Slide 1

WASHINGTON STATE UNIVERSITY EXTENSION

World Class. Face to Face.

Oregon Winter Workshop 2016

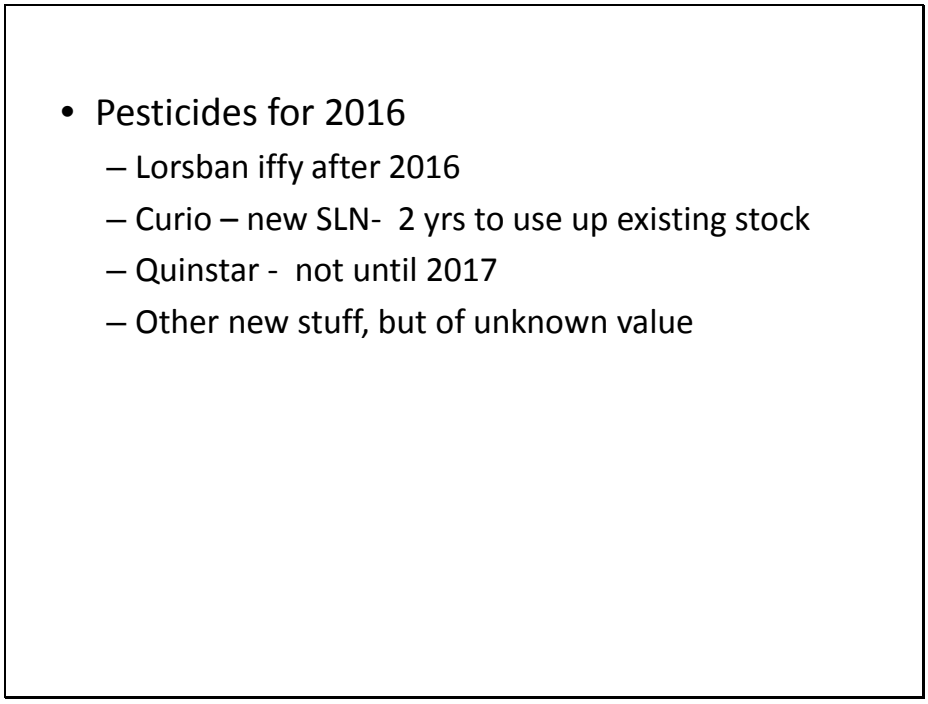
Kim Patten & Chase Metzger

BC Cranberry Marketing Commission
Washington State Commission for Pesticide Registration
Washington State Cranberry Commission
Oregon Cranberry Growers Association
The Cranberry Institute
Ocean Spray
PCCRF

Slide 2

- A few plagiarized slides from BC talks
- Varieties
- Fireworm
- Bees and pesticides
- Fungicides & fruit rot
- Residue - MRL
- Fruit size

Slide 3



If you have Lorsban, you'll probably want to use it up, because after 2016 it's iffy. EPA has it going under review and most people are not optimistic that we will keep that, so this would be a good year to use up existing stock and try not to buy more. It's always hard to predict these things, but that's mine and others' best estimate on what's going to happen.

You have two years to use up existing Curio stock.

It's anticipated that we will get Quinstar in March 2017. That might come into your planning of what you're going to do or not do for yellow loosestrife this season … you may want to hold back on using Casoron and just plan on using Quinstar next year for that. When you do that it's two applications in the spring and it does a pretty good job.

We have several other new registrations that have been labeled, but we don't have any data on them yet.

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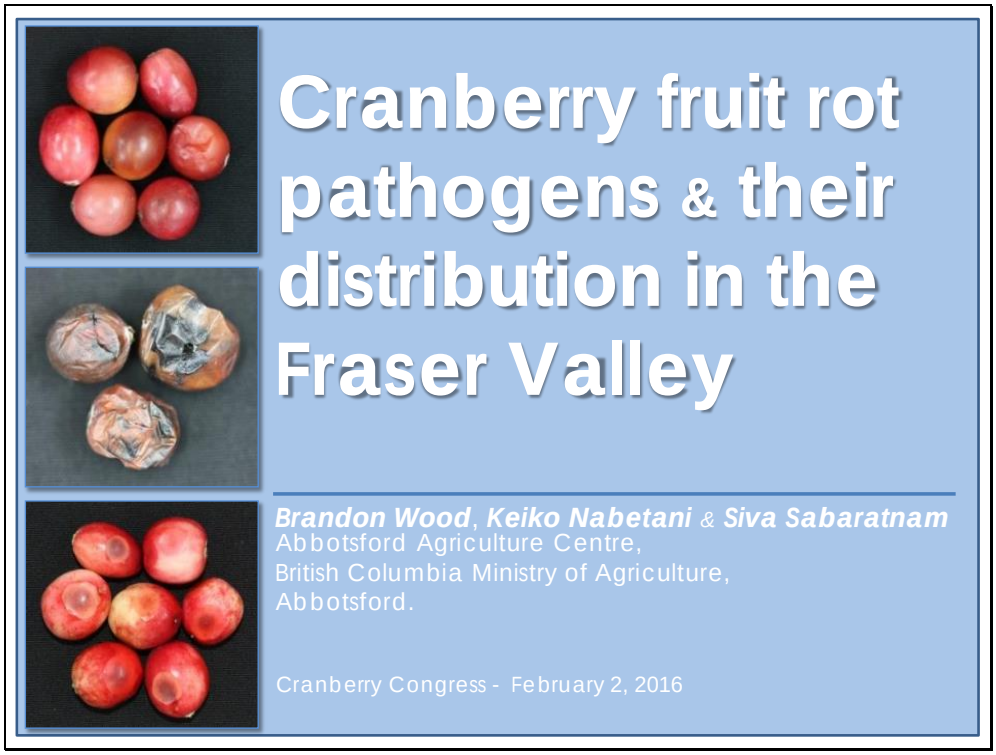
Cranberry fruit rot pathogens & their distribution in the Fraser Valley
Brandon Wood, Keiko Nabetani & Siva Sabaratnam
Abbotsford Agriculture Centre,
British Columbia Ministry of Agriculture,
Abbotsford.
Cranberry Congress - February 2, 2016

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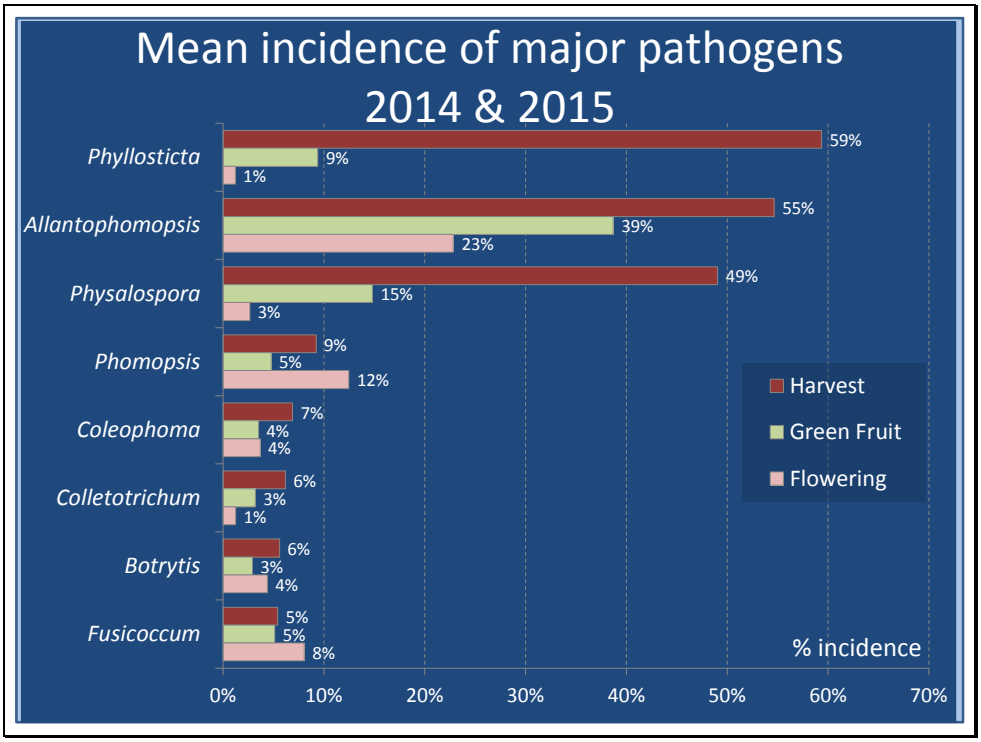
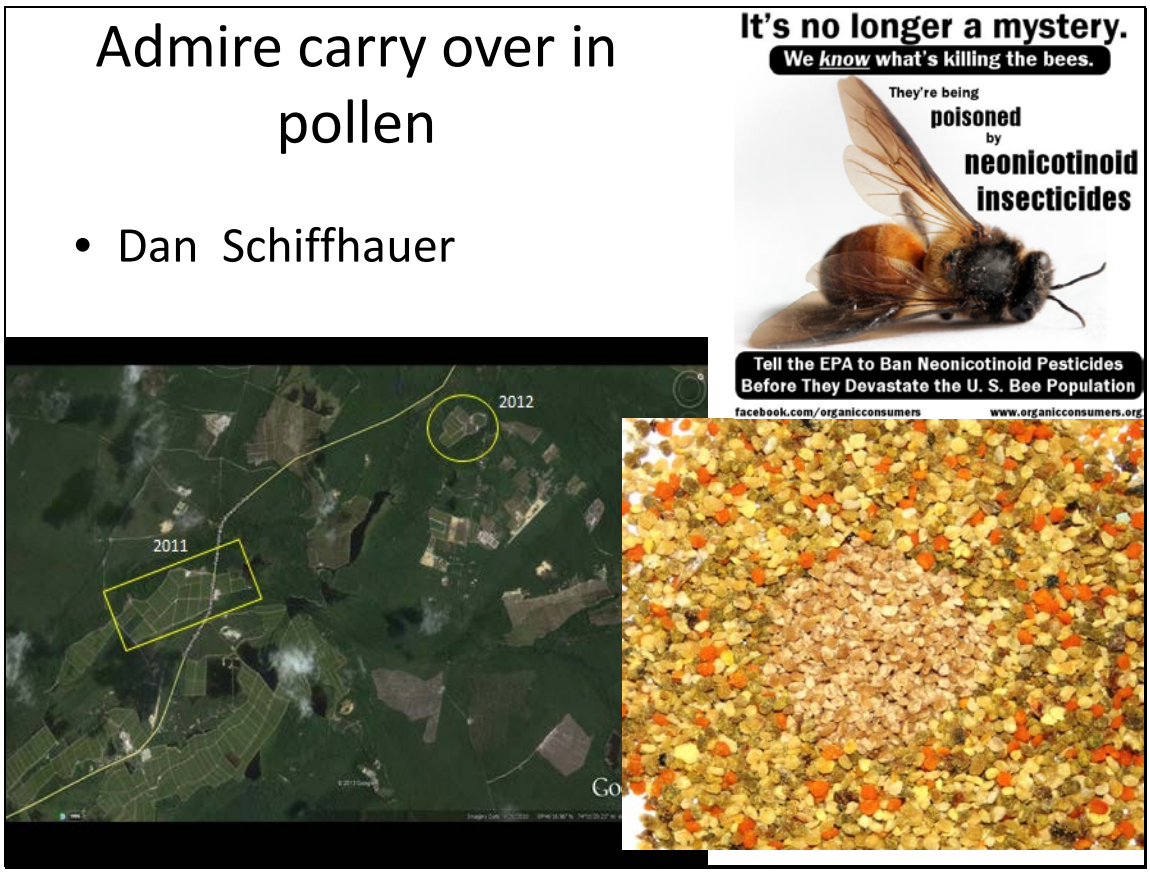
Slide 5



This information similar to what Frank's going to talk about, but what is interesting in particular is that Siva isolated pathogens from cranberries in 2014 and 2015 in BC during bloom, green fruit, and harvest. You can see that all these pathogens are being found during bloom. That emphasizes that they're there early and that's why we have to treat during bloom if you're going to try to manage and minimize fruit rot in your fruit.

Slide 6



I'm glad Cassie had that last side where she mentioned Imidacloprid – trade name Admire – and if you've been following any of the news on Admire or the neonicotinoids, it's not everyone's favorite pesticide right now. It does have some carryover residue and it is systemic, so if you put it out one year it will be found in the plants the following year.

Dan Schiffhauer of Ocean Spray did a study in New Jersey where they had whole beds that were treated with Admire. He followed what happened with Admire in the pollen in subsequent years. So you were able to see how much Admire was in the pollen a year after treatment.

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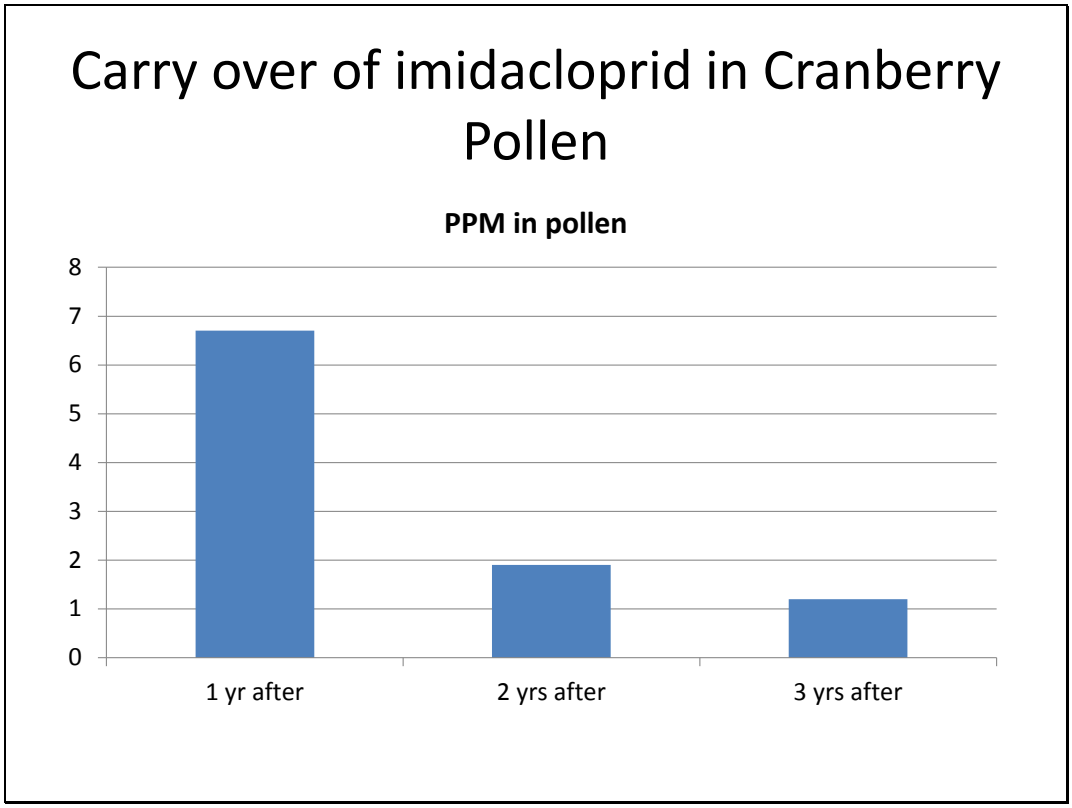

This is a summary of that data. Basically, significant amounts of Admire were present in the pollen a year after treatment, the second year after treatment, and the third year after treatment. It stays around for a long time.

So what this means is if you're going to use Admire, you want to use it sparingly, you want to use it on a spot treatment basis because you don't want to have an impact on your native bee populations.

If you're going to use it on scale, for example, you'd want to go out and treat those very bad spots that Cassie showed a picture of and that's fine. You wouldn't want to do the whole bed because of its potential impact on natives.

