# December 2020



# (FY 2019-2020 Funded Projects)

# **Research Progress Reports**

for the



# Table of Contents

Title	Page
Caneberry Pesticide Registration, Tracking, and New Chemistries Dani Lightle - North Willamette Research and Extension Center	3
Cooperative Breeding Program – Caneberries Bernadine Strik – NWREC, Pat Jones – NWREC, and Chad Finn – USDA ARS	17
Evaluation of Processing Quality of Advanced Caneberry Breeding Selections Zak Wiegand – Oregon State University	47
Small Fruit Update Progress Report Tom Peerbolt – Northwest Berry Foundation	55

# Research Report to the Oregon Raspberry and Blackberry Commission and the Agricultural Research Foundation 2020-2021

TITLE: Caneberry Pesticide Registration, Tracking, and New Chemistries

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#### **OBJECTIVES:**

1. Track status of current caneberry registrations and provide information in support of the Oregon caneberry industry.

2. Update & maintain the Pesticide Registration chart and MRL chart.

3. Provide data or information to pesticide regulatory agencies that are necessary to ensure the pest management needs of Oregon's caneberry growers are being met.

#### **PROGRESS:**

*Objective 1*: Four new labeled materials became available to the caneberry industry in 2020, while others continue to move through the EPA pipeline. Table 1 details changes and pesticide registration activity that may be of interest to the caneberry industry.

*Objective 2*: The pesticide registration chart and MRL charts were updated February 2020, and again in December 2020. The charts which were distributed to industry stakeholders are available at the end of this report.

*Objective 3*: Comments were submitted to EPA in December 2020 as part of the zinc phosphide reregistration process, in support of zinc phosphide use in Oregon agriculture.

Other Pesticide Registration Research Center activities which impact the Oregon Caneberry Industry:

- The Center participated in a fourth year of pesticide degradation research, funded by USDA TASC. This final year's data contributed to creating pesticide degradation decline curves to aid in decision making for applying pesticides near harvest, to benefit growers exporting to international markets. The Center ran one site on Marionberry in Oregon.
- The Center will be taking on the Network Coordinator role for the Pacific Northwest, a signature
  program through the Western Region IPM Center. The Network Coordinator follows the EPA
  Pesticide Re-registration Review process, solicits feedback from OSU/WSU specialists and
  industry contacts about the impacts of proposed label changes, and submits informed
  comments to EPA to aid their decision making process.

Active ingredient	Trade name	Type of material / use	Status
*Fenhexamid	Elevate	Fungicide	Section 3 label issued
*Fenpyroximate	FujiMite	Miticide	Supplemental label issued
Flonicamid	Beleaf	Insecticide	IR-4 lab residue analysis
			completed
*Isoxaben	Trellis	Herbicide	Supplemental label issued
Mefentrifluconazole	Cevya? or	Fungicide	Tolerance set by EPA in
	Provysol?		November 2020
*Penthiopyrad	Fontelis	Fungicide	Section 3 label issued
Pydiflumetofen	Miravis	Fungicide	IR-4 final report being
			written; submission to EPA
			in 2021
Pyrazaflumid	Parade	Fungicide	Submitted to EPA in August
			2020
Saflufenacil	Treevix	Herbicide	Tolerance set by EPA in
			September 2020
Sethoxydim	Poast	Herbicide	EPA PRIA date was 11/2020.
			Tolerance should be coming
			any time
*Sulfoxaflor	Transform	Insecticide	Section 3 label issued

Table 1. Pesticide registration activity in 2020 that is relevant to the caneberry industry.

An A.I. preceded by an asterisk (\*) indicates that a label is currently available for growers to use.

# Insecticide & Miticide Registrations in Oregon Caneberries – January 2021

Dani Lightle, Pesticide Registration Research Leader, Oregon State University

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This document is a guide and not intended as a recommendation or endorsement of the pesticides listed within. Trade names are given as examples only, and other products containing the same active ingredient may also be available. Target pests named are as listed on the product label(s) consulted for this document. Pesticide registrations and labels are subject to change at any time. Read pesticide labels carefully and consult with your supplier, field representative, pest consultant or OSU Extension Service Agent prior to pesticide use.

Active Ingredient	Example trade Name	IRAC <sup>1</sup>	REI <sup>2</sup>	PHI <sup>3</sup>	Aphids	Leafrollers	Root Weevils	Mites	Fruitworm	Thrips	SWD	Crown Borer	Others
Abamectin/Avermectin	AgriMek	6	12	7				✓					
Acequinocyl	Kanemite	20B	12	1				✓					
Acetamiprid	Assail	4A	12	1	$\checkmark$				✓	✓			leafhoppers
Beauveria bassiana	Mycotrol	UNF	4	0	✓								many insects (see label)
Bifenazate	Acramite, Vigilant	20D	12	1				~					
Bifenthrin	Brigade	3A	12	3		✓	✓	✓			✓	✓	
Bt	DiPel, Javelin, etc.	11A	4	0		✓							other leps (see label)
Carbaryl	Sevin	1A	12	7	✓	✓			✓				other insects (see label)
Chlorantraniliprole	Altacor	28	4	3		✓						✓	
Cyantraniliprole	Exirel	28	12	1			✓				$\checkmark$		
Diazinon	Diazinon	1B	5 days	7					~			~	
Esfenvalerate	Asana XL	3A	12	7	$\checkmark$	✓	✓						
Etoxazole	Zeal	10B	12	0				✓					
Fenbutatin-Oxide	Vendex (Raspberry only)	12B	48	3				~					
Fenpropathrin	Danitol	3A	24	3		~		~	~		~		armyworm, leafhoppers, lygus bug, stinkbug
Fenpyroximate	FujiMite SC	21A	12	1									mites, leafhoppers
Flupyradifurone	Sivanto	4D	4	0	$\checkmark$								
Hexythiozox	Savey	10A	12	3				$\checkmark$					
Imidacloprid	Admire Pro (foliar)	4A	12	3	$\checkmark$					$\checkmark$			leafhoppers

Always remember – *the label is the law*.

Support provided by the Oregon Raspberry and Blackberry Commission

Insecticide Registrations in Oregon Caneberries - January 2021

Active Ingredient	Example trade Name	IRAC <sup>1</sup>	REI <sup>2</sup>	PHI <sup>3</sup>	Aphids	Leafrollers	Root Weevils	Mites	Fruitworm	Thrips	SWD	Crown Borer	Others
Imidacloprid	Admire Pro (soil)	4A	12	7	$\checkmark$								leafhoppers
Malathion	Malathion	1B	12	1	$\checkmark$			$\checkmark$		$\checkmark$			leafhoppers
Methoxyfenozide	Intrepid	18	4	3		$\checkmark$			$\checkmark$				armyworm
Neem	AzaDirect, etc.	UNE	4	0	$\checkmark$	$\checkmark$							other insects/mites
Oil	BioCover, 6E, etc.	UNE	4	0				✓					other insects (see label)
Propargite	Omite	12C	10	365				$\checkmark$					
Pyrethrin	Pyganic	3A	12	0	✓	✓							other insects (see label)
Pyriproxyfen	Esteem/Knack	7C	12	7					$\checkmark$				scale
Soaps	Safer, M-Pede	?	12	0	$\checkmark$								
Spinetoram	DelegateWG	5	4	1		✓			✓	✓	✓		armyworm, looper
Spinosad	Success, Entrust	5	4	1		~			✓				armyworm, looper
Sulfoxaflor	Transform WG	4C	24	1	✓								leafhoppers
Tebufenozide	Confirm	18	4	14		✓							other leps (see label)
Thiamethoxam	Actara	4A	12	3	$\checkmark$		$\checkmark$						leafhoppers, stinkbugs
Tolfenpyrad	Bexar	21A	12	1	$\checkmark$	$\checkmark$					$\checkmark$		leafhoppers
Zeta-cypermethrin	Mustang	3A	12	1		$\checkmark$	$\checkmark$						

<sup>1</sup>IRAC: Insecticide (and Miticide) Resistance Action Committee Code Number. Insecticides/ Miticides with the same number should not be used consecutively, as they are similar in chemistry and/or mode of action and doing so may increase the risk of insecticide resistance.

<sup>2</sup>PHI: The preharvest interval (PHI) is the amount of time that must elapse between the last application of a pesticide and harvest of the crop. PHI (usually days) is found on the label in the use directions for each crop that is listed on the label.

<sup>3</sup>REI: All pesticide products have a prescribed-time restricted entry interval (REI) for worker protection. REI is clearly stated in the Agricultural Use Requirements section on the label. Generally, entry into treated areas during the prescribed time (usually hours) REI is not allowed unless Personal Protective Equipment (PPE) is worn or used.

Active Ingredients in **bold type** indicates some formulations are approved for organic production.

# Fungicide Registrations in Oregon Caneberries – January 2021

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This document is a guide and not intended as a recommendation or endorsement of the pesticides listed within. Trade names are given as examples only, and other products containing the same active ingredient may also be available. Target pests named are as listed on the product label(s) consulted for this document. Pesticide registrations and labels are subject to change at any time. Read pesticide labels carefully and consult with your supplier, field representative, pest consultant or OSU Extension Service Agent prior to pesticide use.

Active Ingredient	Example Trade Name	<b>FRAC</b> <sup>1</sup>	REI <sup>2</sup>	PHI <sup>3</sup>	Anthracnose	Powdery Mildew	Botrytis	Septoria Leaf Spot	Spur Blight	Root Rot	Rust	Other
Aureobasidium pullulans	Botector	?	4	0	✓		$\checkmark$					
Azoxystrobin	Abound	11	4	0	✓	✓		$\checkmark$	✓		✓	
Azoxystrobin + propiconazole	QuiltXcel	11 + 3	12	30	✓	$\checkmark$		$\checkmark$			$\checkmark$	
Bacillus subtilis	Serenade	?	4	0	$\checkmark$		$\checkmark$					
Boscalid + pyraclostrobin	Pristine	7 + 11	12	0	$\checkmark$	$\checkmark$	$\checkmark$	~	~		<b>~</b>	
Calcium polysulfide	Lime Sulfur (Rex)	?	See label	Delayed dormant	✓	~		~	~		>	Cane blight
Captan	Captan	M4	48	3	$\checkmark$		$\checkmark$		$\checkmark$			
Captan + fenhexamid	Captevate (Raspberry only)	M4+ 17	48	3	~		~		✓			
Copper	Kocide, Champ, etc.	M1	48	0	~			~			~	Purple blotch
Cymoxanil + famoxadone	Tanos	27 + 11	12	0	$\checkmark$			$\checkmark$	$\checkmark$			
Cyprodinil + fludioxonil	Switch	9+12	12	0	$\checkmark$		$\checkmark$					
Fenhexamid	Elevate	17	12	0			$\checkmark$					
Fluopyram + pyrimethanil	Luna Tranquility	7+9	12	0		$\checkmark$	$\checkmark$	$\checkmark$				
Fosetyl-al	Aliette	33	12	60						$\checkmark$		
Iprodione	Rovral, Meteor	2	24	0			$\checkmark$					
Isofetamid	Kenja	7	12	7			$\checkmark$					
Mefenoxam	Ridomil Gold SL	4	48	45						$\checkmark$		

Always remember – the label is the law.

Active Ingredient	Example Trade Name	<b>FRAC</b> <sup>1</sup>	REI <sup>2</sup>	PHI <sup>3</sup>	Anthracnose	Powdery Mildew	Botrytis	Septoria Leaf Spot	Spur Blight	Root Rot	Rust	Other
Mefenoxam + Copper	Ridomil Gold											
Hydroxide	Copper	4 + M1	48	0								Downy mildew
Myclobutanil	Rally	3	24	0		$\checkmark$					$\checkmark$	
	BioCover; Sun;			Delayed dormant or								
Oil	JMS	?	4	postharvest		$\checkmark$						
Oxathiapiprolin	Orondis Gold 200	U15	4	1						$\checkmark$		
Dhaan hanna a sid	Fosphite,	22		News Pateral								Dama
Phosphorous acid	Phostrol	33	4	None listed	, ,	✓				✓		Downy Willdew
Polyoxin-D	Ph-D, Oso	19	4	0	$\checkmark$	✓	$\checkmark$					
Potassium bicarbonate	Kaligreen	?	4	1		✓						
Penthiopyrad	Fontelis	7	12	0			$\checkmark$		$\checkmark$		$\checkmark$	
Propiconazole	Tilt, others	3	12	30		$\checkmark$		$\checkmark$			$\checkmark$	
Pyraclostrobin	Cabrio	11	12	0	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$		$\checkmark$	
Pyriofenone	Prolivo	50	4	0		$\checkmark$						
Reynoutria sachalinensis	Regalia	P5	4	0	$\checkmark$	$\checkmark$	$\checkmark$				$\checkmark$	
Streptomyces lydicus	Actinovate	?	4	0			$\checkmark$					
Sulfur	Microthiol sp, etc	M2	24	None listed		$\checkmark$		~				Downy mildew

<sup>1</sup>FRAC: Fungicide Resistance Action Committee Code Number. Fungicides with the same number should not be used consecutively, as they are similar in chemistry and/or mode of action and doing so may increase the risk of resistance.

<sup>2</sup>PHI: The preharvest interval (PHI) is the amount of time that must elapse between the last application of a pesticide and harvest of the crop. PHI (usually days) is found on the label in the use directions for each crop that is listed on the label.

<sup>3</sup>REI: All pesticide products have a prescribed-time restricted entry interval (REI) for worker protection. REI is clearly stated in the Agricultural Use Requirements section on the label. Generally, entry into treated areas during the prescribed time (usually hours) REI is not allowed unless Personal Protective Equipment (PPE) is worn or used.

Active Ingredients in **bold type** indicates some formulations are approved for organic production.

# Herbicide and Misc. Registrations in Oregon Caneberries – January 2021

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Active Ingredient	Example Trade Name	HRG <sup>1</sup>	REI <sup>2</sup> (hours)	PHI <sup>3</sup> (days)	PRE	POST	Grass	Broadleaf	Others
Bentazon	Basagran	6	48	365 (non-bearing)		$\checkmark$		✓	sedges
Caprylic & Capric acids	Suppress	?	24	0		$\checkmark$	$\checkmark$	$\checkmark$	
Carfentrazone-ethyl	Aim	14	12	15		~		~	Primocane suppression
Clethodim	Select Max; Arrow	1	24	7		$\checkmark$	$\checkmark$		
Dichlobenil	Casoron	20	12	Avoid new shoots	$\checkmark$			$\checkmark$	some grasses
Diquat dibromide	Reglone	22	24	365 (non-bearing)		$\checkmark$	$\checkmark$	$\checkmark$	
Diuron	Karmex	7	12	Late Spring or Fall	$\checkmark$		$\checkmark$	$\checkmark$	
Fluazifop	Fusilade	1	12	1		$\checkmark$	$\checkmark$		
Flumioxazin	Chateau	14	12	7	$\checkmark$			$\checkmark$	some grasses
Glyphosate	Roundup, Others	9	4	14		$\checkmark$	$\checkmark$	$\checkmark$	
Halosulfuron	Sandea	2	12	14	$\checkmark$	$\checkmark$		$\checkmark$	nutsedge
Indaziflam	Alion	29	12	Prior to bud swell	$\checkmark$		$\checkmark$	$\checkmark$	
Isoxaben	Trellis	21	12	60	$\checkmark$			$\checkmark$	
Mesotrione	Callisto	27	12	Pre-bloom	$\checkmark$	$\checkmark$		$\checkmark$	
Napropamide	Devrinol	15	24	Spring/Fall use	$\checkmark$		$\checkmark$	$\checkmark$	
Norflurazon	Solicam	12	12	60	$\checkmark$		$\checkmark$	$\checkmark$	
Oryzalin	Surflan	3	24	Spring or Fall use	$\checkmark$		$\checkmark$	$\checkmark$	
				Raspberry = 50					Primocane
Oxyfluorfen	Goal	14	24	Blackberry = 15	$\checkmark$	$\checkmark$		$\checkmark$	suppression
Paraquat	Gramoxone	22	24	Avoid new shoots		$\checkmark$	✓	✓	
Pelargonic acid	Scythe	17	12	1		$\checkmark$	$\checkmark$	$\checkmark$	

Always remember – the label is the law.

Support provided by the Oregon Raspberry and Blackberry Commission

Herbicide & Misc. Registrations in Oregon Caneberries - January 2021

Active Ingredient	Example Trade Name	HRG <sup>1</sup>	REI <sup>2</sup> (hours)	PHI <sup>3</sup> (days)	PRE	POST	Grass	Broadleaf	Others
Pronamide	Kerb	3	24	Fall or Winter use	$\checkmark$		✓	$\checkmark$	
Quinclorac	Quinstar	4	12	30	$\checkmark$	✓	✓	✓	
Rimsulfuron	Matrix	2	4	21	$\checkmark$	✓	✓	$\checkmark$	
Sethoxydim	Poast	1	12	45		✓	✓		
Simazine	Simazine; Princep	5	12	Spring or Fall use	$\checkmark$		✓	$\checkmark$	
S-metolachlor	Dual Magnum	15	24	28	$\checkmark$		✓	✓	nutsedge
Sulfentrazone	Zeus XC	14	12	3	$\checkmark$		$\checkmark$	$\checkmark$	nutsedge
Terbacil	Sinbar	5	12	70	$\checkmark$		$\checkmark$	$\checkmark$	

<sup>1</sup>HRG: Herbicide Rotation Guide (from the Weed Science Society of America). Based on mode of action. To avoid selecting for herbicideresistant weeds, do not use herbicides from the same group more than once within three years. Rather, rotate to a different group every year of the production system.

