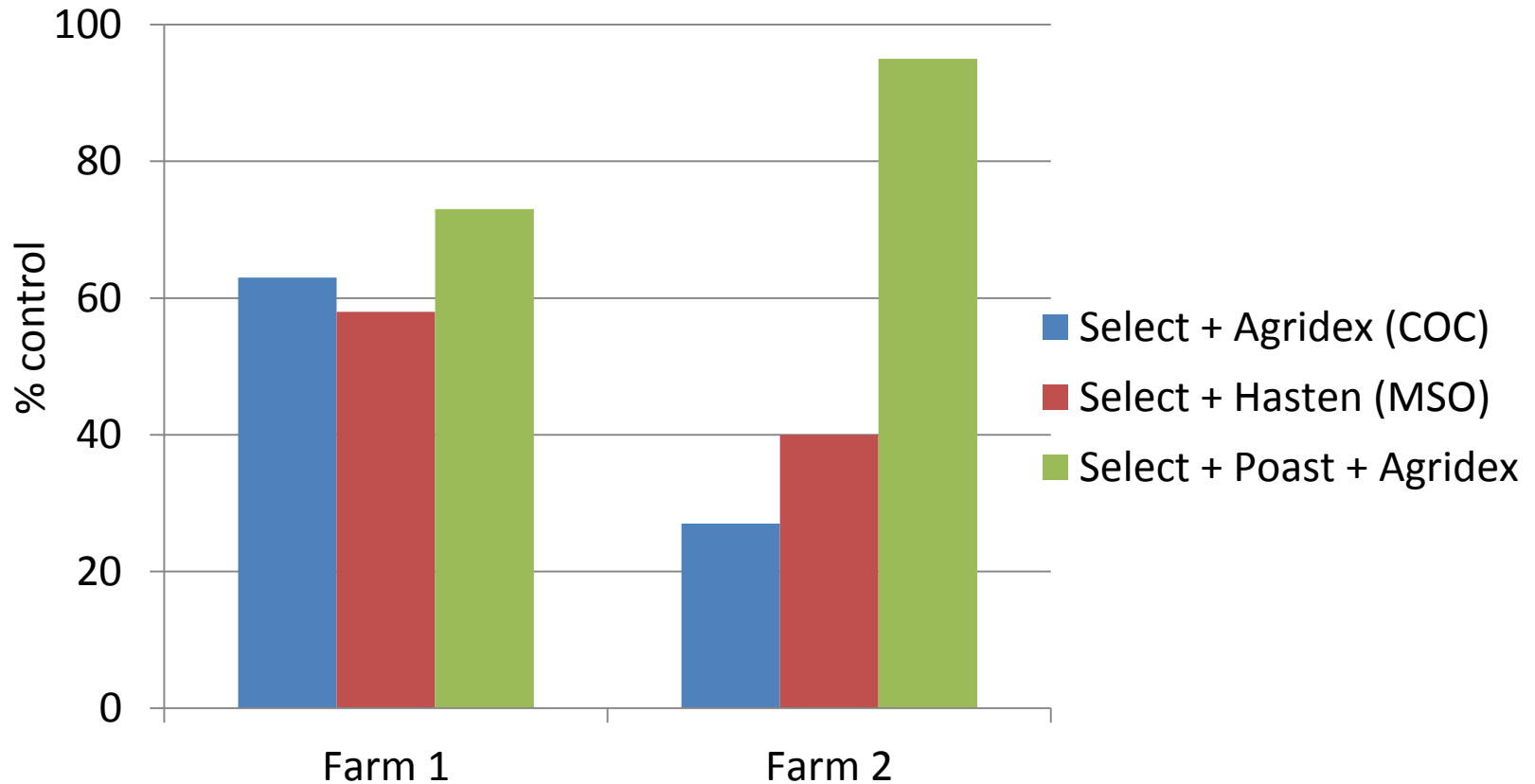
Grass control: new planting recommendations

- New planting – Devrinol, followed Callisto, followed by grass herbicides as needed.
- Devrinol DF – XT (dry) and Devrinol 2-XT (liquid)
- Devrinol great pre-emergent herbicide for grass control on new planting when used at very low rates (2-6 lbs/ac)
- Devrinol is also excellent against Point Broom Sedge and Lotus at higher rates

Grass control: new recommendations for perennial grasses

- Combination of Clethodim (Volunteer/Select) & Sethoxydim (Poast) at full label rates
 - Combination better than either product applied alone
 - Repeat applications maybe required on tough grass species
 - Recommend this combination if you have problem grasses
 - Avoid MSO surfactant during bloom

Reed Canary Grass control 7/7/17



Applied 2/23/17 and 4/14/17

Combination works better than single product.

