

What's New and Exciting in the Northwest Berry Breeding World??



Chad Finn, Mary Peterson, Ted Mackey, Robert Martin- USDA-ARS
Bernadine Strik, Pat Jones, Amanda Vance- OSU; NWREC
Zak Wiegand, OSU- Dept. Food Science
Pat Moore, Wendy Hoashi-Erhardt- WSU- Puyallup
Michael Dossett- BC Blueb. Council, B.C.
Industry Cooperators

New cultivars and promising advanced selections

- **Caneberry**
 - **Floricane/Summer Red Raspberry**
 - **Primocane/Fall Red Raspberry**
 - **Black Raspberry**
 - **Blackberry**
- **Strawberry**
- **Blueberry**



Raspberry Numbers

- Crosses done: **37**; **19** florricane, **18** primocane
- Selections made: **30**; **18** florricane, **12** primocane
- Selections in trial:



	Florricane	Primocane
ORUS	57	55
WSU	31	-
Cultivars	7	9

- Selections being propagated for or in grower trial: **6** florricane, **3** primocane
- Naming: **ORUS 4716-1**

Breeding program overview

What is being planted? Will let Pat Moore cover for raspberries

Newer cultivars and selections in grower trials



“Can be available!”

Means nurseries have clean stock so **Call now!** if want chance of having for Spring or Fall 2020

Means even if want for 2021 should *probably call...*

Right now, best bets for NW bred Raspberries and Blackberries:

North American Plant; www.naplants.com/ ; (503)474-1852

Northwest Plant; <http://www.nwplant.com/> ; 360-354-2919

ORUS 4373-1

- **Floricaner fruiter**
- **Excellent flavor and fruit quality**
- **Bigger than Meeker with similar yield**
- **Machine harvest yield in Lynden ~Cascade Harvest**
- **Root rot resistant at Puyallup!!**
- **Fresh or Processed**
- **Concerns:**
 - **Not widely tested**
 - **Variable size and yield**
 - **Bit “frosty” but doesn’t seem to be a problem for ‘Wakefield**



Thawed IQF fruit

Can be available for Trial in 2020!

ORUS 4607-2



- **Floriscane**
- **Excellent flavor & fruit quality**
- **Machine harvests in OR & WA**
- **Meeker or better yield & fruit size**
- **Concerns:**
 - **New**
 - **RBDV susceptibility/crumbly**



Can be available for Trial in 2020!



Littau harvested fruit (NWREC)

ORUS 4600-3

- **Floricaner fruiter**
- **Excellent flavor & fruit quality**
- **Meeker or greater size & yield in OR & WA**
- **Firmness >Meeker, Cascade Harvest;
<Wake[®]field**
- **Machine harvests**
- **Fresh or Processed**
- **Concerns:**
 - **Var. size**
 - **RBDV & root rot susceptibility?**



If goes well will have plants in 2020



ORUS 4371-4
ORUS 4462-2
ORUS 4600-1

- **Floriscane fruiterers for trial**
- **Excellent flavor & fruit quality**
- **Machine harvests in grower and research plots**

If goes well will have plants in 2021



Examples of MH fruit of each



Cascade Premier

(USPPAF; WSU 2166)

- **Floricaner fruiter**
- **Excellent fruit quality**
- **Much larger than Meeker with similar or higher yield**
- **Machine harvests**
- **Concerns:**
 - **Root rot sensitive?**



In machine harvest trials in Lynden area:

ORUS 4089-2

ORUS 4283-2

ORUS 4371-4

ORUS 4462-2

ORUS 4465-3

ORUS 4607-2

ORUS 4640-1

ORUS 4641-3

ORUS 4783-3

ORUS 4851-1

ORUS 4961-1

Add new every year



New cultivars and promising advanced selections

- **Caneberry**
 - Floricane/Summer Red Raspberry
 - **Primocane/Fall Red Raspberry**
 - **Black Raspberry**
 - **Blackberry**
- **Strawberry**
- **Blueberry**



We will release ORUS 4716-1!

- Fresh Market- **Primocane fruiting**
- Excellent wholesale potential
- Bright and firm
- Excellent flavor and yield
- Can be harvested light pink with good raspberry flavor
- **Concerns: Have seen root rot but does not seem that susceptible**
- **Available now!**



ORUS 4716-1

“May be the best primocane fruiting cultivar I have seen from a public breeding program.”

Anon. Horticulturist



Can harvest at stage that works best in your operation



At harvest

ORUS 4716-1 (l) vs Polka (r)
After 14 d in cooler!



ORUS 4291-1 and ORUS 4487-1

- Fresh Market- **Primocane fruiting**
- Very early
 - ORUS 4291-1, **18 d** < Heritage
 - ORUS 4487-1, **10 d** < Heritage
- **ORUS 4291-1**
 - Medium yield
 - Good quality
 - Going slow as may be too root rot susceptible
 - **Can be available for 2020!**
- **ORUS 4487-1**
 - Very good yield
 - Very good quality
 - **Can be available for 2020!**



ORUS 4291-1,
left

ORUS 4487-1,
below



ORUS 4725-1

- Fresh Market- **Primocane fruiting**
- Excellent wholesale potential
- Firm
- Excellent flavor
- Excellent yield
- **Concerns:**
 - **Need to pick frequently or darkens**

Can be available for 2020!



New cultivars and promising advanced selections

- **Caneberry**
 - Floricane/Summer Red Raspberry
 - Primocane/Fall Red Raspberry
 - **Black Raspberry**
 - **Blackberry**
- **Strawberry**
- **Blueberry**



Black Raspberry Numbers

- **Goal: Cultivar with Munger quality that lives and has greater yield**
- **Crosses done: 12**
- **Selections made: 9**
- **Selections in trial: 130!!**
- **Selections being propagated for grower trial: 8**
5 Available... working with Peerbolt Group!