<sup>2</sup>PHI: The preharvest interval (PHI) is the amount of time that must elapse between the last application of a pesticide and harvest of the crop. PHI (usually days) is found on the label in the use directions for each crop that is listed on the label.

<sup>3</sup>REI: All pesticide products have a prescribed-time restricted entry interval (REI) for worker protection. REI is clearly stated in the Agricultural Use Requirements section on the label. Generally, entry into treated areas during the prescribed time (usually hours) REI is not allowed unless Personal Protective Equipment (PPE) is worn or used.

Active Ingredients in **bold type** indicates some formulations are approved for organic production.

		REI <sup>1</sup>		
Active Ingredient	Example Trade Name	(hours)	PHI <sup>2</sup> (days)	Purpose (as listed on label)
	Ethrel			
Ethephon	(Blackberry only)	48	3	PGR, promotes fruit ripening
Iron Phosphate	Sluggo	0	0	Slugs and snails
Metaldehyde	Deadline, others	12	0	Slugs and snails
Zinc Phosphide	Prozap ZP Pellets	?	70 (Dormant use only)	Rodents (voles)

Misc.

<sup>1</sup>REI: All pesticide products have a prescribed-time restricted entry interval (REI) for worker protection. REI is clearly stated in the Agricultural Use Requirements section on the label. Generally, entry into treated areas during the prescribed time (usually hours) REI is not allowed unless Personal Protective Equipment (PPE) is worn or used.

<sup>2</sup>PHI: The preharvest interval (PHI) is the amount of time that must elapse between the last application of a pesticide and harvest of the crop. PHI (usually days) is found on the label in the use directions for each crop that is listed on the label.

#### Raspberry Maximum Residue Limits (MRLs) for USA and Foreign Trade Markets - Insecticides

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Active Ingredient	Example Trade Name	NSA	Australia	Canada	China	CODEX	EU	Hong Kong	Japan	Korea	Taiwan
Abamectin	AgriMek	0.2	{0.1}	0.2		0.2	{0.08}		{0.05}	{0.05}	{0.02}
Acequinocyl	Kanemite	4		4			{0.01}		{0.01}	{0.5}	
Acetamiprid	Assail	1.6	2	4	2	2	2		2	{1}	{1}
Bifenazate	Acramite	5	7	5		7	7		7	7	
Bifenthrin	Brigade	1	3	1		1	1	1	1	{0.3}	1
Carbaryl	Sevin	12	15	{10}			{0.01}		12	{0.5}	{0.5}
Chlorantraniliprole	Altacor	1.8	2.5	{0.9}	{1}	{1}	{1}	{1}	2	{1}	1.8
Cyantraniliprole	Exirel	4	{0.05}	4	4		{0.9}		{0.01}	{0.7}	
Diazinon	Diazinon	0.75	{0.5}	{0.1}		{0.2}	{0.01}	{0.2}	{0.2}	{0.01}	{0.5}
Esfenvalerate	Asana	1	1	{0.1}	{0.2}		{0.02}	{0.2}	1	{0.01}	1
Etoxazole	Zeal	1.5	{0.05}	1.5			{0.01}		{0.01}	{0.2}	{0.01}
Fenbutatin-Oxide	Vendex	10	{1}	{0.1}			{0.01}	10	10	{0.01}	
Fenpropathrin	Danitol	12		12	{5}		{0.01}	{5}	{5}	{0.01}	{3}
Fenpyroximate	FujiMite	3	{1.5}	{0.1}		{0.2}	{1.5}		{0.2}	{0.7}	{0.5}
Flupyradifurone	Sivanto	5		5			{1.5}		{0.01}	{1}	
Hexythiazox	Savey	3	{1}	{1.5}			{0.5}		{0.01}	{0.01}	{1}
Imidacloprid	Admire	2.5	5	2.5	5	5	5	5	4	{1.5}	{1}
Malathion	Malathion	8	10	8			{0.02}	8	8	{0.5}	{0.01}
Methoxyfenozide	Intrepid	6	{0.03}	6			{0.01}		6	{1}	{0.01}
Pyrethrins	Pyganic	1	1	1			1		1	{0.01}	
Pyriproxyfen	Esteem	1	{0.1}	{0.1}			{0.05}		{0.01}	{0.01}	{0.5}
Spinetoram	Delegate	0.8	{0.5}	{0.5}	0.8	0.8	1		0.8	{0.7}	{0.5}
Spinosad	Entrust	1	{0.7}	{0.5}		1	1.5		1	{0.5}	1
Sulfoxaflor	Transform	1.5	{0.7}	{0.1}			{0.01}		{0.01}	{0.5}	
Tebufenozide	Confirm	3	{0.05}	{0.1}		{2}	{2}	{2}	{2}	{2}	{2}
Thiamethoxam	Actara	0.35	0.5	0.5	0.5	0.5	{0.01}	0.5	0.5	1	0.5
Tolfenpyrad	Bexar	7		{0.1}			{0.01}		{0.01}	{0.01}	{0.01}
Zeta-cypermethrin	Mustang	0.8	{0.5}	0.8			{0.5}		{0.5}	{0.01}	2

Current as of: December 22, 2020

All MRLs listed in ppm

{ } = indicate a MRL that is lower than US tolerances

# Blackberry Maximum Residue Limits (MRLs) for USA and Foreign Trade Markets - Insecticides

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Active Ingredient	Example Trade Name	NSA	Australia	Canada	China	CODEX	EU	Hong Kong	Japan	Korea	Taiwan
Abamectin	AgriMek	0.2	{0.1}	0.2		0.2	{0.08}		{0.05}	{0.05}	{0.02}
Acequinocyl	Kanemite	4		4			{0.01}		{0.01}	{0.5}	
Acetamiprid	Assail	1.6	{0.1}	4	2	2	2		2	{1}	{1}
Bifenazate	Acramite	5	7	5	7	7	7		7	7	
Bifenthrin	Brigade	1	3	1	1	1	1	1	1	{0.3}	1
Carbaryl	Sevin	12	{0.02}	{10}			{0.01}		12	{0.5}	{0.5}
Chlorantraniliprole	Altacor	1.8	2.5	{0.9}	{1}	{1}	{1}	{1}	2	{1}	1.8
Cyantraniliprole	Exirel	4	{0.05}	4	4		{0.9}		{0.01}	{0.7}	
Diazinon	Diazinon	0.75	{0.5}	{0.1}	{0.1}	{0.1}	{0.01}	{0.1}	{0.1}	{0.01}	{0.5}
Esfenvalerate	Asana	1	1	{0.1}	{0.2}		{0.02}	{0.2}	1	{0.01}	1
Etoxazole	Zeal	1.5	{0.5}	1.5			{0.01}		{0.01}	{0.2}	{0.01}
Fenpropathrin	Danitol	12		12	{5}		{0.01}	{5}	{5}	{0.01}	{3}
Fenpyroximate	FujiMite	3	{0.1}	{0.1}			{0.7}		{0.01}	{0.7}	{0.5}
Flupyradifurone	Sivanto	5		5			{1.5}		{0.01}	{1}	
Hexythiazox	Savey	3	{1}	{1.5}			{0.5}		{0.01}	{0.01}	{1}
Imidacloprid	Admire	2.5	5	2.5	5	5	5	5	4	{1.5}	{1}
Malathion	Malathion	8	10	8			{0.02}	8	8	{0.5}	{0.01}
Methoxyfenozide	Intrepid	6	{0.03}	6			{0.01}		6	{1}	{0.01}
Pyrethrins	Pyganic	1	1	1			1	1	1	1	
Pyriproxyfen	Esteem	1	{0.1}	{0.1}			{0.05}		{0.01}	{0.01}	{0.5}
Spinetoram	Delegate	0.8	{0.5}	{0.5}			1		{0.7}	{0.7}	
Spinosad	Entrust	1	{0.7}	{0.5}	1	1	1.5		1	{0.5}	1
Sulfoxaflor	Transform	1.5	{0.7}	{0.1}			{0.01}		{0.01}	{0.5}	
Tebufenozide	Confirm	3	{0.05}	{0.1}			{0.01}	3	3	{2}	{0.01}
Thiamethoxam	Actara	0.35	0.5	0.5	0.5	0.5	{0.01}	0.5	0.5	1	0.5
Tolfenpyrad	Bexar	7		{0.1}			{0.01}		{0.01}	{0.01}	{0.01}
Zeta-cypermethrin	Mustang	0.8	{0.5}	0.8			{0.5}		{0.5}	2	2

Current as of: December 22, 2020

All MRLs listed in ppm

{ } = indicate a MRL that is lower than US tolerances

#### Raspberry Maximum Residue Limits (MRLs) for USA and Foreign Trade Markets - Fungicides

Dani Lightle, Pesticide Registration Research Leader, Oregon State University

danielle.lightle@oregonstate.edu

#### Current as of: December 22, 2020

Active Ingredient	Example Trade Name	USA	Australia	Canada	China	CODEX	EU	Hong Kong	Japan	Korea	Taiwan
Azoxystrobin	Abound	5	5	5	5	5	5	5	5	{3}	5
Captan	Captan	25	30	{5}		{20}	{20}	{20}	{20}	{5}	{20}
Fenhexamid	Elevate	20	20	20	{5}	{15}	{15}	{15}	{15}	{5}	
Fosetyl-al	Aliette	0.1	100	0.1			300		70	1	20
Iprodione	Rovral	15	{12}	25		30	{0.01}	30	{5}	30	{5}
Isofetamid	Kenja	4	5	4		{3}	{3}		4	{0.01}	
Mefenoxam	Ridomil Gold	0.7	{0.5}	{0.2}		{0.2}	{0.02}	{0.2}	{0.2}	{0.01}	1
Myclobutanil	Rally	2	2	2			{1}		{1}	{0.01}	{0.5}
Oxathiapiprolin	Orondis Gold	0.5	0.5	0.5		0.5	{0.01}		0.5	0.5	
Penthiopyrad	Fontelis	10	{0.05}	10			{0.01}		{0.01}	{0.5}	
Propiconazole	Tilt	1	1	1			{0.01}		{0.05}	{0.01}	{0.5}
Pyraclostrobin	Cabrio	4	4	{3.5}		{3}	{3}	{2}	{3}	{3}	{3}
Pyriofenone	Prolivo	0.9	{0.05}	0.9		0.9	0.9		0.9	{0.01}	
		F	ungicide	pre-mixt	ure form	ulations					
Azoxystrobin +		5	5	5	5	5	5	5	5	{3}	5
propiconazole	QuiltXcel	1	1	1			{0.01}		{0.05}	{0.01}	{0.5}
Boscalid +		10	10	{6}	10	10	10	10	10	{9}	{6}
pyraclostrobin	Pristine	4	4	{3.5}		{3}	{3}	{2}	{3}	{3}	{3}
Captan +		25	30	{5}		{20}	{20}	{20}	{20}	{5}	{20}
fenhexamid	Captevate	20	20	20	{5}	{15}	{15}	{15}	{15}	{5}	
Cymoxanil +		4		4			{0.01}		4	{0.01}	{1}
famoxadone	Tanos	10	10	10			{0.01}		10	{0.01}	{0.01}
Cyprodinil +		10	10	10	10	10	{3}	10	10	10	{3}
fludioxonil	Switch	5	5	7		5	5	5	5	5	5
Fluopyram +	Luna	5	5	5	{3}	5	5		5	{0.01}	
pyrimethanil	Tranquility	15	15	15	{3}	15	15		{10}	15	{10}
Mefenoxam +	Ridomil Gold	0.7	{0.5}	{0.2}		{0.2}	{0.02}	{0.2}	{0.2}	{0.01}	1
Copper Hydroxide	Copper	exempt	exempt	exempt	exempt	exempt	exempt	exempt	exempt	exempt	exempt

All MRLs listed in ppm

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#### Blackberry Maximum Residue Limits (MRLs) for USA and Foreign Trade Markets - Fungicides

Dani Lightle, Pesticide Registration Research Leader, Oregon State University

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#### Current as of: December 22, 2020

Active Ingredient	Example Trade Name	NSA	Australia	Canada	China	CODEX	EU	Hong Kong	Japan	Korea	Taiwan
Azoxystrobin	Abound	5	5	5	5	5	5	5	5	{3}	{2}
Captan	Captan	25	30	{0.1}			{20}		{0.01}	{5}	{20}
Fenhexamid	Elevate	20	20	20	{15}	{15}	{15}	{15}	{15}	{5}	
Fosetyl-al	Aliette	0.1		0.1			300		70	1	20
Iprodione	Rovral	25	{12}	25	30	30	{0.01}	30	{12}	30	{5}
Isofetamid	Kenja	4	5	4		{3}	{3}		4	{0.01}	
Mefenoxam	Ridomil Gold	0.7	{0.5}	{0.1}			{0.02}		0.7	{0.01}	1
Myclobutanil	Rally	2	2	2			{1}		{1}	{0.01}	{0.5}
Oxathiapiprolin	Orondis Gold	0.5	0.5	0.5		0.5	{0.01}		0.5	0.5	
Penthiopyrad	Fontelis	10	{0.05}	10			{0.01}		{0.01}	{0.5}	
Propiconazole	Tilt	1	1	1			{0.01}		{0.05}	{0.01}	1
Pyraclostrobin	Cabrio	4	4	{3.5}	{3}	{3}	{3}		{3}	{3}	{3}
Pyriofenone	Prolivo	0.9	{0.05}	0.9		0.9	0.9		0.9	{0.01}	
		F	ungicide	pre-mixt	ure form	ulations					
Azoxystrobin +		5	5	5	5	5	5	5	5	{3}	{2}
propiconazole	QuiltXcel	1	1	1			{0.01}		{0.05}	{0.01}	1
Boscalid +		10	10	{6}	10	10	10	10	10	{9}	{6}
pyraclostrobin	Pristine	4	4	{3.5}	{3}	{3}	{3}		{3}	{3}	{3}
Cymoxanil +		4		4			{0.01}		4	{0.01}	{1}
famoxadone	Tanos	10		10			{0.01}		10	{0.01}	{0.01}
Cyprodinil +		10	10	10	10	10	{3}		10	10	{3}
fludioxonil	Switch	5	5	7	5	5	5	5	5	5	5
Fluopyram +	Luna	5	{0.1}	5	{3}	5	5		5	6	{2}
pyrimethanil	Tranquility	15	15	15	{3}	15	15		{10}	15	{4}
Mefenoxam +	Ridomil Gold	0.7	{0.5}	{0.1}			{0.02}		0.7	{0.01}	1
Copper Hydroxide	Copper	exempt	exempt	exempt	exempt	exempt	exempt	exempt	exempt	exempt	exempt

All MRLs listed in ppm

{ } = indicate a MRL that is lower than US tolerances

#### Raspberry Maximum Residue Limits (MRLs) for USA and Foreign Trade Markets - Herbicides

Dani Lightle, Pesticide Registration Research Leader, Oregon State University

danielle.lightle@oregonstate.edu

#### Current as of: December 22, 2020

Active Ingredient	Example Trade Name	VSN	Australia	Canada	China	CODEX	EU	Hong Kong	Japan	Korea	Taiwan
Carfentrazone	Aim	0.1	{0.05}	0.1			{0.01}	0.1	0.1	0.1	0.1
Clethodim	Select Max	0.3	{0.1}	{0.1}			{0.1}		{0.01}	{0.01}	
Dichlobenil	Casoron	0.1	1	0.1	0.2	0.2	{0.01}		{0.01}	{0.01}	
Diuron	Karmex	0.1		0.1			{0.01}	0.1	{0.05}	{0.01}	
Fluazifop	Fusilade	0.08	0.2	0.08		{0.01}	{0.01}		{0.01}	{0.01}	{0.01}
Flumioxazin	Chateau	0.5	{0.02}	0.5			{0.02}		{0.01}	{0.01}	
Glyphosate	Roundup	0.2	{0.05}	{0.1}	{0.1}		{0.1}	0.2	0.2	0.2	0.2
Halosulfuron	Sandea	0.05	0.05	0.05			{0.01}		0.05	{0.01}	
Indaziflam	Alion	0.01		0.01			0.01		0.01	0.01	
Isoxaben	Trellis	0.01		0.1			0.05		0.01	0.01	
Mesotrione	Callisto	0.01		0.1	0.01	0.01	0.01	0.01	0.01	0.01	
Napropamide	Devrinol	0.1	0.1	0.1			0.1	0.1	0.1	{0.01}	{0.01}
Norflurazon	Solicam	0.2	{0.05}	{0.1}			{0.01}		0.2	{0.01}	
Oryzalin	Surflan	0.05	0.1	0.1			{0.01}	0.05	0.08	{0.01}	
Oxyfluorfen	Goal	0.05		0.05			0.05		{0.01}	{0.01}	{0.01}
Paraquat	Gramoxone	0.05	0.05	0.05	{0.01}	{0.01}	{0.02}	{0.01}	0.05	{0.01}	{0.01}
Pronamide											
(propyzamide)	Kerb	0.05	{0.02}	0.1			{0.01}		{0.01}	{0.01}	
Quinclorac	Quinstar 4L	0.08		0.1			{0.01}		{0.01}	{0.01}	
Rimsulfuron	Matrix	0.01		0.01			0.01		0.01	0.01	
Sethoxydim	Poast	5	{0.1}	5			{0.1}		{0.01}	{0.01}	{0.5}
Simazine	Simazine	0.2	{0.1}	{0.1}			{0.01}		0.2	{0.01}	0.2
S-metolachlor	Dual Magnum	0.1		0.1			{0.05}		{0.01}	{0.01}	{0.01}
Sulfentrazone	Zeus XC	0.15		0.15			{0.01}		{0.05}	{0.01}	
Terbacil	Sinbar	0.2		{0.1}			{0.01}		{0.1}	{0.01}	