Slide 8

Variety Data
Oregon, Washington and BC

We have four years of data from the Variety Trial plots at Bob’s.

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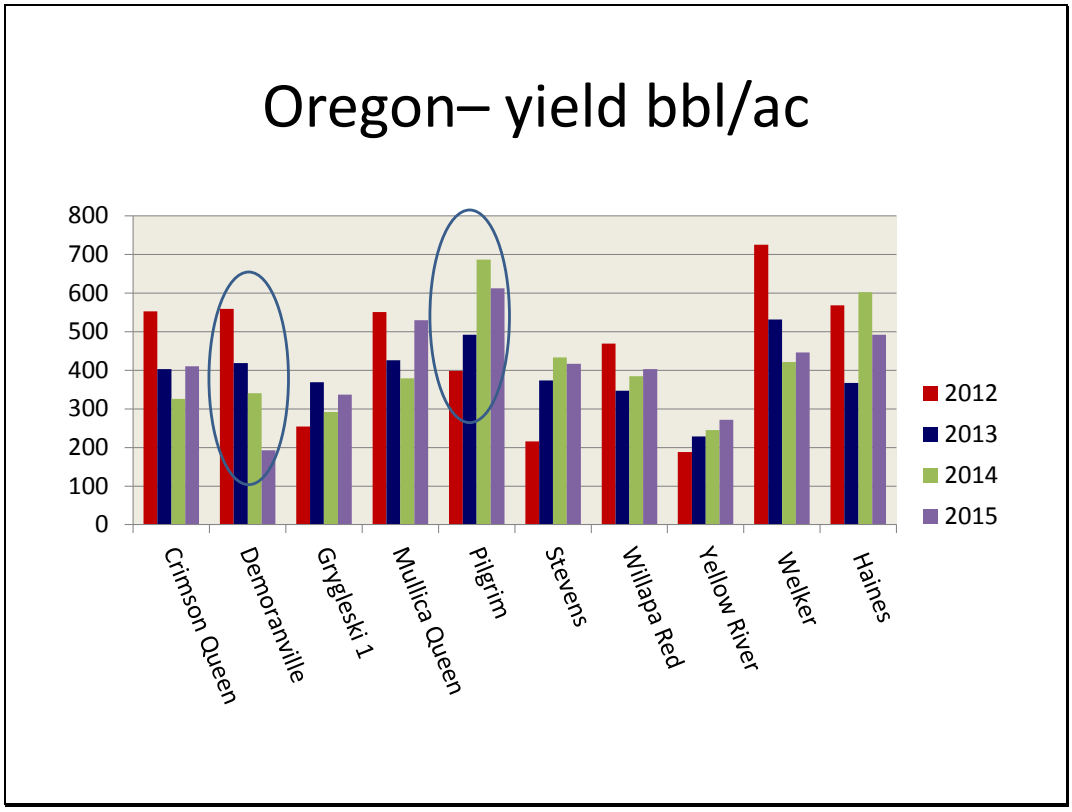
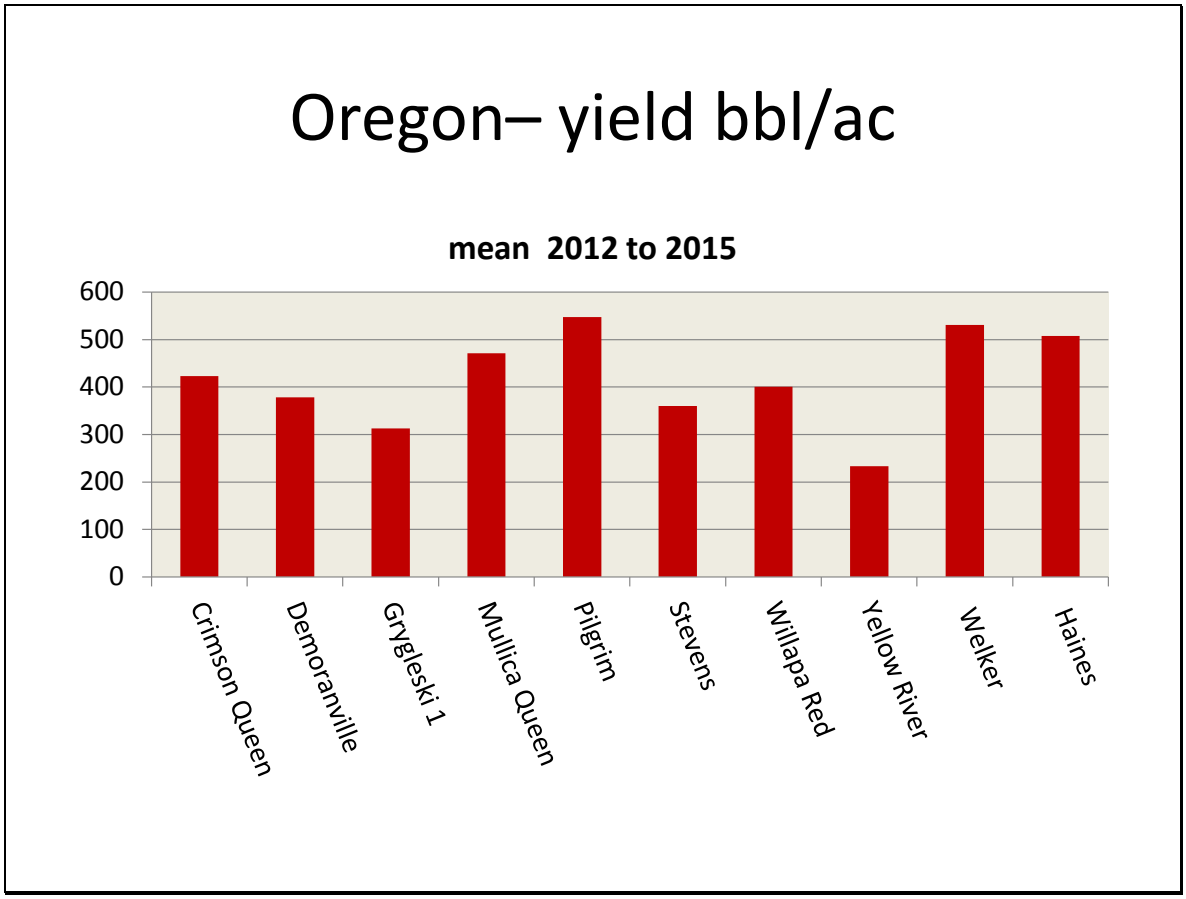


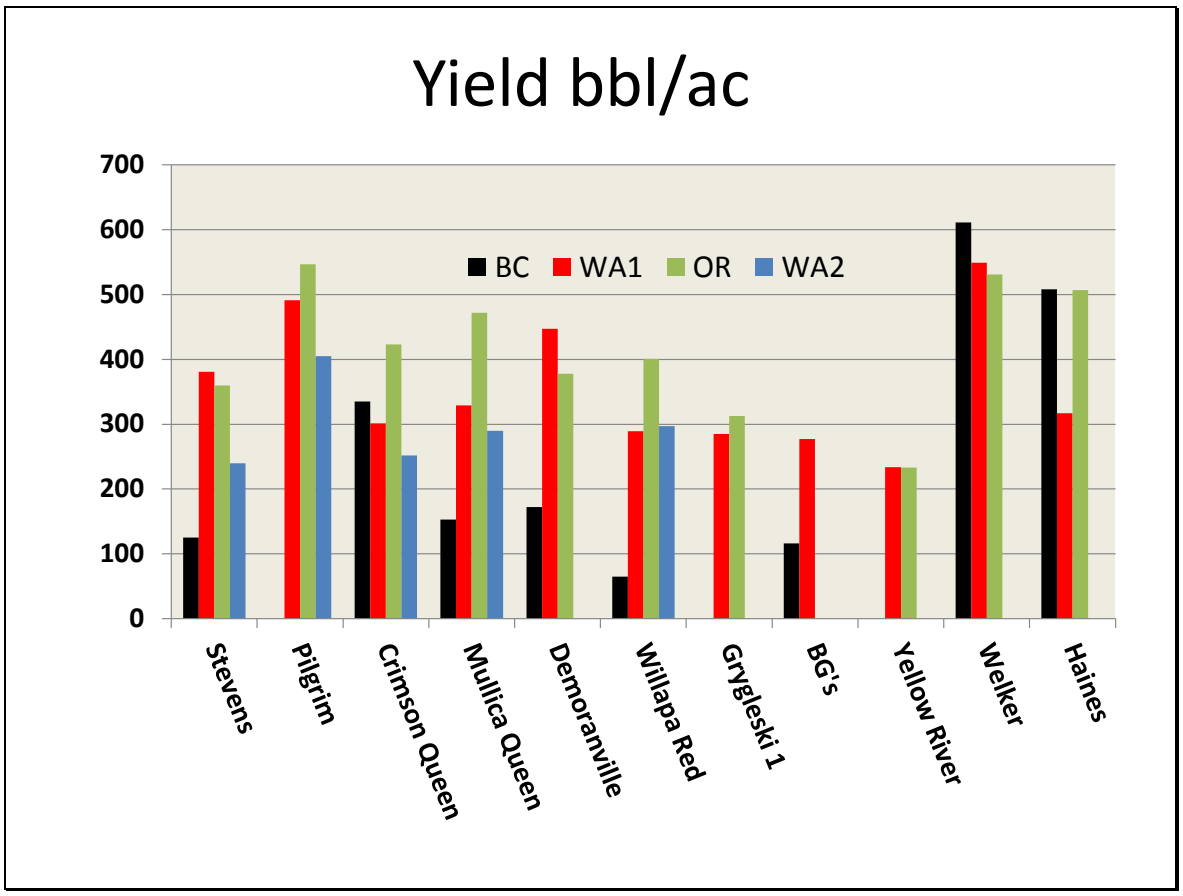
This is the summary by year of the named varieties.
The new ones that were recently released, Haines and Welker … they tended to be the overall best for yield. But Pilgrims are right there in the pack. Some of these other varieties are iffy. What's interesting is the decline on yield of Demoranville – it started out great, but every year it's gotten less and less. Same with maybe Crimson Queen – it's had some issues. Others, like Stevens, have continued to increase, but they've never been in the hunt with the others.

Slide 10



Here's a summary across all those years. I want to point out that Pilgrim is just as good across all years as the new stuff.
So, if you can't afford these sexy new things, you can go with old plain jane and plant Pilgrims and it would be fine.

Slide 11



Similar variety trial plots were put in in Washington and BC. This is a summary of all those yields.
In all those areas, Welkers and Haines have done fairly well.
But also Pilgrims have done well and some of the others as well.
There is a trend for Welker and Haines to be the outstanding varieties. For Oregon, Pilgrim was comparable to Welker and Haines.

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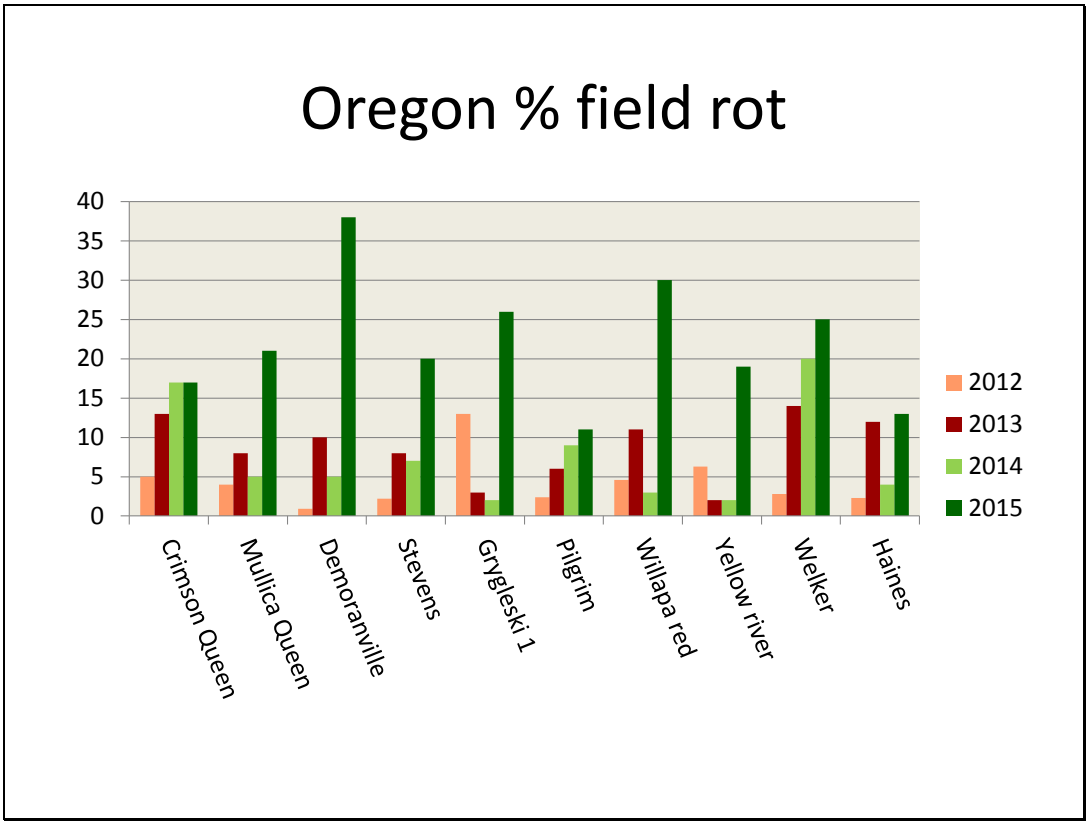

Fruit rot is important information that has been collected from the variety trials.
This is the field rot. You go out figure out how much rot is in what you're picking. You might have a big yield, but if 50% of it is rot, you don't have as much yield.

For example, here in the Demoranville, we were getting 35% field rot this year.

It varies by year, so we look for consistency. What gives us the overall best consistency?
If you look at Welker, we were running pretty high rots – 15-20%. Fairly consistently. So you're going to need a more vigorous spray program if you want to get your 700 bbl/ac Welkers.
Pilgrims are consistently in the better range for low field rot.

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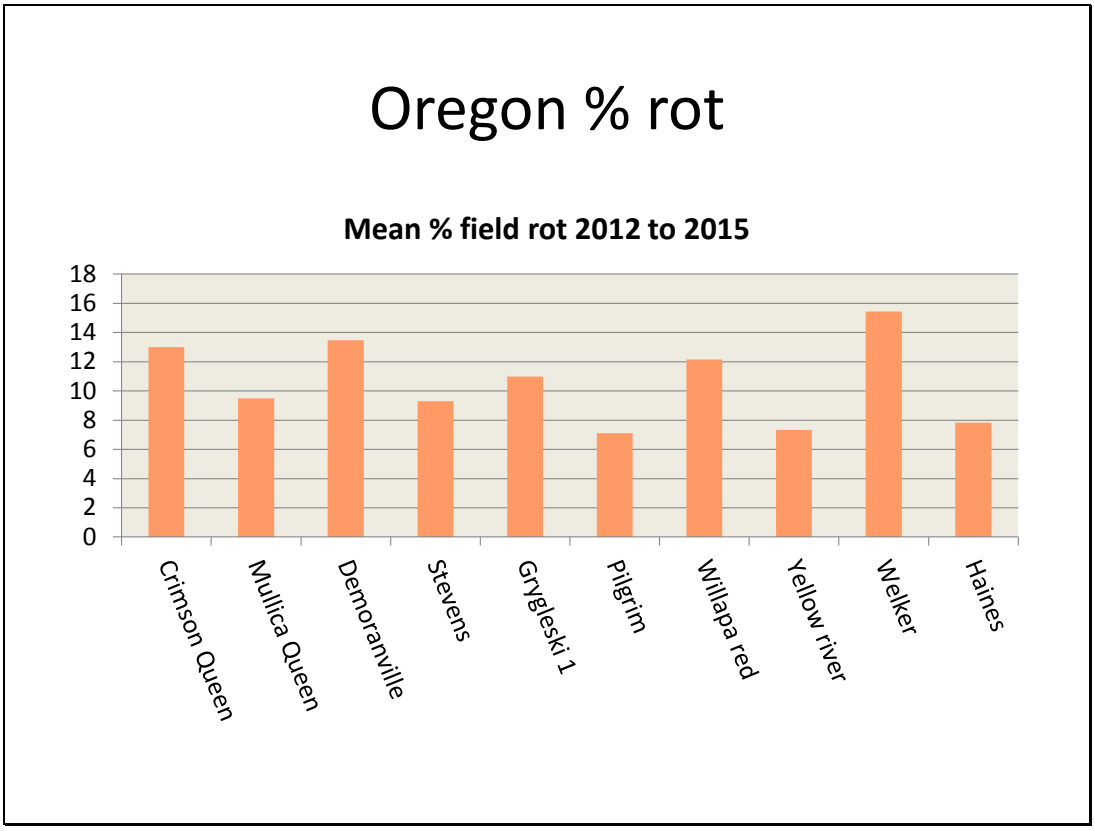

Here is a summary of field rot across all those varieties. You can see that Pilgrim, Yellow River, Stevens are some of the better ones in terms of having consistently lower field rots.