Black Raspberry Numbers

- **Goal: Cultivar with Munger quality that lives and has greater yield**
- **Crosses done: 12**
- **Selections made: 9**
- **Selections in trial: 130!!**
- **Selections being propagated for grower trial: 8**
5 Available... working with Peerbolt Group!



Machine or hand (***) harvested promising selections

ORUS 3013-1



ORUS 3021-1



ORUS 3032-3



ORUS 3038-1



Available at
nurseries

ORUS 3409-1



ORUS 4412-2



ORUS 4499-1



ORUS 3381-3

- **Very late!** w/MacBlack; 10 d later than Munger
- Will release to replace/complement MacBlack
- Larger yield and fruit size than MacBlack
- Excellent flavor- always scores well in panels whether fresh or frozen
- Excellent yield

Can be available for 2020!



ORUS 4179-1

- Thornless!
- Black raspberry with heavy pubescence
- Since mostly going to puree **does appearance matter** as long as flavor, yield, machine harvesting and anthocyanin levels are acceptable????
- **Not available until 2021**



A Grower Trial in 2019



Munger



ORUS 3038-1



ORUS 3021-1



ORUS 3013-1

New cultivars and promising advanced selections

- **Caneberry**
 - Floricane/Summer Red Raspberry
 - Primocane/Fall Red Raspberry
 - Black Raspberry
 - **Blackberry**
- **Strawberry**
- **Blueberry**



Blackberry Numbers

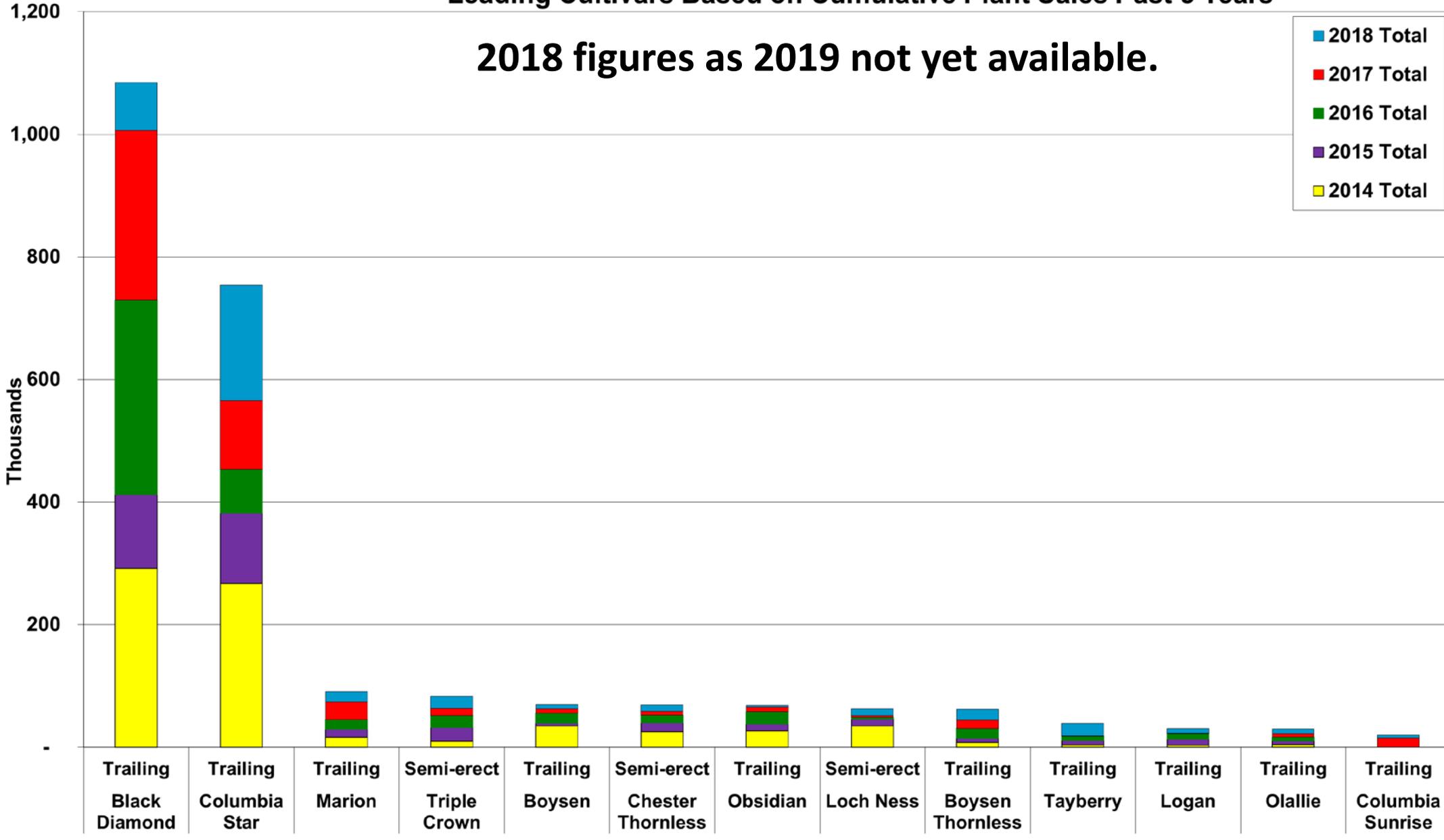


- **Crosses done: 49**
- **Selections made: 21 (11 trailing, 9 semi-erect, 1 primocane frt.)**
- **Selections being propagated for grower trial:**

Trailing named recently:	Hall's Beauty
Grower Trial- Standard processed:	ORUS 4222-1, ORUS 4663-1, ORUS 4902-1
Grower Trial- "Machine harvestable Tay":	ORUS 4024-3
Semi-erect named recently:	Galaxy, Eclipse, Twilight (ORUS 4370-1)
Grower Trial- Semi-erect fresh:	ORUS 4670-1
Grower Trial- Primocane fruiting:	ORUS 4545-2;
To be named Primocane fruiting:	ORUS 4999-2
Trailing thornless dwarf ornamental to be named:	ORUS 4535-1