Grass control: new labels

- **Chemigation label for Intensity and Intensity One**
 - Loveland label for clethodim
 - Chemigation approved in MA, approval expected in WA soon (SLN)
 - Why? Easy and avoid physical damage to fruit during growing season.
 - What weeds?
 - Late season grasses (barnyard grass in particular)
 - Grass spread throughout the beds requiring widespread treatment over the spring and summer
 - New planting with new grasses
 - Why not?
 - Likely affect grass on dikes, so depends on the bed design.



Yellow River



Stevens



CNJ 98-153-48



GH1



BG's



Pilgrim



CNJ 93-21-170



NJS 98-71



Willapa Red



HyRed



Decoranville



Crimson Queen



AR2



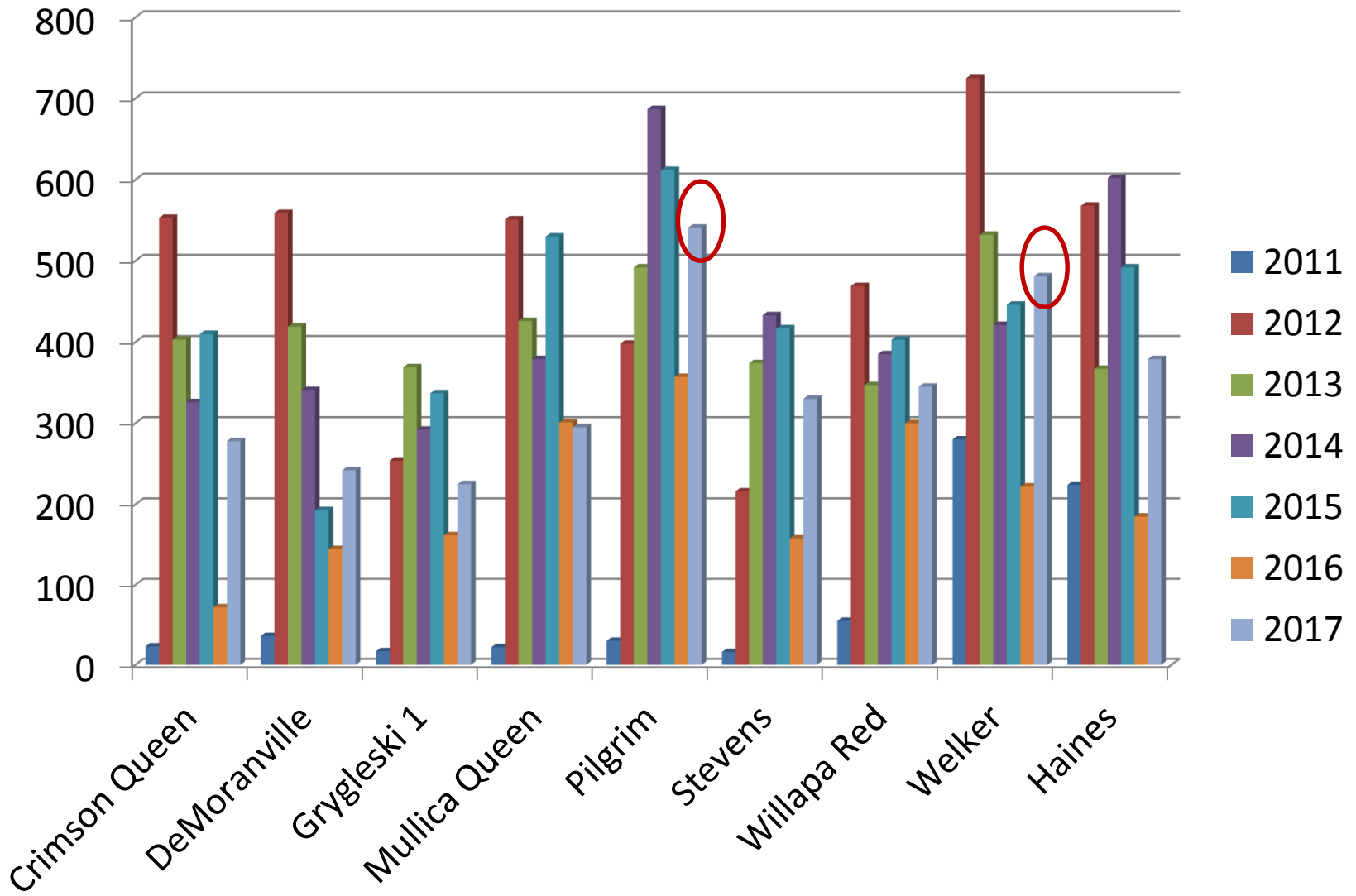
Bain Favorite



Mullica Queen

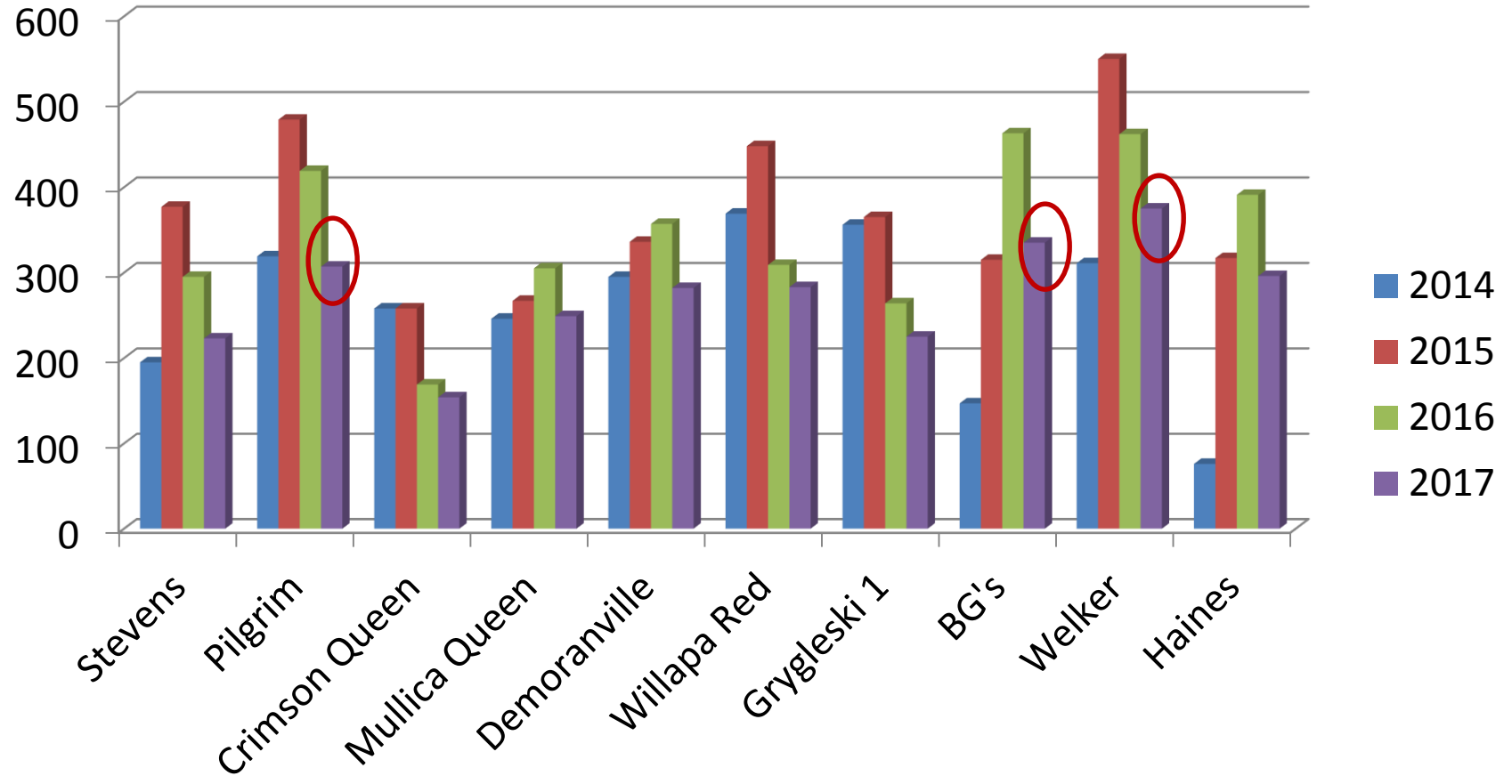
Oregon

bbl/ac



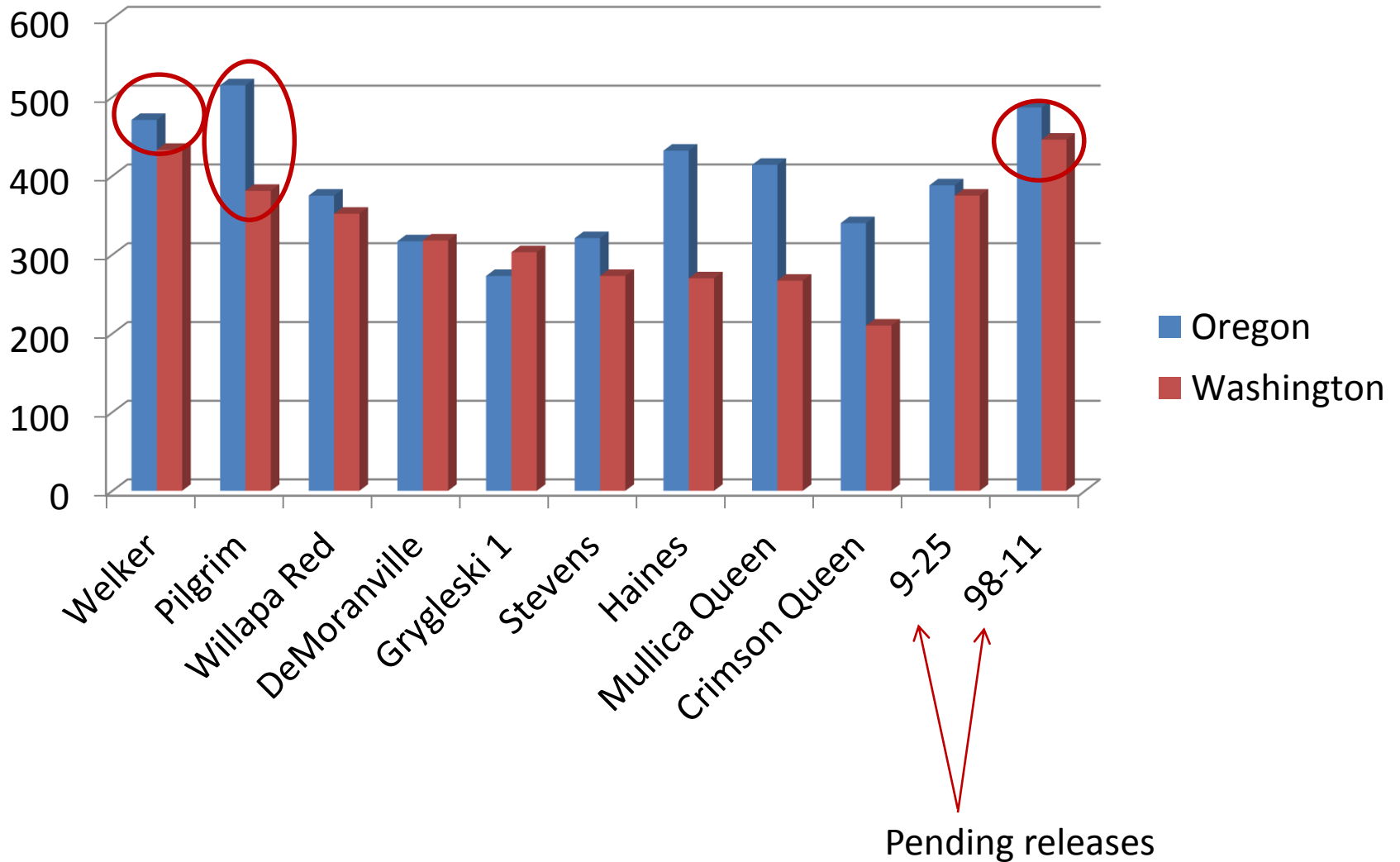
Washington

bbt/ac



Mean yield

bbl/ac



Goat Yoga



WASHINGTON STATE UNIVERSITY
 EXTENSION

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