Also, Bob has not been the most aggressive at spraying to control everything because you want to have some rot for comparison purposes. So, intentionally, you're not out there trying to have zero rot. So you can see again, Welker stands out in terms of field rot.

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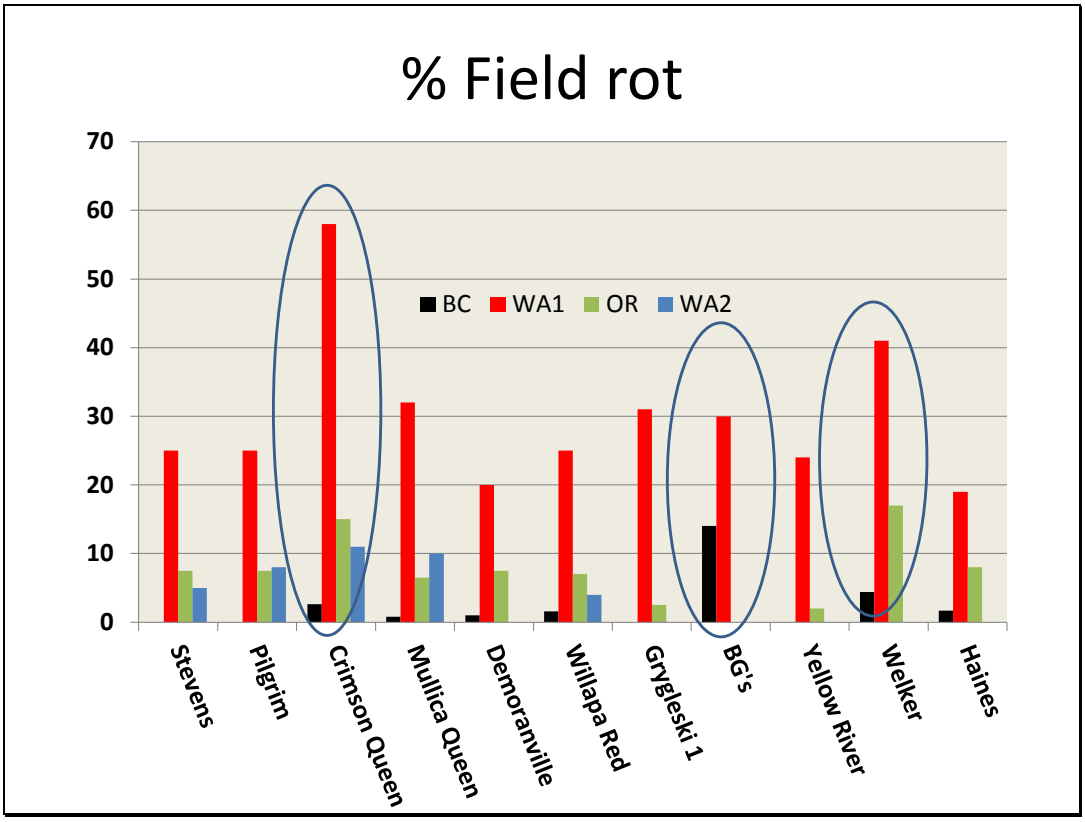

This is the average across all sites and you can see Crimson Queen is problematic in terms of rot … also BG's, which is a new Grygleski … and Welker.

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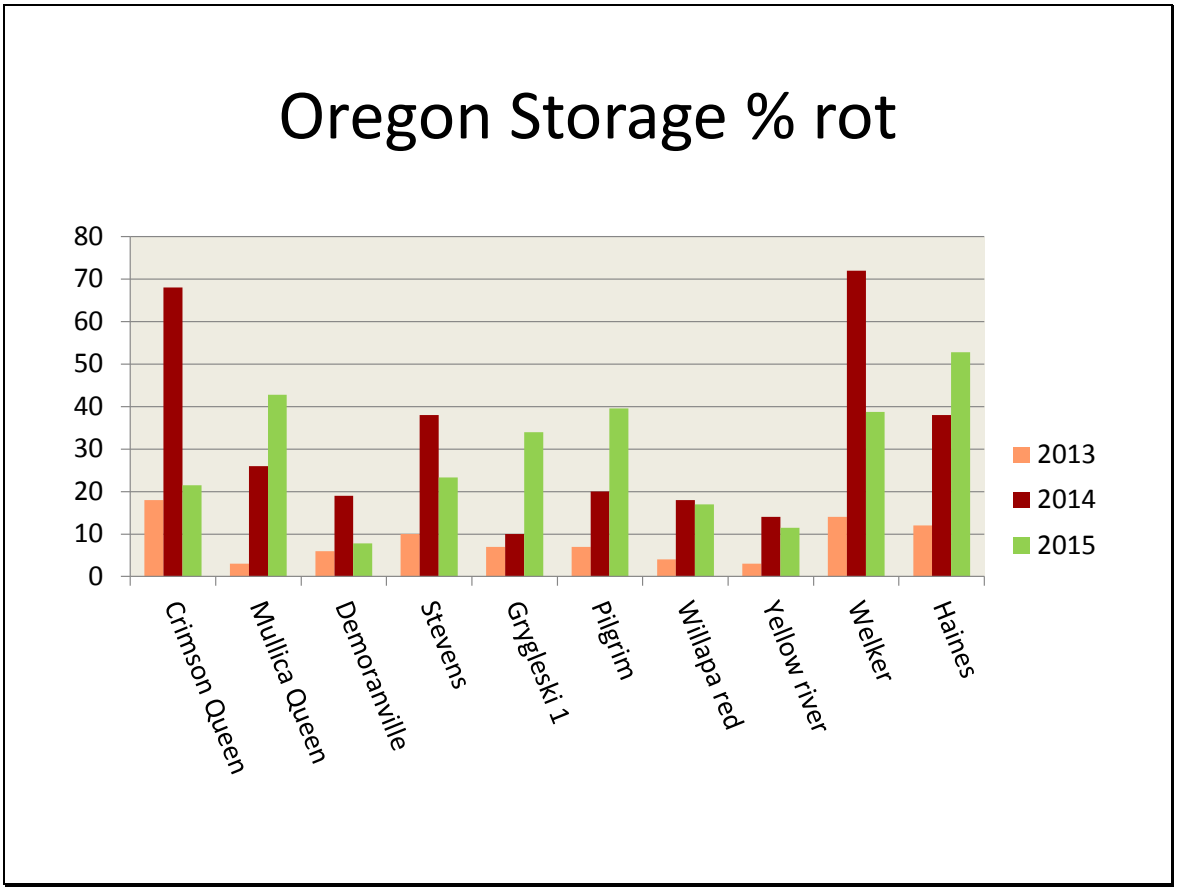
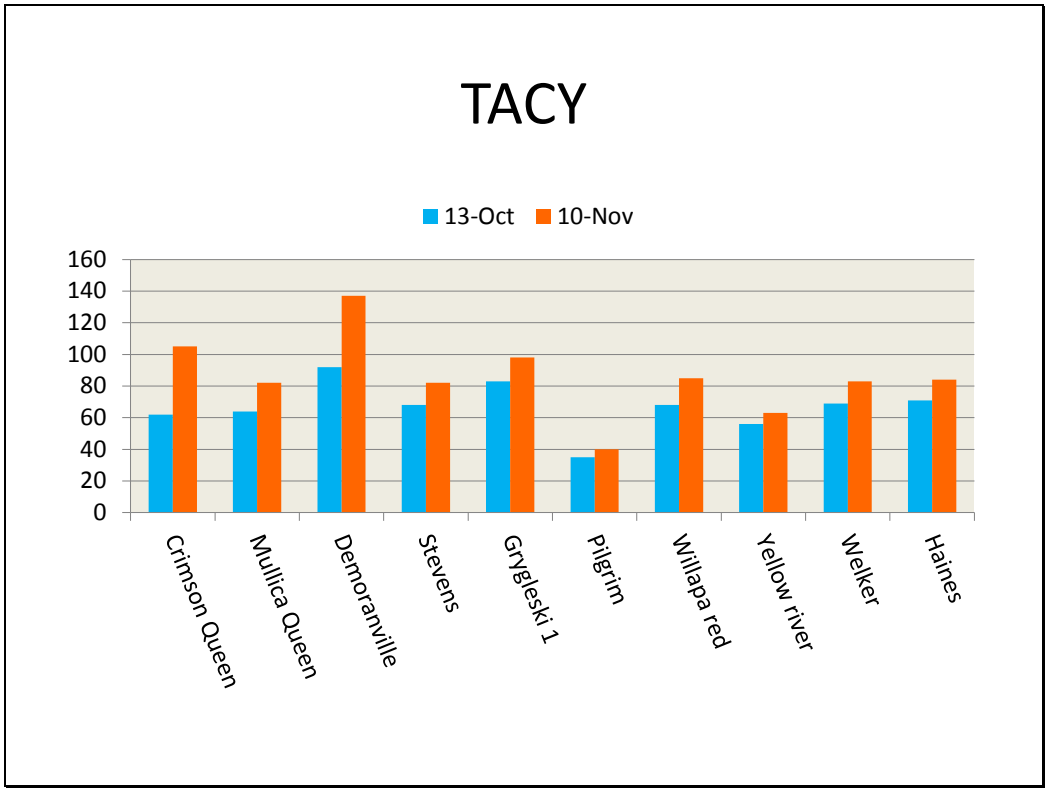


When we look at storage rot, we remove all the field rot and look at how long they store – it's about 6 weeks and then we recount. Welker and Haines also tended to have higher storage rot. So this will be important if you're doing fresh fruit, for example – it'll give you an idea of how well they will hold up with regard to firmness, etc after harvest.
Willapa Red and Yellow River are pretty good; Demoranville is pretty good … in terms of storage, there is some potential there.
If you're thinking about fresh fruit, you probably wouldn't want to use Welker, Haines, or Crimson Queen.

Slide 16



There's a moving target on what we're looking for and right now Ocean Spray is saying we really don't want a 140 TACY fruit; we want something that is in the 30-50 range … they don't want overly red fruit. A lot of this stuff will be too red (the Crimsons, and so forth).
It looks like Pilgrim has a good TACY. (These are Oregon values).
If you're looking for a reduction in TACY, you might consider Pilgrim.

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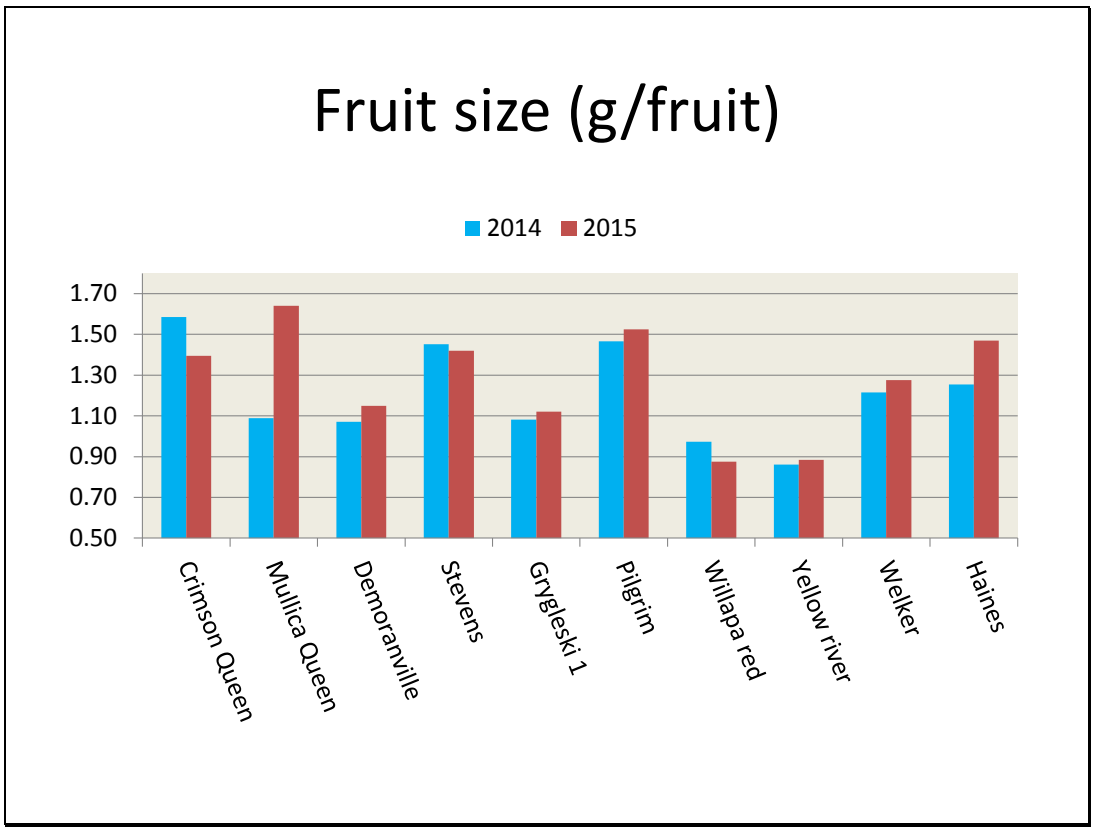

Looking at fruit size, this is Oregon fruit size data from 2014 and 2015. Pilgrims are consistently the biggest, then Stevens, then Haines. Again, Ocean Spray is wanting larger fruit and Pilgrim fits that bill.

Summary of variety data

- Tonnage- Welker, Haines, Pilgrim
- Low field rot - Pilgrim, Yellow River, Haines
- Low Storage rot - Demoranville, Willapa Red, Yellow River
- Large size for Craisins- Crimson, Pilgrim, Stevens
- Low Tacy for Craisins - Pilgrim

Best variety depends on your objective

Check out Ed Grygleski's website. He has some varieties that look good – Kim had one of them in a trial in WA that did pretty well.

Kim is thinking about putting in new varieties to try at Bob's research site – if that's something you think would be of interest, let him know. We're done with the trials we've been working with and at the point where we're thinking about what to do next. Are you done with this stuff? Or would it be helpful to test more varieities?
We're planning for 10-20 years out.