Leading Cultivars Based on Cumulative Plant Sales Past 5 Years

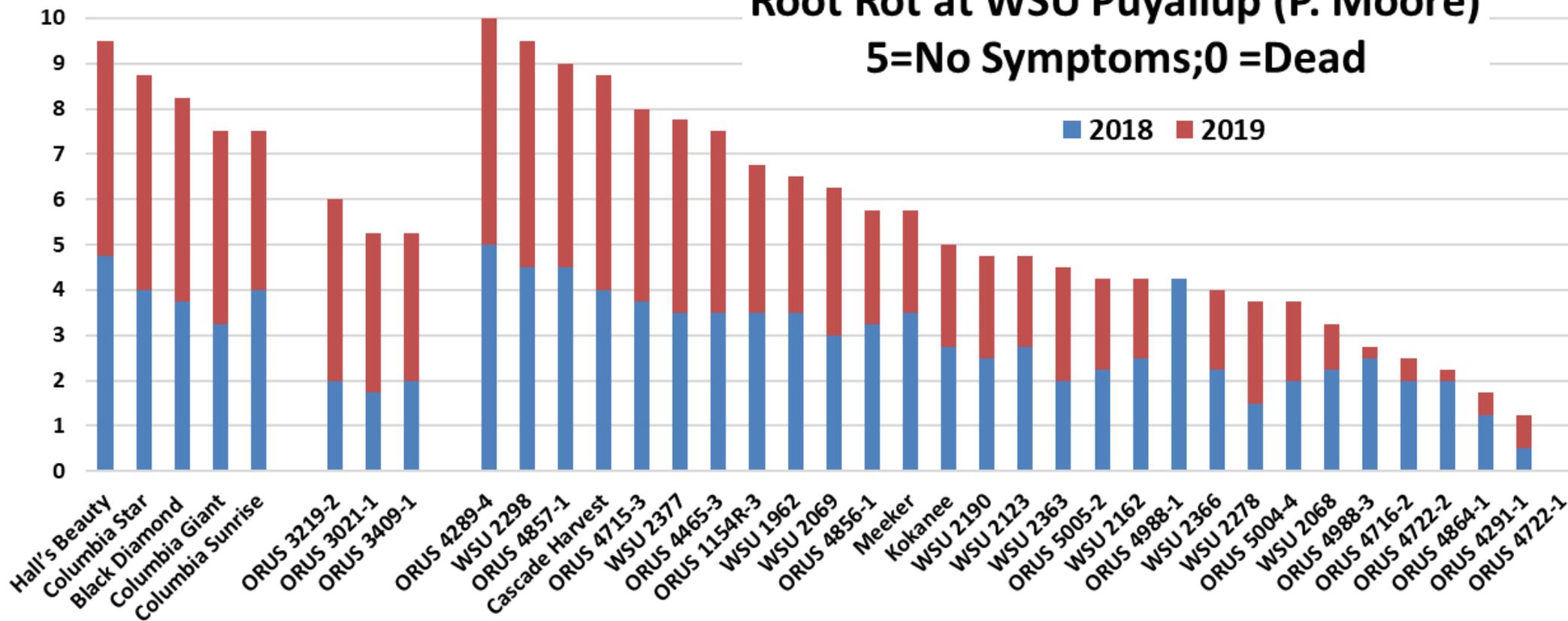
2018 figures as 2019 not yet available.



*** Does not include sales of 'Willamette Thornless Marion'**

Root Rot at WSU Puyallup (P. Moore)

5=No Symptoms;0 =Dead



Blackberries only planted 2017... so just starting to really see differences

'Columbia Sunrise'

(USPP29,367)

- Shares parent with 'Columbia Star' and 'Columbia Giant'
- Early! 10 d < Black Diamond; 14 d < Marion
- Thornless with excellent yield
- Large, sweet berries
- Excellent fresh and processed fruit quality!
- **Concerns:**
 - **Not widely tested!**
 - **Tertiary buds breaking vs primary**



Plants can be available!

Hall's Beauty

(ORUS 3453-2; USPP 30,063)

- Excellent in grower trials Early! 7 d < Black Diamond; reduced SWD??
- Yield = Black Diamond & Columbia Star and > Marion
- Consistently noted as Very sweet
- Excellent potential as ornamental!
- Has grown well in Pudding River Floodplain
- Concerns:
 - Not widely tested!

Plants can be available!



ORUS 4222-1

- Very high yielding; can out yield Black Diamond
- Very uniform, medium-sized fruit
- Machine harvests
- Concerns:
 - Tender skin
 - Shape in northern climates

Plants can be available!



ORUS 4024-3

- Thorny
- Looks like a 'Tayberry' but picks easily!
- Performed well at fresh grower

Concerns: Not widely tested; Cold hardiness

Can be available!



Galaxy

(ORUS 2711-1; PPAF)

- **New**
- **Thornless, semi-erect habit**
- **75% Eastern (erect/semi-erect) : 25% western**
- **Large fruit, roundish shape; V. glossy; Good flavor/ v. sweet, V. good firmness**
- **Earlier than Triple Crown**



Plants can be available!



