



Selecting Summer-Bearing Raspberry Cultivars for Northern Utah

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Introduction

Summer-bearing raspberry plants have a perennial crown and root system with biennial canes, meaning the crowns and root system may live for many years (perennial) while the individual canes live for only 2 years (biennial). During the first year, new “primocanes” emerge from the roots and crowns and produce shoots and leaves but do not flower or fruit. In the second year, the same canes (now “floricanes”) flower and bear fruit.

In temperate climates of northern Utah, an advantage of summer-bearing (floricane fruiting) cultivars is that they bloom and bear fruit during midsummer. This allows plants to reach their full yield potential before the first fall freeze. However, fruit susceptibility to sunburn during the hot summer months dictates that cooler regions of Utah, such as the northern Wasatch Front, Cache Valley and Bear Lake Valley, are best suited to summer-bearing cultivars. Another disadvantage of summer-bearing cultivars is that any winter injury to the overwintering canes results in crop loss (Figure 1).

Important characteristics to consider in selecting summer-bearing cultivars are winter hardiness, yield, and fruit quality, including sunburn resistance and resistance to common insects and diseases. In response to increasing local interest in raspberry production, two different research trials were conducted to evaluate the suitability of summer-bearing cultivars to northern Utah.



Figure 1. Winter injury to floricanes is characterized by cane dieback, and bud damage that results in poor leaf emergence in the spring, and subsequently, reduced yield.

Study 1 (2006–2011)

Sixteen summer-bearing raspberry cultivars were planted in 2006 at the Utah State University Agricultural Research Farm in Kaysville, Utah. Each cultivar was grown in four replicated plots 24 feet long. Each plot was initially established with six nursery-produced plants spaced 2 feet apart within the row. Rows were spaced 11 feet apart. Alleyways were planted to grass (Figure 2). Irrigation was provided using both drip and overhead. Canes were supported with a permanent T-shaped trellis. Management specifics are detailed in [Raspberry Management for Utah](#).

In the 2008–2010 growing seasons, plots were evaluated for yield, fruit size, and length of production season. Consumer preference was evaluated in 2010



Figure 2. Trellised raspberry rows with grass alleyway.

using an amateur taste panel (16-Jul, 22-Jul), and in 2011 by surveying customers at a local farmers' market (21-Jul, 14-Aug).

Plots were not sprayed with insecticides in order to evaluate insect damage. Approximately weekly during June to August in 2009–2011, the number of canes with wilted tips and raspberry horntail (*Hartigia cressonii*) larvae present (Figures 3 and 4) was determined for each cultivar. Suspect canes were cut open to determine the presence, size, and location of horntail larvae (Figure 4) and parasitoid wasps (beneficial wasps attacking the raspberry horntail larvae) (Figure 5).



Figure 3. Characteristic wilted cane tip indicating presence of raspberry horntail.

Results (Study 1)

Yield

The degree of winter cane injury differed significantly from year to year. There was no visible winter injury in any of the canes in the spring of 2008, whereas injury was severe in spring 2007 and spring 2011, with dramatic differences among cultivars. The cultivars 'Royalty', 'Cascade Bounty', and 'Moutere' showed the least amount of winter injury, while 'Coho', 'Lauren', 'Titan' and 'Tulameen' all showed substantial winter injury in most years (Table 1). Not surprisingly, yields were strongly affected by florican survival, where the cultivars with the greatest winter survival typically produced the highest yields (Table 2). 'Royalty', 'Cascade Bounty', 'Georgia', 'Reveille' and 'Chemainus' had the highest yields, while 'Lauren', 'Coho' and 'Tulameen' had the lowest. Average yields of 'Cascade



Figure 4. Raspberry horntail adult just prior to emergence from the florican.



Figure 5. Parasitic wasp pupae and a collapsed horntail larva.

Table 1. Study 1– Winter survival of summer-bearing raspberry cultivars at the USU Kaysville Research Farm. Values are percent florican survival.

