

Oregon Updates

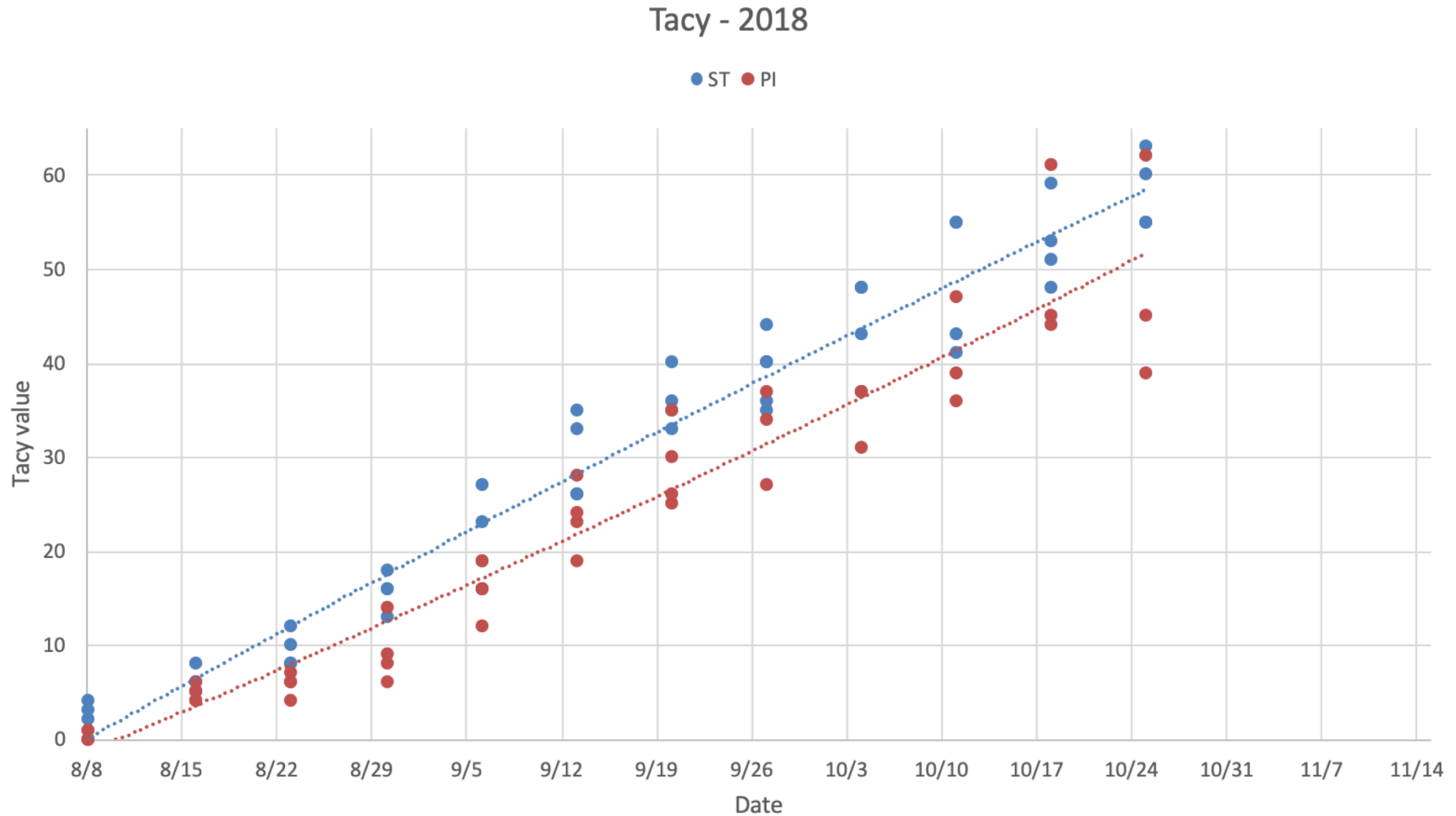
Cassie Bouska

2019 Oregon Cranberry School

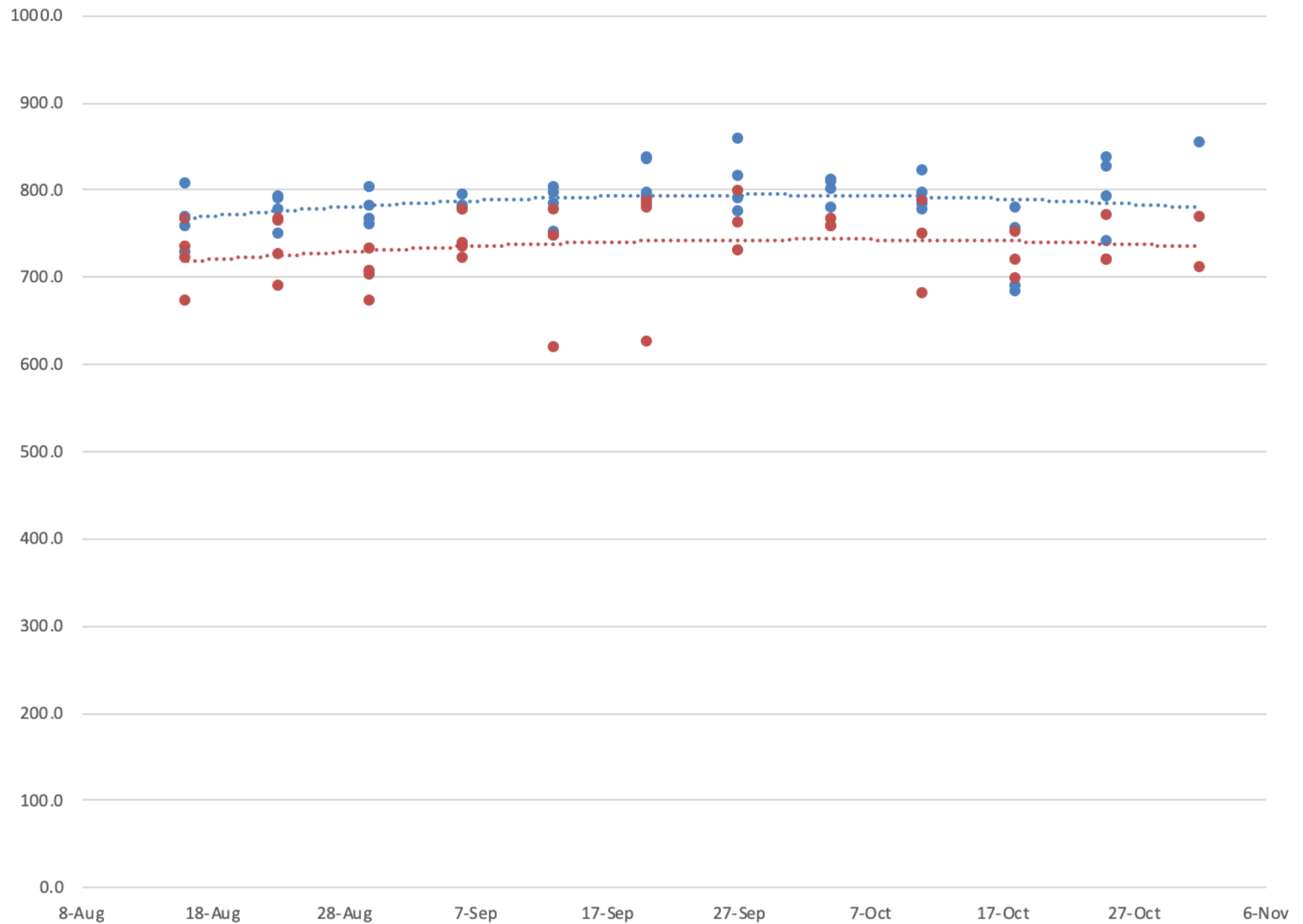


Oregon State University

Fruit development study

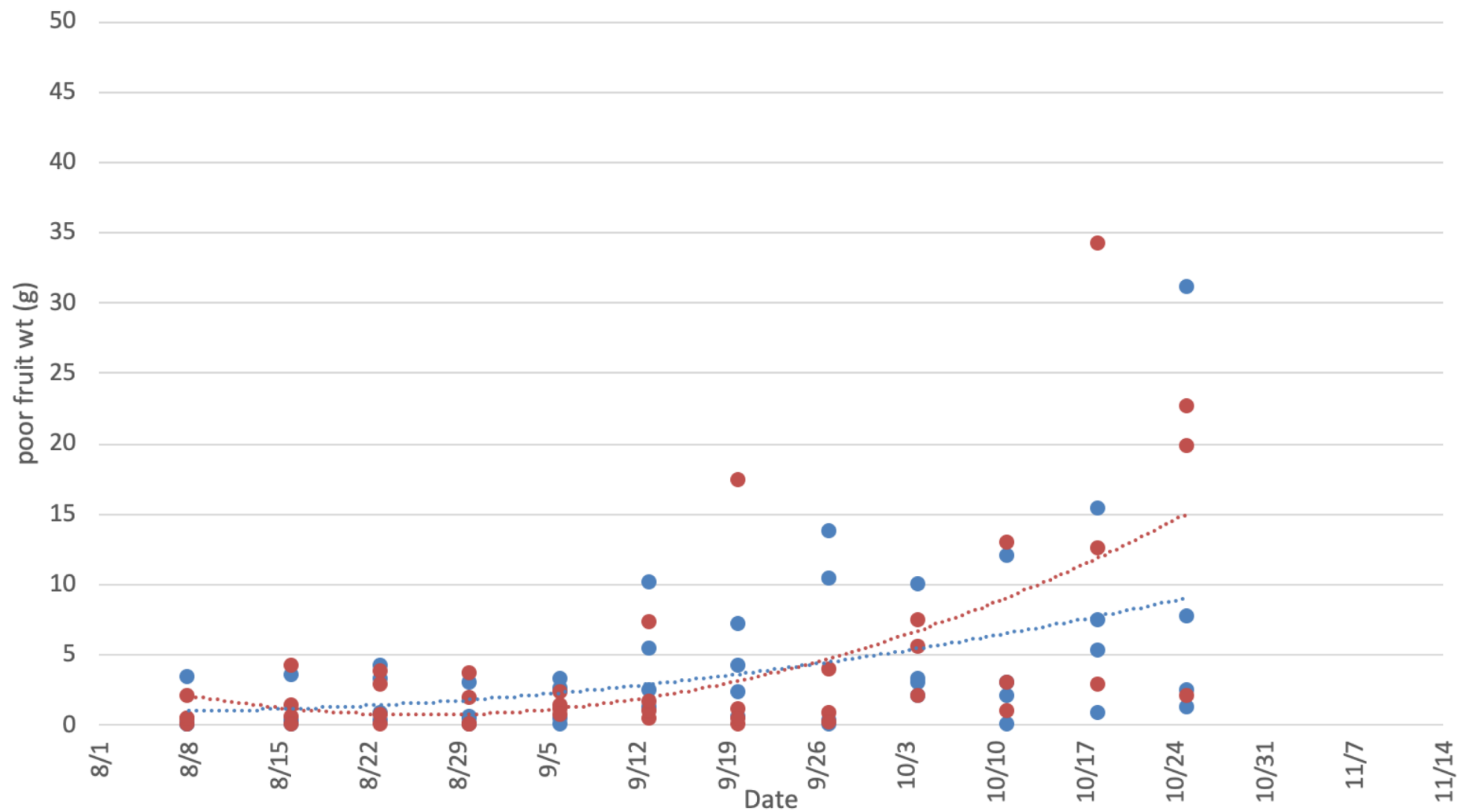


Avg Firmness

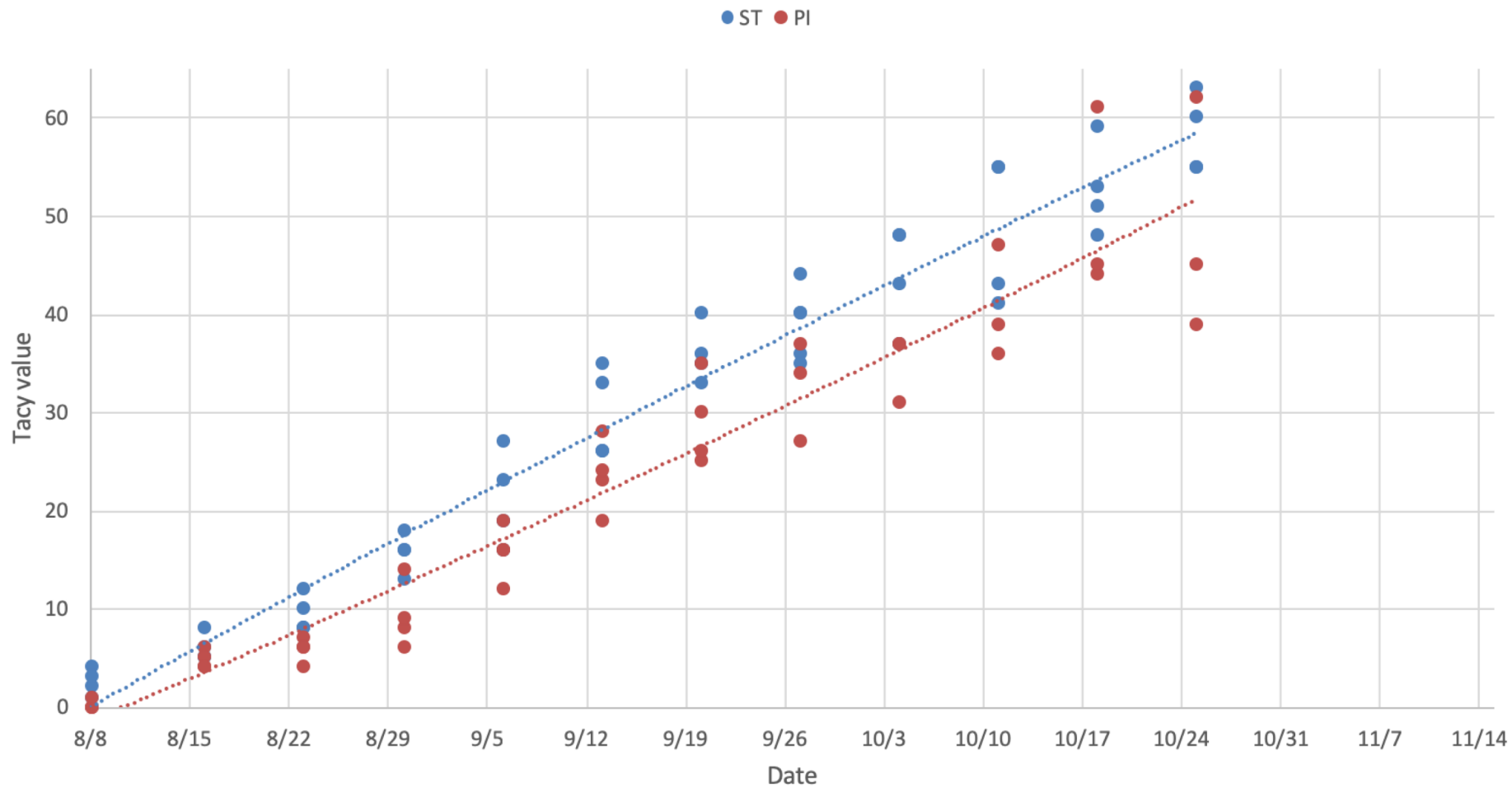


Weight (g) of poor fruit per sample

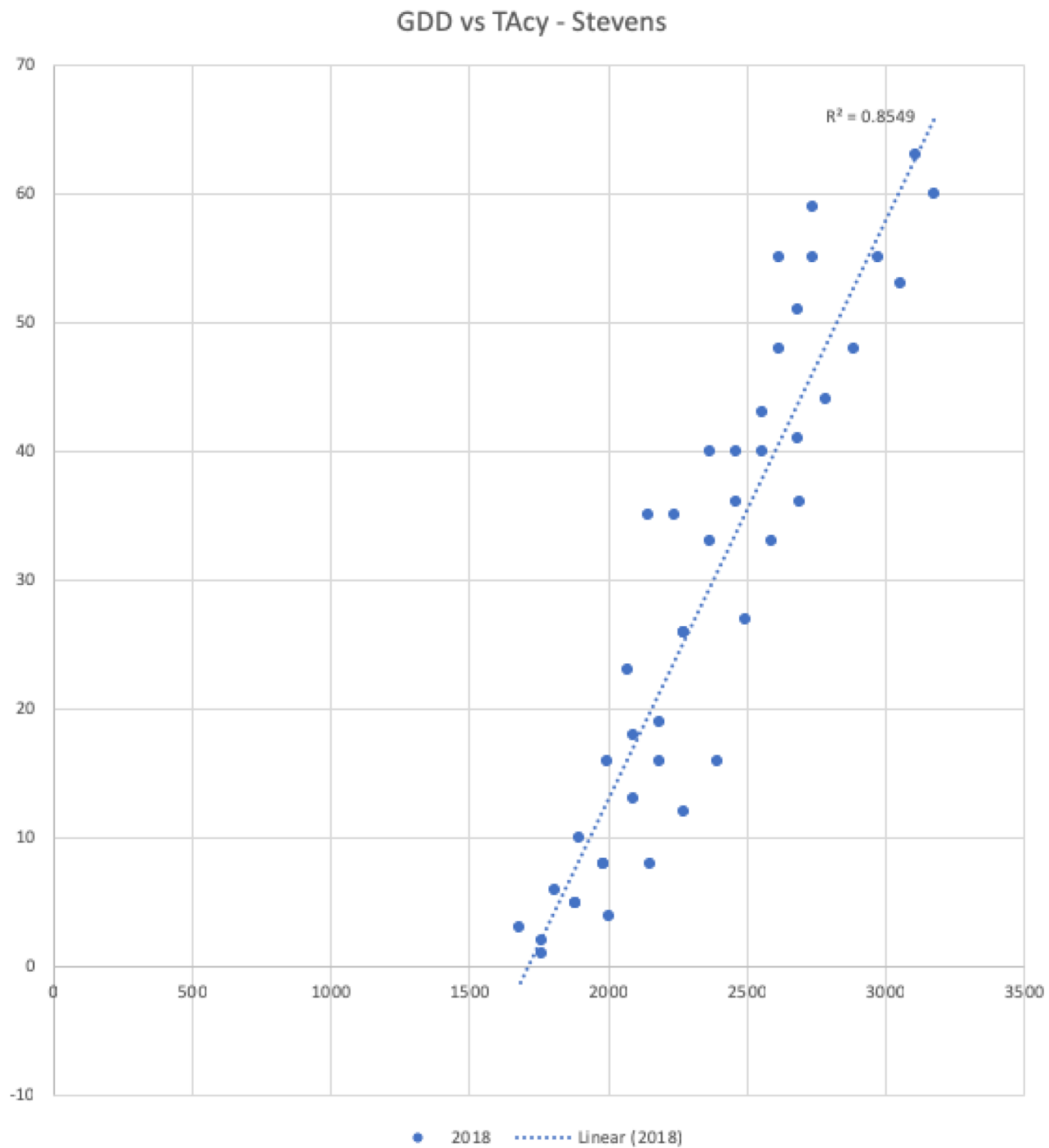