Galaxy

(ORUS 2711-1; PPAF)



7 d vs 14 d storage
In both pairs, Galaxy on left and Eclipse on right

Eclipse (ORUS 2816-4; PPAF)

- New
- Thornless, **semi-erect habit**
- Marion+ yields
- Marion size fruit, roundish shape; V. glossy; Good flavor/ v. sweet, V. good firmness
- Earlier than Triple Crown
- **Plants can be available!**



Eclipse

(ORUS 2816-4; PPAF)



7 d vs 14 d storage
In both pairs, Galaxy on
left and Eclipse on right





Eclipse (ORUS 2816-4; PPAF)

**Chester
Thornless**

Eclipse

Triple Crown

Eclipse



Twilight (ORUS 4370-1) PPAF

- Thornless, **semi-erect habit**
- Medium-high yield
- Large fruit; 9 g
- Very firm and crisp texture
- Excellent flavor
- With or slightly later than Loch Ness but before Triple Crown and Chester Thornless
- **Plants can be available!**





Twilight vs Triple Crown

**Same Twilight vs
Chester Thornless**



21 days storage Twilight (l) vs Chester (r)



Primocane fruiting blackberry

ORUS 4999-2

- Thorny
- 2x the yield of Prime-Ark 45 planted a year earlier!
- Similar or slightly larger than PA45
- Similar or earlier than PA45
- Would need tunnel in Wash.



Primocane fruiting blackberry

ORUS 4999-2



Primocane fruiting blackberry

ORUS 4999-2

Storage

7 d in storage

23 d in storage

ORUS 4999-2 Prime-Ark[®]45

ORUS 4999-2 Prime-Ark[®]45



New cultivars and promising advanced selections

- **Caneberry**
 - Floricane/Summer Red Raspberry
 - Primocane/Fall Red Raspberry
 - Black Raspberry
 - Blackberry
- **Strawberry**
- **Blueberry**



“Can be available!”

Means nurseries have clean stock so **Call now!** if want chance of having for Spring or Fall 2020

Means even if want for 2021 should *probably call...*

Right now, best bets for NW bred strawberries:

Lassen Canyon Nursery; <http://www.lassencanyonnursery.com/>

Norcal/Planasa; <http://norcalnursery.com/>

Strawberry Numbers

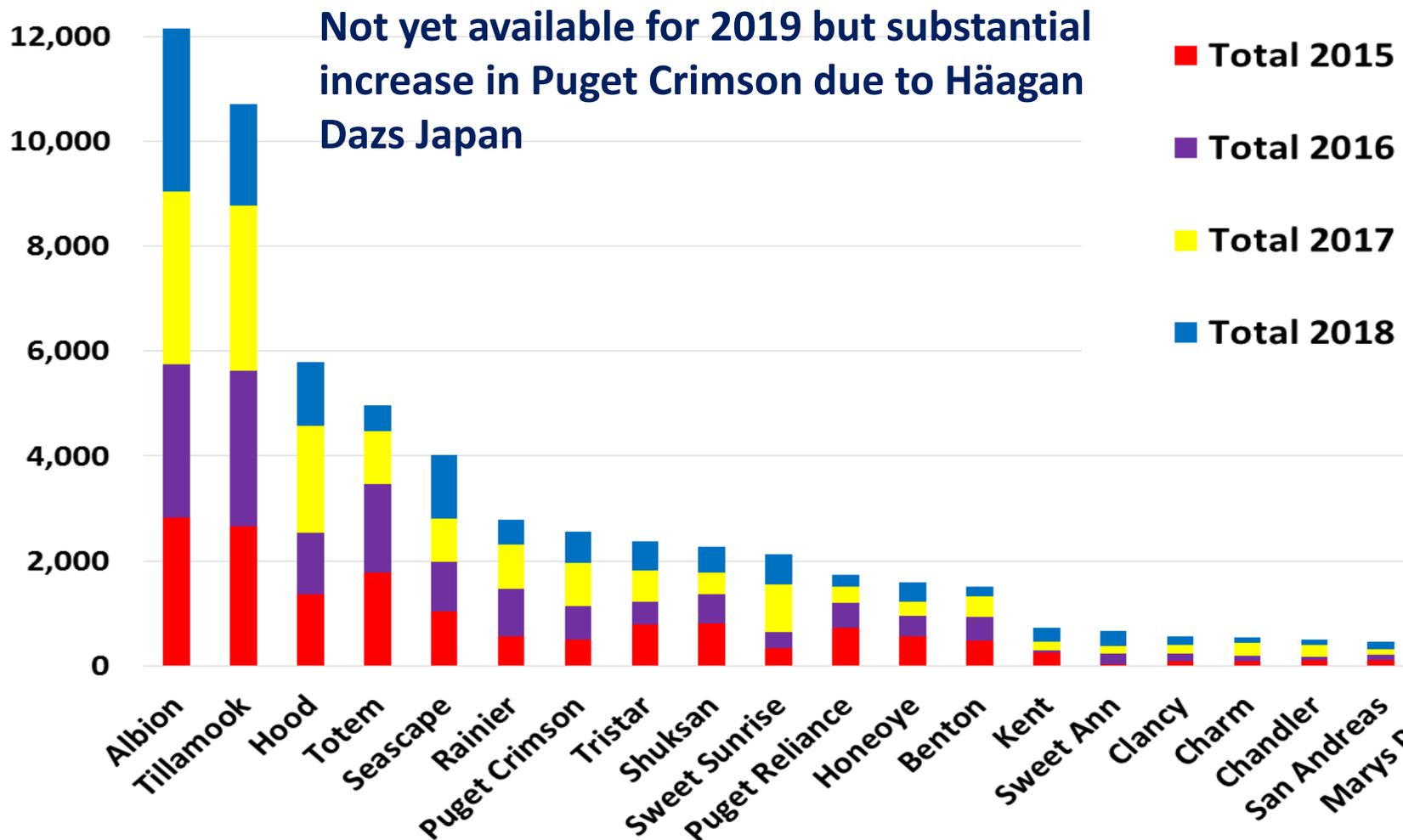
- Crosses done: **60 (all short-day)**
- Selections made: **29 (all short day)**
- Selections being propagated for grower trial: **7**
- Ornamental selections being commercially trialed: **7**
- Cultivars named in past few years: **Marys Peak, Charm, and Sweet Sunrise**