All MRLs listed in ppm

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--- = no MRL established in that market

#### Raspberry Maximum Residue Limits (MRLs) for USA and Foreign Trade Markets – Misc. Materials

Active Ingredient	Example Trade Name	VSN	Australia	Canada	China	CODEX	EU	Hong Kong	Japan	Korea	Taiwan
Metaldehyde	Deadline	0.15	1	0.15			{0.05}	0.15	{0.01}	{0.01}	

#### Blackberry Maximum Residue Limits (MRLs) for USA and Foreign Trade Markets - Herbicides

Dani Lightle, Pesticide Registration Research Leader, Oregon State University

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#### Current as of: December 22, 2020

Active Ingredient	Example Trade Name	NSA	Australia	Canada	China	CODEX	EU	Hong Kong	Japan	Korea	Taiwan
Carfentrazone	Aim	0.1	{0.05}	0.1			{0.01}	0.1	0.1	0.1	
Clethodim	Select Max	0.3	{0.1}	{0.1}			{0.1}		{0.01}	{0.01}	
Dichlobenil	Casoron	0.1		0.1	0.2	0.2	{0.01}		{0.01}	{0.01}	
Diuron	Karmex	0.1		0.1			{0.01}	0.1	{0.05}	{0.01}	
Fluazifop	Fusilade	0.08	0.2	0.08		{0.01}	{0.01}		{0.01}	{0.01}	{0.01}
Flumioxazin	Chateau	0.5	{0.02}	0.5			{0.02}		{0.01}	{0.01}	
Glyphosate	Roundup	0.2	{0.05}	{0.1}	{0.1}		{0.1}	0.2	0.2	0.2	0.2
Halosulfuron	Sandea	0.05		0.05			{0.01}		0.05	{0.01}	
Indaziflam	Alion	0.01		0.01			0.01		0.01	0.01	
Isoxaben	Trellis	0.01		0.1			0.05		0.01	0.01	
Mesotrione	Callisto	0.01		0.1	0.01	0.01	0.01	0.01	0.01	0.01	
Napropamide	Devrinol	0.1	0.1	0.1			0.1	0.1	0.1	{0.01}	{0.01}
Norflurazon	Solicam	0.1	{0.05}	0.1			{0.01}	0.1	0.1	{0.01}	
Oryzalin	Surflan	0.05	0.1	0.1			{0.01}	0.05	0.08	{0.01}	
Oxyfluorfen	Goal	0.05		0.1			0.05	0.05	{0.01}	{0.01}	{0.01}
Paraquat	Gramoxone	0.05	0.05	0.05	{0.01}	{0.01}	{0.02}	{0.01}	0.05	{0.01}	{0.01}
Pronamide											
(propyzamide)	Kerb	0.05	{0.02}	0.1			{0.01}	0.05	{0.01}	{0.01}	
Quinclorac	Quinstar 4L	0.08		0.1			{0.01}		{0.01}	{0.01}	
Rimsulfuron	Matrix	0.01		0.01			0.01		0.01	0.01	
Sethoxydim	Poast	5	{0.1}	5			{0.1}		{0.01}	{1}	
Simazine	Simazine	0.2	{0.1}	{0.1}			{0.01}	0.2	0.2	{0.01}	
S-metolachlor	Dual Magnum	0.1		0.1			{0.05}		{0.01}	{0.01}	{0.01}
Sulfentrazone	Zeus XC	0.15		0.15			{0.01}		{0.05}	{0.01}	
Terbacil	Sinbar	0.2		{0.1}			{0.01}		{0.1}	{0.01}	

All MRLs listed in ppm

{ } = indicate a MRL that is lower than US tolerances

--- = no MRL established in that market

#### Blackberry Maximum Residue Limits (MRLs) for USA and Foreign Trade Markets – Misc. Materials

Active Ingredient	Example Trade Name	NSA	Australia	Canada	China	CODEX	EU	Hong Kong	Japan	Korea	Taiwan
Ethephon	Ethrel	30	{0.1}	{20}			{0.05}	30	{2}	{0.01}	{2}
Metaldehyde	Deadline	0.15	1	0.15			{0.05}	0.15	{0.01}	{0.01}	

# **Progress Report to the Agricultural Research Foundation, 2020-2021**

Title: Cooperative breeding program - Caneberries

Principal investigators:	<ul> <li>Bernadine Strik, Professor, Horticulture</li> <li>Berry Crops Research Leader, NWREC</li> <li>Pat Jones, Senior Faculty Research Assistant I, NWREC</li> <li>Chad Finn (deceased), Research Geneticist, USDA/ARS, HCRU</li> </ul>
Collaborators:	Michael Hardigan, Post-doctoral scientist, USDA/ARS, HCRU Mary Peterson, USDA/ARS Technician
	Amanda Davis, Senior Faculty Research Assistant I, NWREC
Cooperators:	Wendy Hoashi-Erhardt. WSU, Puyallup Michael Dossett: Agriculture and Agri-Foods Canada
	Zak Weigand, OSU, Dept. Food Science & Tech.
	Enfield Farms/Northwest Plants
	North American Plant Co.
	Northwest Plants
	Oregon berry growers
	Littau Harvesters Inc.

#### **Objectives:**

- To develop new blackberry cultivars for the Pacific Northwest that are high yielding, thornless, winter tolerant, adapted to mechanical harvesting, and that have excellent fruit quality. While the primary emphasis is on blackberries with excellent processed fruit quality, high quality fresh market cultivars will be pursued as well.
- To develop raspberry cultivars for the Pacific Northwest in cooperation with Agriculture and Agri-Foods Canada and Washington State University that are high-yielding, machine harvestable, disease/virus resistant and that have superior processed fruit quality. While the priority will be on the processed market, fresh market cultivars will be pursued as well.
- To evaluate black raspberry selections and cultivars for their adaptation to the Pacific Northwest and to develop selections that combine similar processed fruit quality to 'Munger' with greater yields and plant longevity (disease tolerance and aphid resistance).
- To collect, evaluate and incorporate new *Rubus* germplasm into the breeding program.

#### **Progress:**

The USDA-ARS breeding program in cooperation with Oregon State University and the Pacific Northwest industry continues to develop red and black raspberry and blackberry cultivars that meet the industry stated objectives. A primary objective for the Oregon caneberry industry has been the development of thornless blackberry cultivars with outstanding flavor/processing characteristics that can be machine harvested for processing and ideally are firmer and more winter tolerant than 'Marion'. 'Black Diamond' has been the most widely planted cultivar from this effort and has been the #1 for plant sales for several years. 'Columbia Star' since its release has been 2<sup>nd</sup> only to 'Black Diamond' for sales. In addition, while thorny, 'Obsidian' was released to provide different options for the blackberry fresh market. 'Columbia Sunrise', the earliest ripening thornless blackberry we are aware of was released in 2016. In 2017, the trailing blackberry 'Hall's Beauty' and the semi-erect blackberries 'Eclipse' and 'Galaxy' were released. They will be working their way into the

marketplace over the next few years. We released 'Twilight', a semi-erect blackberry, in 2019. We plan to release ORUS 4999-2 primocane-fruiting blackberry and ORUS 4670-1, a semi-erect type, in 2021. We have been active in testing WSU and AgCanada raspberry selections to assess what is appropriate for Oregon and we were partners in the new release WSU2166 and the recent release of 'Cascade Harvest' a couple of years ago. We have several selections in machine harvest trials in northern Washington and a few of these are promising. 'Vintage' and 'Kokanee' have found some small marketing niches. We plan to release the very promising ORUS 4716-1 primocane-fruiting red raspberry in 2021. We identified several black raspberry selections for processing that we are moving to the nurseries with the goal of having quantities available for commercial trial soon. While not of great interest to commercial growers, we have a dwarf thornless trailing blackberry, ORUS 4535-1, that the ornamental nurseries have asked us to release (2021).

*NOTE:* We did not perform new parental crosses in the caneberry breeding program in 2020, it was agreed that decisions regarding the generation of new populations will be left to the new USDA breeder starting in 2021.

# **Blackberry**

# Seedlings, Germplasm/Cultivar Development

# New & Recently Released Cutlivars

Notable recent varieties released by the cooperative breeding program in 2018-2019 (see previous reports, cultivar releases for additional details):

- 'Hall's Beauty': Trailing blackberry, released and patented 2019.
- **'Eclipse' and 'Galaxy':** Semi-erect blackberries derived from east-west hybrid populations, combining Oregon, Arkansas, and North Carolina genetics. Both are early ripening, with slightly lower yield and significantly better fruit quality and flavor compared to 'Chester Thornless'. Both have done well in fresh market and storage trials.
- **'Twilight':** Semi-erect thornless blackberry with <sup>3</sup>/<sub>4</sub> eastern blackberry and <sup>1</sup>/<sub>4</sub> western blackberry genetics, early season (10 d < 'Triple Crown') with outstanding fruit quality and yields comparable to 'Chester Thornless'.

# To Be Released

- (NEW) ORUS 4670-1 is a very promising early-season and productive thornless semierect blackberry, *in the words of Chad Finn: "the most exciting semi-erect selection we have had!"* This selection had similar or greater yields to 'Chester Thornless' in 2018-19, and significantly greater yields than 'Chester Thornless' in 2020. Ripens 10 d ahead of 'Chester Thornless', closer to 'Triple Crown', but harvest season extends 14 d beyond 'Triple Crown'. Similar fruit size and firmness to 'Chester Thornless' but **much better flavor**.
- **ORUS 4535-1** is a dwarf, thornless blackberry for homeowner market. While a floricane type, it has short internodes and its 0.60-0.75 m (2-2.5 ft.) long canes will cascade out of containers. The fruit quality is fine but unremarkable.
- **ORUS 4999-2** is an early-ripening, high-yielding primocane-fruiting blackberry. The plants have been vigorous and productive, with fruit that ripen with or earlier than 'Prime-Ark® 45'. Yields on two-year-old plots were twice as high as three-year-old plots of 'Prime-Ark® 45' in 2019, continued to be highest yielding selection in 2020. The fruit are large, firm, tough-skinned, and had a good sweet flavor.

# **Grower Trials**

In addition to the above releases, the following have been/are going to be propagated for grower trials:

- ORUS 4670-1 will be named and patented, 10 d earlier and higher yielding than Chester Thornless, with comparable fruit quality and much better flavor.
- **ORUS 4024-3** has 'Willamette' red raspberry as a grandparent. Very attractive glossy red fruit that look like a 'Tayberry'. Picks easily and may even be machine harvestable. Wonderful flavor and commercial growers wanted it after a first look.
- **ORUS 4222-1** is thornless and very high yielding, comparable to 'Black Diamond', with fruit size comparable to 'Marion'. Yield in 2020 was higher than 'Black Diamond' and 'Columbia Star'. Excellent quality for processing, need to see how firmness holds up in large-scale machine harvest trials.
- **ORUS 4663-1** is thornless and high yielding with excellent fruit quality, yields were on par with 'Columbia Star' and 'Black Diamond' in 2018-19, significantly higher in 2020. Fruit has good texture and flavor, separates well, not quite as firm as 'Columbia Star'.
- **ORUS 4902-1** trailing selection has the rare combination of extremely firm fruit with outstanding flavor. Thornless but will not see yield in trial until 2021.
- **ORUS 4928-1** is a sterile, ornamental pink flowering semi-erect blackberry that is of interest to cut flower growers, it is slated to go into NC State coordinated cut-flower trials in 2021.

# Trailing Blackberry Trials (Tables BLK[1-3]-trailing)

- After three years, ORUS 4663-1 continues to show excellent size and yield, with strongest 3-year average performance for both yield and fruit size, AND strongest 2020 performance for yield and fruit size. Yield and fruit size were significantly higher than 'Black Diamond' and 'Columbia Star' across three years, will probably name and release.
- **ORUS 4892-1** is thornless with terrific yield and very attractive, high quality fruit. **Highest yield and fruit size among replicated trials in 2017 planting.** Main issue is slight tendency for uneven drupelet set. Fruit size may be better suited to fresh market.
- **ORUS 4024-3**, a thorny "Tay-type" while thorny should be machine harvestable, which 'Tayberry' is not. Fresh market folks have expressed interest but hard to gauge whether that would translate into significant acreage. Yields significantly below current cultivar standards including 'Marion', possible value as specialty variety.
- 'Columbia Star' continued to yield similarly to 'Black Diamond' in multi-year plantings.

# Semi-erect Blackberry Trials (Tables BLK[1-2]-semierect)

- **ORUS 4670-1** will be named and released, three years of data show that it is earlier and more productive than 'Chester Thornless', with excellent fruit quality and much better flavor.
- Several promising selections in 2017 Nonreplicated plots with productivity on par with 'Chester Thornless', higher than 'Galaxy', 'Twilight' and 'Eclipse'
  - ORUS 4743-1: best yield in 2020, good firmness and flavor.

# Primocane Blackberry Trials (Tables BLK1-primocane)

• **ORUS 4999-2** will be named and released, yields continued to be highest in 2020.

• Currently waiting on multi-year data for other ORUS primocane selections.

# **Red Raspberry**

# Seedlings, Germplasm/Cultivar Development

To Be Released

• ORUS 4716-1 is a primocane-fruiting selection, with yields greater than the cultivar check 'Heritage', and with larger and much higher quality fruit. The fruit can be picked at a range of colors from light pink to full red and still have sweetness and a good flavor. The season starts at about the same time as 'Heritage' but it peaks and finishes about 7 d later than 'Heritage'.

# **Grower Trials**

In addition to the above releases, the following have been/are going to be propagated for grower trials:

- ORUS 4371-4. Floricane, processed. Very good yield machine harvested (MH) fruit at NWREC and Enfield's. Good winter tolerance. High quality fruit. Best overall yield and 2020 yield for ORUS selections planted in replicated 2017 trials, outperforms 'Meeker'.
- **ORUS 4373-1.** Floricane, processed. Good yield. Good fruit quality. Excellent root rot resistance at WSU-Puyallup. Fair yield in MH trial in Washington.
- **ORUS 4462-2.** Floricane, processed. Concerned with light color but very productive, winter hardy in Lynden. Machine harvests.
- **ORUS 4600-1.** Floricane, processed. Promising in MH at NWREC. Very high quality. Very good yield.
- **ORUS 4600-3.** Floricane, processed. Promising in MH at NWREC. Very high quality. Very good yield.
- **ORUS 4607-2.** Floricane, processed. Promising in MH Trial at NWREC and Enfield's. Excellent quality. Main concern is whether fruit get crumbly too quickly.
- **ORUS 4089-2.** Primocane or floricane fresh. Looked very good in Lynden and at NWREC. Bright firm and attractive as PF
- **ORUS 4487-1.** Primocane, fresh. Very early! 10d < 'Heritage'; Concerned with yield, higher than 'Kokanee' but lower than 'Polka'. May be good enough for an early cultivar but not incredible.

# Floricane-fruiting Red Raspberry Trials (Tables RY[1-3]-floricane)

- All machine harvested with Littau harvester.
- ORUS 4371-4, WSU 2130 and WSU 2088 had excellent machine harvest yields and excellent MH fruit quality, firmness in the 2016 planted trials.
  - ORUS 4371-4 and WSU 2130 outperformed cultivar standard 'Meeker'.
  - **ORUS 4371-4** may have **improved winter tolerance**, will use as parent.
- **ORUS 4600-1 and WSU 2188** had excellent machine harvest yields and excellent MH fruit quality, firmness in the 2017 planted trials. Both outperformed 'Meeker' with respect to yield and fruit size.
- **ORUS 4961-1 and WSU 2376** had significantly higher yield and size than 'Wakefield' and 'Meeker' in the 2018 planted trial. Some concern with soft fruit in ORUS 4961-1.

# Primocane-fruiting Red Raspberry Trials (Tables RY[1-3]-primocane)

- Yields were down in 2020 due to wildfire smoke interfering with harvest.
- 2017 planted trials: Only harvested ORUS 5005-1 and ORUS 5005-2, possibly will use for parent material but neither was as productive as existing varieties.
- 2018 planted trials: **ORUS 4487-1** somewhat promising in replicated trials. Very early at 10 d < 'Heritage'. Yield is perhaps acceptable for a cultivar, higher than 'Kokanee' but lower than 'Polka'.
- 2019 planted trials (*early observations*):
  - ORUS 5209-1, BEST replicated selection in 2020. Great flavor. Nice plant with sturdy erect canes and strong laterals. Can be soft when fully ripe, BUT, like ORUS 4716-1 the fruit harvest easily when pink, with excellent flavor and sweetness.
  - **ORUS 5248-3** (unreplicated) was most productive new selection, fruit quality is high but has "wild" flavor, will likely use as parent.