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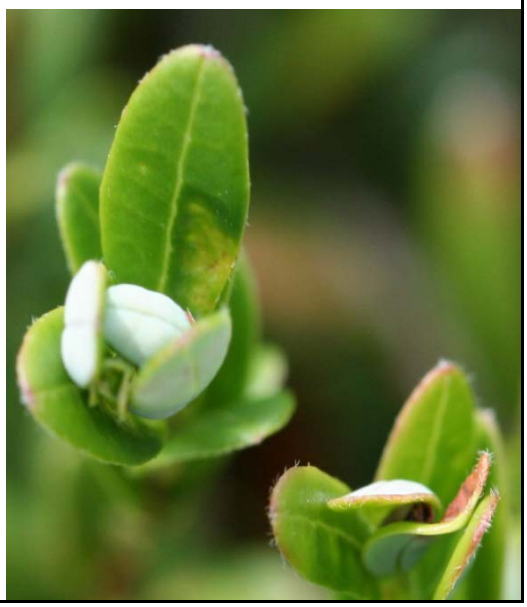
Tipworm Efficacy Trials -



Tipworm isn't a pest in Oregon, but it might come. It is present in the northwest corner of Clatsop county. You would recognize it by the curled tips at the end of uprights.

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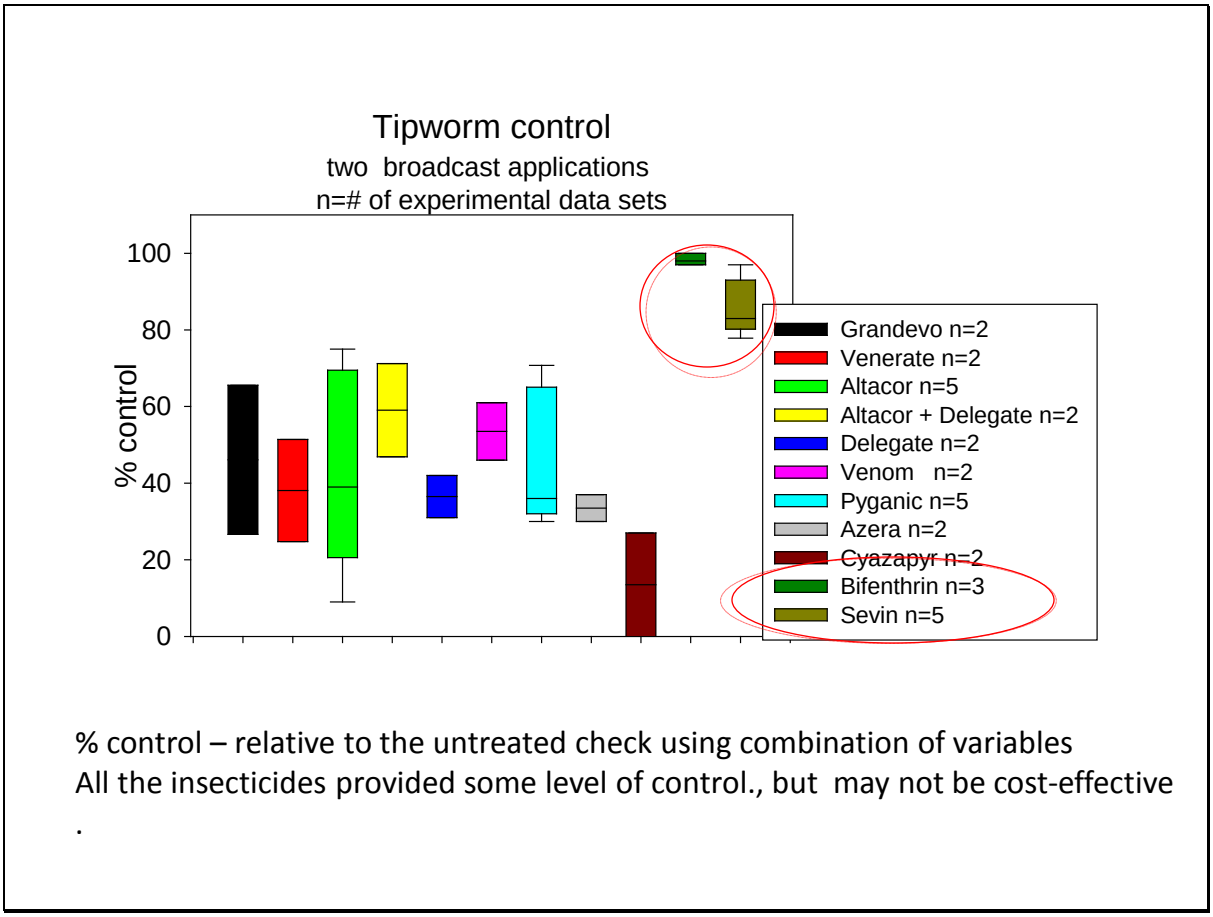

% control – relative to the untreated check using combination of variables
All the insecticides provided some level of control., but may not be cost-effective
.

We've done a lot of screening trials. There are a lot of chemistries, and I put this slide in here because some of these might work on your scale problem. Some are in the pipeline for that, and could be screened and have some potential for controls, although there is no hard data to show how they might work on scale. The main idea is that there are options out there other than Diazinon that might work, if we can get some trials going.

This is data for tipworm control, and these are called whisper graphs (or plots). The wider the graph, the more variability there was in control. Also, this is a summary of the combination of all my experiments done over the past 4-5 years.

I get good control in some cases. When you look at the graph, you want a narrow (short) box … that means that there's a good chance you'll get good control every time. A wide box indicates a wide degree of variability in how effective the chemistry is … in some cases you might get good control, but in other cases, you might get poor control. That line in the middle of each box tells you what the average control is.

Altacor, for example (the wide green box) … sometimes you get decent control, sometimes the control is really poor. It's really variable.
Bifenthrin and Sevin are both reasonably good.

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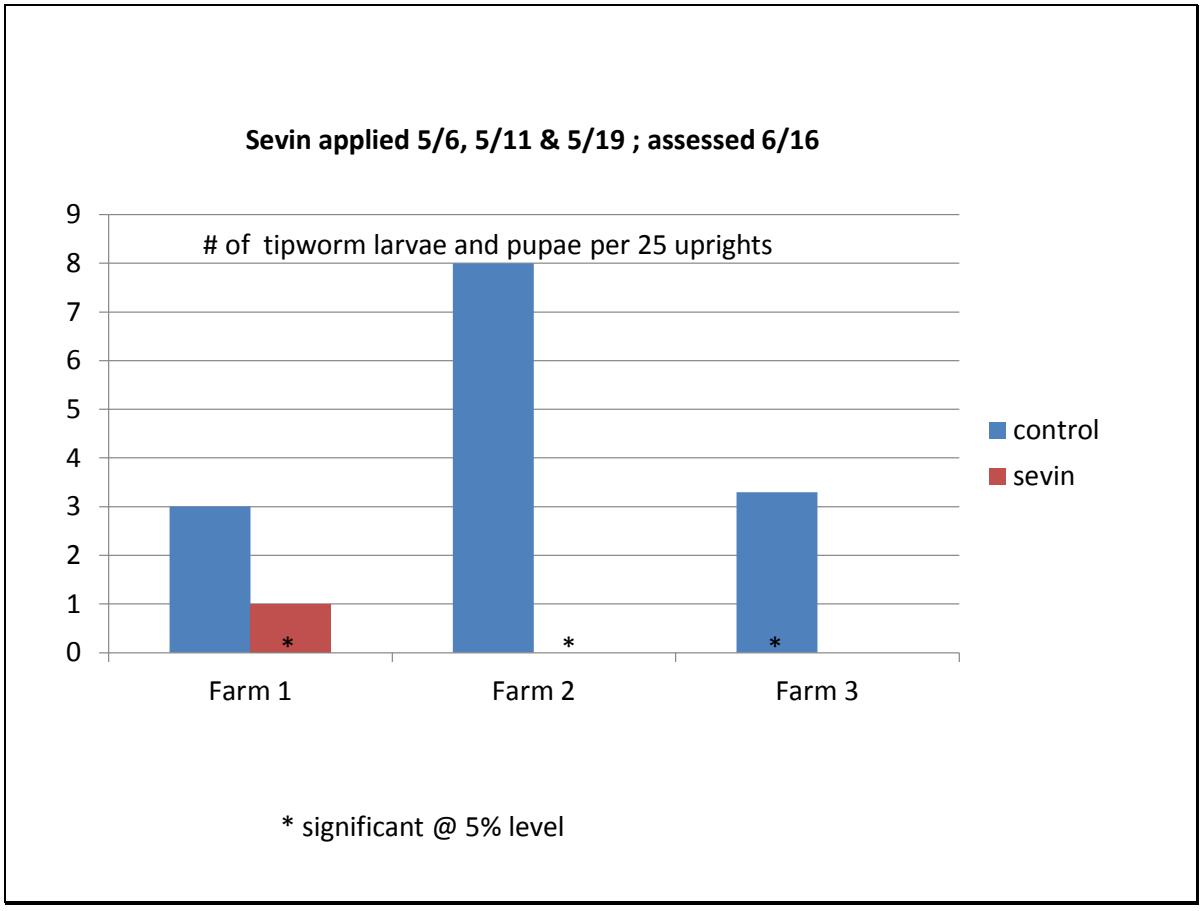

On farms in Washington, what we've gone to now is a whole bunch of Sevin sprays before bloom trying to get that first generation of tipworm before they come out. It takes about three applications of Sevin. Not exactly great IPM – we just go out and treat before the bees come. There are some new insecticides in route that may be labeled for cranberries; those could potentially be labeled for scale if we find that they work on scale.
In Washington for tipworm, three applications of pre-bloom Sevin works very well.

Tipworm – conclusion

- Several “New” insecticides look impressive
- Sevin - multiple applications during first generation (7 days apart) works well.

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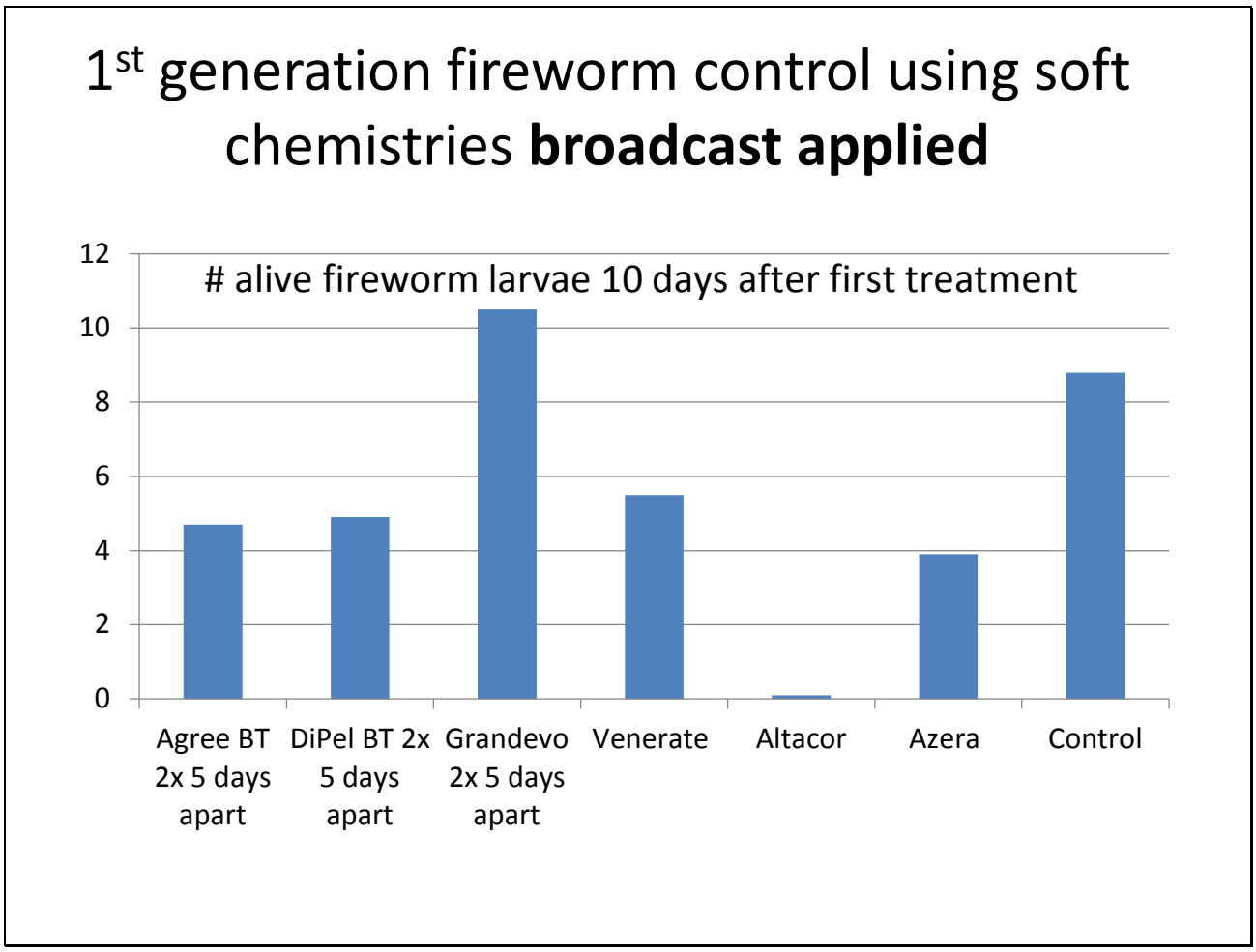
Fireworm control using softer chemistries

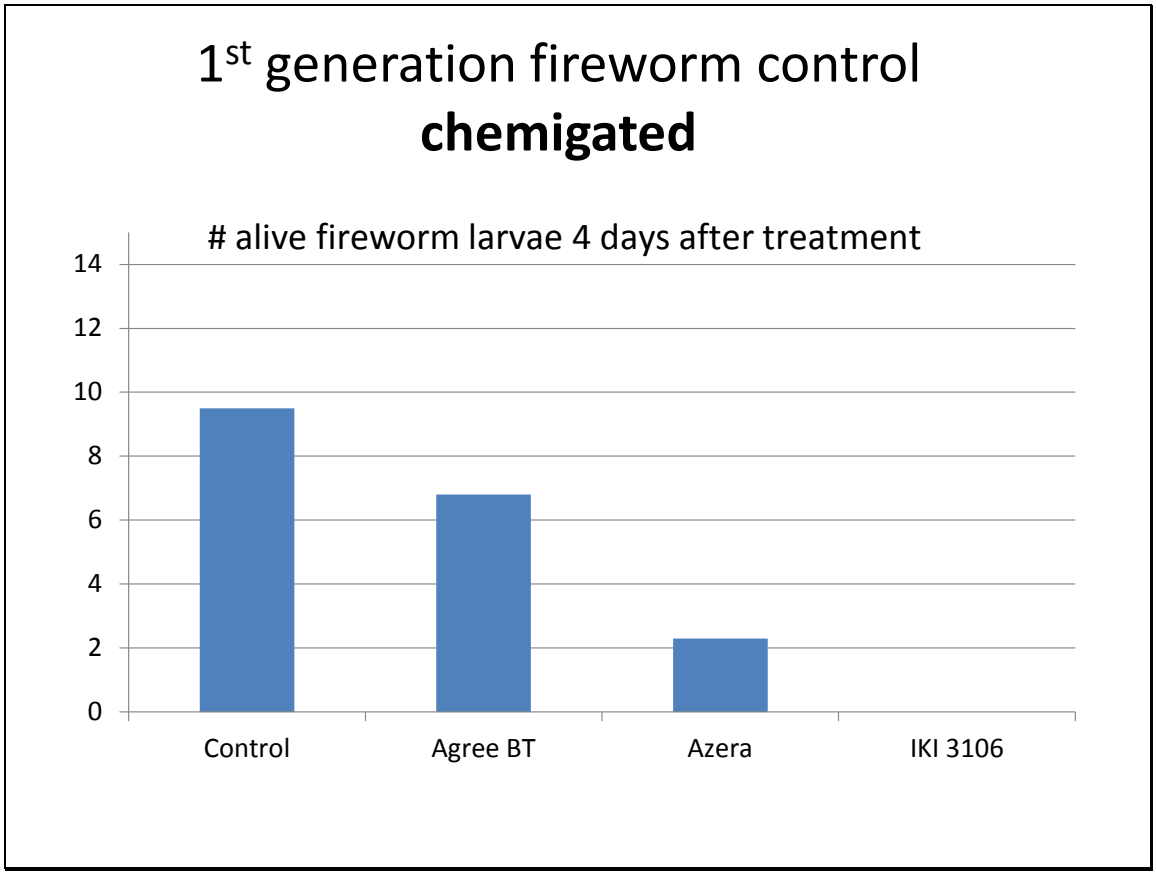
Slide 24



If you can use Altacor, you don't really have an issue.
I wanted to try some of these other softer chemistries. These are all organic labeled products. Right now the only label organic growers have is Entrust … and I have some concerns about Entrust and bees which I'll talk about later.
If you have altacor, it does a great job. Because it's such a good chemistry, there is a tendency to apply it twice, and that's all you ever do and all you ever use … once, twice, three times a season. That's going to be good UNTIL you get resistance.
You need to rotate Altacor with something else. You might do an Altacor/Intrepid, or Altacor/Intrepid/Altacor … but make sure you put something in your rotation so you're not only using Altacor all the time, even though it's a great chemistry.