- **Breeding program objectives**
- **What is being planted?**
- **New releases**
- **Grower trials**



Pacific Northwest Plant Sales (1,000s) Last 4 Years (only for those sold in '18)



Data collected by P. Moore; thanks to nurseries for sharing information

- **Breeding program objectives**
- **What is being planted?**
- **New releases**
- **Grower trials**



Sweet Sunrise

(USPP 25,223)

- Puget Reliance offspring
- Dual use potential
- 1 week earlier than Totem
- Large fruit= Tillamook
- High yields= Tillamook
- V. good, sweet flavor
- Excellent vigor and open plant
- Held up very well to weevil infestation
- Performed well in Grower Trials!
- **Available but mostly sold out!**



Charm

(USPP 25,300)

- Processing & Local fresh market
- Totem size fruit
- Large yields=Tillamook
- Excellent vigor
- Excellent in bad fields & years
- Main concern is fruit size
- “Very impressive; Potential Hood Replacement”
- **Available**



Marys Peak (ORUS 2427-4)

(USPP 29,370)

- **Dual Purpose**
- **Large fruit =Tillamook**
- **Excellent vigor with open plant**
- **Good yields=Tillamook**
- **Outstanding performance in BC**
- **Main concern is fruit shape & capping**

- **Available!!**



Thawed frozen fruit





Photo: Jo Peterson



- **Breeding program objectives**
- **What is being planted?**
- **New releases**
- **Grower trials**



ORUS 2486-1

- Fresh/processed
- Outstanding fruit quality especially flavor
- Yield= Totem
- Fruit size is large.
- Concerns:
 - Yield across range
- **Need to request!**



ORUS 2678-1

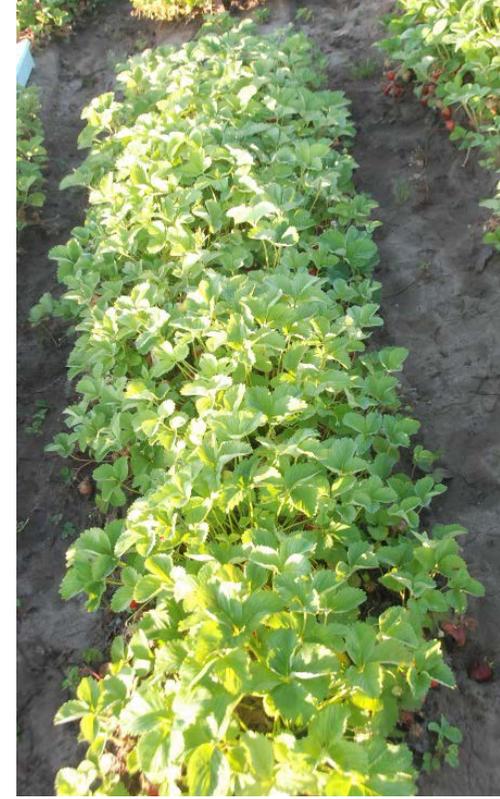
- Fresh
- Puget Summer x ORUS 2019-1
- Late, in Oregon later than Puget Crimson
- Yield high= Tillamook
- Fruit size large= Tillamook
- **Need to request!**



ORUS 3009-1

- Fresh/Processing
- Yield & fruit size equal to or greater than Totem
- Very high quality, sweet fruit

Clean and being propagated



New cultivars and promising advanced selections

- **Caneberry**
 - **Florricane/Summer Red Raspberry**
 - **Primocane/Fall Red Raspberry**
 - **Black Raspberry**
 - **Blackberry**
- **Strawberry**
- **Blueberry**

Developing commercial cultivars adapted to the Pacific Northwest with an emphasis on tolerance of *Blueberry shock virus* (BIShV)

Chad Finn, Ted Mackey, and Bob Martin; USDA-ARS, HCRU

Oregon and Washington Blueberry Commissions
Blueberry Trial Support Group
Fall Creek Farm & Nursery,
North American Plant Co., Oregon Blueberry Farm & Nursery



Objectives

- **Begin preliminary investigations to determine whether breeding for *Blueberry shock virus* (BShV) resistance makes sense from a practical standpoint.**
- **Develop improved cultivars that are adapted to PNW with: outstanding fruit quality, machine harvestability, unique fruit characteristics, extended fruiting season**

Blueberry shock virus

- Bristow (WSU) and Martin (USDA-ARS) did initial characterization
- Pollen transmitted and the infected part of the plant has many or all of its flowers, flower buds or new growth killed.
- The infected part of the plant is symptomatic for only one year other than foliar symptoms and it not known to reoccur
- May take time to “jump” from one block of a single cultivar to another, but once it does it often moves through quickly through it
- **Challenges:**
 - **Variable on how quickly a genotype gets it**
 - **Can't control pollinator vector**
 - **While pre-plant intentional infection has been discussed not practical and may have long term impact**



**Field symptoms in “shock year”
‘Berkeley’ above,**

‘Liberty’ below (RR Martin photos)



Identifying Useful Germplasm

- Genotypes that industry members identified in 2015 as high, medium, low & v. low susceptibility
 - High- Bluegold, Brigitta, Liberty
 - Medium- Rubel, Duke, Bluejay, 1613A
 - Low- *Draper (NO!)*, Bluecrop, Blueray, Elliott, Aurora
 - Very low- Legacy, Jersey, Burlington, Baby Blues