#### Evaluation of Root Rot resistance at WSU (2019 report)

Pat Moore at WSU has been screening raspberries in root rot trials. Based on his results he identified a range of responses to root rot. While many would appear to be susceptible, it was exciting to see some at the high end of the graph. The results:

- Probably better than 'Meeker': ORUS 4373-1
- Probably comparable to 'Meeker': ORUS 4482-3
- Probably comparable to or worse than 'Meeker': Kokanee, Lewis, Vintage, ORUS 3234-1, ORUS 4090-2, ORUS 4097-1, ORUS 4283-1, ORUS 4289-1, ORUS 4462-2, ORUS 4465-2, and ORUS 4619-1.

#### **Black Raspberry**

#### **Developing the Genomic Infrastructure for Breeding Improved Black Raspberries**

(Bushakra, Bassil, Dossett, Ju. Lee, Weber, Scheerens, Fernandez, Weiland, Ja. Lee, Finn) Project number 2072-21220-002-04R.

While the funding period has completed, we are further refining **markers for aphid resistance** and are **using the markers to screen seedlings for aphid resistance**. We now have selections in which we have pyramided multiple sources of aphid resistance. Fruit chemistry analysis has also been performed on a population of individuals segregating for nutritional compounds including anthocyanins, the antioxidant compounds found in "superfoods" and many berries. We are using the marker data produced for this project to investigate the genetic control of black raspberry fruit chemistry, which carries potential for the selection for varieties with improved nutritional value.

#### Seedlings, Germplasm/Cultivar Development

#### To Be Released

• **ORUS 3381-3** is a late season variety, as late as 'MacBlack' but with better fruit size and quality. Yield comparable to or slightly less than 'Munger' but starts ripening 12 d later. Targeted for fresh market, although fruit is suitable for processing.

# **Grower Trials**

In addition to the above, the following have been/are going to be propagated for grower trials:

- **ORUS 3021-1:** Processing. Larger than 'Munger'. Similar yield but may be more durable. Machine harvests.
- **ORUS 3032-3:** Processing or fresh. Great size and fruit quality. Comparable yield to 'Munger'. Machine harvests.
- **ORUS 3409-1:** Produces a nice floricane and primocane crop. Excellent root rot tolerance in WSU-Puyallup trials.
- **ORUS 4412-2:** Processing. Excellent yield and fruit quality. Machines well.
- **ORUS 4499-1** Processing. Excellent yield and fruit quality. Machines well. Excellent root rot tolerance in WSU-Puyallup trials.

# 2017 Planted Trials (Table BR1)

- Several selections appeared to have yield that was similar to or better than 'Munger'. Since most selections look good after 2 years in the field, it will take until 2021 before we can identify the selections that are most durable.
- **ORUS 4833-1** outperformed 'Munger' and all other selections for yield across multiple seasons (2<sup>nd</sup> and 3<sup>rd</sup> years after planting), has slightly larger fruit than 'Munger' with decent quality and flavor. Machine harvested quite nicely, with few stems and consistent quality/appearance across replicated plots.
- **ORUS 4401-1,** Large-fruited for a black raspberry, still machine harvests well with fairly few stems and better firmness than 'Munger', and comparable 2<sup>nd</sup>/3<sup>rd</sup> season yields. Noted by several people for its nice, sweet flavor.
- **ORUS 4820-1** is particularly interesting due to it being comparable to 'Munger' for yield and fruit size but ripens 5-9 d ahead of 'Munger'. An early cultivar could be advantageous to avoid the higher mid-summer temperatures (90s F) that cause black raspberry fruit to "stick" and prevent effective machine harvesting. Concerned about yield stability due to drop-off in 2020, may rep further.
- 'Basha' continued to have slightly small fruit and intermediate yields in its second year.
- Nonreplicated plot results:
  - Several selections with VERY high yields of small fruit: **ORUS 4812-1, ORUS 4836-1, ORUS 4809-1, and ORUS 4835-1** yielded higher than all replicated.

# 2018 Planted Trials (Table BR2)

- Too soon to identify best performers, but several selections planted in observation trials, in particular, had yields similar to or better than 'Munger'.
- 'Jewel' had large fruit size but low-to-intermediate yield relative to most of program's selections currently in trial.
- "to-be-patented" selection **ORUS 3381-3** yielded almost identically to 'Munger' but fruit was >2.5x larger.
- Replicated trial selections with strong performance:
  - **ORUS 4310-1**: Fruit size and yield were both similar to standard.
- Observation trial selections with strong performance:
  - **ORUS 4945-2**: Significantly better size and yield than standards.
  - **ORUS 4395-1**: Significantly better size and yield than standards.

- ORUS 4952-2: Comparable size and yield to 'Munger', higher yield than 'Jewel'.
- ORUS 5076-1: Comparable yield to 'Munger' with much larger fruit.

**Table BLK1-trailing.** Fruit size and yield of trailing blackberry genotypes at OSU-NWREC for trials planted in 2016, harvested from 2018-20. All are thornless except 'Marion' and ORUS 4537-2 is a thorny, "Tay-Type" blackberry.

	Berry Size (g)	١	I <sup>-1</sup> )	
Genotype	2018-20	2019	2020	2018-20
<u>Annual Mean</u>				
2018	7.33			5.46
2019	6.95			6.55
2020	6.98			4.37
<b>Replicated Plots</b>				
ORUS 4663-1	8.6 a	7.31 a	6.08 a	6.88 a
Columbia Star	7.67 b	7.47 a	4.58 b	5.87 b
Black Diamond	6.43 c	8.66 a	4.12 bc	5.53 b
ORUS 4057-3	7.8 b	7.15 a	3.78 bc	5.28 bc
Marion	5.80 d	4.77 b	4.47 b	5.06 bc
Columbia Sunrise	6.69 c	5.14 b	4.60 b	5.04 bc
Hall's Beauty	6.54 с	5.34 b	2.98 c	4.56 с
<u>Nonreplicated</u>				
ORUS 4535-2	5.7	3.63	4.76	4.85
ORUS 4537-2	4.8	2.81	1.92	3.30

	Berry Size (g)	Yield (tons·a⁻¹)				
Genotype	2019-20	2019	2020	2019-20		
<u>Annual Mean</u>						
2019	6.63			6.68		
2020	6.38			4.60		
<u>Replicated Plots</u>						
ORUS 4892-1	9.3 a	8.96 a	5.83 a	7.40 a		
ORUS 4222-1	5.3 d	7.81 a	5.99 a	6.90 a		
Columbia Star	7.7 b	7.53 a	5.76 a	6.64 a		
Black Diamond	6.1 c	7.82 a	5.25 a	6.53 a		
ORUS 4225-1	4.3 e	4.45 b	2.46 b	3.45 b		
ORUS 4024-3	6.4 c	3.49 b	2.31 b	2.90 b		
<u>Nonreplicated</u>						
Columbia Giant	13.2	-	8.70	8.70		
Marion	5.4	-	6.43	6.43		
ORUS 4767-1	5.1	-	3.92	3.92		
Hall's Beauty	5.4	-	3.57	3.57		

**Table BLK2-trailing.** Fruit size and yield of trailing blackberry genotypes at OSU-NWREC for trials planted in 2017, harvested from 2019-20. All are thornless except 'Marion'.

<b>Table BLK3-trailing.</b> Fruit size and yield of trailing blackberry genotypes at OSU-NWREC for
trials planted in 2018, harvested from 2020. All are thornless except 'Marion' and ORUS 4537-2
is a thorny, "Tay-Type" blackberry.

Berry Size (g)	Yield (tons·a⁻¹)
2020	2020
7.5	6.7
7.3 b	8.08 a
5.6 c	7.85 a
7.0 b	6.69 b
7.7 b	5.36 c
9.9 a	5.36 c
5.6	5.81
7.7	3.50
6.3	2.58
7.9	0.60
	Berry Size (g) 2020 7.5 7.3 b <b>5.6 c</b> 7.0 b <b>7.7 b</b> 9.9 a <b>5.6</b> <b>7.7</b> 6.3 7.9

<sup>z</sup> Groups determined by t-Test (LSD) of replicated plot means,  $p \le 0.05$ .

**Table BLK1-semierect.** Fruit size and yield of thornless semi-erect blackberry genotypes at OSU-NWREC for rep/obs. trials planted in 2016, harvested from 2018-2020.

	Berry Size (g)	Y	′ield (tons∙a	<sup>-1</sup> )
Genotype	2018-20	2019	2020	2018-20
<u>Annual Mean</u>				
2018	5.9			6.89
2019	6.6			4.97
2020	5.3			9.12
<b>Replicated Plots</b>				
ORUS 4670-1	6.3 a	5.09 a	10.21 a	8.10 a
Chester Thornless	5.6 b	4.85 a	8.02 a	5.89 b
<b>Nonreplicated</b>				
Triple Crown	8.2	3.50	6.77	4.60

Table BLK2-semierect. Fruit size and yield of thornless semi-erect blackberry genotypes at
OSU-NWREC for single-plot observation trials planted in 2017 and 2018, harvested from 2019-
2020.

	Dorm ( Cizo / ~)	(1, 1, 2, 2, 3, 3, 2, 3, 3, 3, 3, 3, 3, 3, 3, 3, 3, 3, 3, 3,			
	Derry Size (g)	1		2010.20	
Genotype	2019-20	2019	2020	2019-20	
<u>Nonreplicated</u>					
(2017 planting)					
ORUS 4743-1	8.0	-	9.44	9.44	
Chester Thornless	6.2	6.03	12.67	9.35	
ORUS 4928-2	7.3	8.26	10.02	9.14	
ORUS 4926-1	8.1	10.41	5.71	8.06	
ORUS 4929-1	7.5	7.61	6.43	7.02	
ORUS 4929-2	8.6	5.19	8.57	6.88	
Triple Crown	8.2	6.66	5.96	6.31	
Twilight	8.4	6.47	6.01	6.24	
Galaxy	7.5	6.60	4.73	5.66	
ORUS 2816-3	5.8	3.69	7.54	5.61	
ORUS 4370-2	6.1	-	4.33	4.33	
Eclipse	6.1	2.97	4.32	3.64	
<u>Nonreplicated</u>					
(2018 planting)					
ORUS 4273-2	5.2	-	9.01	9.01	
<b>Chester Thornless</b>	5.5	-	8.09	8.09	
Blackjack	7.3	-	5.17	5.17	
Triple Crown	6.4	-	2.45	2.45	

	Berry Size (g)	,	a⁻¹)	
Genotype	2019-20	2019	2020	2019-20
<b>Nonreplicated</b>				
(2017 planting)				
ORUS 4999-2	8.25	6.85	3.34	5.10
ORUS 4939-4	9.45	0.31	2.90	1.60
ORUS 4939-3	6.5	1.67	0.26	0.96
ORUS 4939-6	5.95	1.36	0.48	0.92
Nonreplicated				
(2018 planting)				
ORUS 5068-5	10.5	-	2.16	2.16
ORUS 5069-1	7.0	-	0.91	0.91
ORUS 5068-1	7.9	-	0.64	0.64
Replicated				
(2018 plantina)				
PrimeArk 45	8.9 a	-	1.41	1.41 a
ORUS 5068-3	7.3 a	-	1.03	1.03 a

**Table BLK1-primocane.** Fruit size and yield of primocane blackberry genotypes at OSU-NWREC for rep/obs. trials planted in 2017 and 2018, harvested from 2019-2020. All primocane types are thorny unless stated otherwise.

Constune	Tuno	Harves	t Season (% Rip	e Date)	No. Years in
	туре -	5%	50%	95%	Mean
ORUS 4425-1	TRL	9-Jun	23-Jun	30-Jun	1
Columbia Sunrise	TRL	19-Jun	30-Jun	7-Jul	2
ORUS 4057-3	TRL	23-Jun	30-Jun	7-Jul	1
ORUS 4892-1	TRL	23-Jun	30-Jun	10-Jul	2
Black Diamond	TRL	23-Jun	4-Jul	21-Jul	3
ORUS 4767-1	TRL	30-Jun	30-Jun	7-Jul	1
Columbia Star	TRL	30-Jun	30-Jun	14-Jul	3
Hall's Beauty	TRL	30-Jun	3-Jul	10-Jul	2
ORUS 4537-2	TRL	30-Jun	7-Jul	7-Jul	1
Columbia Giant	TRL	30-Jun	7-Jul	14-Jul	1
Marion	TRL	30-Jun	7-Jul	14-Jul	3
ORUS 4535-2	TRL	30-Jun	7-Jul	14-Jul	1
ORUS 4663-1	TRL	30-Jun	7-Jul	14-Jul	1
ORUS 4892-2	TRL	30-Jun	7-Jul	14-Jul	1
ORUS 4222-1	TRL	30-Jun	7-Jul	21-Jul	1
ORUS 4344-3	TRL	30-Jun	7-Jul	21-Jul	1
ORUS 4024-3	TRL	7-Jul	14-Jul	14-Jul	1
ORUS 4743-1	SE	7-Jul	14-Jul	14-Jul	1
ORUS 4762-1	TRL	7-Jul	14-Jul	21-Jul	1
ORUS 4273-2	SE	7-Jul	21-Jul	28-Jul	1
Black Jack	SE	7-Jul	21-Jul	4-Aug	1
ORUS 4453-2	SE	10-Jul	17-Jul	31-Jul	1
ORUS 4453-1	SE	10-Jul	24-Jul	31-Jul	1
ORUS 4670-1	SE	19-Jul	2-Aug	20-Aug	2
Triple Crown	SE	23-Jul	1-Aug	9-Aug	5
<b>Chester Thornless</b>	SE	27-Jul	12-Aug	26-Aug	5
Eclipse	SE	28-Jul	28-Jul	11-Aug	1
ORUS 4926-1	SE	28-Jul	28-Jul	11-Aug	1
Galaxy	SE	28-Jul	4-Aug	11-Aug	1
Twilight	SE	28-Jul	4-Aug	11-Aug	1
ORUS 2816-3	SE	28-Jul	4-Aug	18-Aug	1
ORUS 4370-2	SE	28-Jul	4-Aug	18-Aug	1
ORUS 4928-2	SE	28-Jul	4-Aug	25-Aug	1
ORUS 4929-1	SE	28-Jul	4-Aug	25-Aug	1
ORUS 4929-2	SE	4-Aug	18-Aug	1-Sep	1

**Table BLK-Season.** Mean ripening season for all blackberry genotypes harvested in 2020. Mean is average of 1-3 most recent years harvested at OSU-NWREC.

ORUS 4802-1	PF	17-Aug	24-Aug	7-Sep	2
ORUS 5068-1	PF	18-Aug	18-Aug	29-Sep	1
ORUS 5068-5	PF	18-Aug	25-Aug	1-Sep	1
ORUS 4801-1	PF	20-Aug	31-Aug	11-Sep	2
ORUS 4545-4	PF	21-Aug	28-Aug	4-Sep	1
ORUS 4805-3	PF	21-Aug	28-Aug	4-Sep	1
Prime-Ark Freedom	PF	21-Aug	28-Aug	11-Sep	1
ORUS 4545-2	PF	21-Aug	4-Sep	18-Sep	1
ORUS 4545-1	PF	21-Aug	4-Sep	26-Sep	1
ORUS 4999-2	PF	21-Aug	6-Sep	23-Sep	2
Prime-Ark 45	PF	23-Aug	6-Sep	19-Sep	4
ORUS 4805-2	PF	24-Aug	31-Aug	3-Sep	2
ORUS 4546-1	PF	28-Aug	11-Sep	26-Sep	1
ORUS 5069-1	PF	1-Sep	1-Sep	1-Sep	1
ORUS 5068-3	PF	1-Sep	1-Sep	29-Sep	1
ORUS 4939-4	PF	2-Sep	6-Sep	12-Sep	2
ORUS 4939-6	PF	12-Sep	23-Sep	30-Sep	2
ORUS 4939-3	PF	16-Sep	23-Sep	30-Sep	2

<sup>y</sup> TRL=Trailing; SE=Semi-erect; PF=Erect primocane fruiting.