With these other soft chemistries we looked at, you can certainly get some suppression, but it's not too exciting, and if you're going to use any of these softer chemistries you will have to be diligent, stay on top of it, and use multiple applications.

Slide 25



Here's another study of 1st generation fireworm control comparing a BT with Azera, which is a combination of pyrethrins and azadirachtin. It's okay. There's a new chemistry we're looking at is in the registration queue that works pretty well, too. There are some options, but none of them are really good.

At this point, most of these softer insecticides are only marginal and Altacor is superlative – we know that. But beware of resistance when using it.

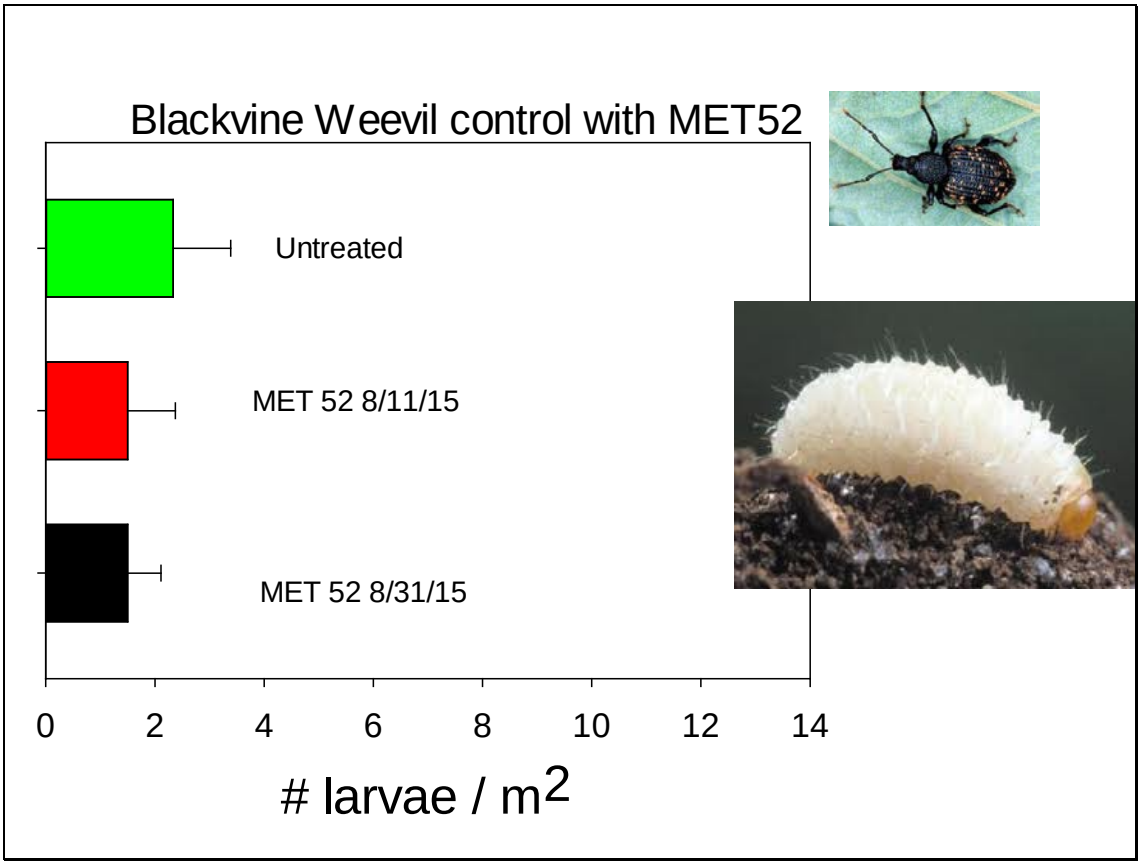
Fireworm – conclusion

- “Softer” insecticides only marginally effective.
- Altacor – superlative

Slide 27

Biological control of weevils

Slide 28



Looking at MET52, field applications for black vine weevil control – they have commercial product out there and you can do great work in a lab, but it's hard to get consistent data on this stuff in field plots.

These are field plots treated versus not treated in the summer of 2015, single application. They have a new formulation that is commercial now. We're still not getting the control we'd like, and I can't recommend it at this point in time. It's expensive – you can pay $1000/acre (and then some) – and at this point it's hard to get the efficacy you'd like to see. Stick with nematodes for the time being, flooding … or even Admire … for weevil control.

BVW - conclusion

- MET – 52 doesn’t look too promising (suspect similar results for girdler)
- Nematodes & fall flooding instead

Slide 30

Last summer the EPA announced plans to restrict all acute insecticides during bloom. Basically, they're going to pull the label off of anything that's acute and not allow you to spray when commercial bees are out there. There has been a lot of industry and public input to the EPA. I don't know what is going to be decided, but for us, if they decide that you cannot use certain chemistries during bloom, it's a real hardship … it's especially a hardship for two chemistries (which I'll talk about in a bit).

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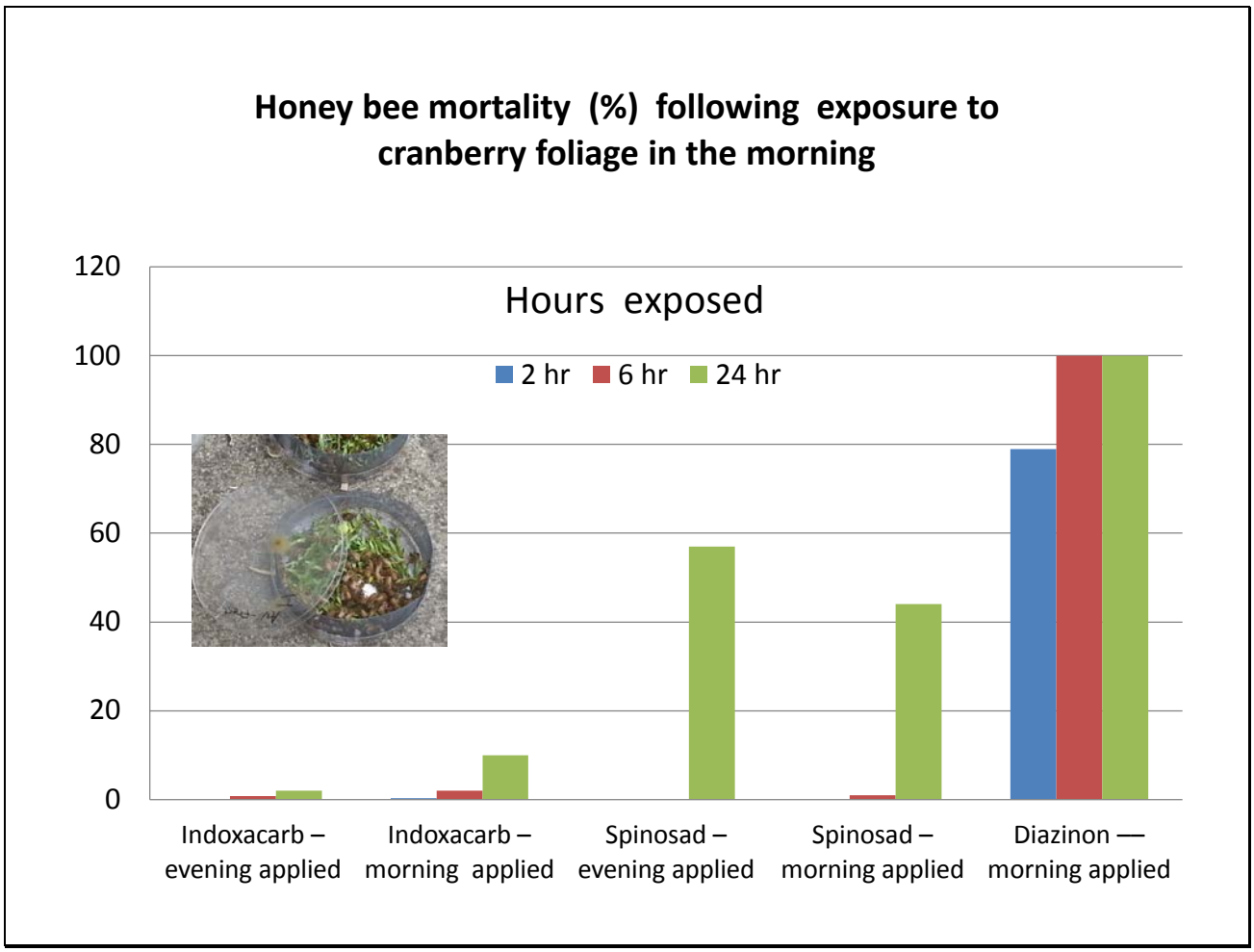
I submitted a letter to the EPA, but I wanted to back up my comments with some data. I did some mortality studies. The way you do these is you gas the bee colonies with CO2, shake off some workers, put them into little screen cages. We have some cranberry uprights in each cage that we spray with different chemicals and expose the bees to see how long they take to die. If you spray these with diazinon, let it dry … the bees die relatively fast (a couple hours). If you do that with other chemistries, it takes longer.

Slide 32



It allows you to come up with some exposure curves.
There are two chemistries which I think are really important:

1. indoxacarb (avaunt) – this is our primary way that we control black vine weevil. We put it out when they first emerge and it does a great job, but it happens to be right during bloom and it's an acute toxic compound for bees, according to EPA's label.
2. Spinosad (Entrust) – this is an organically approved chemistry used to control fireworm, and it's pretty hot on bees. So if you're an organic grower and you can't use spinosad, what are you going to do?

This is the data. You expose them, and this is how many die (percent mortality) 2hours, 6 hours, and 24 hours after application (relative exposure).

If you put indoxacarb on in the evening, basically you have no mortality (relataive to the control); if applied in the morning, there is some mortality, but it's relatively safe. If we went out in the evening and used indoxacarb to control weevils, you would not pose any threat to your honeybees.

Spinosad, on the other hand, evening or morning applied, has some potential to do some damage over long term. In other words, it might be an organic chemistry but it also can cause issues with honeybees. I don't know if EPA is going to say you're not going to use this product (Entrust – the organic version of this) during bloom. This would be a concern for an organic farmer because this is the one tool they currently have to control early fireworm.

And I included a comparison with diazinon – when you put diazinon out in the morning, you're going to kill bees. We did several studies 20 years ago looking at diazinon applied in the evening and washed off in the morning, but when you do that, you still end up with pretty high mortality. The bottom line is you don't want to use diazinon during bloom.

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Bees & pesticide - conclusion

- Insecticides are not benign to bees, even if they are organic.
- Avoid morning or daytime applications
- Evening Avaunt might be OK

If EPA goes with this ruling, we'd have to get an exemption with ODA.

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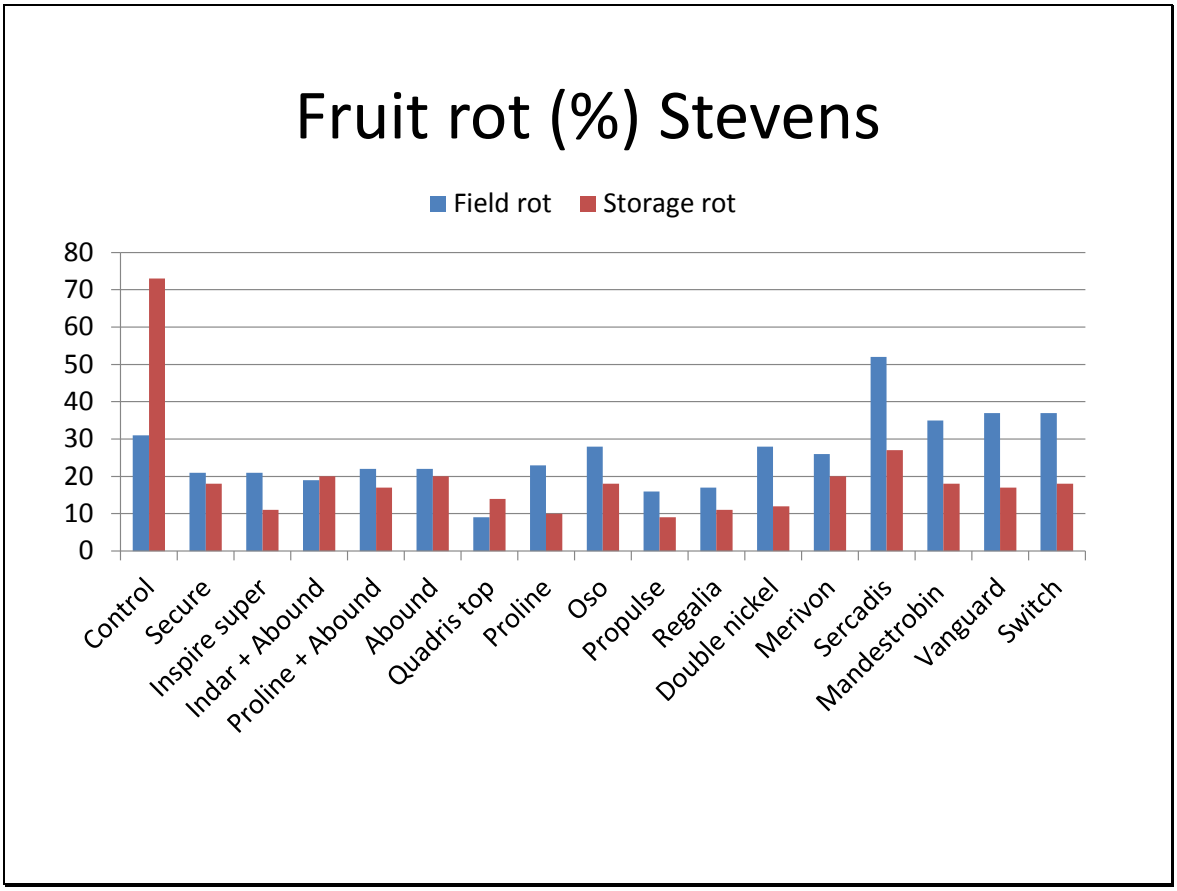
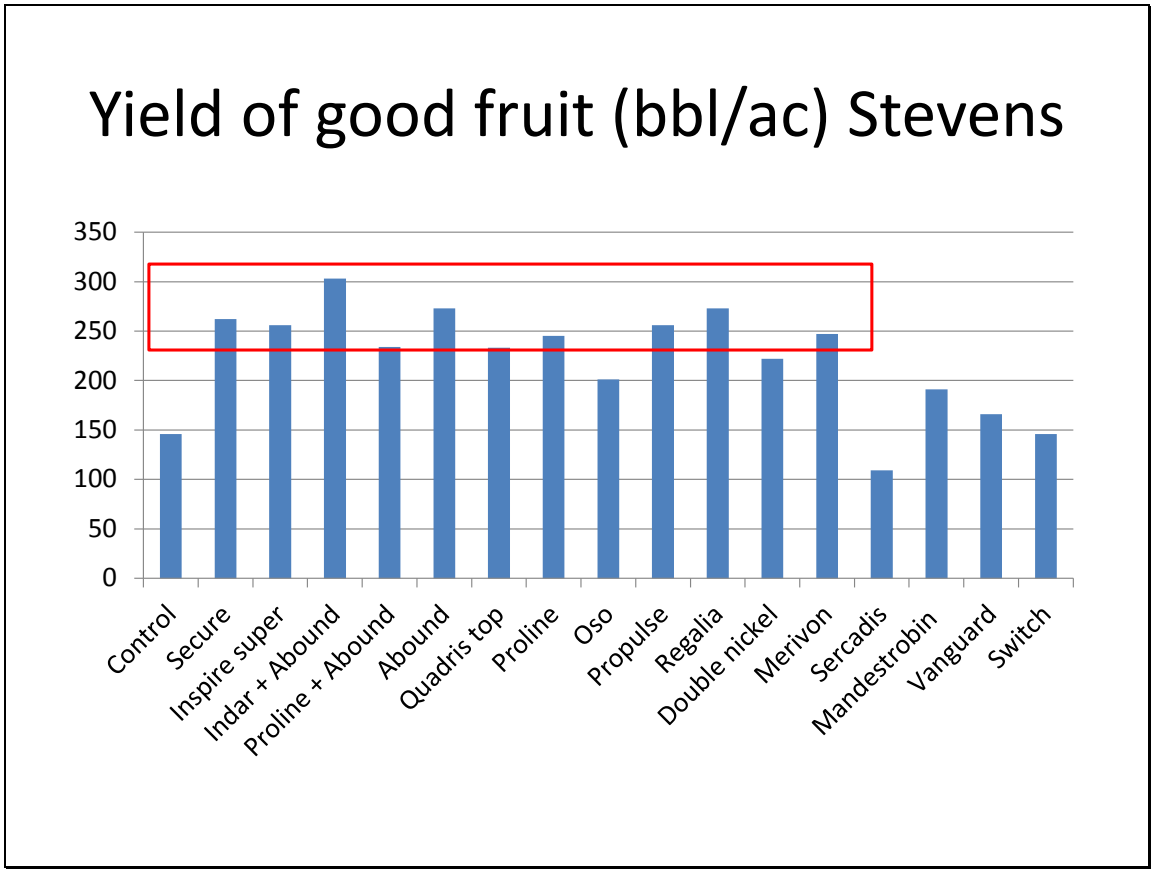
Fruit rot and fungicides