Identifying Useful Germplasm Cultivars

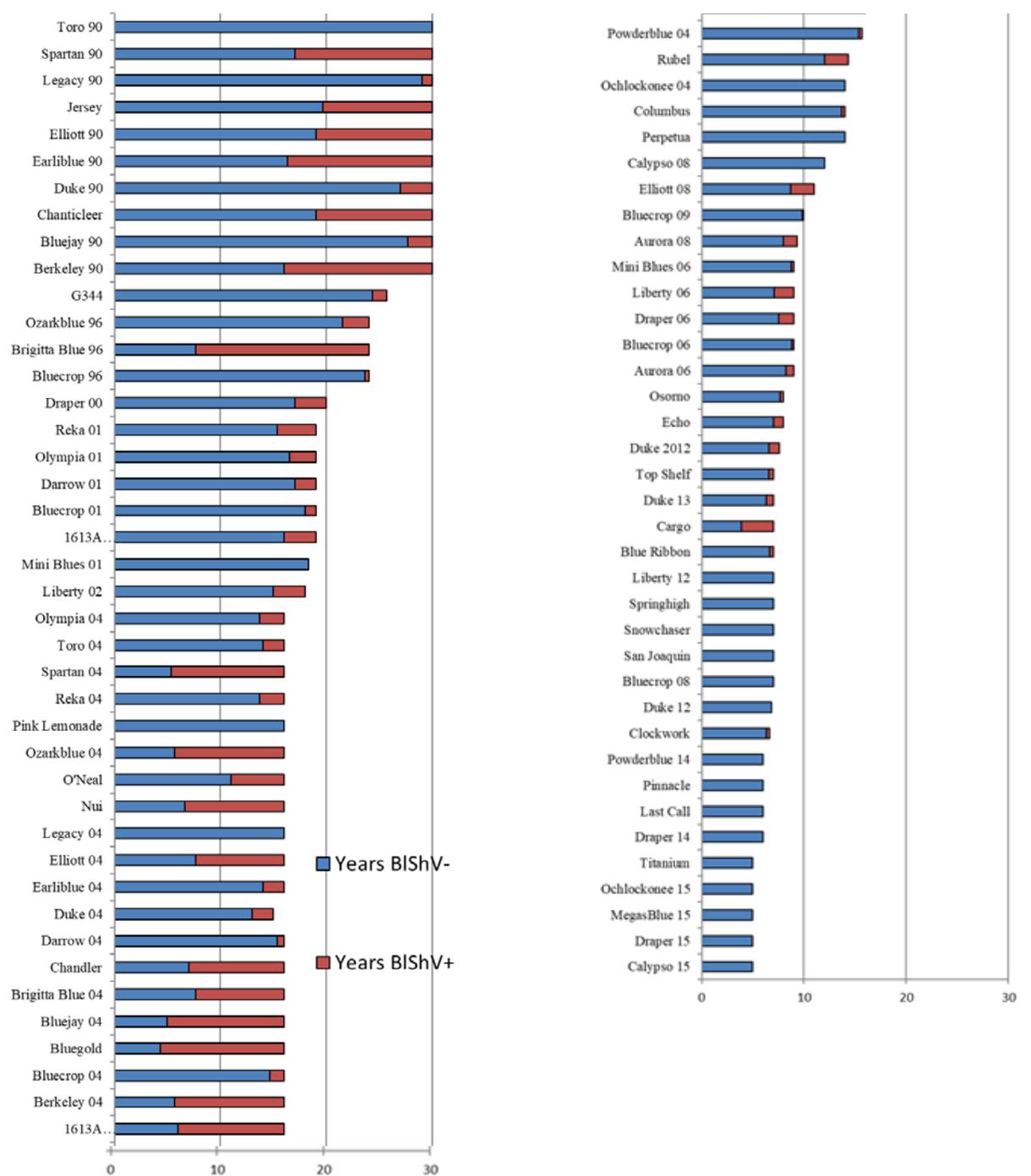


Table 1. Mean period of time that genotypes planted at OSU-NWREC tested negative or positive for Blueberry shock virus. Genotypes with less than 5 years negative were not considered as either slow or not slow to become BISHV+. Through 2019.