	Berry Size (g)	Yield (tons∙a⁻¹)		
Genotype	2019-20	2019	2020	2019-20
<u>Annual Mean</u>				
2019	3.4 a			4.35 a
2020	2.9 b			3.07 b
<b>Replicated Plots</b>				
WSU 2130	3.2 bc	5.28 ab	4.76 a	5.02 a
ORUS 4371-4	4.0 a	5.93 a	3.91 ab	4.92 a
Meeker	2.6 e	4.02 cd	3.68 bc	3.85 b
WSU 2088	3.2 bc	4.68 bc	2.87 cd	3.77 b
ORUS 4690-1	3.4 b	4.49 bc	2.03 de	3.26 bc
WSU 2162	3.0 cd	3.04 d	3.06 bc	3.05 c
ORUS 4707-2	2.9 de	3.01 d	1.16 e	2.08 d
<b>Nonreplicated</b>				
ORUS 4692-2	4.6	6.75	3.78	5.27
ORUS 4713-1	3.1	4.44	4.41	4.42
ORUS 4690-3	4.1	4.39	4.18	4.29
WSU 2087	3.6	4.73	3.39	4.06
ORUS 4641-3	2.8	5.00	2.54	3.77
ORUS 4692-4	3.2	4.98	1.49	3.23
ORUS 4707-1	3.0	3.52	2.85	3.19
ORUS 4713-2	3.4	2.63	3.37	3.00

**Table RY1-floricane.** Fruit size and yield of floricane-fruiting red raspberry genotypes at OSU-NWREC for trials planted in 2016, harvested from 2019-20. Normally we would include 2<sup>nd</sup> year (2018) data, but floricanes were cut to the ground prematurely due to rose stem girdler damage in 2017. Plants were mechanically harvested by Littau Harvester.

	Berry Size (g)	Yield (tons⋅a <sup>-1</sup> )		
Genotype	2019-20	2019	2020	2019-20
<u>Annual Mean</u>				
2019	3.6 a			4.64 a
2020	3.0 a			3.58 b
<u>Replicated Plots</u>				
ORUS 4600-1	3.3 b	4.76 a	4.65 a	4.70 a
WSU 2188	4.2 a	5.30 a	3.57 a	4.44 a
Meeker	2.6 c	4.35 a	3.27 a	3.81 a
WSU 1914	3.1 b	4.13 a	2.82 a	3.47 a
<u>Nonreplicated</u>				
Georgia	3.4	5.47	6.10	5.78
WSU 2421	3.5	5.09	4.38	4.74
WSU 2298	2.6	4.70	4.37	4.54
WSU 2088	3.6	5.56	3.23	4.40
ORUS 4837-2	3.7	4.17	4.00	4.09
WSU 2205	3.1	3.94	4.17	4.05
ORUS 4837-1	4.8	3.53	4.33	3.93
ORUS 4851-2	3.1	4.23	3.57	3.90
ORUS 4846-1	5.0	2.73	5.02	3.87
WSU 2366	3.3	4.33	3.02	3.67
WSU 2299	2.5	4.31	2.64	3.47
ORUS 4851-1	3.5	3.47	3.31	3.39
WSU 2123	3.1	4.36	1.88	3.12
WSU 2202	2.8	2.29	3.90	3.10
WSU 2195	3.7	3.58	1.91	2.74
ORUS 3702-3	4.9	3.06	2.19	2.63
ORUS 4373-1	3.9	1.93	2.97	2.45
ORUS 4840-1	2.7	2.85	0.72	1.78

**Table RY2-floricane.** Fruit size and yield of floricane-fruiting red raspberry genotypes at OSU-NWREC for trials planted in 2017, harvested from 2019-20. Plants were mechanically harvested by Littau Harvester.

	Berry Size (g)	Yield (tons·a⁻¹)
Genotype	2020	2020
<u>Annual Mean</u>		
2020	2.9	3.89
<u>Replicated Plots</u>		
ORUS 4961-1	3.7 a	5.60 a
WSU 2376	3.1 ab	5.52 a
Wakefield	2.7 ab	4.90 ab
WSU 2348	3.1 ab	4.72 ab
ORUS 4640-1	3.1 ab	4.05 bc
Meeker	2.3 b	3.30 cd
WSU 2385	2.8 ab	2.54 d
ORUS 4463-1	2.8 ab	2.30 d
ORUS 4978-3	2.6 b	2.10 d
<u>Nonreplicated</u>		
Wakehaven	3.0	7.88
WSU 2372	3.2	6.68
WSU 2377	4.1	6.38
Cascade Harvest	3.9	6.19
WSU 2510	3.1	6.15
WSU 2234	3.1	6.11
WSU 2278	3.1	5.89
WSU 2268	2.7	5.66
WSU 2505	2.9	5.57
WSU 2506	3.0	5.53
ORUS 4641-3	3.3	5.48
WSU 2511	3.0	5.39
WSU 2298	2.6	5.21
WSU 2357	2.8	4.76
WSU 2432	3.4	4.56
ORUS 4600-3	2.4	4.43
WSU 2437	2.6	4.18
ORUS 4974-1	2.5	3.91
ORUS 4961-3	3.5	3.90
ORUS 4972-1	2.3	3.79

Table RY3-floricane. Fruit size and yield of floricane-fruiting red raspberry genotypes at OSU-NWREC for trials planted in 2018, harvested from 2020. Plants were mechanically harvested by Littau Harvester.

WSU 2442	2.2	3.44	
ORUS 4978-2	3.4	3.36	
ORUS 4975-1	3.6	2.99	
ORUS 4971-2	4.2	2.76	
ORUS 4965-1	3.2	2.69	
ORUS 4978-1	2.8	2.63	
ORUS 4971-3	4.4	2.57	
ORUS 4971-1	4.2	2.48	
ORUS 4961-5	3.5	2.33	

Table RY1-primocane	e. Fruit size and yield of primocane red raspberry genotypes at	OSU-
NWREC for trials plant	ted in 2017, harvested from 2018-20.	

	Berry Size (g)	Yield (tons∙a⁻¹)		
Genotype	2018-20	2019	2020	2018-20
<u>Annual Mean</u>				
2018	2.7 b			0.92 b
2019	3.4 a			2.08 a
2020	3.5 a			1.84 ab
<u>Replicated Plots</u>				
ORUS 5005-2	3.2	2.08	1.84	1.62
Nonreplicated				
ORUS 5005-1	4.4	4.1	1.49	2.44
Heritage	2.7	-	0.69	0.69

	Berry Size (g)	Yield (tons∙a⁻		a <sup>-1</sup> )
Genotype	2019-20	2019	2020	2019-20
<u>Annual Mean</u>				
2019	3.0 a			3.51 a
2020	3.3 a			2.85 b
<b>Replicated Plots</b>				
Polka	3.5 a	4.68 a	4.63 a	4.65 a
ORUS 4487-1	2.8 b	4.44 a	3.01 b	3.72 b
Kokanee	3.2 a	1.42 b	0.91 c	1.16 c
<u>Nonreplicated</u>				
ORUS 4858-1	3.1	4.71	2.66	3.68
ORUS 5114-1	4.0	4.13	2.02	3.08
ORUS 5243-3	3.9	3.96	0.72	2.34
ORUS 5118-1	3.0	2.71	1.96	2.34
ORUS 5243-1	4.7	1.79	1.75	1.77
ORUS 5114-2	2.6	2.49	0.86	1.68
ORUS 5109-2	3.8	2.04	0.81	1.43
ORUS 5243-2	3.5	1.78	0.78	1.28
ORUS 4291-1	3.5	1.20	1.33	1.27
ORUS 4985-1	3.5	1.68	0.53	1.11
Vintage	2.6	1.30	0.35	0.82
Heritage	3.0	-	0.23	0.23

**Table RY2-primocane.** Fruit size and yield of primocane red raspberry genotypes at OSU-NWREC for trials planted in 2018, harvested from 2019-20.

	Berry Size (g)	Yield (tons·a⁻¹)
Genotype	2020	2020
<u>Annual Mean</u>		
2020	3.1	1.59
Replicated Plots		
ORUS 5209-1	3.5 a	2.51 a
ORUS 5250-1	3.8 a	1.91 b
Kokanee	2.2 b	1.38 c
ORUS 4725-1	2.9 ab	1.17 c
ORUS 5248-1	3.3 a	1.01 c
<b>Nonreplicated</b>		
ORUS 5248-3	4.4	2.54
Polka	2.7	1.97
ORUS 5211-1	3.4	1.59
ORUS 5209-2	2.5	1.48
ORUS 471-6	2.9	1.19
ORUS 5218-1	3.9	1.12
ORUS 5227-3	3.5	0.97
ORUS 5220-1	1.9	0.79
ORUS 5227-2	4.4	0.58
ORUS 5248-2	3.5	0.53

**Table RY3-primocane.** Fruit size and yield of primocane red raspberry genotypes at OSU-NWREC for trials planted in 2019, harvested from 2020.

<sup>z</sup> Group means determined by t-Test (LSD),  $p \le 0.05$ .

		Harves	t Season (% Rip	e Date)	No. Years in
Genotype	Type <sup>y</sup> –	5%	50%	95%	Mean
ORUS 4837-2	FL	13-Jun	23-Jun	7-Jul	2
ORUS 4837-1	FL	13-Jun	25-Jun	10-Jul	2
ORUS 4611-1	FL	14-Jun	25-Jun	28-Jun	1
WSU 2511	FL	16-Jun	25-Jun	9-Jul	1
ORUS 4640-1	FL	16-Jun	29-Jun	13-Jul	1
ORUS 4961-1	FL	16-Jun	29-Jun	13-Jul	1
WSU 2377	FL	16-Jun	2-Jul	13-Jul	1
WSU 2505	FL	16-Jun	2-Jul	13-Jul	1
ORUS 4692-1	FL	17-Jun	24-Jun	8-Jul	2
Georgia	FL	18-Jun	28-Jun	14-Jul	2
WSU 2130	FL	20-Jun	26-Jun	10-Jul	2
ORUS 4846-1	FL	20-Jun	26-Jun	12-Jul	2
ORUS 4692-2	FL	20-Jun	28-Jun	10-Jul	2
WSU 2205	FL	20-Jun	28-Jun	10-Jul	2
WSU 2421	FL	20-Jun	28-Jun	15-Jul	2
WSU 2191	FL	20-Jun	30-Jun	12-Jul	2
ORUS 4603-2	FL	20-Jun	2-Jul	12-Jul	1
ORUS 4607-2	FL	20-Jun	2-Jul	12-Jul	1
ORUS 4641-3	FL	20-Jun	29-Jun	13-Jul	3
WSU 2123	FL	21-Jun	1-Jul	15-Jul	2
ORUS 4600-3	FL	21-Jun	2-Jul	14-Jul	2
WSU 2298	FL	21-Jun	29-Jun	13-Jul	3
ORUS 4965-1	FL	22-Jun	29-Jun	9-Jul	1
Cascade Harvest	FL	22-Jun	29-Jun	13-Jul	1
ORUS 4465-2	FL	22-Jun	29-Jun	13-Jul	1
Wakehaven	FL	22-Jun	29-Jun	13-Jul	1
WSU 2268	FL	22-Jun	29-Jun	13-Jul	1
WSU 2506	FL	22-Jun	29-Jun	13-Jul	1
ORUS 4974-1	FL	22-Jun	2-Jul	9-Jul	1
ORUS 4961-3	FL	22-Jun	2-Jul	13-Jul	1
ORUS 4961-5	FL	22-Jun	2-Jul	13-Jul	1
ORUS 4971-1	FL	22-Jun	2-Jul	13-Jul	1
ORUS 4971-2	FL	22-Jun	2-Jul	13-Jul	1
ORUS 4971-3	FL	22-Jun	2-Jul	13-Jul	1
ORUS 4972-1	FL	22-Jun	2-Jul	13-Jul	1

**Table RY-Season.** Mean ripening season for all red raspberry genotypes trialed in 2020. Mean is average of 1-4 most recent years harvested at OSU-NWREC.

ORUS 4978-1	FL	22-Jun	2-Jul	13-Jul	1
ORUS 4978-2	FL	22-Jun	2-Jul	13-Jul	1
ORUS 4978-3	FL	22-Jun	2-Jul	13-Jul	1
WSU 2278	FL	22-Jun	2-Jul	13-Jul	1
WSU 2348	FL	22-Jun	2-Jul	13-Jul	1
WSU 2357	FL	22-Jun	2-Jul	13-Jul	1
WSU 2372	FL	22-Jun	2-Jul	13-Jul	1
WSU 2376	FL	22-Jun	2-Jul	13-Jul	1
WSU 2432	FL	22-Jun	2-Jul	13-Jul	1
WSU 2437	FL	22-Jun	2-Jul	13-Jul	1
WSU 2442	FL	22-Jun	2-Jul	13-Jul	1
WSU 2510	FL	22-Jun	2-Jul	13-Jul	1
ORUS 4463-1	FL	22-Jun	6-Jul	13-Jul	1
WSU 2385	FL	22-Jun	6-Jul	13-Jul	1
WSU 2299	FL	22-Jun	1-Jul	14-Jul	3
ORUS 4713-1	FL	23-Jun	30-Jun	12-Jul	2
WSU 1914	FL	23-Jun	30-Jun	14-Jul	2
ORUS 3702-3	FL	23-Jun	1-Jul	12-Jul	2
WSU 2087	FL	23-Jun	1-Jul	12-Jul	2
ORUS 4371-4	FL	23-Jun	1-Jul	13-Jul	2
ORUS 4692-4	FL	23-Jun	1-Jul	13-Jul	2
ORUS 4713-2	FL	23-Jun	1-Jul	13-Jul	2
ORUS 4600-1	FL	23-Jun	1-Jul	15-Jul	2
WSU 2202	FL	23-Jun	1-Jul	15-Jul	2
WSU 2366	FL	23-Jun	1-Jul	15-Jul	2
ORUS 4690-1	FL	23-Jun	3-Jul	13-Jul	2
ORUS 4707-1	FL	23-Jun	3-Jul	13-Jul	2
ORUS 4851-2	FL	23-Jun	3-Jul	15-Jul	2
WSU 2188	FL	23-Jun	3-Jul	15-Jul	2
WSU 2234	FL	23-Jun	3-Jul	15-Jul	2
ORUS 4851-1	FL	23-Jun	3-Jul	15-Jul	2
WSU 2195	FL	23-Jun	3-Jul	15-Jul	2
ORUS 4707-2	FL	23-Jun	5-Jul	13-Jul	2
WSU 2162	FL	23-Jun	5-Jul	13-Jul	2
WSU 2088	FL	23-Jun	5-Jul	14-Jul	4
ORUS 4373-1	FL	23-Jun	5-Jul	15-Jul	2
Wakefield	FL	23-Jun	5-Jul	15-Jul	2
Meeker	FL	23-Jun	2-Jul	14-Jul	6
ORUS 4715-2	FL	24-Jun	1-Jul	15-Jul	1
ORUS 1154R-3	FL	24-Jun	4-Jul	18-Jul	1

ORUS 3959-1	FL	24-Jun	4-Jul	18-Jul	1
ORUS 4715-1	FL	24-Jun	4-Jul	18-Jul	1
ORUS 4690-3	FL	24-Jun	8-Jul	18-Jul	1
ORUS 4694-1	FL	24-Jun	8-Jul	18-Jul	1
ORUS 4715-3	FL	24-Jun	8-Jul	18-Jul	1
ORUS 4975-1	FL	25-Jun	2-Jul	13-Jul	1
ORUS 4600-2	FL	25-Jun	2-Jul	16-Jul	1
ORUS 4603-1	FL	25-Jun	5-Jul	16-Jul	1
ORUS 4840-1	FL	28-Jun	15-Jul	18-Jul	1
ORUS 4988-2	PF	17-Jul	24-Jul	24-Jul	1
ORUS 4988-1	PF	17-Jul	24-Jul	14-Aug	1
ORUS 4988-3	PF	17-Jul	7-Aug	14-Aug	1
Amaranta	PF	17-Jul	7-Aug	28-Aug	1
ORUS 4864-1	PF	24-Jul	7-Aug	21-Aug	1
BP-1	PF	24-Jul	14-Aug	4-Sep	1
ORUS 5005-3	PF	31-Jul	7-Aug	28-Aug	1
ORUS 4981-2	PF	31-Jul	7-Aug	4-Sep	1
ORUS 4858-3	PF	31-Jul	14-Aug	28-Aug	1
ORUS 4873-1	PF	31-Jul	14-Aug	28-Aug	1
ORUS 4872-1	PF	31-Jul	14-Aug	18-Sep	1
ORUS 5005-1	PF	1-Aug	13-Aug	29-Aug	3
ORUS 5005-2	PF	1-Aug	15-Aug	1-Sep	3
ORUS 4291-1	PF	1-Aug	4-Aug	21-Aug	4
ORUS 4988-5	PF	3-Aug	14-Aug	27-Aug	2
ORUS 4858-2	PF	3-Aug	24-Aug	11-Sep	2
ORUS 4289-4	PF	3-Aug	17-Aug	21-Aug	2
ORUS 4725-1	PF	4-Aug	11-Aug	18-Aug	1
ORUS 5209-2	PF	4-Aug	11-Aug	18-Aug	1
ORUS 5211-1	PF	4-Aug	11-Aug	18-Aug	1
ORUS 5218-1	PF	4-Aug	11-Aug	18-Aug	1
ORUS 5250-1	PF	4-Aug	11-Aug	1-Sep	1
ORUS 5209-1	PF	4-Aug	18-Aug	1-Sep	1
Polka	PF	4-Aug	14-Aug	30-Aug	3
ORUS 4487-1	PF	5-Aug	19-Aug	12-Sep	2
ORUS 4858-1	PF	5-Aug	22-Aug	6-Sep	2
Imara	PF	6-Aug	20-Aug	11-Sep	2
Kweli	PF	6-Aug	24-Aug	11-Sep	2
ORUS 4988-4	PF	7-Aug	14-Aug	21-Aug	1
Lagorai Plus	PF	7-Aug	14-Aug	28-Aug	1
ORUS 4494-3	PF	7-Aug	21-Aug	11-Sep	1