ST PI



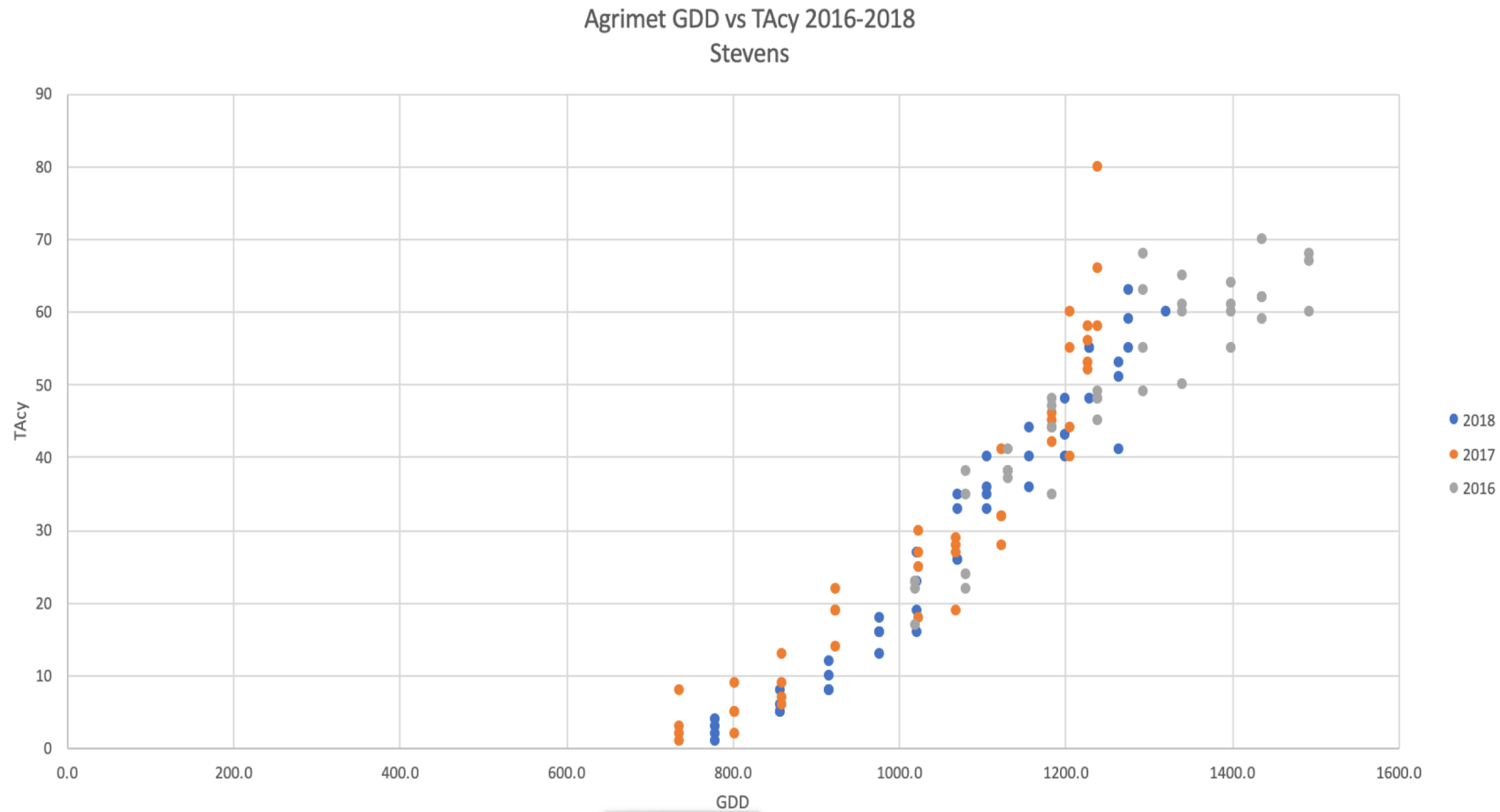
Tacy - 2018



STEVENS

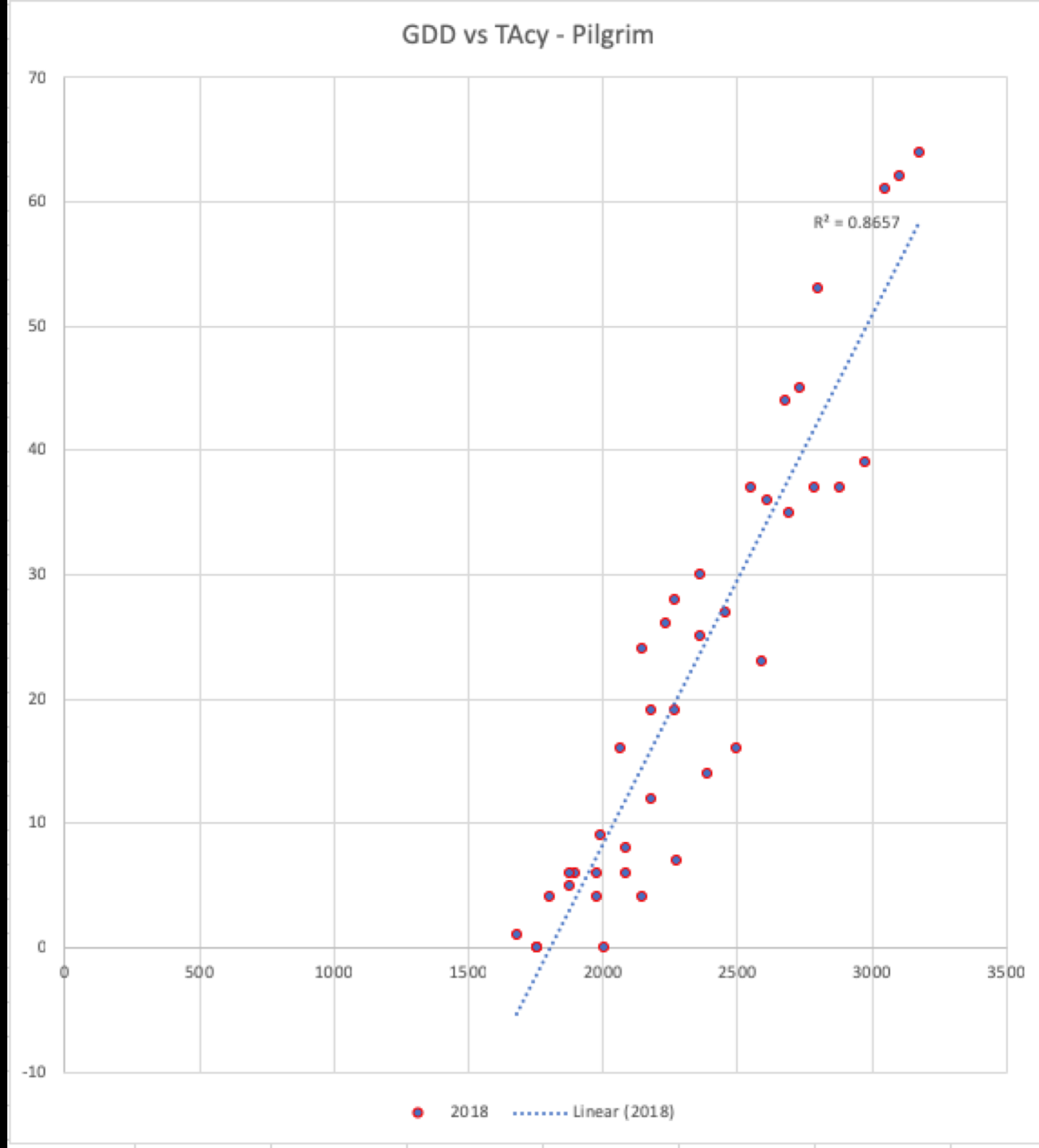


STEVENS



Screenshot

PILGRIM



Tipworm

- Located at sites across growing region



Scale update

- No greedy scale
- Brown soft scale
- Oystershell scale
- Cottony scale

Brown Soft Scale

- 2% M-Pede
- Boom sprayed (NOT chemigated)