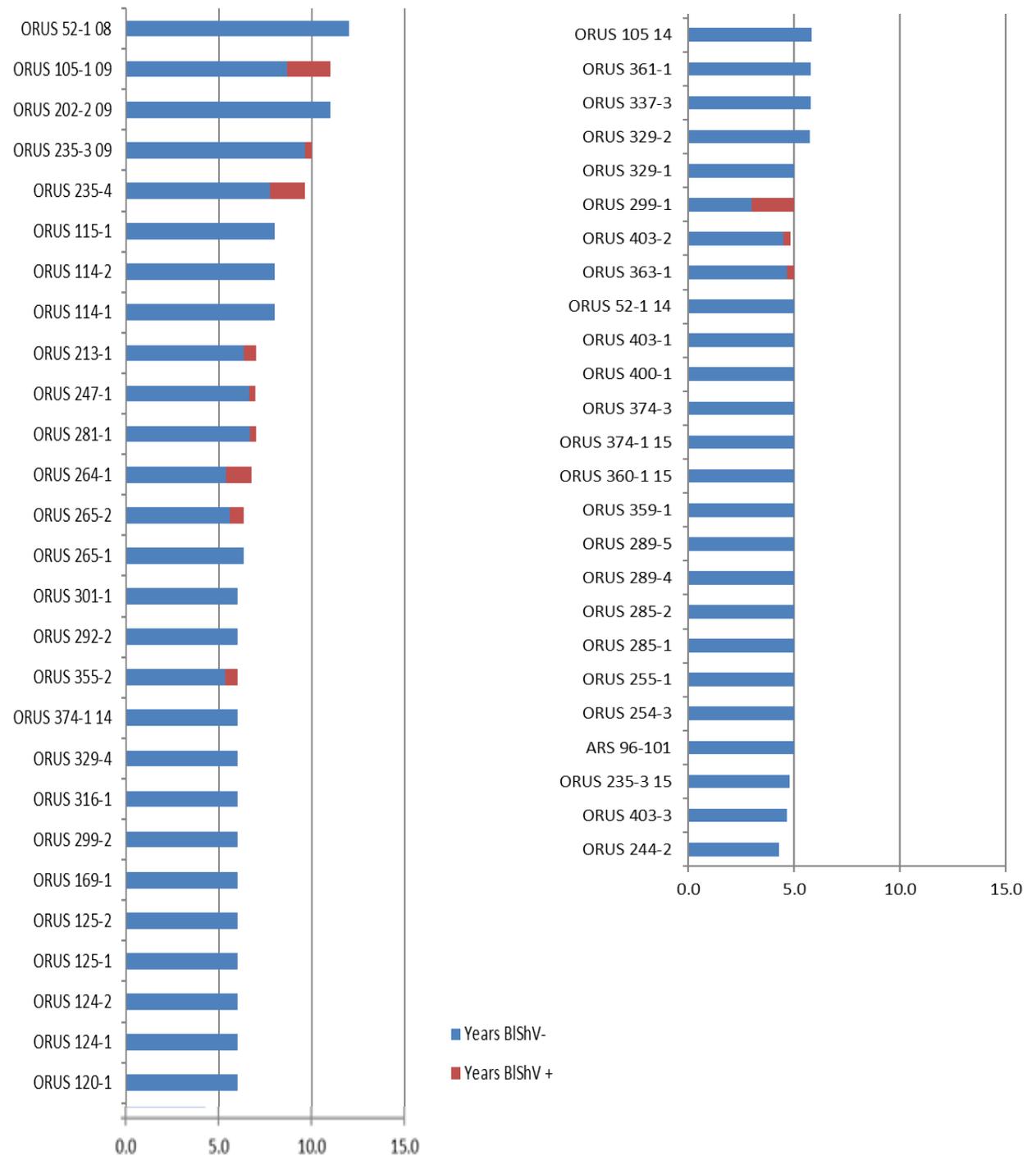
Genotype	Years BISHV-	Years BISHV+	Genotype	Years BISHV-	Years BISHV+	Genotype	Years BISHV-	Years BISHV+	Genotype	Years BISHV-	Years BISHV+
1613A (Hardyblue) 01	16.0	3.0	Clockwork	6.3	0.3	Legacy 04	16.0	0.0	Reka 01	15.3	3.7
1613A (Hardyblue) 04	6.0	10.0	Columbus	13.7	0.3	Legacy 90	29.0	1.0	Reka 04	13.7	2.3
Aurora 06	8.3	0.8	Darrow 01	17.0	2.0	Liberty 02	15.0	3.0	Rubel	12.0	2.3
Aurora 08	8.0	1.3	Darrow 04	15.3	0.7	Liberty 06	7.1	1.9	Spartan 04	5.3	10.7
Berkeley 04	5.7	10.3	Draper 00	17.0	3.0	Liberty 12	7.0	0.0	Spartan 90	17.0	13.0
Berkeley 90	16.0	14.0	Draper 06	7.6	1.4	MegasBlue 15	5.0	0.0	Springhigh	7.0	0.0
Blue Ribbon	6.7	0.3	Draper 14	6.0	0.0	Mini Blues 01	18.3	0.0	Titanium	5.0	0.0
Bluecrop 96	23.7	0.3	Draper 15	5.0	0.0	Mini Blues 06	8.8	0.2	Top Shelf	6.6	0.4
Bluecrop 01	18.0	1.0	Duke 04	13.0	2.0	Nui	6.7	9.3	Toro 04	14.0	2.0
Bluecrop 04	14.7	1.3	Duke 12	6.8	0.0	Ochlockonee 04	14.0	0.0	Toro 90	30.0	0.0
Bluecrop 06	8.8	0.2	Duke 13	6.3	0.7	Ochlockonee 15	5.0	0.0			
Bluecrop 08	7.0	0.0	Duke 2012	6.6	1.0	Olympia 01	16.5	2.5	Grower Trial Selections		
Bluecrop 09	9.9	0.1	Duke 90	27.0	3.0	Olympia 04	13.7	2.3	ORUS 98-1	8.0	1.3
Bluegold	4.3	11.7	Earliblue 04	14.0	2.0	O'Neal	11.0	5.0	ORUS 114-1	8.0	0.0
Bluejay 04	5.0	11.0	Earliblue 90	16.3	13.7	Osorno	7.7	0.3	ORUS 114-2	8.0	0.0
Bluejay 90	27.7	2.3	Echo	7.0	1.0	Ozarkblue 04	5.7	10.3	ORUS 115-1	8.0	0.0
Brigitta Blue 04	7.7	8.3	Elliott 04	7.7	8.3	Ozarkblue 96	21.5	2.5	ORUS 169-1	6.0	0.0
Brigitta Blue 96	7.7	16.3	Elliott 08	8.7	2.3	Perpetua	14.0	0.0	ORUS 235-3	9.6	0.4
Calypso 08	12.0	0.0	Elliott 90	19.0	11.0	Pink Lemonade	16.0	0.0	ORUS 235-4	7.8	1.9
Calypso 15	5.0	0.0	G344	24.3	1.3	Pinnacle	6.0	0.0	ORUS 247-1	6.6	0.3
Cargo	3.9	3.1	Jersey	19.7	10.3	Powderblue 04	15.3	0.3	ORUS 264-1	5.4	1.4
Chandler	7.0	9.0	Last Call	6.0	0.0	Powderblue 14	6.0	0.0	ORUS 292-2	6.0	0.0
Chanticleer	19.0	11.0							ORUS 359-1	5.0	0.0

Identified by growers as slow to get

Slow to get in our testing

Identifying Useful Germplasm

Selections that have been in ground for at least 5 years and have not been discarded for other reasons



Take homes for breeding/growing

- Mini Blues, Bluecrop, Calypso, Darrow, G-344, Legacy, Perpetua, Reka, and Toro repeatedly identified as being **slow to become BISHV+**
- ORUS 52-1, ORUS 202-2, and ORUS 235-3 **slow to become BISHV+**
- Berkeley, Bluegold, Bluejay, Brigitta Blue, Cargo, Nui, Ozarkblue and Spartan **rapidly become BISHV+**
- While southern highbush (San Joaquin, Snowchaser) and rabbiteyes are slow to become infected, they bloom extremely early or late and may just “escape” BISHV

Take homes for breeding/growing (cont.)