Kokanee	PF	8-Aug	26-Aug	11-Sep	6
ORUS 4874-1	PF	10-Aug	24-Aug	7-Sep	2
Vintage	PF	10-Aug	27-Aug	10-Sep	5
ORUS 5248-3	PF	11-Aug	5-Aug	1-Sep	1
ORUS 5248-1	PF	11-Aug	25-Aug	1-Sep	1
ORUS 5118-1	PF	12-Aug	26-Aug	6-Sep	2
Heritage	PF	12-Aug	19-Aug	2-Sep	7
ORUS 5114-1	PF	12-Aug	26-Aug	6-Sep	2
ORUS 5004-2	PF	14-Aug	21-Aug	21-Aug	1
ORUS 4289-3	PF	14-Aug	21-Aug	4-Sep	1
ORUS 4856-1	PF	14-Aug	21-Aug	11-Sep	1
ORUS 4857-1	PF	14-Aug	28-Aug	4-Sep	1
ORUS 4990-1	PF	14-Aug	31-Aug	22-Sep	2
ORUS 5109-2	PF	16-Aug	29-Aug	2-Sep	2
ORUS 5243-1	PF	16-Aug	29-Aug	10-Sep	2
ORUS 4716-1	PF	17-Aug	26-Aug	10-Sep	3
ORUS 4985-1	PF	19-Aug	26-Aug	6-Sep	2
Kwanza	PF	19-Aug	31-Aug	15-Sep	2
ORUS 5114-2	PF	23-Aug	2-Sep	10-Sep	2
ORUS 4723-2	PF	24-Aug	4-Sep	18-Sep	2
ORUS 4722-2	PF	24-Aug	10-Sep	22-Sep	2
ORUS 5220-1	PF	25-Aug	25-Aug	1-Sep	1
ORUS 5227-3	PF	25-Aug	25-Aug	1-Sep	1
ORUS 5227-2	PF	25-Aug	1-Sep	1-Sep	1
ORUS 5248-2	PF	25-Aug	1-Sep	1-Sep	1
ORUS 5243-3	PF	26-Aug	6-Sep	12-Sep	2
ORUS 4722-1	PF	28-Aug	18-Sep	26-Sep	1
ORUS 5243-2	PF	29-Aug	6-Sep	12-Sep	2
ORUS 4989-1	PF	3-Sep	14-Sep	22-Sep	2
ORUS 5004-3	PF	3-Sep	14-Sep	22-Sep	2
ORUS 4861-1	PF	18-Sep	18-Sep	26-Sep	1
ORUS 5004-5	PF	18-Sep	26-Sep	26-Sep	1

<sup>y</sup> FL=Floricane fruiting; PF=Primocane fruiting.

	Berry Size (g)	Y	′ield (tons∙a	a <sup>-1</sup> )
Genotype	2019-20	2019	2020	2019-20
<u>Annual Mean</u>				
2019	1.36			2.48
2020	0.50			3.36
<u>Replicated Plots</u>				
ORUS 4833-1	0.97 b	3.09	4.34	3.72 a
Munger	0.93 b	2.24	3.87	3.06 ab
ORUS 4401-1	1.20 a	2.10	3.83	2.96 ab
ORUS 4820-1	0.92 bc	3.11	2.82	2.96 ab
ORUS 4942-3	0.88 bc	2.66	2.57	2.61 b
ORUS 4833-3	0.83 bc	1.95	3.27	2.61 b
ORUS 4824-1	0.77 c	2.19	2.83	2.51 b
<u>Nonreplicated</u>				
ORUS 4812-1	0.70	2.93	6.13	4.53
ORUS 4836-1	0.75	2.39	5.50	3.95
ORUS 4809-1	0.65	2.81	5.04	3.93
ORUS 4835-1	0.70	2.54	5.18	3.86
ORUS 4815-1	0.95	2.85	4.78	3.82
ORUS 4825-2	0.80	3.45	4.17	3.81
ORUS 4952-1	0.60	2.65	4.53	3.59
ORUS 4946-1	1.15	2.79	4.32	3.56
ORUS 4818-2	1.20	2.99	4.07	3.53
ORUS 4834-1	0.70	2.64	4.08	3.36
ORUS 4821-2	0.90	2.26	4.31	3.28
ORUS 4826-1	0.65	2.54	4.01	3.27
ORUS 4808-2	0.80	2.63	3.51	3.07
ORUS 4829-1	0.80	2.25	3.82	3.04
ORUS 4956-2	0.70	3.20	2.82	3.01
ORUS 3021-1	1.05	1.94	3.93	2.93
ORUS 4948-1	0.95	2.80	3.04	2.92
ORUS 4818-1	1.10	2.34	3.50	2.92
ORUS 4942-4	0.90	3.28	2.55	2.92
ORUS 4808-1	0.90	2.63	3.16	2.89
ORUS 4944-4	0.90	3.24	2.46	2.85
ORUS 4677-1	1.15	2.71	2.97	2.84

**Table BR1.** Fruit size and yield of black raspberry genotypes at OSU-NWREC for trials planted in 2017, harvested from 2019-20.

ORUS 4944-2	0.80	3.82	1.84	2.83
Basha	0.75	2.12	3.53	2.82
ORUS 3412-1	1.00	2.13	3.45	2.79
ORUS 4554-1	1.10	2.12	3.32	2.72
ORUS 4951-1	1.00	2.91	2.46	2.68
ORUS 4829-2	1.00	1.70	3.54	2.62
ORUS 4828-1	0.55	2.20	3.04	2.62
ORUS 4820-2	0.75	2.14	3.00	2.57
ORUS 4951-2	0.95	2.08	2.90	2.49
ORUS 4074-3	0.90	2.34	2.61	2.48
ORUS 4821-1	0.80	1.56	3.19	2.38
ORUS 4829-3	0.80	2.26	2.38	2.32
ORUS 4954-1	0.70	1.14	3.41	2.28
ORUS 4831-2	0.70	1.76	2.73	2.24
ORUS 4831-1	0.60	0.74	3.67	2.21
ORUS 3038-1	1.25	1.90	2.31	2.11
ORUS 4957-1	0.80	1.80	2.31	2.06
MacBlack	1.10	1.62	1.38	1.50
ORUS 4812-3	0.75	1.00	1.51	1.25

<sup>z</sup> Group means determined by t-Test (LSD),  $p \le 0.05$ .

	Berry Size (g)	Yield (tons·a⁻¹)
Genotype	2020	2020
<u>Annual Mean</u>		
2020	0.60	5.03
<u>Replicated Plots</u>		
Munger	0.63 a	6.31 a
ORUS 4310-1	0.60 a	6.27 a
ORUS 4110-2	0.37 b	4.85 ab
ORUS 3843-1	0.67 a	3.90 b
ORUS 4306-1	0.73 a	3.80 b
<b>Nonreplicated</b>		
ORUS 4945-2	0.70	7.50
ORUS 4395-1	0.80	7.09
ORUS 4952-2	0.50	6.21
Munger	0.50	5.54
ORUS 5076-1	1.00	5.51
ORUS 3038-1	0.70	5.49
ORUS 3381-3	1.30	5.44
ORUS 4686-1	0.90	4.97
ORUS 43046-5	0.40	4.81
ORUS 4957-2	0.20	4.61
ORUS 4499-1	0.90	4.51
ORUS 3032-3	0.50	4.38
ORUS 5078-1	0.30	4.31
ORUS 4412-2	0.40	4.17
Jewel	0.60	3.74
ORUS 5086-1	0.70	3.58
ORUS 3219-2	0.60	2.78
ORUS 5085-1	1.20	1.65
ORUS 5070-1	0.70	1.32

**Table BR2.** Fruit size and yield of black raspberry genotypes at OSU-NWREC for trials planted in 2018, harvested from 2020.

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<sup>z</sup> Group means determined by t-Test (LSD),  $p \le 0.05$ .

Canatura	Harves	t Season (% Rip	e Date)	No. Years in
Genotype	5%	50%	95%	Mean
ORUS 4585-1	5-Jun	2-Jul	2-Jul	1
ORUS 4820-1	17-Jun	21-Jun	2-Jul	2
ORUS 4305-74	18-Jun	25-Jun	25-Jun	1
ORUS 4679-1	18-Jun	25-Jun	2-Jul	1
ORUS 4681-1	18-Jun	25-Jun	2-Jul	1
ORUS 4833-2	20-Jun	24-Jun	1-Jul	1
ORUS 4956-1	20-Jun	28-Jun	8-Jul	1
ORUS 4942-1	20-Jun	24-Jun	1-Jul	1
ORUS 4942-2	20-Jun	24-Jun	1-Jul	1
ORUS 4942-5	20-Jun	24-Jun	1-Jul	1
ORUS 4304-156	20-Jun	28-Jun	8-Jul	1
ORUS 4305-88	20-Jun	28-Jun	8-Jul	1
ORUS 4411-3	20-Jun	28-Jun	8-Jul	1
ORUS 4944-1	20-Jun	28-Jun	8-Jul	1
ORUS 4944-3	20-Jun	28-Jun	8-Jul	1
ORUS 4818-1	21-Jun	23-Jun	4-Jul	2
ORUS 4401-1	21-Jun	27-Jun	4-Jul	2
ORUS 4818-2	21-Jun	27-Jun	4-Jul	2
ORUS 4820-2	21-Jun	27-Jun	4-Jul	2
ORUS 4833-1	21-Jun	27-Jun	4-Jul	2
ORUS 4836-1	21-Jun	27-Jun	4-Jul	2
ORUS 4831-2	21-Jun	27-Jun	7-Jul	2
ORUS 4944-4	21-Jun	27-Jun	7-Jul	2
ORUS 4829-2	21-Jun	29-Jun	4-Jul	2
Basha	21-Jun	29-Jun	7-Jul	2
ORUS 3021-1	21-Jun	29-Jun	7-Jul	2
ORUS 4554-1	21-Jun	29-Jun	7-Jul	2
ORUS 4808-1	21-Jun	29-Jun	7-Jul	2
ORUS 4808-2	21-Jun	29-Jun	7-Jul	2
ORUS 4809-1	21-Jun	29-Jun	7-Jul	2
ORUS 4812-1	21-Jun	29-Jun	7-Jul	2
ORUS 4812-3	21-Jun	29-Jun	7-Jul	2
ORUS 4815-1	21-Jun	29-Jun	7-Jul	2
ORUS 4821-1	21-Jun	29-Jun	7-Jul	2
ORUS 4821-2	21-Jun	29-Jun	7-Jul	2

**Table BR-Season.** Mean ripening season for all black raspberry genotypes trialed in 2020. Mean is average of 1-3 most recent years harvested at OSU-NWREC.