- Check nozzles





Cottony scale



Oystershell Scale



Not a big problem,
but it's out there

Watch for dead
spots in beds

We'll have to treat
this one like greedy
scale

Oystershell scale

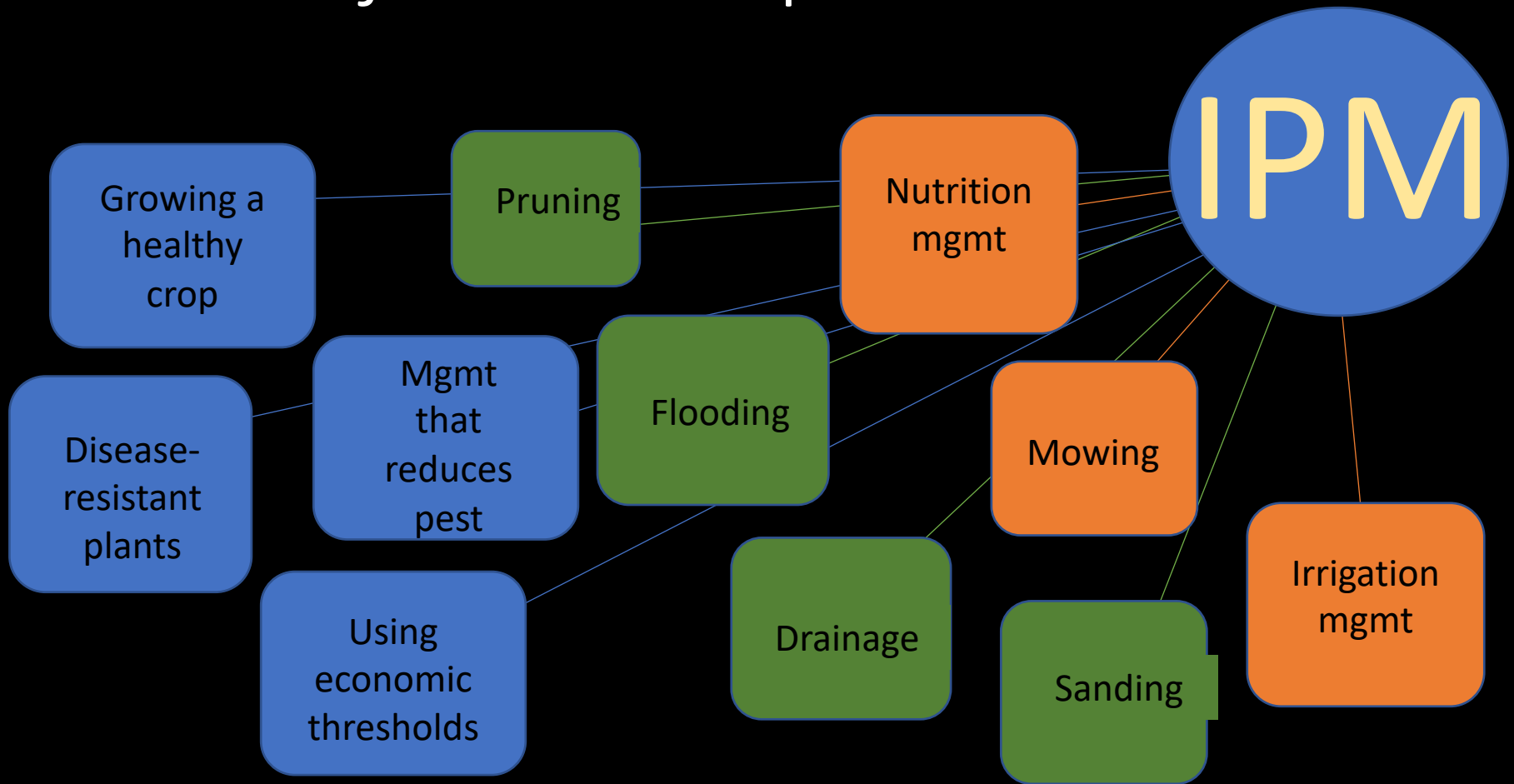


Pesticide Resistance Management

Integrated Pest Management ...

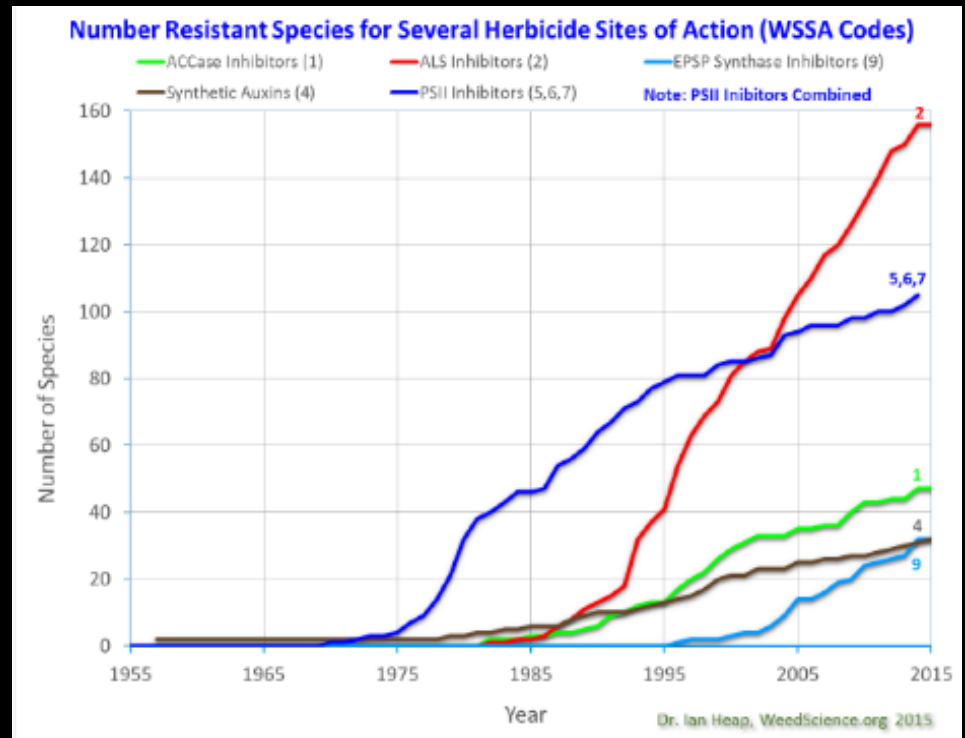
- Focuses on long-term prevention
- Is a combined approach that uses
 - Biological control
 - Habitat manipulation
 - Cultural practices
 - Resistant varieties
- Depends on monitoring
- Minimizes risk to
 - Humans
 - The environment
 - Non-target organisms
- Maximizes impact on target pest

It's not just about pesticides



Is resistance something to worry about?