- Need to revise sampling
- Need to continue monitoring DxJ population and look to other molecular marker development to see if can identify the slow to become BShV+ types without growing in field for years!

Total Genotypes

308

Positive 2018

12

Positive 2019

76



2016 2017 2018 2019 Total

Crosses

53 57 65 50 225

Selections

41 47 22 29 139

**Targeted for trials/in
nursery grower trial**

22

**Being prepped for grower
trial**

9

In grower trial

4

New ornamental releases

2

Named

3+





In grower trial:

ORUS 235-3

- A few available! Let us know if want
- Outstanding fruit quality with aromatic, SHB flavor
- Nice to eat, pops
- High yields; >Bluecrop
- Medium blue round, firm with excellent scar & picking ease
- As IQF, scored better than Draper and comparable to Duke.
- Sweet; 16.2% SS
- **Concerns:**
 - Too much sprawl? Needs trellis?
 - Hardiness



- Bluecrop x Aurora
- Excellent quality especially firmness & flavor w/ very good yield in Liberty season
- Slow to get shock

ORUS 114-1



ORUS 114-2



ORUS 264-1

- MSU 51 x ORUS 202-1
- Liberty season
- Outstanding fruit quality
- Large, firm fruit
- Excellent yields
- Nice upright and vase shaped bush
- Good heat tolerance
- **Concerns:**
 - **Not widely tested**



Available for Grower Trial

ORUS 169-1

- Liberty x G344
- Mid-late season, a little after 'Cargo' and before 'Calypso' and 'Last Call'
- Outstanding fruit quality
- Large (2.1 g), firm fruit
- Greater yield than 'Draper' and 'Last Call' in 2017-19
- **Concerns:**
 - **New**
 - **Does it hang well enough?**
 - **Tight clusters**



Can be available for Grower Trial

ORUS 120-1

- **Rabbiteye**
- Not likely of any interest in northern Washington
- Late
- Medium-large
- High quality for rabbiteye
- **Can be available for Grower Trial**



Moving to grower trial:

- ORUS 247-1** Excellent quality and yield. Slight bit of Draper Drop
- ORUS 359-1** Gorgeous firms fruit. Very blue. Stores well
- ORUS 587-1** Very late, holds well on the plant with excellent size
- ORUS 620-2** Amazing quality. May be lower chilling and less hardy

'Mini Blues' (USPP 28,233)

- Processing, small fruit market
- Only one plant has tested positive for BShV in 20 years
- Bluecrop yield but ½ the size
- Vigorous plant
- High quality fruit with outstanding flavor
- In grower trial Washington and Oregon



'Echo' (PPAF)

- Ornamental
- Repeat fruiter as was 'Perpetua'
- Royalties from 'Perpetua' and now 'Echo' starting to support commercial program.



ORUS 596-2 and -3

- Offspring of 'Perpetua'
- Fruiting on new growth¹¹
- 19 September 2019!!



“Can be available!”

Means nurseries have clean stock so **Call now!** if want chance of having for Spring or Fall 2020

Means even if want for 2021 should *probably call...*

Right now, best bets for NW bred blueberries:

Briggs Nursery; <https://www.briggsnursery.com/>

Fall Creek Farm and Nursery; <http://www.fallcreeknursery.com/>

JRT Nursery; <http://jrtnurseries.com/>

North American Plant; www.naplants.com/

Oregon Blueberry Farm and Nursery; <http://www.oreblueberry.com/>

Breeding for tolerance to heat and intense UV

To determine whether can identify genotypes resistant to intense sunlight and heat (e.g., eastern Washington, southern Oregon)

Methods

- Cultivars and seedlings planted in locations where abiotic stresses occur.
- Will evaluate using traditional observations and using unmanned aerial systems and high-throughput digital imaging tools; D. Bryla cooperation.
- Planted in 2018-19. Will evaluate plant survival in Spring 2019. Will begin fruit evaluations in 2020 and 2021.

Spring 2019

Corvallis, OR



Summer 2019

Lynden, WA



Prosser, WA



Myrtle Creek, OR





New cultivars and promising advanced selections

- **Caneberry**
 - **Florricane/Summer Red Raspberry**
 - **Primocane/Fall Red Raspberry**
 - **Black Raspberry**
 - **Blackberry**
- **Strawberry**
- **Blueberry**

Going to miss these guys!

Any Questions!



'Puget Summer'

- **Very late season production**
- **Excellent flavor**
- **Result of lost seedling crop at WSU**
- **Parent of 'Puget Crimson'**



ORUS 3088-1

- Fresh/Processing
- Yield and fruit size greater than Totem
- Awesome flavor

Clean and being propagated



And just because you may hear about it and wonder....

**Releasing ORUS 4535-1 as dwarf,
thornless ornamental blackberry**



ORUS 4670-1

- If performs well again in 2020 will name
- Thornless, semi-erect habit
- Higher yield than Chester Thornless!!
- Much better to eat than Chester!!!
- Start and peaks ahead of Chester Thornless
- Medium sized but bigger than Chester Thornless



In 2018-2019:

	Berry size (g)	Yield (tons·a ⁻¹)
ORUS 4670-1	6.5 a	7.04 a
Chester Thnls	6.0 b	4.83 b



Not yet available!

ORUS 4670-1 vs Chester Thornless

A Grower Trial in 2018



Munger



ORUS 3038-1



ORUS 3021-1