	21 100	20 100	7 1.1	r
ORUS 4824-1	21-Jun 21-Jun	29-Jun	7-Jul 7-Jul	2
ORUS 4825-2	21-Jun 21-lun	29-Jun	7-Jul 7-Jul	2
ORUS 4828-1	21 Jun 21-lun	29 Jun	7 Jul	2
ORUS 4820-1	21 Jun 21-lun	29 Jun	7 Jul	2
ORUS 4829-3	21 Jun 21-lun	29-Jun	7 Jul 7-Jul	2
ORUS 4831-1	21 Jun 21-lun	29-lun	7-Jul	2
ORUS 4833-3	21 Jun 21-lun	29-lun	7-Jul	2
ORUS 4834-1	21 Jun 21-lun	29-lun	7-Jul	2
ORUS 4835-1	21-lun	29-lun	7-lul	2
ORUS 4944-2	21-Jun	29-Jun	7-Jul	2
ORUS 4951-1	21-Jun	29-Jun	7-Jul	2
ORUS 4951-2	21-Jun	29-Jun	7-Jul	2
ORUS 4952-1	21-Jun	29-Jun	7-Jul	2
ORUS 4956-2	21-Jun	29-Jun	7-Jul	2
ORUS 4957-1	21-Jun	29-Jun	7-Jul	2
ORUS 3038-1	22-Jun	29-Jun	7-Jul	3
ORUS 4677-1	22-Jun	27-Jun	5-Jul	3
Munger	22-Jun	29-Jun	6-Jul	5
ORUS 4686-1	23-Jun	23-Jun	7-Jul	1
Jewel	23-Jun	30-Jun	7-Jul	1
<b>Jewel</b> ORUS 3032-3	<b>23-Jun</b> 23-Jun	<b>30-Jun</b> 30-Jun	<b>7-Jul</b> 7-Jul	<b>1</b> 1
<b>Jewel</b> ORUS 3032-3 ORUS 3843-1	<b>23-Jun</b> 23-Jun 23-Jun	<b>30-Jun</b> 30-Jun 30-Jun	<b>7-Jul</b> 7-Jul 7-Jul	<b>1</b> 1 1
<b>Jewel</b> ORUS 3032-3 ORUS 3843-1 ORUS 4110-2	<b>23-Jun</b> 23-Jun 23-Jun 23-Jun	<b>30-Jun</b> 30-Jun 30-Jun 30-Jun	<b>7-Jul</b> 7-Jul 7-Jul 7-Jul	<b>1</b> 1 1
Jewel ORUS 3032-3 ORUS 3843-1 ORUS 4110-2 ORUS 4304-65	<b>23-Jun</b> 23-Jun 23-Jun 23-Jun 23-Jun	<b>30-Jun</b> 30-Jun 30-Jun 30-Jun 30-Jun	<b>7-Jul</b> 7-Jul 7-Jul 7-Jul 7-Jul	1 1 1 1
Jewel ORUS 3032-3 ORUS 3843-1 ORUS 4110-2 ORUS 4304-65 ORUS 4306-1	<b>23-Jun</b> 23-Jun 23-Jun 23-Jun 23-Jun 23-Jun	<b>30-Jun</b> 30-Jun 30-Jun 30-Jun 30-Jun 30-Jun	<b>7-Jul</b> 7-Jul 7-Jul 7-Jul 7-Jul 7-Jul	1 1 1 1 1
Jewel ORUS 3032-3 ORUS 3843-1 ORUS 4110-2 ORUS 4304-65 ORUS 4306-1 ORUS 4310-1	<b>23-Jun</b> 23-Jun 23-Jun 23-Jun 23-Jun 23-Jun 23-Jun	<b>30-Jun</b> 30-Jun 30-Jun 30-Jun 30-Jun 30-Jun 30-Jun	<b>7-Jul</b> 7-Jul 7-Jul 7-Jul 7-Jul 7-Jul 7-Jul	1 1 1 1 1 1
Jewel ORUS 3032-3 ORUS 3843-1 ORUS 4110-2 ORUS 4304-65 ORUS 4306-1 ORUS 4310-1 ORUS 4395-1	<b>23-Jun</b> 23-Jun 23-Jun 23-Jun 23-Jun 23-Jun 23-Jun 23-Jun	<b>30-Jun</b> 30-Jun 30-Jun 30-Jun 30-Jun 30-Jun 30-Jun	<b>7-Jul</b> 7-Jul 7-Jul 7-Jul 7-Jul 7-Jul 7-Jul 7-Jul	1 1 1 1 1 1 1
Jewel ORUS 3032-3 ORUS 3843-1 ORUS 4110-2 ORUS 4304-65 ORUS 4306-1 ORUS 4310-1 ORUS 4395-1 ORUS 4499-1	<b>23-Jun</b> 23-Jun 23-Jun 23-Jun 23-Jun 23-Jun 23-Jun 23-Jun	<b>30-Jun</b> 30-Jun 30-Jun 30-Jun 30-Jun 30-Jun 30-Jun 30-Jun	<b>7-Jul</b> 7-Jul 7-Jul 7-Jul 7-Jul 7-Jul 7-Jul 7-Jul 7-Jul	1 1 1 1 1 1 1 1 1
Jewel ORUS 3032-3 ORUS 3843-1 ORUS 4110-2 ORUS 4304-65 ORUS 4306-1 ORUS 4310-1 ORUS 4395-1 ORUS 4499-1 ORUS 4945-2	<b>23-Jun</b> 23-Jun 23-Jun 23-Jun 23-Jun 23-Jun 23-Jun 23-Jun 23-Jun	<b>30-Jun</b> 30-Jun 30-Jun 30-Jun 30-Jun 30-Jun 30-Jun 30-Jun 30-Jun	<b>7-Jul</b> 7-Jul 7-Jul 7-Jul 7-Jul 7-Jul 7-Jul 7-Jul 7-Jul	1 1 1 1 1 1 1 1 1 1
Jewel ORUS 3032-3 ORUS 3843-1 ORUS 4110-2 ORUS 4304-65 ORUS 4306-1 ORUS 4310-1 ORUS 4395-1 ORUS 4499-1 ORUS 4945-2 ORUS 4952-2	23-Jun 23-Jun 23-Jun 23-Jun 23-Jun 23-Jun 23-Jun 23-Jun 23-Jun 23-Jun	<b>30-Jun</b> 30-Jun 30-Jun 30-Jun 30-Jun 30-Jun 30-Jun 30-Jun 30-Jun 30-Jun	<b>7-Jul</b> 7-Jul 7-Jul 7-Jul 7-Jul 7-Jul 7-Jul 7-Jul 7-Jul 7-Jul	1 1 1 1 1 1 1 1 1 1 1
Jewel ORUS 3032-3 ORUS 3843-1 ORUS 4110-2 ORUS 4304-65 ORUS 4306-1 ORUS 4310-1 ORUS 4395-1 ORUS 4499-1 ORUS 4945-2 ORUS 4952-2 ORUS 4957-2	23-Jun 23-Jun 23-Jun 23-Jun 23-Jun 23-Jun 23-Jun 23-Jun 23-Jun 23-Jun 23-Jun	<b>30-Jun</b> 30-Jun 30-Jun 30-Jun 30-Jun 30-Jun 30-Jun 30-Jun 30-Jun 30-Jun	<b>7-Jul</b> 7-Jul 7-Jul 7-Jul 7-Jul 7-Jul 7-Jul 7-Jul 7-Jul 7-Jul 7-Jul	1 1 1 1 1 1 1 1 1 1 1 1
Jewel ORUS 3032-3 ORUS 3843-1 ORUS 4110-2 ORUS 4304-65 ORUS 4306-1 ORUS 4306-1 ORUS 4395-1 ORUS 4395-1 ORUS 4945-2 ORUS 4952-2 ORUS 4957-2 ORUS 5070-1	23-Jun 23-Jun 23-Jun 23-Jun 23-Jun 23-Jun 23-Jun 23-Jun 23-Jun 23-Jun 23-Jun 23-Jun	<b>30-Jun</b> 30-Jun 30-Jun 30-Jun 30-Jun 30-Jun 30-Jun 30-Jun 30-Jun 30-Jun 30-Jun	<b>7-Jul</b> 7-Jul 7-Jul 7-Jul 7-Jul 7-Jul 7-Jul 7-Jul 7-Jul 7-Jul 7-Jul 7-Jul	1 1 1 1 1 1 1 1 1 1 1 1 1 1
Jewel ORUS 3032-3 ORUS 3843-1 ORUS 4110-2 ORUS 4304-65 ORUS 4306-1 ORUS 4306-1 ORUS 4395-1 ORUS 4395-1 ORUS 4999-1 ORUS 4945-2 ORUS 4952-2 ORUS 4957-2 ORUS 5070-1 ORUS 5076-1	23-Jun 23-Jun 23-Jun 23-Jun 23-Jun 23-Jun 23-Jun 23-Jun 23-Jun 23-Jun 23-Jun 23-Jun 23-Jun	<b>30-Jun</b> 30-Jun 30-Jun 30-Jun 30-Jun 30-Jun 30-Jun 30-Jun 30-Jun 30-Jun 30-Jun 30-Jun	<b>7-Jul</b> 7-Jul 7-Jul 7-Jul 7-Jul 7-Jul 7-Jul 7-Jul 7-Jul 7-Jul 7-Jul 7-Jul	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
Jewel ORUS 3032-3 ORUS 3843-1 ORUS 4110-2 ORUS 4304-65 ORUS 4306-1 ORUS 4306-1 ORUS 4395-1 ORUS 4395-1 ORUS 4499-1 ORUS 4945-2 ORUS 4952-2 ORUS 4957-2 ORUS 4957-2 ORUS 5070-1 ORUS 5076-1 ORUS 5078-1	23-Jun 23-Jun 23-Jun 23-Jun 23-Jun 23-Jun 23-Jun 23-Jun 23-Jun 23-Jun 23-Jun 23-Jun 23-Jun 23-Jun	<b>30-Jun</b> 30-Jun 30-Jun 30-Jun 30-Jun 30-Jun 30-Jun 30-Jun 30-Jun 30-Jun 30-Jun 30-Jun 30-Jun	<b>7-Jul</b> 7-Jul 7-Jul 7-Jul 7-Jul 7-Jul 7-Jul 7-Jul 7-Jul 7-Jul 7-Jul 7-Jul 7-Jul 7-Jul	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
Jewel ORUS 3032-3 ORUS 3843-1 ORUS 4110-2 ORUS 4304-65 ORUS 4306-1 ORUS 4306-1 ORUS 4395-1 ORUS 4395-1 ORUS 4499-1 ORUS 4945-2 ORUS 4957-2 ORUS 4957-2 ORUS 5070-1 ORUS 5076-1 ORUS 5078-1 ORUS 5085-1	23-Jun 23-Jun 23-Jun 23-Jun 23-Jun 23-Jun 23-Jun 23-Jun 23-Jun 23-Jun 23-Jun 23-Jun 23-Jun 23-Jun 23-Jun	<b>30-Jun</b> 30-Jun 30-Jun 30-Jun 30-Jun 30-Jun 30-Jun 30-Jun 30-Jun 30-Jun 30-Jun 30-Jun 30-Jun 30-Jun	7-Jul 7-Jul 7-Jul 7-Jul 7-Jul 7-Jul 7-Jul 7-Jul 7-Jul 7-Jul 7-Jul 7-Jul 7-Jul 7-Jul	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
Jewel ORUS 3032-3 ORUS 3843-1 ORUS 4110-2 ORUS 4304-65 ORUS 4306-1 ORUS 4306-1 ORUS 4395-1 ORUS 4395-1 ORUS 4499-1 ORUS 4945-2 ORUS 4957-2 ORUS 4957-2 ORUS 5070-1 ORUS 5076-1 ORUS 5078-1 ORUS 5085-1 ORUS 5086-1	23-Jun 23-Jun 23-Jun 23-Jun 23-Jun 23-Jun 23-Jun 23-Jun 23-Jun 23-Jun 23-Jun 23-Jun 23-Jun 23-Jun 23-Jun	<b>30-Jun</b> 30-Jun 30-Jun 30-Jun 30-Jun 30-Jun 30-Jun 30-Jun 30-Jun 30-Jun 30-Jun 30-Jun 30-Jun 30-Jun 30-Jun	7-Jul 7-Jul 7-Jul 7-Jul 7-Jul 7-Jul 7-Jul 7-Jul 7-Jul 7-Jul 7-Jul 7-Jul 7-Jul 7-Jul 7-Jul 7-Jul	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
Jewel ORUS 3032-3 ORUS 3843-1 ORUS 4110-2 ORUS 4304-65 ORUS 4306-1 ORUS 4306-1 ORUS 4395-1 ORUS 4395-1 ORUS 4499-1 ORUS 4945-2 ORUS 4957-2 ORUS 4957-2 ORUS 5070-1 ORUS 5076-1 ORUS 5078-1 ORUS 5085-1 ORUS 5086-1 ORUS 3219-2	23-Jun 23-Jun 23-Jun 23-Jun 23-Jun 23-Jun 23-Jun 23-Jun 23-Jun 23-Jun 23-Jun 23-Jun 23-Jun 23-Jun 23-Jun 23-Jun 23-Jun	<b>30-Jun</b> 30-Jun 30-Jun 30-Jun 30-Jun 30-Jun 30-Jun 30-Jun 30-Jun 30-Jun 30-Jun 30-Jun 30-Jun 30-Jun 30-Jun 30-Jun	7-Jul 7-Jul 7-Jul 7-Jul 7-Jul 7-Jul 7-Jul 7-Jul 7-Jul 7-Jul 7-Jul 7-Jul 7-Jul 7-Jul 7-Jul 7-Jul	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 2
Jewel ORUS 3032-3 ORUS 3843-1 ORUS 4110-2 ORUS 4304-65 ORUS 4306-1 ORUS 4306-1 ORUS 4395-1 ORUS 4395-1 ORUS 4499-1 ORUS 4945-2 ORUS 4957-2 ORUS 4957-2 ORUS 5070-1 ORUS 5076-1 ORUS 5078-1 ORUS 5085-1 ORUS 5086-1 ORUS 3219-2 ORUS 4074-3	23-Jun 23-Jun 23-Jun 23-Jun 23-Jun 23-Jun 23-Jun 23-Jun 23-Jun 23-Jun 23-Jun 23-Jun 23-Jun 23-Jun 23-Jun 23-Jun 23-Jun 23-Jun	<b>30-Jun</b> 30-Jun 30-Jun 30-Jun 30-Jun 30-Jun 30-Jun 30-Jun 30-Jun 30-Jun 30-Jun 30-Jun 30-Jun 30-Jun 30-Jun 30-Jun 29-Jun	7-Jul 7-Jul 7-Jul 7-Jul 7-Jul 7-Jul 7-Jul 7-Jul 7-Jul 7-Jul 7-Jul 7-Jul 7-Jul 7-Jul 7-Jul 7-Jul 7-Jul 7-Jul	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 2 2

ORUS 4942-4	23-Jun	29-Jun	7-Jul	2
ORUS 4948-1	23-Jun	29-Jun	7-Jul	2
ORUS 4954-1	23-Jun	29-Jun	7-Jul	2
ORUS 4942-3	23-Jun	30-Jun	7-Jul	2
ORUS 4827-1	24-Jun	28-Jun	8-Jul	1
ORUS 4828-3	24-Jun	28-Jun	8-Jul	1
ORUS 4830-1	24-Jun	28-Jun	8-Jul	1
ORUS 4943-1	24-Jun	28-Jun	8-Jul	1
ORUS 4497-1	24-Jun	1-Jul	8-Jul	1
ORUS 4825-1	24-Jun	1-Jul	8-Jul	1
ORUS 4305-51	25-Jun	25-Jun	25-Jun	1
ORUS 4304-5	25-Jun	25-Jun	2-Jul	1
ORUS 4304-192	25-Jun	2-Jul	2-Jul	1
ORUS 4305-66	25-Jun	2-Jul	2-Jul	1
ORUS 4686-3	25-Jun	2-Jul	2-Jul	1
ORUS 5083-1	30-Jun	30-Jun	30-Jun	1
ORUS 3381-3	30-Jun	30-Jun	14-Jul	1
ORUS 4946-1	30-Jun	4-Jul	11-Jul	2
ORUS 3412-1	4-Jul	7-Jul	15-Jul	2
Mac Black	4-Jul	15-Jul	18-Jul	2

# RESEARCH REPORT TO THE OREGON RASPBERRY AND BLACKBERRY COMMISSION AND THE AGRICULTURAL RESEARCH FOUNDATION 2019-2020

Title:	Evaluation of processing quality of advanced caneberry breeding selections
Investigator:	Zak Wiegand, Faculty Research Assistant Food Science & Technology, OSU
Cooperators:	USDA-ARS HCRL, Northwest Center for Small Fruit Research Washington State University
Objectives:	<ol> <li>Evaluate advanced caneberry breeding selections from NWREC and USDA for objective attributes related to processing potential</li> <li>Process samples of advanced selections, selected field crosses, and standard varieties for display to and evaluation by</li> </ol>
Project Duration:	growers, breeders, and processors
Funding Requeste	d for 2020-2021: \$ 9291

# **Results:**

Despite the challenges that the current pandemic has posed, caneberry cultivars, ORUS breeding selections, and WSU breeding selections from the North Willamette Research and Extension Center's Caneberry Test Block were sent to the OSU Department of Food Science & Technology Pilot Plant for processing and analysis from June 9th through September 1st, 2020.

Processing and analysis took place with updated practices to ensure safety and product quality improvement. Evaluations from the 2019 season occurred prior to restrictions from the pandemic and changes to daily life. Moving forward, evaluations and sharing samples of IQF breeding material will change.

# **Processing:**

Caneberry cultivars and selections from plots at the North Willamette Research and Extension Center During of the following genotypes were sent to OSU Department of Food Science & Technology Pilot Plant for processing and analysis:

# **Blackberries**

- 6 processing cultivars
- 13 ORUS processing selections
- 6 fresh market floricane fruiting cultivars
- 9 ORUS fresh market floricane fruting selections
- 1 fresh market primocane fruiting cultivars
- 8 ORUS fresh market primocane fruiting selections

# Red Raspberry

- 2 processing cultivars
- 9 ORUS processing selections
- 4 primocane/fall fruiting cultivars
- 26 ORUS primocane/fall fruiting selections
- 26 WSU primocane/fall fruiting selections

# Black Raspberry

- 5 commercial cultivars
- 66 ORUS Selections

Processing methods were adjusted for the pandemic to ensure the safety of student workers and myself while making sure to continue this important project. While there were challenges due to the pandemic, processes were updated to improve the quality, food safety, and alignment with commercial IQF fruit production methods.

# **Evaluations:**

# USDA/OSU Caneberry Research Evaluation - 11/25/19

All cultivars and selections of blackberry, red raspberry, and black raspberry processed during the 2019 growing season were displayed for evaluation. 25 representatives from food processors, commissioners, researchers, and berry processors attended to provide feedback

# Oregon Raspberry & Blackberry Commission Annual Meeting – 12/10/19

A set of commercial cultivars and advanced selections of blackberries, red raspberries, and black raspberries were displayed at the ORBC Annual meeting allowing industry stakeholders attending the event to see results from the breeding efforts and compare them to the industry standard cultivars commonly grown.

The pandemic has eliminated the ability to do typical fruit display and evaluations and the near future is uncertain. Despite the limitations, there are plans to perform evaluations and provide industry stakeholders an opportunity to receive samples to evaluate in the comfort and safety of their own homes. Stakeholders will be notified with details as they are available.

# Chemistry:

Basic chemical analysis was performed for samples collected during the 2020 processing season and the results for those samples are attached in Table 1 and Table 2. (°brix, pH, and TA)

Table 1. Weighted chemistry analysis for 2020 blackberry, red raspberry, and black raspberry advanced selections and commercial cultivars

auvanceu selections and		13		
Selection/Cultivar	Planting Year	Titratable Acidity <sup>a</sup>	Soluble Solids <sup>b</sup>	рН
Black Diamond	2018	1.26	9.87	3.61
Black Diamond	2017	1.35	9.64	3.54
Black Diamond	2016	1.40	10.31	3.62
Chester Thornless	2018	1.16	12.52	3.48
Chester Thornless	2017	1.15	12.17	3.41
Chester Thornless	2016	1.27	11.89	3.35
Columbia Giant	2017	1.89	10.83	3.29
Columbia Star	2018	1.36	12.25	3.45
Columbia Star	2017	1.44	11.45	3.49
Columbia Star	2016	1.47	11.58	3.39
Columbia Sunrise	2018	0.93	13.37	3.76
Columbia Sunrise	2016	0.90	13.40	3.78
Eclipse	2017	1.13	13.38	3.48
Galaxy	2017	1.04	12.85	3.70
Halls Beauty	2017	1.47	14.45	3.45
Halls Beauty	2016	1.48	13.54	3.42
Marion	2018	1.47	12.83	3.46
Marion	2017	1.52	11.50	3.31
Marion	2016	1.43	12.26	3.48
Prime-Ark 45	2018	1.33	15.87	3.40
Triple Crown	2018	1.11	16.08	3.64
Triple Crown	2017	1.01	14.49	3.70
Triple Crown	2016	0.91	14.80	3.75
Twilight	2017	1.09	14.53	3.64
ORUS 2816-3	2017	1.08	13.64	3.54
ORUS 4024-3	2017	1.78	15.49	3.51
ORUS 4057-3	2016	1.42	12.16	3.48
ORUS 4222-1	2017	1.57	14.07	3.39
ORUS 4273-2	2018	1.27	12.00	3.46
ORUS 4344-3	2018	1.18	10.39	3.69
ORUS 4425-1	2017	1.38	11.21	3.74
ORUS 4535-2	2016	2.06	13.16	3.22
ORUS 4537-2	2016	1.70	12.27	3.47
ORUS 4663-1	2016	1.43	11.18	3.48
ORUS 4670-1	2016	1.01	13.01	3.70
ORUS 4743-1	2017	1.49	9.90	3.24
ORUS 4767-1	2017	0.85	11.75	3.61
ORUS 4778-3	2018	1.21	11.30	3.61
ORUS 4892-1	2018	1.04	11.90	3.75
ORUS 4892-1	2017	1.09	11.52	3.69
ORUS 4892-2	2018	1.14	10.13	3.76
ORUS 4926-1	2017	1.16	10.07	3.78
ORUS 4928-2	2017	1.00	12.91	3.67
ORUS 4929-1	2017	1.14	11.64	3.66

advanced selections and commercial cultivars							
Selection/Cultivar	Planting Year	litratable Acidity	Soluble Solids	рН			
ORUS 4929-2	2017	1.19	12.04	3.51			
ORUS 4931-1	2018	1.61	10.65	3.48			
ORUS 4999-2	2017	1.10	15.08	3.52			
Black Raspberry							
Munger	2018	1.13	12.33	3.89			
Munger	2017	1.13	12.63	3.70			
ORUS 3381-3	2018	0.97	11.52	3.98			
ORUS 3412-1	2017	0.94	13.29	3.98			
ORUS 3843-1	2018	1.28	14.09	3.78			
ORUS 4110-2	2018	1.22	11.69	3.93			
ORUS 4306-1	2018	1.02	13.48	4.13			
ORUS 4310-1	2018	1.27	12.46	3.95			
ORUS 4395-1	2018	1.04	12.02	3.99			
ORUS 4401-1	2017	1.07	12.50	3.93			
ORUS 4686-1	2018	1.15	12.24	3.92			
ORUS 4818-1	2017	1.09	13.99	4.00			
ORUS 4818-2	2017	1.12	12.26	3.87			
ORUS 4833-1	2017	1.11	11.46	3.71			
ORUS 4833-3	2017	1.21	14.10	3.73			
ORUS 4836-1	2017	1.10	11.75	3.79			
ORUS 4945-2	2018	1.06	11.23	3.96			
ORUS 4952-2	2018	1.21	13.32	3.94			
ORUS 4957-2	2018	1.18	14.23	3.89			
ORUS 5076-1	2018	0.94	10.48	3.94			
Red Raspberry							
Kokanee	2019	1.67	13.92	3.28			
Meeker	2016	1.64	13.49	3.32			
Polka	2018	1.39	12.92	3.73			
Wakefield	2018	1.99	12.12	3.24			
ORUS 4487-1	2018	1.32	14.21	3.84			
ORUS 4640-1	2018	1.98	12.79	3.13			
ORUS 4725-1	2019	1.36	15.60	3.61			
ORUS 5005-2	2017	1.46	14.23	3.54			
ORUS 5209-1	2019	0.86	15.05	4.06			
ORUS 5250-1	2019	1.59	12.85	3.78			
WSU 2088	2016	1.47	12.07	3.35			
WSU 2188	2017	2.10	12.46	3.31			
WSU 2348	2018	1.87	12.99	3.21			
WSU 2385	2018	1.66	12.83	3.36			

Table 1. Weighted chemistry analysis for 2020 blackberry, red raspberry, and black raspberry advanced selections and commercial cultivars

Note: All reported values are weighted averages based on the number of harvests and samples tested.