- Mode of action (MOA)
- Resistance increasing



Is resistance something to worry about?

Pest	Product
Weevil in MA	Resistant to OPs, Concerns about Avaunt
Sparganothus fruitworm	Resistant to OP Concerns about Delegate
Tipworm	Suspected resistance to diazinon

Also:

- Curio
- Glyphosate
- Select, etc
- Poast
- Callisto
- ...

High Risk

Repeated
applications of the
same pesticide

Regular calendar-based
spraying

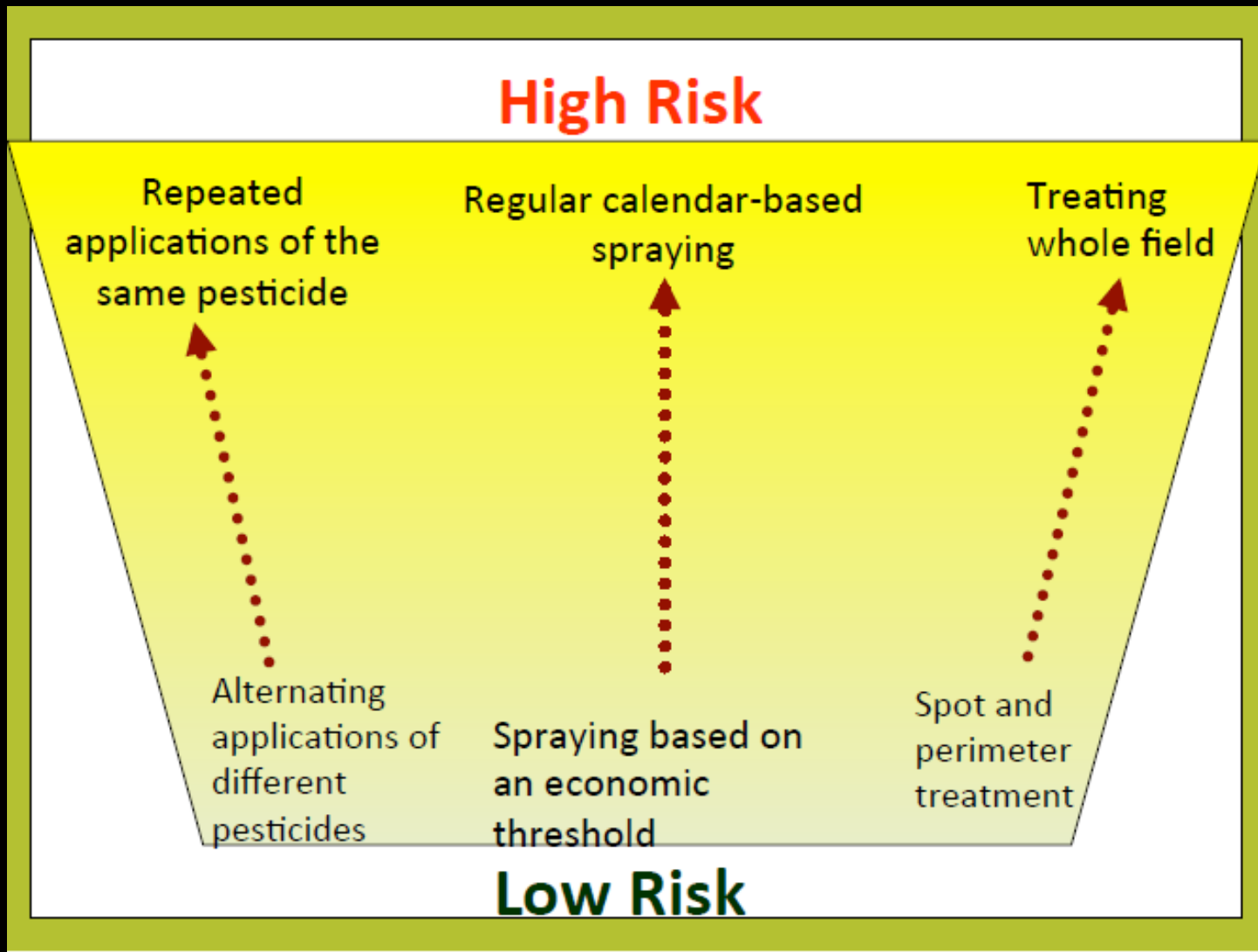
Treating
whole field

Alternating
applications of
different
pesticides

Spraying based on
an economic
threshold

Spot and
perimeter
treatment

Low Risk



Black-headed fireworm

Dormancy/bud-break (Nov – April)	Shoot elongation (April-May)	Bloom (May – June)	Fruit set/development (June – September)	Harvest (Aug – Nov)
Flooding Cultural	Altacor 28	Altacor 28	Altacor 28	
	Diazinon 1A	Intrepid 18	Diazinon 1A	
		Intrepid 18		
	Imidan 1A	Intrepid 18	Imidan 1A	
	Pyganic, etc. 3A	Pyganic, etc. 3A	Pyganic, etc. 3A	
	Delegate 5	Delegate 5	Delegate 5	
	Entrust 5	Entrust 5	Entrust 5	
	Orthene 1B		Orthene 1B	
	Assail, etc. 4A		Admire Pro 4A	

Bt
Biopesticide

Grandevo
Biopesticide

Growth Stages in Cranberry

Dormancy/ bud-break (Nov – April)	Shoot elongation (April-May)	Bloom (May – June)	Fruit set/ development (June – Sept)	Harvest (Aug – Nov)
---	--	------------------------------	--	-------------------------------

Pest Management

Dormancy/ bud-break (Nov – April)	Shoot elongation (April-May)	Bloom (May – June)	Fruit set/ development (June – Sept)	Harvest (Aug – Nov)
---	--	------------------------------	--	-------------------------------



Pest Management

Dormancy/ bud-break (Nov – April)	Shoot elongation (April-May)	Bloom (May – June)	Fruit set/ development (June – Sept)	Harvest (Aug – Nov)
---	--	------------------------------	--	-------------------------------

MOA #1

Pest Management

Dormancy/ bud-break (Nov – April)	Shoot elongation (April-May)	Bloom (May – June)	Fruit set/ development (June – Sept)	Harvest (Aug – Nov)
---	--	------------------------------	--	-------------------------------

MOA #1

MOA #1

MOA #1

Pest Management

Dormancy/ bud-break (Nov – April)	Shoot elongation (April-May)	Bloom (May – June)	Fruit set/ development (June – Sept)	Harvest (Aug – Nov)
	MOA #1	MOA #2	MOA #1	

Fireworm

Dormancy/ bud-break (Nov – April)	Shoot elongation (April-May)	Bloom (May – June)	Fruit set/ development (June – Sept)	Harvest (Aug – Nov)
Year 1	MOA #1		MOA #2 MOA #2	

Example 1: Fireworm Controls

Dormancy/ bud-break (Nov – April)	Shoot elongation (April-May)	Bloom (May – June)	Fruit set/ development (June – Sept)	Harvest (Aug – Nov)
Year 1	MOA #1		MOA #2 MOA #2	
Year 2	MOA #3		MOA #4	

Example 1: Fireworm Controls

Dormancy/ bud-break (Nov – April)	Shoot elongation (April-May)	Bloom (May – June)	Fruit set/ development (June – Sept)	Harvest (Aug – Nov)
Year 1	MOA #1		MOA #2 MOA #2	
Year 2	MOA #3		MOA #4	
Year 3		MOA #4	MOA #5	

Example 1: Fireworm Controls

Dormancy/ bud-break (Nov – April)	Shoot elongation (April-May)	Bloom (May – June)	Fruit set/ development (June – Sept)	Harvest (Aug – Nov)
Year 1	MOA #1		MOA #2 MOA #2	
Year 2	MOA #3		MOA #4	
Year 3		MOA #4	MOA #5	
Year 4	MOA #1	MOA #4	MOA #5	

Fireworm

Dormancy/ bud-break (Nov – April)	Shoot elongation (April-May)	Bloom (May – June)	Fruit set/ development (June – Sept)	Harvest (Aug – Nov)
Year 1	MOA #1		MOA #2 MOA #2	
	MOA #3		MOA #4	
Year 3		MOA #4	MOA #5	
	MOA #1	MOA #4	MOA #5	
Year 5	MOA #1	MOA #4 MOA #5	MOA #4	