Slide 35



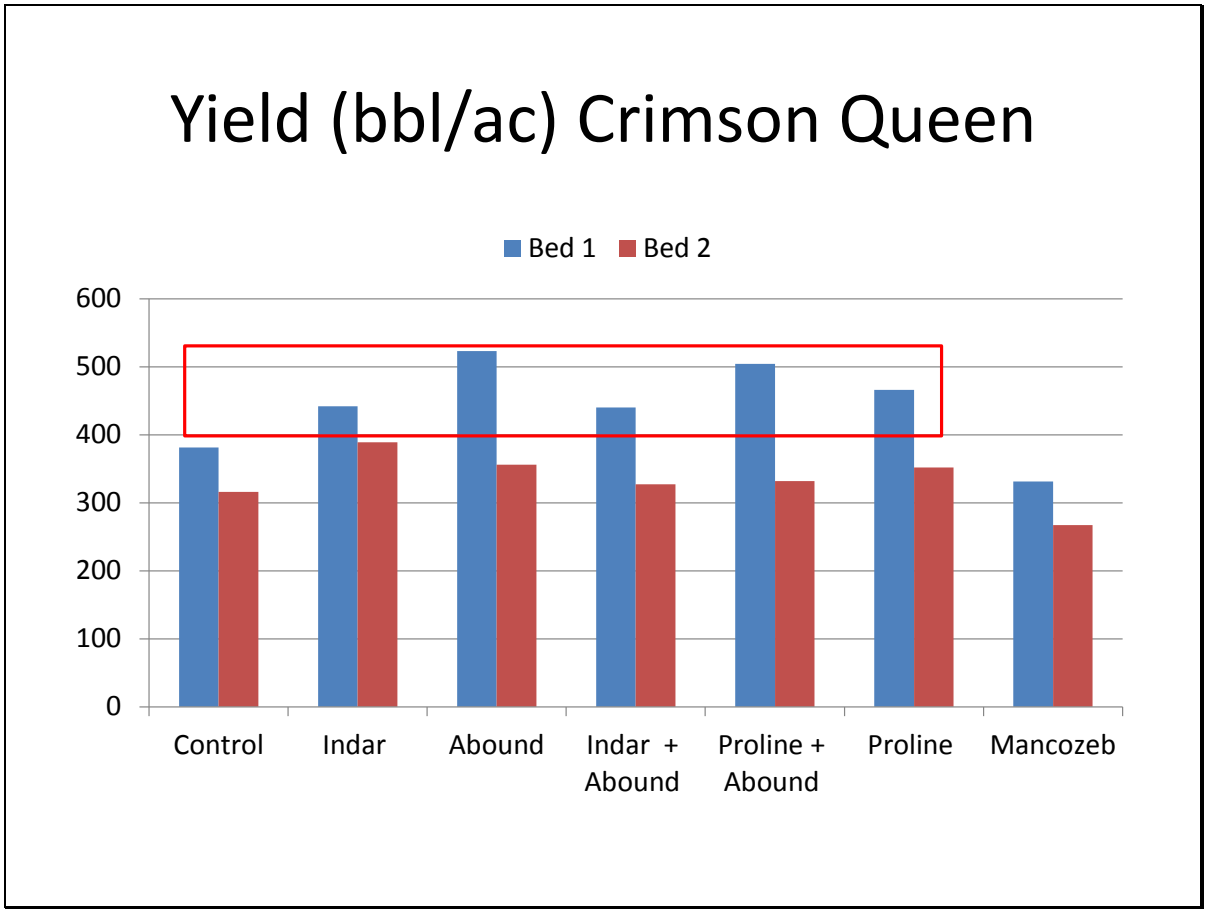
There are a bunch of new chemistries out there – so we wanted to do some screening tests with these … some alone, some in combination.
Note the control on the left. This is a graph showing both field rot and storage rot – this data is from the research farm. You can see that overall most of them do a pretty good job … some not as good as others, but they're all in the same ballpark, so we've got good options moving forward.

Slide 36



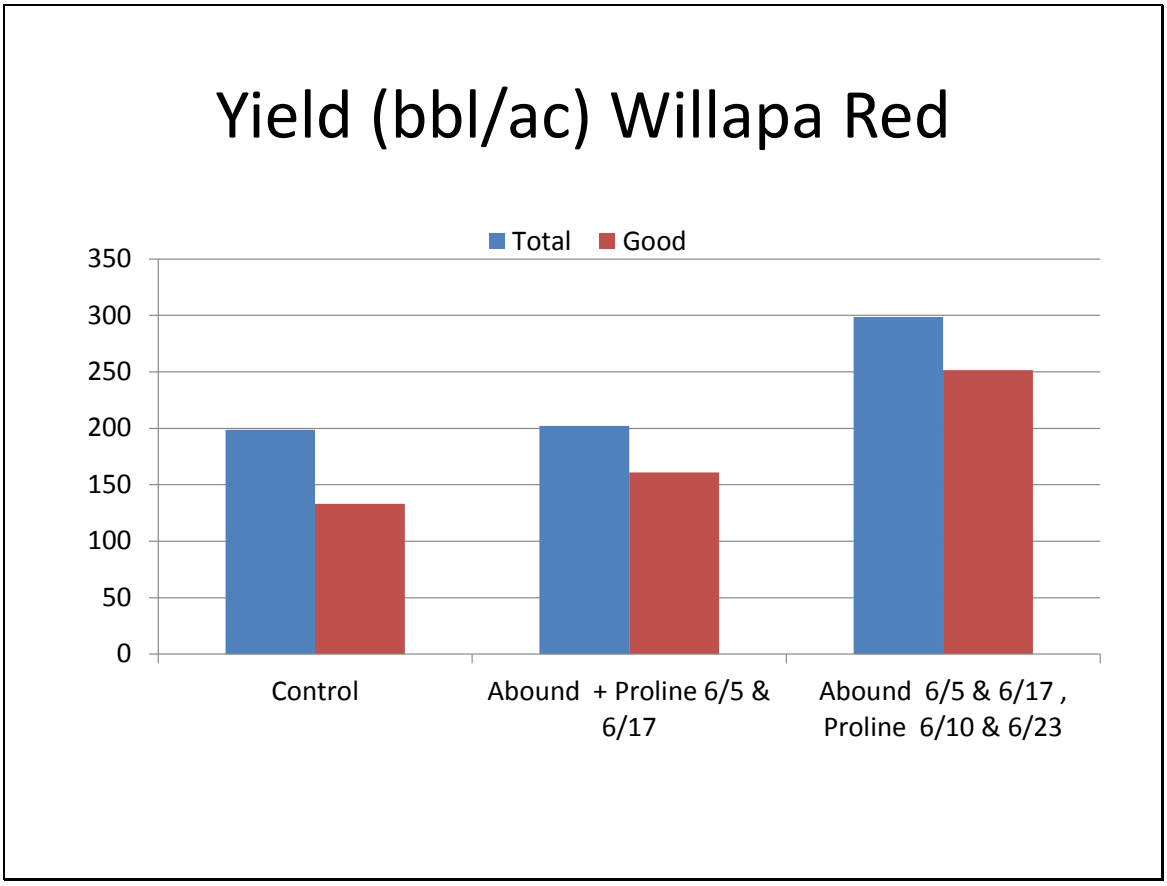
It's neat to look at the effect on yield.
The control is on the left at about 150 bbl/ac. If you put these sprays out during bloom, you're adding another 100 bbl/ac to those beds. So you're reducing rot and increasing yield with the bulk of those chemistries. Good information to know, and gives you a reason to spray during bloom at the right rate and timing.

Slide 37



You see the same sort of pattern with Crimson Queen – 2 different beds of Crimsons. We saw a consistent trend of higher yield on those beds where fungicide was applied during bloom. In some cases it was fairly significant – increase of 150bbl/ac.

Slide 38



Here's Willapa Red – the same trend is seen here, too, with the control vs the proline and abound.

One of the growers said, "You're recommending Abound and Proline, mixed together, putting out twice during bloom … My bloom goes for a long time. Why don't I just put out Abound, then put out Proline, then put out Abound, and then another application of Proline? Spread it out over the whole 4 week period of bloom? Wouldn't that make a lot more sense?"

Kim's reply: yeah, it probably would. All that other data was based on recommendations from back east where everything is warm and blooms within a 2 week time period … that's great for there. But here, we have a long bloom, and we might want to put out one after another – resistance management is really important for us. So…he tried the grower's suggestion of alternating fungicide applications and it worked!

For Willapa Red, we got a big boost in total yield on that.

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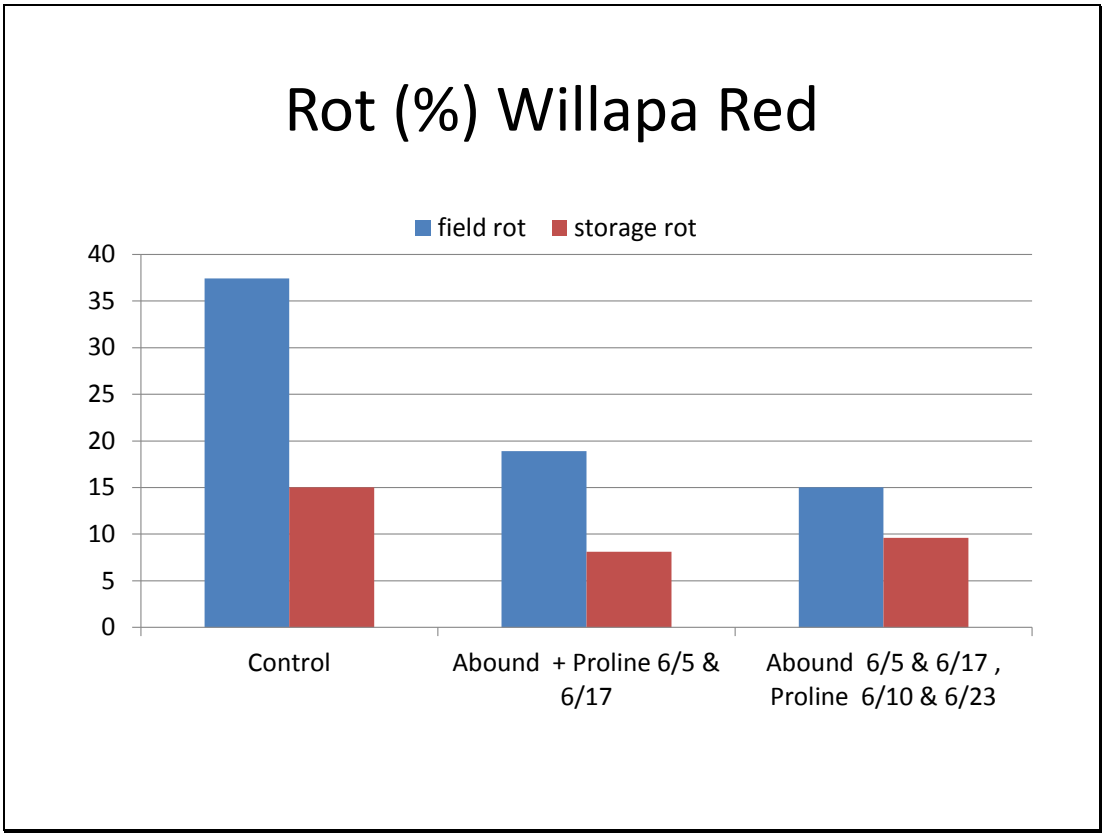
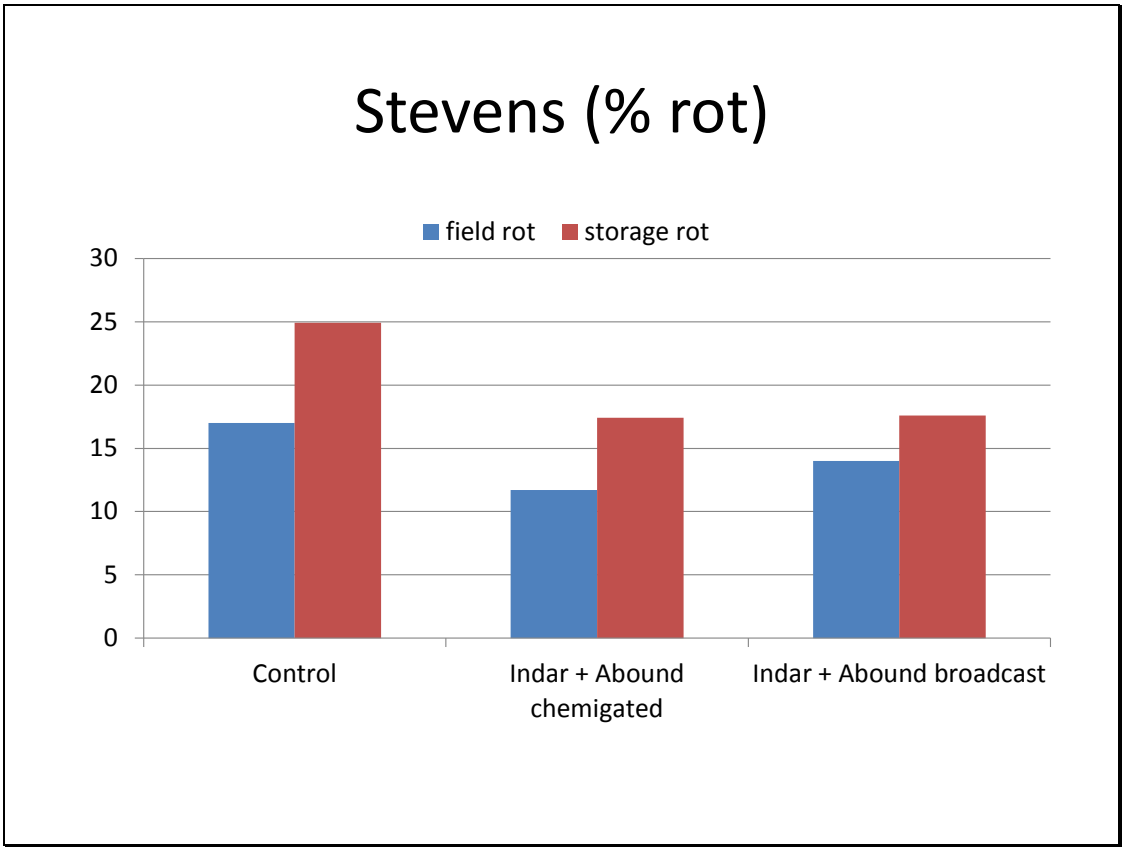


Here's the field rot, storage rot data compared to the control.
There's not as much difference in field rot, but certainly with the yield there was a difference.
There's a pattern there that we need to look at.