<sup>a</sup> g citric acid/100g fruit

Selection/Cultivar	Planting Year	Harvest Date	Titratable Acidity <sup>a</sup>	Soluble Solids <sup>b</sup>	рНа
Blackberry					
Black Diamond	2018	6/23/2020	1.51	10.78	3.37
		6/30/2020	1.16	9.49	3.71
	2017	6/30/2020	1.35	9.64	3.54
	2016	6/23/2020	1.55	10.69	3.40
		6/30/2020	1.34	10.14	3.73
Chester Thornless	2018	7/28/2020	1.07	12.51	3.61
		8/4/2020	1 20	12 76	3 50
		8/11/2020	1 18	12 32	3 39
	2017	8/4/2020	1 15	12.32	3 57
	2017	8/11/2020	1 15	12.02	3 29
	2016	7/28/2020	1.13	12.03	3 53
	2010	8/4/2020	1.05	10.99	3.35
		8/18/2020	1.35	12 59	3.33
Columbia Giant	2017	6/30/2020	2.07	10.89	3.22
	2017	0/30/2020	1 71	10.35	3.29
Columbia Star	2018	6/30/2020	1.71	12.25	3.28
	2013	6/30/2020	1.30	11.25	3.45
	2017	6/20/2020	1.44	11.45	2 20
Columbia Suprise	2010	6/30/2020	0.93	12.30	3.35
Columbia Sumise	2016	6/23/2020	0.95	13.57	3.70
	2010	6/20/2020	0.92	12 27	2 70
Eclipse	2017	7/14/2020	1 16	13.57	3.75
Lenpse	2017	7/14/2020	1.10	13.02	3.30
		8/4/2020	1.09	12.73	2.72
Galaxy	2017	7/20/2020	1.09	14.07	3.07
Galaxy	2017	8/4/2020	1.08	12.36	2 70
Halls Beauty	2017	6/30/2020	1.00	14.52	3.75
Trails beauty	2017	0/30/2020	1.45	14.52	2.40
	2016	6/30/2020	1.45	14.56	3.40
Marian	2010	6/20/2020	1.40	12.14	2.60
Wallon	2010	0/30/2020	1.70	13.14	3.05
	2017	7/7/2020	1.54	11 50	2.52
	2017	6/30/2020	1.32	12.26	3.31
Primo Ark 15	2010	0/30/2020	1.45	12.20	3.40
Triple Crown	2018	9/1/2020	1.55	15.87	3.40
Triple Crown	2018	8/4/2020	1.11	10.08	2 70
	2016	7/28/2020	0.80	14.49	3.70
	2010	20/20/2020 8/4/2020	0.69	14.59	3.75
	2017	8/4/2020	0.95	15.41	3.75
i wilight	2017	7/28/2020 8/4/2020	0.98	14.54	3./5
	2017	8/4/2020	1.22	14.52	3.51
UKUS 2810-3	2017	8/18/2020	1.08	13.04	3.54
UKUS 4024-3	2017	//14/2020	1.78	15.49	3.51
UKUS 4057-3	2016	6/23/2020	1.51	12.87	3.42

Table 2. Chemistry analysis for 2020 blackberry, red raspberry, and black raspberry advanced selections and commercial cultivars
by harvest date

Selection/Cultivar	Planting Year	Harvest Date	Titratable Acidity <sup>a</sup>	Soluble Solids <sup>b</sup>	рН
		6/30/2020	1.37	11.83	3.51
ORUS 4222-1	2017	6/30/2020	1.57	14.07	3.39
ORUS 4273-2	2018	7/7/2020	1.21	12.43	3.43
		7/14/2020	1.32	11.69	3.49
ORUS 4344-3	2018	6/30/2020	1.18	10.39	3.69
ORUS 4425-1	2017	6/23/2020	1.39	10.90	3.85
		6/30/2020	1.37	11.65	3.58
ORUS 4535-2	2016	6/30/2020	2.06	13.16	3.22
ORUS 4537-2	2016	6/30/2020	1.70	12.27	3.47
ORUS 4663-1	2016	6/30/2020	1.43	11.18	3.48
ORUS 4670-1	2016	7/28/2020	1.06	12.64	3.70
		8/4/2020	0.92	12.93	3.73
		8/18/2020	1.06	14.51	3.68
ORUS 4743-1	2017	7/14/2020	1.49	9.90	3.24
ORUS 4767-1	2017	6/30/2020	0.85	11.75	3.61
ORUS 4778-3	2018	6/30/2020	1.21	11.30	3.61
ORUS 4892-1	2018	6/23/2020	1.33	11.67	3.53
		6/30/2020	0.89	12.01	3.87
	2017	6/23/2020	1.32	12.55	3.55
		6/30/2020	1.01	11.17	3.74
ORUS 4892-2	2018	6/30/2020	1.22	10.08	3.84
		7/7/2020	1.08	9.84	3.65
		7/14/2020	1.12	10.94	3.86
ORUS 4926-1	2017	7/28/2020	1.12	10.18	3.79
		8/4/2020	1.25	9.79	3.77
ORUS 4928-2	2017	7/28/2020	0.90	13.19	3.78
		8/4/2020	1.12	12.52	3.52
ORUS 4929-1	2017	7/28/2020	0.97	12.02	3.84
		8/4/2020	1.37	11.11	3.42
ORUS 4929-2	2017	8/4/2020	1.26	12.07	3.51
		8/18/2020	1.13	12.02	3.52
ORUS 4931-1	2018	7/14/2020	1.61	10.65	3.48
ORUS 4999-2	2017	9/1/2020	1.10	15.08	3.52
Black Raspberry					
Munger	2018	6/23/2020	1.13	12.33	3.89
	2017	6/23/2020	1.13	12.63	3.70
ORUS 3381-3	2018	7/7/2020	0.97	11.52	3.98
ORUS 3412-1	2017	7/7/2020	0.94	13.29	3.98
ORUS 3843-1	2018	6/23/2020	1.28	14.09	3.78
ORUS 4110-2	2018	6/23/2020	1.22	11.69	3.93
ORUS 4306-1	2018	6/23/2020	1.02	13.48	4.13
ORUS 4310-1	2018	6/23/2020	1.27	12.46	3.95
ORUS 4395-1	2018	6/23/2020	1.04	12.02	3.99

Table 2. Chemistry analysis for 2020 blackberry, red raspberry, and black raspberry advanced selections and commercial cultivars by harvest date

Table 2. Chemistry analysis for 2020 blackberry, red raspberry, and black raspberry advanced selections and commercial cultivars by harvest date

Selection/Cultivar	Planting Year	Harvest Date	Titratable Acidity <sup>a</sup>	Soluble Solids <sup>b</sup>	pН
ORUS 4401-1	2017	6/23/2020	1.07	12.50	3.93
ORUS 4686-1	2018	6/23/2020	1.15	12.24	3.92
ORUS 4818-1	2017	6/23/2020	1.09	13.99	4.00
ORUS 4818-2	2017	6/23/2020	1.12	12.26	3.87
ORUS 4833-1	2017	6/23/2020	1.11	11.46	3.71
ORUS 4833-3	2017	6/23/2020	1.21	14.10	3.73
ORUS 4836-1	2017	6/23/2020	1.10	11.75	3.79
ORUS 4945-2	2018	6/23/2020	1.06	11.23	3.96
ORUS 4952-2	2018	6/23/2020	1.21	13.32	3.94
ORUS 4957-2	2018	7/7/2020	1.18	14.23	3.89
ORUS 5076-1	2018	6/23/2020	0.94	10.48	3.94
Red Raspberry					
Kokanee	2019	8/25/2020	1.67	13.92	3.28
Meeker	2016	7/7/2020	1.64	13.49	3.32
Polka	2018	8/4/2020	1.42	13.29	3.68
		8/11/2020	1.35	12.26	3.84
Wakefield	2018	7/7/2020	1.99	12.12	3.24
ORUS 4487-1	2018	8/4/2020	1.28	14.36	3.67
		8/11/2020	1.34	14.11	3.95
ORUS 4640-1	2018	7/7/2020	1.98	12.79	3.13
ORUS 4725-1	2019	8/11/2020	1.36	15.60	3.61
ORUS 5005-2	2017	8/4/2020	1.49	14.13	3.44
		8/11/2020	1.43	14.33	3.65
ORUS 5209-1	2019	8/11/2020	0.86	15.05	4.06
ORUS 5250-1	2019	8/11/2020	1.59	12.85	3.78
WSU 2088	2016	7/7/2020	1.47	12.07	3.35
WSU 2188	2017	7/1/2020	2.10	12.46	3.31
WSU 2348	2018	7/7/2020	1.87	12.99	3.21
WSU 2385	2018	7/7/2020	1.66	12.83	3.36

<sup>a</sup> g citric acid/100g fruit

<sup>b</sup> <sup>o</sup>Brix



# The Northwest Berry Foundation

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# **Small Fruit Update Progress Report**

As of November 2020

#### **Objectives:**

- Increase industry communication.
- > Increase grower knowledge of IPM strategies.
- > Accelerate the dissemination of pesticide information. such as label changes to growers.
- > Facilitate real time pest alerts to growers throughout the growing season.
- Inform industry personnel of upcoming meetings as well as other relevant commission news such as elections, seat vacancies and/or legislative activities.

#### Overview

The SFU, Small Fruit Update, is released via email weekly during the growing season and shifts to bimonthly during the winter months (October – February). Subscribers were reduced by four individuals with a total audience of **1,428 (1,432 in 2019) people. Seventy-six percent of subscribers are highly engaged**, reading each week. From 2019-2020, NBF has been doing a decade's overdue cleanup of its subscriber list. As result, we deleted a lot of addresses have been found to be inactive/outdated. This has created a large drop in the total number of subscribers but does not truly reflect a drop in readership of the SFU.

Peerbolt Crop Management has been providing a weekly emailed Small Fruit Update (SFU) to an increasing number of growers, industry personnel, and researchers since February 2000. Six years ago, the SFU was taken over by Northwest Berry Foundation. As several recipients regularly pass it on to others, we estimate the total number receiving the Update to be well over 1,500 people. Additionally, considering the movement of sharing this with social media platforms over the last couple years, readership has increased but just in a different format.

Of the subscribers:

- 311 are in BC, 541 in Oregon, 341 in Washington, and 235 located elsewhere
- 682 are growers, 550 are industry members, and 160 are public researchers
- Of growers who reported what they produce: 181 Blackberry, 388 Blueberry, 115 Strawberries, 181 Raspberry

While the newsletter *primarily targets regional producers and processors*, it is regularly *forwarded to buyers to boost sales*. Our readership count is artificially low, as we are unable to directly track readership outside subscription. In Addition to email, NBF has been expanding disseminating the Small Fruit Update through various social media platforms. The demographics and way people receive the SFU is shifting so we are adjusting to that shift.

Small Fruit Update Progress Report for 2020: Page 1 of 4

#### Strategy for 2021

#### **Expanding SFU Audience**

Over the past year, we have made an effort to clean up our 20-year-old mailing list. We have had a reduction in our SFU mailing list subscribers, with 267 unsubscribed and 386 cleaned contacts. Unsubscribers typically occur when someone changes jobs or email addresses, and thus are typically resubscribing with new credentials (unless they are leaving the industry altogether. Cleaned contacts occurs when email addresses are no longer valid, or recipient has not opened emails in over a year. In 2021, gaining subscribes through our social media platforms will be the primary goal. Forty-seven percent of SFU subscribers are over the age of 65 and 22% below the age of 44. By targeting the various social media platforms, we hope to diversify the demographics of our readers and establish a strong social media presence for disseminating the SFU.

#### **Equitably Representing All Small Fruit Commodities**

the SFU's intent is to provide a central hub of information for those in the small fruit industry. It is crucial all small fruits have information pertaining to them presented in the SFU. This has become more challenging over the years as some commodities have remained relatively small or shrank, while others have become giants and represent a far greater share of PNW fruit production. However, we fully believe the value of the information provided is enhanced when there are cross-commodity insights being shared and the overall strength of the PNW small fruits industry is exceptional because of the diversity of small fruits. For 2021, we want to ensure that the information provided is useful to all growers big and small, regardless of whether the commodities they focus on are strawberries, blackberries, raspberries, or blueberries

#### 2020 Profile of the Small Fruit Update



The following charts illustrate the profile of the Small Fruit Update recipients in our database as of the date of this report

#### Small Fruit Update Progress Report for 2020: Page 2 of 4



We make every effort to provide you with accurate information. We don't mandate those who sign up for the Update to give us any information beyond their email address, name, address, and phone number. We also request that growers note what crops they grow. Sometimes they do, and sometimes they do not. This means that our annual demographic reports often change previous report's numbers. Also note that each year we lose a certain number of recipients. Some drop out because of a job change, but there are always a few dropped simply because their email address no longer works, and we are unable to rectify the situation after attempting to contact them. In the last couple years, we have made an effort to clean up the mailing list to better reflect actual active recipients.

In general, the trend over the past 10 years is that strawberry, blackberry, and raspberry recipients have grown at near parallel rates. However, in 2020 there was a reduction in crops grown by growers in all categories. The number of recipients identifying themselves as strawberry growers decrease by 63, raspberry growers decreased by 87, blackberry growers decreased by 57, and blueberry growers increased by 136.



Small Fruit Update Progress Report for 2020: Page 3 of 4

Our signup form encourages those wanting the Update to give us demographic information. The crop data presented above reflects the fact that some growers do not indicate what crop they grow, and many growers are harvesting more than one small fruit.

As noted at the start of this report the Small Fruit Update continues to expand its recipient list and the quality and quantity of the information provided. In 2004 our list comprised the addresses of 186 individuals. We have added 1,242 addresses since that time.

#### Social Media Report

#### Facebook

The NW Berry Foundation Facebook page was created in 2019 to direct people back to the NW Berry Website. Individuals using the Facebook platform searched and found our page using the terms "NW Berry Foundation" and "berry u-picks." In July of 2019, we had a small audience of **90 followers**. As of November 2020, our **followers have increased to 151**. The majority of our current Facebook followers are *vegetable farmers, berry growers, and regional food service organizations*. Beginning July 2019, the SFU was unofficially released via Facebook. The SFU newsletters shared on Facebook receive up to 127 impressions\* and 12 engagements\*\*. \*Impressions: the number of times a post is displayed. \*\*Engagement: the number of likes, shares and comments. This social media platform has been successful at direct newsletter clicks and directing readers to the SFU Newsletter webpage.

#### Twitter

Beginning in September 2019, a NW Berry Foundation Twitter account was established to provide an additional outlet for quickly releasing berry news and the Small Fruit Update. In two weeks of operation, we gained **170 twitter followers.** As of November 2020, our followers have **increased to 252 followers**. Multiple news and event postings have been retweeted including conference announcements, berry research articles, and ag policy news. The quality of followers is high with retweets from the Packer and WSU/OSU professors and likes primarily from graduate students and industry researchers. Monthly impressions\* range from 439 -2,820 depending on post content. \*Impressions is the number of times posts have been seen. High impressions occurred at the beginning of the growing season (Feb. and March) as well as at the end of the season in October. This social media platform has been successful at gaining industry members and researcher followers.

#### Instagram

The Northwest Berry Foundation established an Instagram account in September 2019. Starting in January 2020, Instagram was used an avenue for sharing the Small Fruit Update. Relevant SFU photos were shared and linked to our SFU newsletter webpage (i.e. Link in Bio). As of November 2020, our Instagram followers have **increased to 68 followers**. This social media platform has been successful at gaining local grower engagement as well as small farms across the Pacific Northwest.