Fireworm

Dormancy/ bud-break (Nov – April)	Shoot elongation (April-May)	Bloom (May – June)	Fruit set/ development (June – Sept)	Harvest (Aug – Nov)
Year 1	MOA #1		MOA #1	
Year 2		MOA #1	MOA #1	
Year 3	MOA #1		MOA #1	
Year 4	MOA #1		MOA #1	
Year 5	MOA #1		MOA #1	

Example 3: Fireworm Controls

Dormancy/ bud-break (Nov – April)	Shoot elongation (April-May)	Bloom (May – June)	Fruit set/ development (June – Sept)	Harvest (Aug – Nov)
Year 1		MOA #2	MOA #5	
		MOA #6	MOA #1	
	MOA #2	MOA #5	MOA #1	
Year 3	MOA #2		MOA #2	
	MOA #2	MOA #4	MOA #6	
Year 5		MOA #5		

Example 4: Fireworm Controls

Dormancy/ bud-break (Nov – April)	Shoot elongation (April-May)	Bloom (May – June)	Fruit set/ development (June – Sept)	Harvest (Aug – Nov)
Year 1	MOA #4	MOA #4	MOA #4	
	MOA #4	MOA #4		
Year 3	MOA #4		MOA #4	

High Risk

Repeated
applications of the
same pesticide

Regular calendar-based
spraying

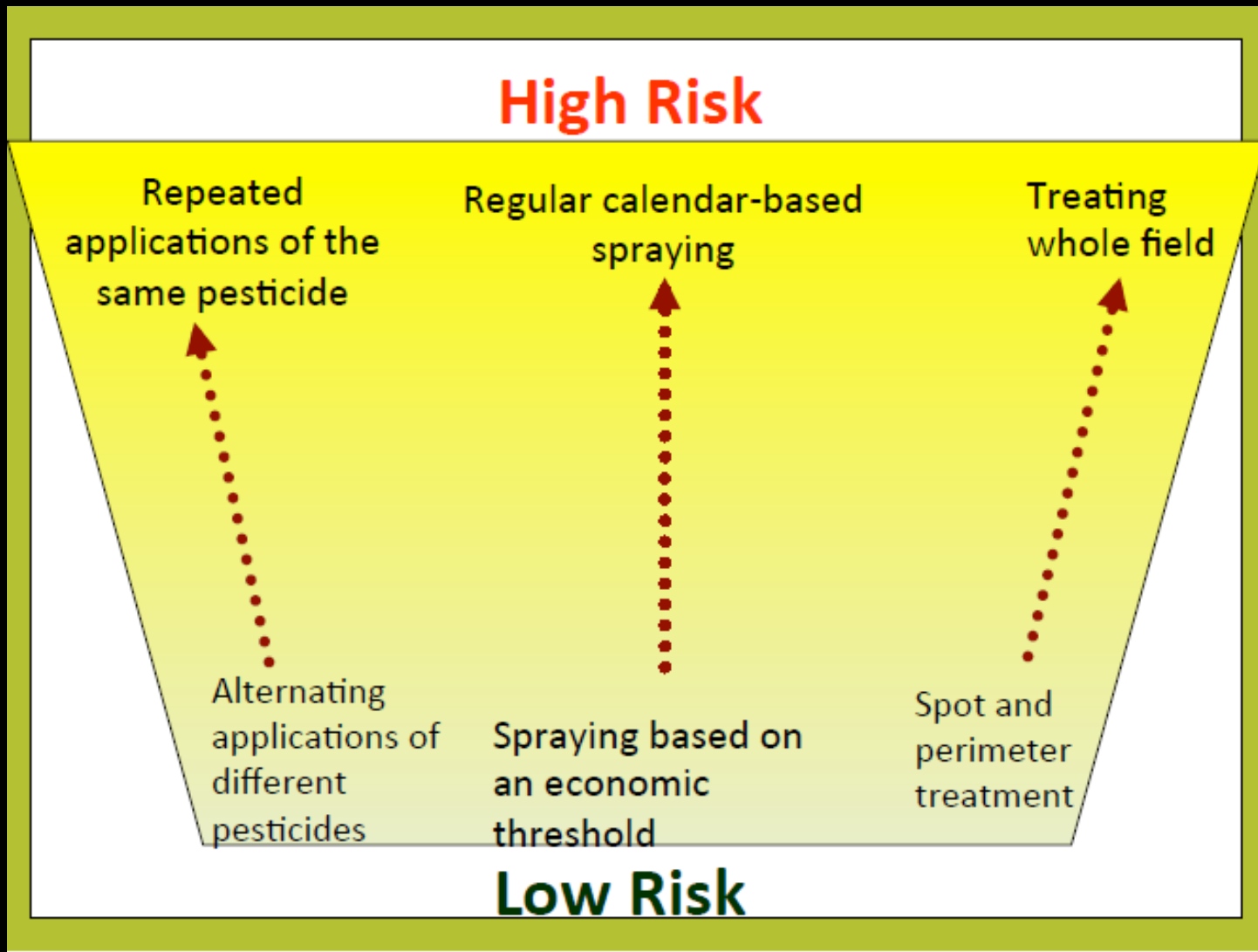
Treating
whole field

Alternating
applications of
different
pesticides

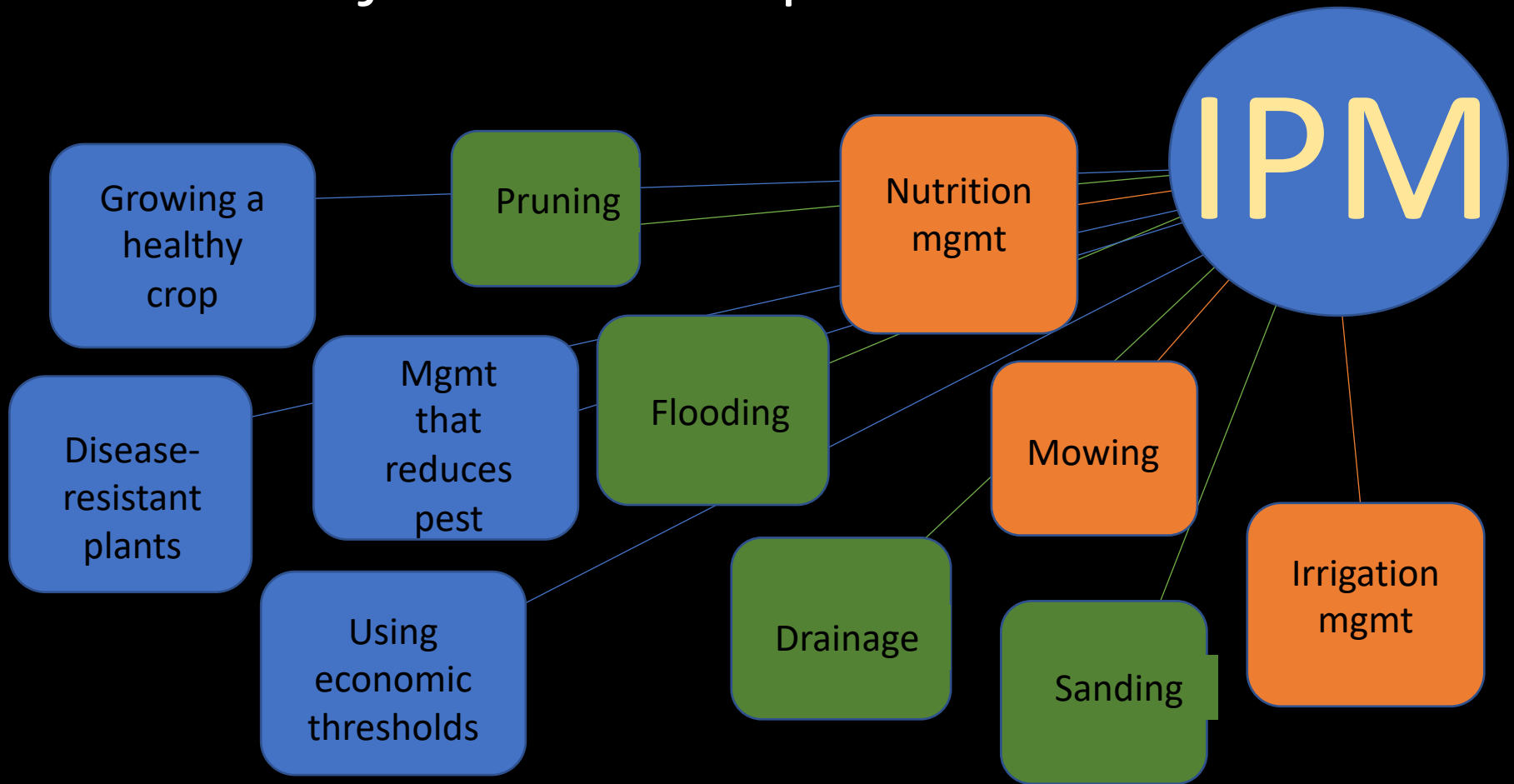
Spraying based on
an economic
threshold

Spot and
perimeter
treatment

Low Risk



It's not just about pesticides











2018 Northwest United States Cranberry Pesticide Chart

Oregon and Washington


Growers applying chemicals written in bold font should refer to their handler's recommendations for additional directions.