Slide 40



We always get asked about broadcast vs chemigation. This is for Stevens. The control is on the left. And the typical Abound/Indar treatment we would use. We didn't see much difference between the application methods.

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Fruit rot - conclusion

- Numerous new fungicide look promising.
- Lots of variability in results with no definitive recommendations
- Need to apply fungicides from early to mid-bloom or longer
- Need combination of fungicides &/or rotation of fungicides.
- Some fungicides (or combinations) appear to increase yield

The number of new fungicides available is promising.
There's a lot of noise and variability in the system, but overall, we can pick out some trends.
You need to apply your fungicides early bloom – spread them out during the course of bloom.

You need to use a combination of fungicides. You can't just use Proline, proline, proline – you're going to get resistance and you're going to get it fast and then you're not going to get any control. So you do want to use products that are either combination or rotate them with other things.

We do have Bravo now – that MRL is not an issue. Some growers put out Bravo during bloom --there's a debate, at least in Washington, whether you can use Bravo during bloom or not.

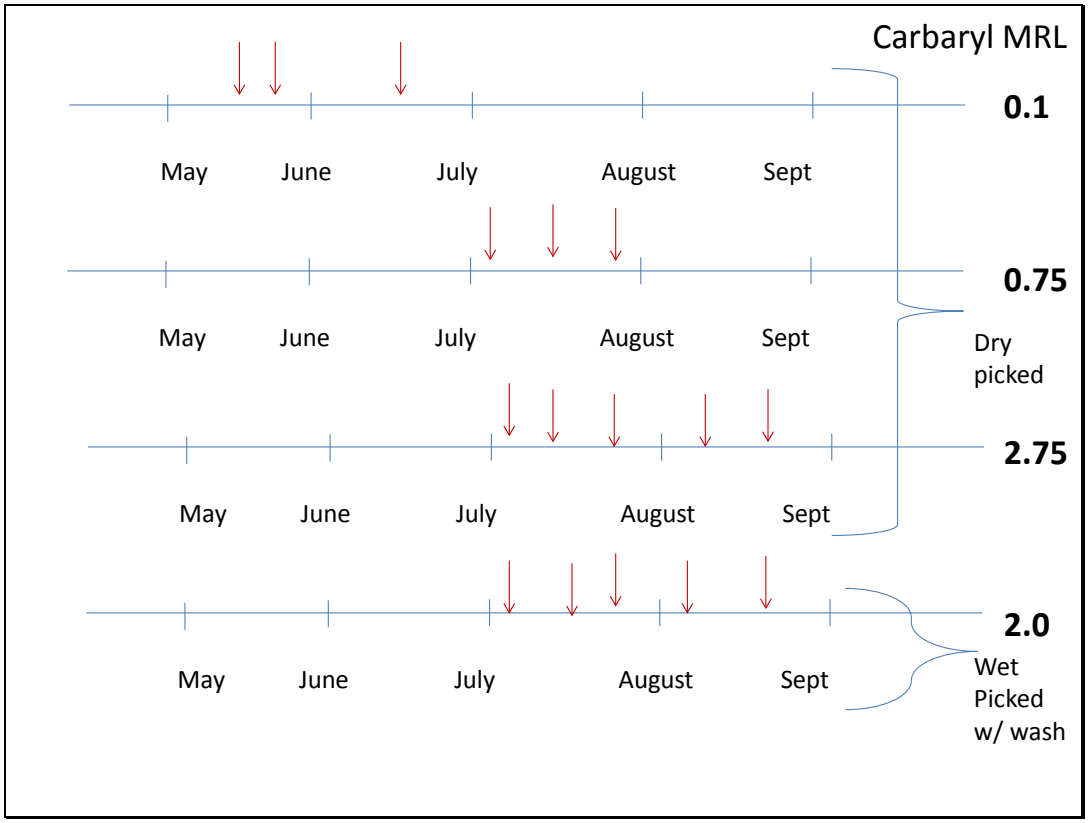
Some fungicides appear to increase yield … at least some of these newer ones.

MRL – carbaryl and mancozeb

- Should we be concerned

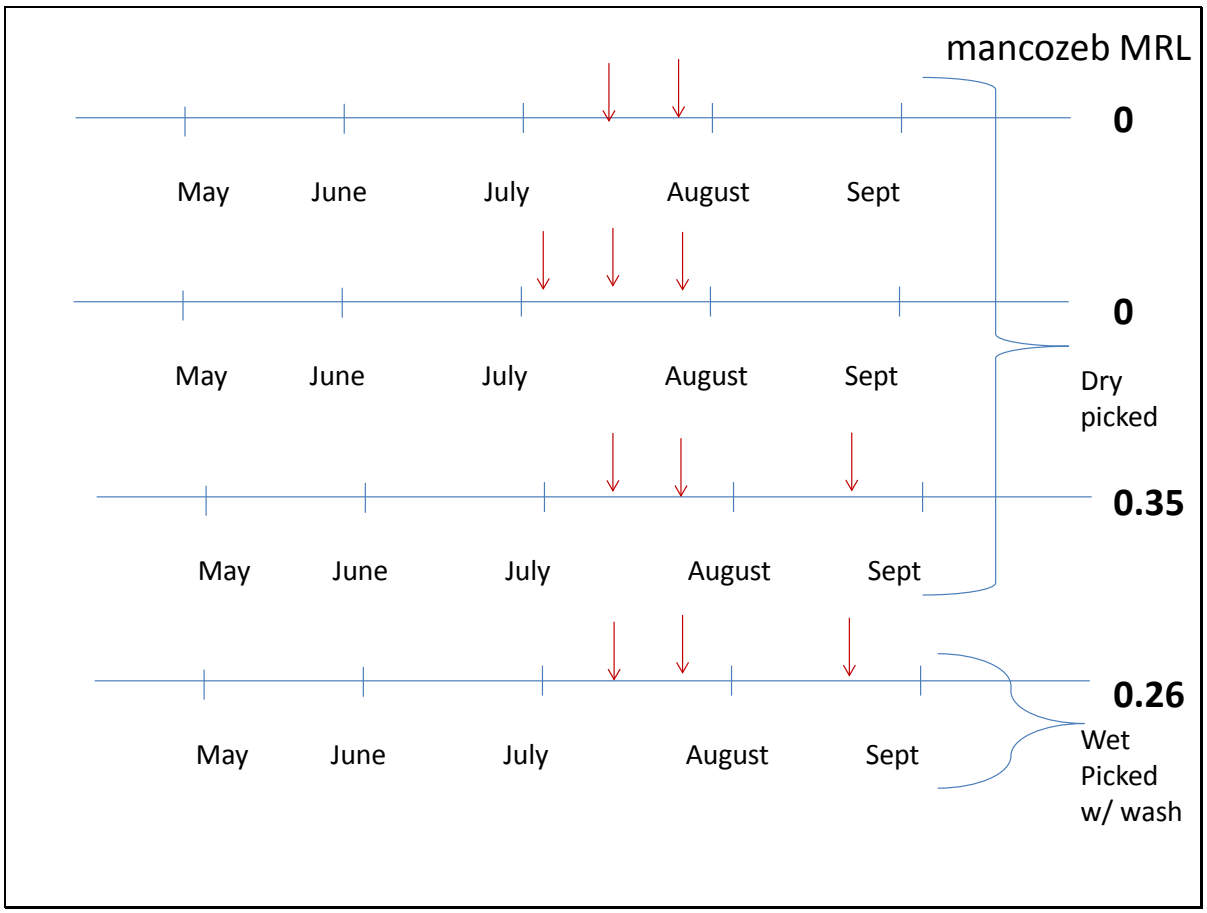
This is probably less relevant to you guys because you're not necessarily using a lot of these chemistries, but I thought I'd show these slides. This is an MRL study looking at pre-bloom, during bloom, and post-bloom applications.

Slide 43



Applied 2 pre-bloom, one during bloom, or 3 post-bloom, or 5 post bloom applications of carbaryl … what does it do to the MRL?
5 post-bloom dry picked (picked by hand).
5 post-bloom where we wet picked them and ran them through the wash at Ocean Spray.
The point is, if you do a pre-bloom spray, you won't have much a residue regardless of the chemistries you're using.
Usually, with just hand picking/dry picking, you're going to have higher residue levels. If you wet pick it and you wash it, you're going to reduce the residue levels, but not as much as you would have thought. A lot of that stuff just doesn't come off. You can reduce it with a wash, but it's not a lot.

Slide 44



The same pattern shows up with mancozeb. Not as much of a residue issue with that one. We did get a little reduction with the washing. None are these are huge issues … it depends on the market. Talk to your handler – where the fruit is going makes a big difference in what MRL is allowed.
Canada has an MRL that is lower for mancozeb than any other place, for example.

MRL Residue - conclusion

- carbaryl – prebloom- no problem, post-bloom– possible issues.
- mancozeb – minimal concerns

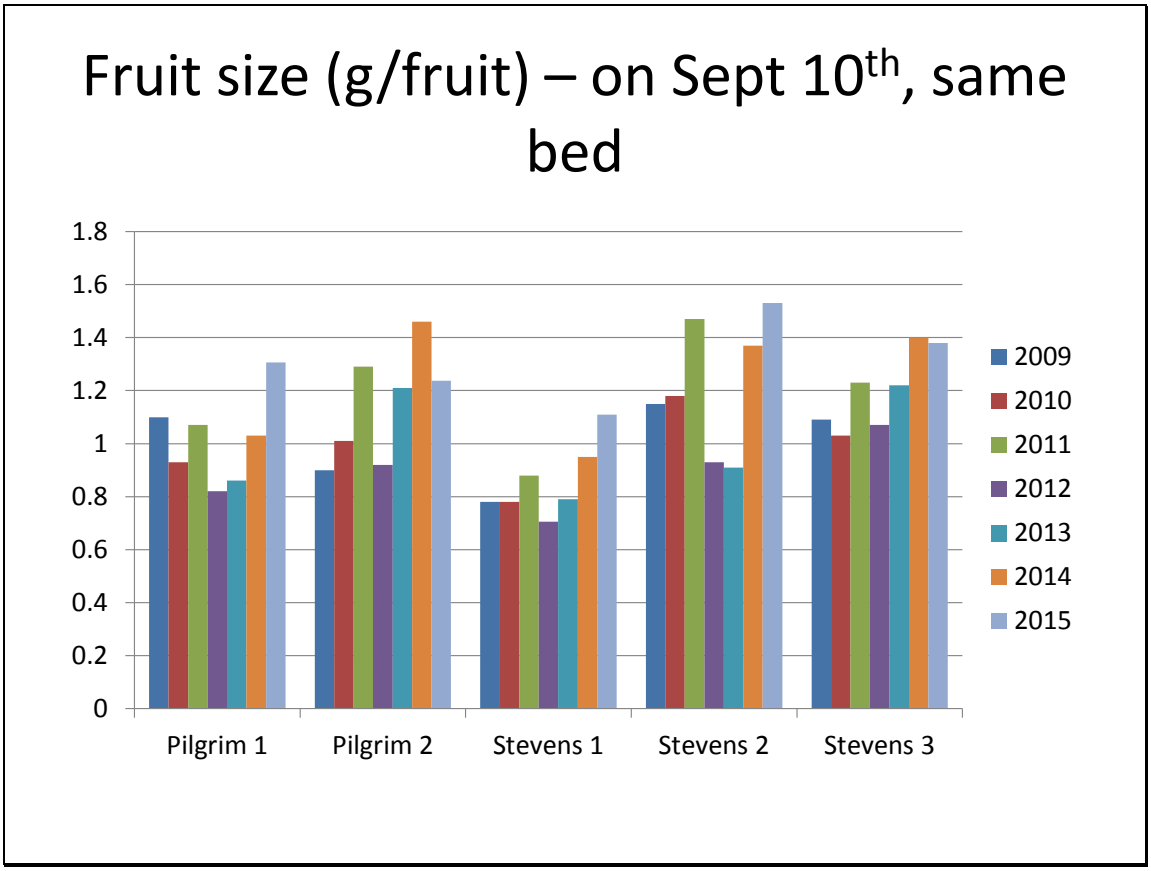
Slide 46

Fruit Size

- Year effect
- Harvest time effect

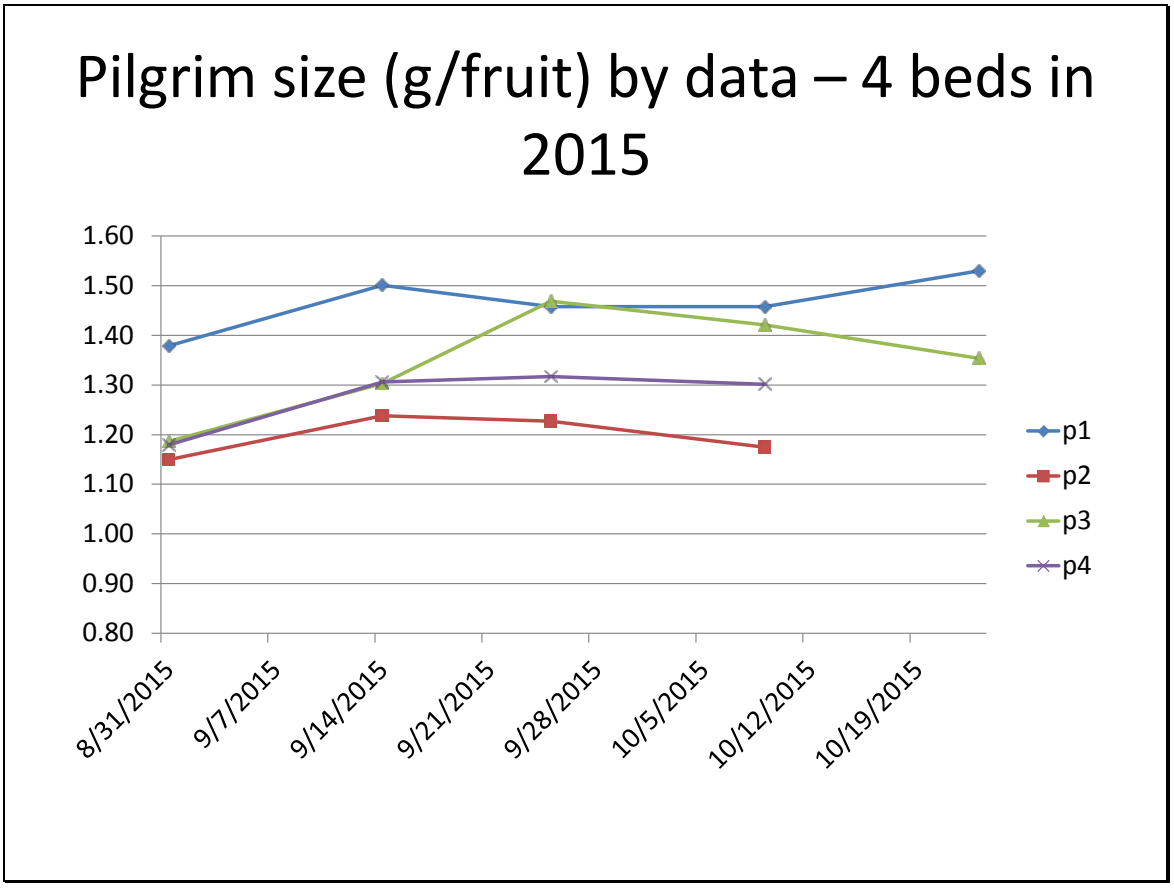
Ocean Spray is a handler that might want you to pick early. You might want to know if there is a difference in yield if you pick early – is it worth it?