IRAC	Insecticide	Rate per acre	MAX	PHI (days)	REI	(Active Ingredient) - Notes
1	Diazinon AG600	51 to 76.5 fl.oz.	3 apps	7	5 days	Recommended 3-day water impoundment. Reduced odor and handler hazard for AG600. 14-day minimum application interval except AG500, which has a 7-day minimum application interval. No aerial application allowed. EXTREMELY toxic to bees.
	Diazinon 50W	4 to 6 lbs.				
	Diazinon AG500	2 to 3 qts.				
	Imidan 70W	1.3 to 4.0 lbs.	15.6 lbs.	14	3 days	(Phosmet). For heavy insect infestations and cranberry fruitworm, use higher rate. Insecticidal activity may be reduced if pH is 6 or higher. EXTREMELY toxic to bees.
	Lorsban 4E, Chlorpyrifos 4ER, Nufos, Advanced	3 pts.	2 apps	60	24 hrs	(Chlorpyrifos). Note chemigation parameters on label. Consult label for water impoundment requirements: 5 days recommended. Do not apply to flooded bogs. EXTREMELY toxic to bees.
	Lorsban 75WG	2 lbs.				
	Acephate 90, WSP, WDG, Prill	1.1 lbs.	1 app	90 or 75	24 hrs	(Acephate). See label for application timing. PHI interval and pollinator warnings. PHI varies depending on product and state. EXTREMELY toxic to bees.
	Orthene or Acephate 97, 97UP or 97 WDG	1 lb.				
	Sevin XLR, 4F	1.5 to 2 qts.	10 qts.	7	12 hrs.	(Carbaryl). Note pollinator caution. EXTREMELY toxic to bees.
3	Pyganic EC 1.4	16 to 64 fl. oz.		0	3	(Pyrethrins). Sunlight degrades product. Final spray should be buffered to 5.5 to 7.0 pH.
	Pyganic EC 5.0	4.5 to 18 fl.oz.				
3A	Aza-Direct	1 to 2 pts.	See label	0	4 hrs.	(Azadirachtin). Antifeedant, repellent, insect growth regulator.
	Neemix 4.5	4 to 16 fl.oz.				
	Azera	2 pts.				
4	Actara	2 to 4 oz.	12 oz.	30	12 hrs	(Thiamethoxam). Hold water for 5 days after application. EXTREMELY toxic to bees.
	Admire Pro	7 to 14 oz.	14 fl. oz.	30	12 hrs	(Imidacloprid). No aerial application. Do not apply during bloom. See label for application rates and timing. EXTREMELY toxic to bees
	Alias or Nuprid 4F, Wrangler	8 to 16 fl. Oz.	16 fl. Oz.			
	Alias 2F or Nuprid 2SC, Widow	16 to 32 fl. oz.	32 fl.oz.			
	Assail 30 SG	4 to 6.9 oz.	13.8 oz.	See note	12 hrs	(Acetamiprid). Coverage and timing are critical as insect pests must ingest the product. Not 60-day PHI for water harvest fruit. Moderately toxic to bees.
	Assail 70 WP	1.7 to 3.0 oz.	6 oz.			
4A	Scorpion	3.5 to 7 fl. oz.	14 fl.oz.	7	12 hrs	(Dinotefuran). Can be applied by air or ground.
5	Delegate WG	3 to 6 oz.	19.5 oz.	21	4 hrs	(Spinetoram). Refer to label to minimize insect resistance. EXTREMELY toxic to bees.
	Entrust	1.23 to 3 oz.	9 oz.	21	4 hrs.	(Spinosad). Entrust is USDA organic approved. EXTREMELY toxic to bees.
11	DiPel, Xen Tari, Biobit	See label		0	4 hrs.	(Bacillus thuringiensis). Most effective against early stage larvae. Xen Tari is toxic to aquatic invertebrates.
18	Confirm 2F	16 fl.oz.	64 fl.oz.	30	4 hrs	(Tebufenozide). Chemigation allowed.
22	Avaunt	6 oz.	24 oz.	30	12 hrs.	(Indoxacarb). Hold water for 1 day after application. EXTREMELY toxic to bees.
23	Movento	8 to 10 fl. oz.	30 fl.oz.	7	24 hrs.	(Spirotetramat). Chemigation allowed.
28	Altacor	3.0 to 4.5 oz.	9 oz.	1	4 hrs.	(Chlorantraniliprole). 7-day minimum for reapplication. Chemigation allowed.

FRAC	Fungicide	Rate per acre	MAX	PHI (days)	REI	(Active Ingredient) - Notes	
M1	Badge SC, Champ, Kocide, Nordox, Nucop, Cuprofix Ultra 40	See label	See label	0	12 to 48 hrs.	(Copper hydroxide). REI is dependent on product.	
M3	Ferbam Granuflo	6 lbs.	5 apps.	50	24 hrs.	No later than 28 days after mid-bloom.	
	ManKocide	7 lbs.	21 lbs.	30	24 hrs.	(Mancozeb and copper hydroxide). 7-day minimum application interval.	
	Dithane F45, Manzate MAX	2.4 to 4.8 qts.	14.4 qts.			(Mancozeb). See label for maximum application interval.	
	Penncozeb, Dithane M45, Manzate Pro-stick	3 to 6 lbs.	See label				
M5	Chloronil 720, Equus 720	4 to 6.5 pts.	20 pts. Or 15 lbs. a.i./acre	50	12 hrs.	(Chlorothalonil). CONSULT HANDOUT for release of irrigation water for at least 48 hrs. Most products are labeled for use on ornamentals, invertebrates and wildlife.	
	Weather Stik						
	Echo 720	4 to 7 pts.					
	Echo 90 DF	3.25 to 5.75 lbs.					
	Equus 500 ZN	5.8 to 9.25 pts.	29 pts.				
	Echo Zn	6 to 10 pts.	28.8 pts.				
	Bravo Ultrex, Equus DF	3.8 to 6 lbs.	18.2 lbs.				
11	Abound	6 to 15.5 fl. oz.	92. fl.oz.	3	4 hrs.	(Azoxystrobin). See label regarding use.	
33	Aliette WDG	5 lbs.	20 lbs.	3	12 hrs.	(Aluminum tris). Do not exceed 4 lbs./acre.	
	Phostrol	5 to 6 pts.	See label	3	4 hrs.	(Phosphites). Read label and follow directions.	
	Rampart, Confine	1 to 3 qts.					
	ProPhyt	4 pts.	3 apps.	0			
3	Indar 2F	6 to 12 fl.oz.	4 apps.	30	12 hrs.	(Fenbuconazole). Chemigation approved.	
	PropiMax, Tilt	4 to 6 fl. oz.	24 fl.oz.	45		(Propiconazole). Refer to product label.	
	Proline 480 SC	5 fl. oz.	2 apps.			(Prothioconazole). See supplement.	
4	Ridomil Gold SL	1 to 1.75 pts.	3 apps	45	48 hrs	(Mefenoxam). SL and Ultra not allowed.	
	Ultra Fluorish	3 to 3.5 pts.					
	Ridomil Gold GR	20 to 35 lbs.					
19	Oso 5% SC	3.75 to 13 fl. oz.	6 apps	0	4 hrs.	(Polyoxin D). Chemigation allowed.	
	Ph-D	6.2 oz.					
No code No code No code	Top Cop w/Sulfur	2 qts.		0	24 hrs.	(Copper sulfate). 7-day minimum interval.	
	Bordeaux 8:8:100	24 lbs.		0	48 hrs.	Repeated use may cause plant injury.	
		Copper-Count-N	8 qts.	3 apps.	0	12 hrs.	(Copper). 10-day minimum application interval.

Toxicity	Insecticide	Rate per acre	MAX	PHI (days)	REI	IRAC	Notes
	Actara	2 to 4 oz.	12 oz.	30	12 hrs.	4	No aerial application. Hold water for 5 days after application. EXTREMELY toxic to bees.
	Admire Pro	7 to 14 fl. oz.	14 fl. oz.	30	12 hrs.	4	No aerial application. Do not apply during bloom. See label for application rates and timing. EXTREMELY toxic to bees.
	Alias or Nuprid 4F, Wrangler	8 to 16 fl. oz.	16 fl. oz.				
	Alias 2F or Nuprid 2SC, Widow	16 to 32 fl. oz.	32 fl. oz.				
	Altacor	3.0 to 4.5 oz.	9 oz.	1	4 hrs.	28	7-day minimum for reapplication. Chemigation allowed.
	Assail 30 SG	4 to 6.9 oz.	13.8 oz.	See note	12 hrs.	4	Coverage and timing are critical as insect pests must ingest the product. Note 60-day for water harvest fruit. Moderately toxic to bees.
	Assail 70 WP	1.7 to 3.0 oz.	6 oz.				
	Avaunt	6 oz.	24 oz.	30	12 hrs.	22	Hold water for 1 day after application; no flow through bogs. EXTREMELY toxic to bees.
	Belay	4 fl. oz.	12 fl. oz.	21	12 hrs.	4	Use the higher rate for post-bloom soil application only. Follow local recommendation targeting specific pests. EXTREMELY toxic to bees.
		12 fl. oz.					
	† Confirm 2F	16 fl. oz.	64 fl. oz.	30	4 hrs.	18	Chemigation allowed. Suggested use of a spreader sticker improves coverage.
	Cryolite 50 Dust	19 to 23 lbs.	69 lbs.	30	12 hrs.		Ground application only for Cryolite Bait. See label for minimum application interval
	* Diazinon AG600	51 to 76.5 fl. oz.	3 apps	7	5 days	1	Recommend 3-day water impoundment. Reduced odor and handler hazard for AG600. 7-day minimum application interval except AG500, which has a 7-day minimum application interval. No aerial application allowed. EXTREMELY toxic to bees.
	* Diazinon 50W	4 to 6 lbs.					
	* Diazinon AG500	2 to 3 qts.					
	† Delegate WG	3 to 6 oz.	19.5 oz.	21	4 hrs.	5	Refer to label to minimize insect resistance. EXTREMELY toxic to bees.
	Imidan 70W	1.3 to 4.0 lbs.	15.6 lbs.	14	3 days	1	For heavy insect infestations and cranberry fruitworm use higher rate. Insecticidal activity may be reduced if pH is 6 or higher. EXTREMELY toxic to bees.
	† Intrepid 2F	10 to 16 fl. oz.	64 fl. oz.	14	4 hrs.	18	Suggested use of a spreader sticker improves coverage.

HRAC	Herbicide	Rate per acre	MAX	PHI (days)	REI	(Active Ingredient) – Notes
1	Poast	0.5 to 2.5 pts	5 pts	60	12 hrs	(Sethoxydim). No chemigation
	Select, Intensity	6 to 8 fl. oz.	32 fl. oz.	30	24 hrs	(Clethodim). No chemigation allowed
	Select Max	9 to 16 fl. oz.	64 fl. oz.			
4	2,4 – D granules	10 to 20 lbs.	1 app	See note	12 hrs.	(2,4-D). For preemergence use only. Read label for precautions.
	Weedar 64	2.4 pts.		30	48 hrs.	(2,4-D). Wipe over tops of weeds. Best if used in late June to July.
	Stinger	2.67 to 8 fl.oz.		50	12 hrs	(Clopyralid). Not within 5 feet of any moving water. Avoid wiping. Do not apply with surfactants.
	Spur	0.25 to 1pt.		45		
E	Aim EC	2 fl. oz.	6.15 fl.oz.	0	12 hrs	(Carfentrazone).
5	Simazine 4L	2 qts.	2 qts.	0	12 hrs.	
	Simazine 90 DF	2.2 qts.	2.2 qts.			
9	Glyfos, Roundup	Dilution rates vary	See label	30	See label	(Glyphosate).
27	Callisto	Up to 8 fl.oz.	16 fl.oz.	45	12 hrs	(Mesotrione). Adjuvant use is recommended but avoid a COC. Chemigation allowed.
20	Casoron 4G	Up to 100 lbs.	100 lbs.	See note	12 hrs.	(Dichlobenil). Apply early spring or <u>post harvest</u> .
15	Devrinol 2-XT, Devrionol DF-XT	See label	See label	See note	24 hrs.	(Napropamide). Special timing and soil type/rate relationships on label. Labeled for new plantings. See label for additional weeds, rates, PHI and yearly maximum.
2	Curio	0.5 lbs.	2 apps	60	12 hrs.	(Chlorimuron Ethyl). Add NIS or COC. 30-day minimum reapplication interval. Special Oregon SLN. Must sign waiver to use.
12	Evital 5G	80 to 160 lbs.	1 app	See note	12 hrs.	(Norflurazon). Apply once in early spring or post-harvest.
26	Quinstar 4L	8.4 fl. oz.	16.8 fl. oz.	60	12 hrs.	(Quinclorac). Follow label directions. Chemigation allowed.

Toxicity	Herbicide	Rate per acre	MAX	PHI (days)	REI	HRAC	Notes
	† Callisto	Up to 8 fl. oz.	16 fl. oz.	45	12 hrs.	27	Adjuvant use is recommended but avoid a COC. Chemigation allowed.
	Casoron 4G	Up to 100 lbs.	100 lbs.	See note	12 hrs.	20	Apply early spring or post-harvest.
	Curio	0.5 fl. oz.	1 fl. oz.	60	12 hrs.	2	24(c) for WA and OR only.
	Devrinol 2-XT, Devrinol DF-XT	See label	See label	See note	24 hrs.	15	Special timing and soil type/rate relationships on label. Labeled for use on corn. See label for additional weeds, rates, PHI and yearly maximum.
	Evital 5G	80 to 160 lbs.	1 app	See note	12 hrs.	12	Apply once in early spring or post-harvest.
	Glyfos, Roundup	Dilution rates vary	See label	30	See Label	9	Wipe over tops of weeds above vines. Do not touch or drip on corn.
	Poast	0.5 to 2.5 pts.	5 pts.	60	12 hrs.	1	No chemigation. Use 1.3 oz. per gallon of water and 0.6 oz. of D.
	Quinstar 4L	8.4 fl. oz.	16.8 fl. oz.	60	12 hrs.	26	Follow label directions. Chemigation allowed.
	Select	6 to 8 fl. oz.	32 fl. oz.	30	24 hrs.	1	No chemigation allowed. Add 0.25% v/v non-ionic surfactant (Select) in the finished spray volume. Do not apply between hook
	Select Max	9 to 16 fl. oz.	64 fl. oz.				
	Stinger	2.67 to 8 fl. oz.	16 fl. oz.	60	12 hrs.	4	Not within 5 feet of any moving water. Avoid wiping. Do not apply
	Weedar 64	2.4 pts.	1 app	30	48 hrs.	4	Wipe over tops of weeds. Best if used in late June to July.

Pesticide Resistance Management

Pesticide Resistance Management Oregon Cranberry School 2019

1. How many applications for fireworm did you put out this year?

2. What products did you use (list in order of use). If you used any cultural controls, include those as well.

3. Did you use scouting for the larvae to determine application timing?

4. Did you use adult monitoring data to determine application timing?

5. Did you want to change pesticides – or use alternative pesticides - for fireworm but were unable to? If so, why?

6. List the tools you used to prevent/control disease (fruit rot, lophodermium, etc) you applied in 2018. List them in order if you can.

7. List the tools you used to control grass in your bogs in 2018. List multiple applications if you made them.

8. What did you use on cutgrass (slough sedge) in 2018?

9. What do you think works best on cutgrass?

10. Did you gain or increase knowledge and/or skills about pesticide resistance prevention practices or strategies?

11. For those who are ag professionals (advise growers): Do you intend to use knowledge, skills, and/or awareness learned on pesticide resistance prevention in your education activities or services for growers?

12. What are your top 5 problem weeds?

Questions?

- Cassie Bouska
- 541-290-2287
- Cassie.bouska@oregonstate.edu