Slide 47



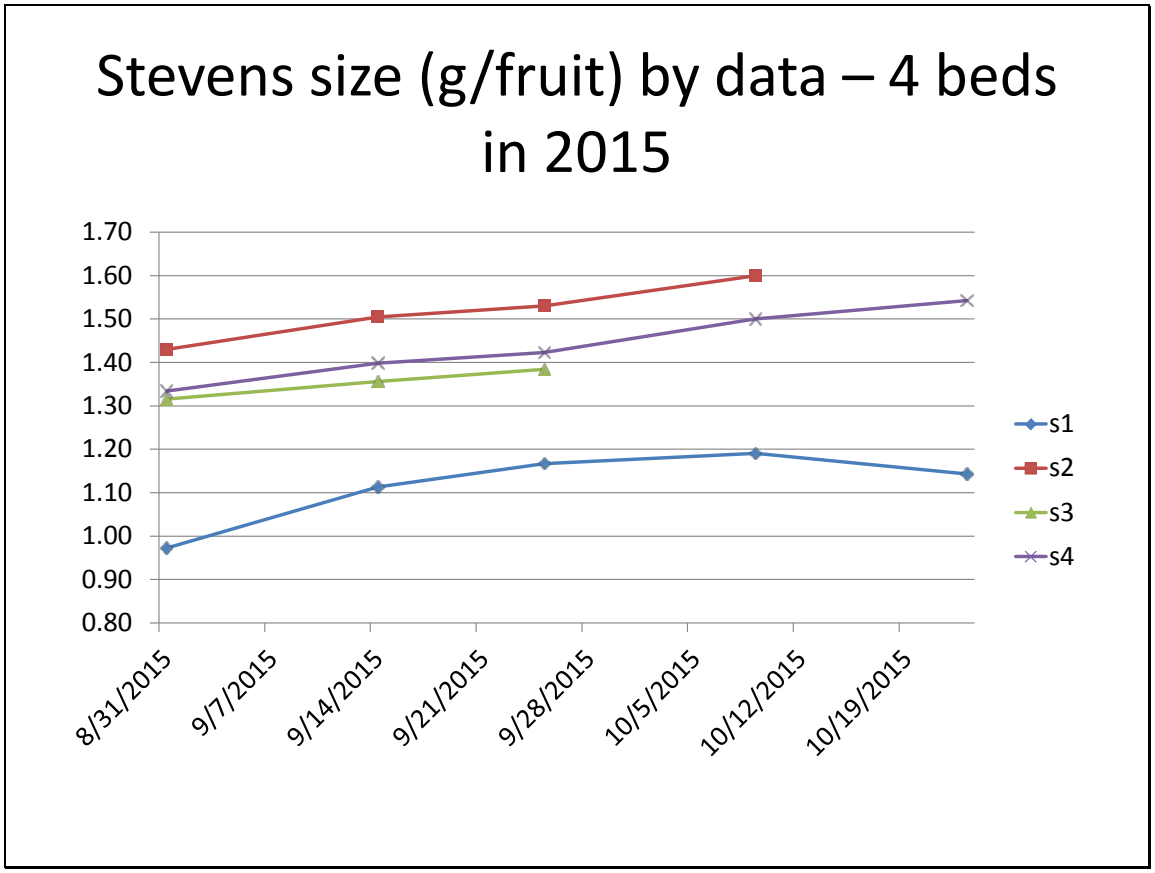
Fruit size was measured on September 10 for 7 years. It shows the 'year effect.' This is Washington, so you guys will probably have a little larger fruit than us. The temperature during bloom and right after is significant for size. If you're wondering what's going on – why your fruit's so small … the weather makes a huge difference, especially during bloom.

Slide 48



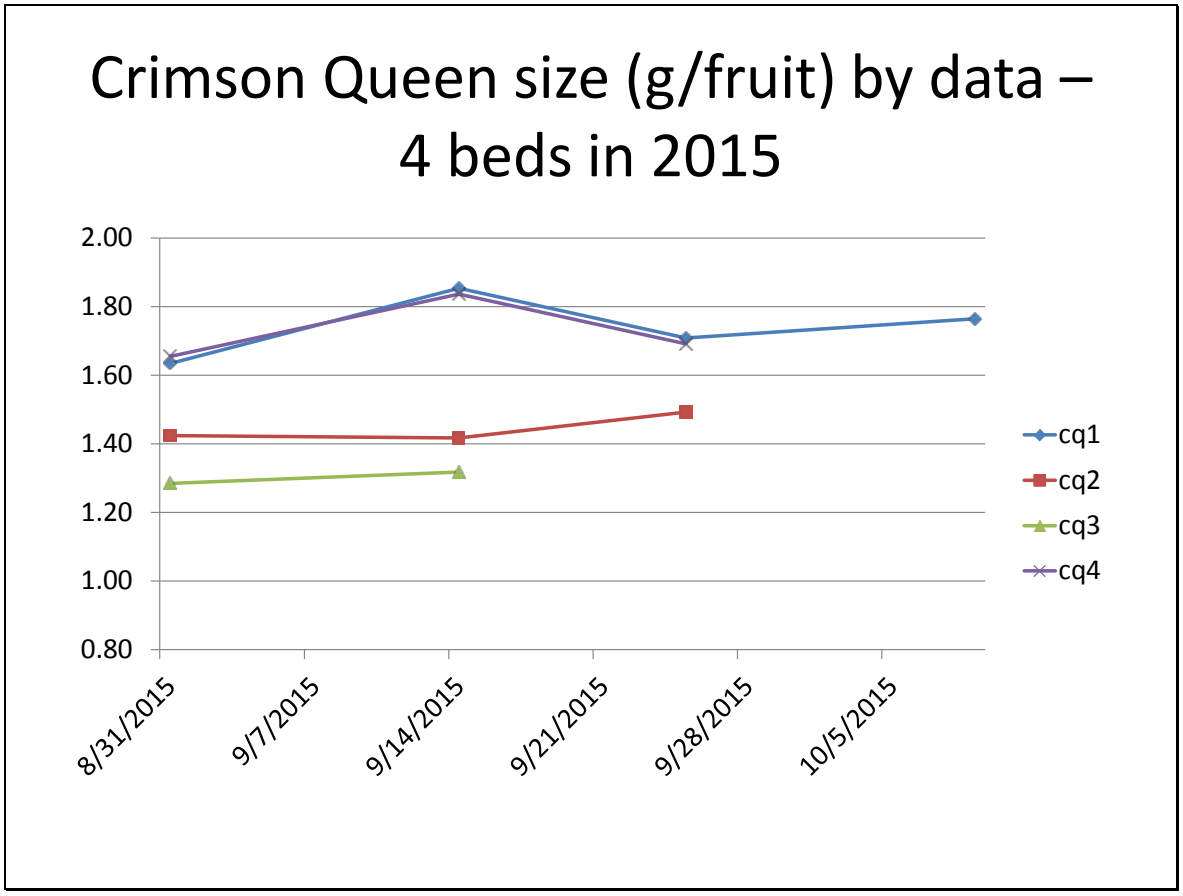
Back to my other question, if we pick early in the season, what effect does that have on yield? These are 4 pilgrim beds this year. Pilgrim usually sizes early and it if you pick early or late, it doesn't make a huge difference. If you look at the mean increase, it wouldn't be much. You wouldn't lose much yield by picking later.

Slide 49



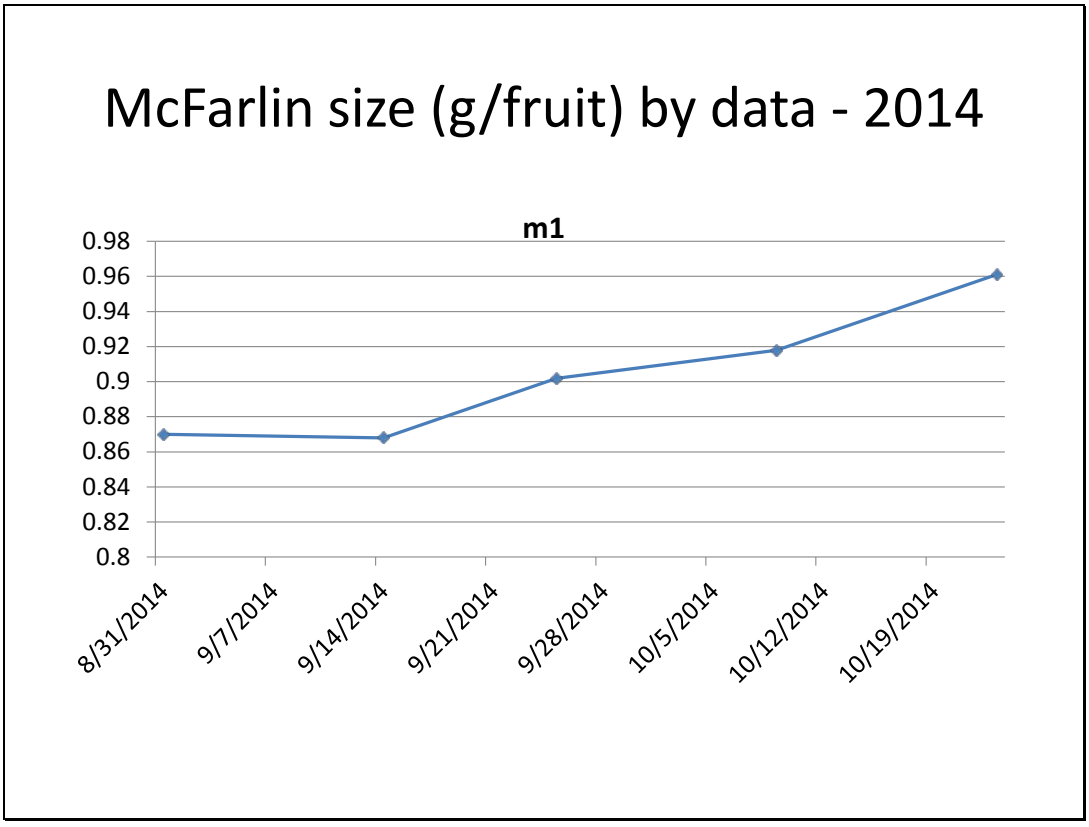
Stevens, on the other hand, seems to just slowly grow through the season. You'll note the variability between the beds, but you still see the slight increase every sample. You might lose a little bit by picking early rather than later. At some point these level off. There's a lot of variability by year, by bed, by grower … it's all over the place.

Slide 50



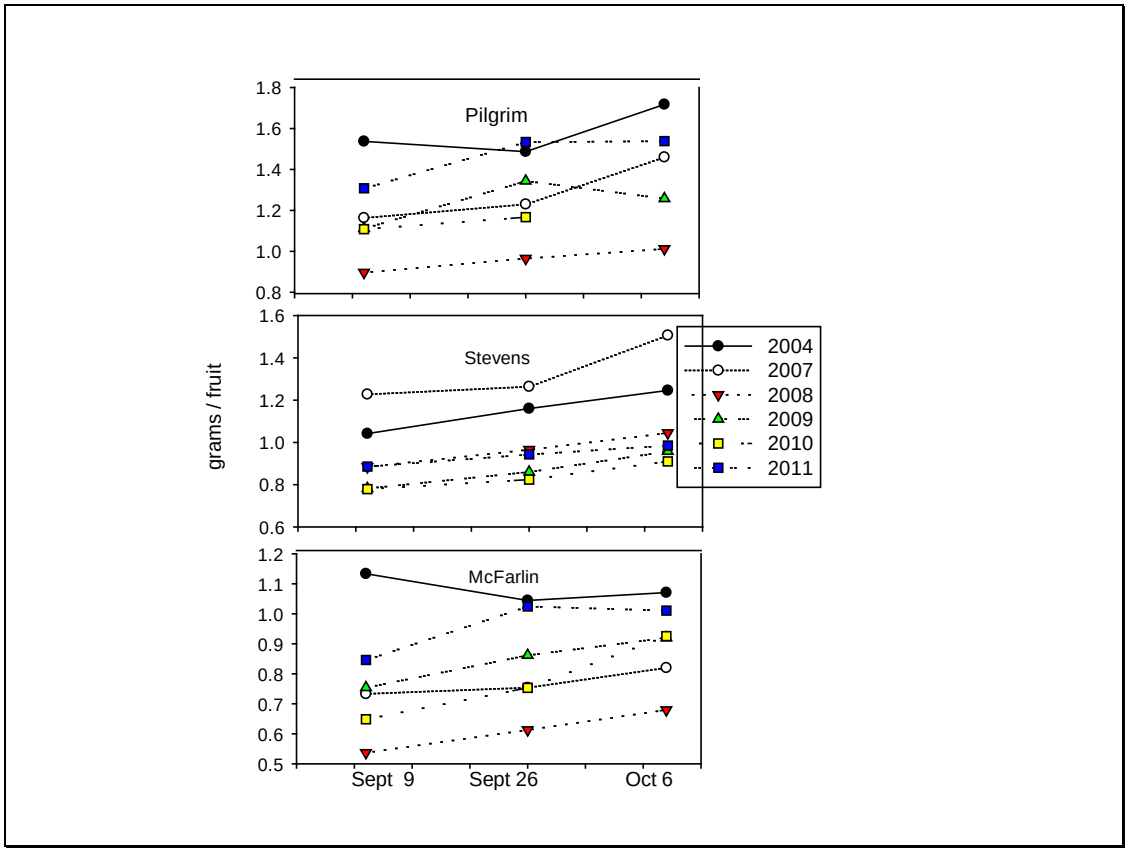
Crimson Queen … they tend to stop growing early, and there's no difference in size once they've stopped.

Slide 51



There's still some McFarlin out here – this is a different year, but they continue to grow through the season.

Slide 52



I've showed these slides before – they vary by year and variety, etc, but there is some increase

Fruit size conclusion

- Final size is function of bed and weather
- Some variety continue to grow between mid-Sept and Mid-Oct, others not.
- This translate into ~10 bbl/ac for best case scenerio, 0 or -5 bbl/ac (rot) for worse case.

. If you do all the math, it boils down to about 5-10 bbls difference across all varieties from a mid-September harvest to a mid-October harvest. In some cases, you get more rot and you lose fruit, so it really depends on the scenario … weather, some varieties continue to grow while others do not … but overall, a best-case scenario is an increase of abou 10 bbl/ac from an early to a late harvest.

Slide 54

New dormant season burn down herbicide with registration potential

We are still screening other chemistries.
This is an herbicide applied to my new nemesis: sheep sorrel. Really tough to control.
There are some good burn-down chemistries out there that have some good potential. We're still looking at some of these.

Slide 55

Questions