Cultivar	2007	2008	2009	2010	2011	Mean
Royalty	100	100	100	100	90	98
Cascade Bounty	93	100	100	96	90	96
Moutere	88	100	100	99	88	95
Reveille	99	100	99	99	73	94
Cowichan	97	100	100	99	74	94
Georgia	100	100	100	96	68	93
Cascade Dawn	-	100	99	98	68	91
Cascade Delight	-	100	99	98	64	90
Saanich	82	100	94	98	68	88
Canby	53	100	94	97	75	84
Chemainus	90	100	92	99	22	81
Willamette	64	100	84	78	59	77
Tulameen	88	100	87	82	16	75
Titan	25	100	99	90	40	71
Lauren	49	100	81	42	20	58
Coho	23	100	80	50	30	57

Dawn' and 'Cascade Delight' were affected by being planted a year later than the other cultivars, which reduced 2008 production.

Fruiting season was evaluated based on the date at which 20% of the total season crop was harvested. Fruiting season differed significantly among years and

among cultivars (Table 3). In general, the earliest cultivars were 'Reveille', 'Canby' and 'Moutere'. The latest maturing cultivars were 'Saanich', 'Royalty' and 'Coho'. Fruit size was largest for 'Cascade Delight', 'Tulameen' and 'Cowichan', and smallest for 'Lauren', 'Canby', 'Saanich', 'Reveille', and 'Moutere' (Table 4).

Table 2. Study 1 – Yield of summer-bearing raspberries, expressed as pounds of fruit per row foot (lbs./ft).

Cultivar	2008	2009	2010	Mean
Royalty	0.97	1.83	1.49	1.43
Cascade Bounty	0.57	1.80	1.38	1.25
Georgia	0.76	1.64	1.22	1.21
Reveille	0.53	1.92	1.16	1.20
Chemainus	0.35	1.92	1.20	1.16
Cowichan	0.47	1.62	1.05	1.04
Canby	0.35	1.55	1.12	1.00
Saanich	0.28	1.50	1.14	0.97
Cascade Delight	0.26	1.49	1.15	0.97
Moutere	0.29	1.44	0.99	0.91
Titan	0.27	1.58	0.70	0.85
Willamette	0.19	1.14	0.84	0.72
Tulameen	0.12	1.21	0.75	0.69
Cascade Dawn	0.07	0.97	0.92	0.65
Coho	0.03	0.79	0.61	0.48
Lauren	0.09	0.51	0.27	0.29
Mean	0.35	1.43	1.00	

Table 3. Study 1 – Fruiting season, based on the average date at which 20% of the total season's yield was harvested.

Cultivar	2008	2009	2010	Mean
Reveille	7-Jul	30-Jun	12-Jul	6-Jul
Canby	14-Jul	4-Jul	12-Jul	10-Jul
Moutere	15-Jul	5-Jul	13-Jul	11-Jul
Lauren	13-Jul	7-Jul	14-Jul	11-Jul
Cascade Dawn	14-Jul	8-Jul	14-Jul	12-Jul
Titan	15-Jul	7-Jul	15-Jul	12-Jul
Willamette	14-Jul	9-Jul	15-Jul	12-Jul
Georgia	19-Jul	6-Jul	14-Jul	13-Jul
Cowichan	15-Jul	8-Jul	17-Jul	13-Jul
Chemainus	19-Jul	9-Jul	15-Jul	14-Jul
Cascade Delight	16-Jul	12-Jul	18-Jul	15-Jul
Cascade Bounty	17-Jul	12-Jul	20-Jul	16-Jul
Tulameen	20-Jul	15-Jul	20-Jul	18-Jul
Saanich	24-Jul	13-Jul	19-Jul	19-Jul
Royalty	22-Jul	15-Jul	21-Jul	19-Jul
Coho	18-Jul	18-Jul	25-Jul	20-Jul
Mean	16-Jul	9-Jul	16-Jul	



Figure 6. Study 1 – Consumer preference evaluations by farmers' market attendees.

Consumer Preference

Flavor preferences differed widely among evaluators. A 10-member panel rated the flavor of the berries in July 2009 and 2010. 'Cascade Delight', 'Tulameen', 'Cascade

Bounty' and 'Georgia' were selected as favorites. A survey was conducted in 2011 with local farmers' market customers (Figure 6). Participants were given 10 votes to cast for their favorite cultivars and berries were ranked on 21 July 2011; 'Saanich', 'Canby' and 'Cascade Dawn' were selected as top picks (Table 5). In both comparisons, the least preferred cultivars were 'Royalty', 'Moutere', 'Titan' and 'Chemainus'. It should be noted that several cultivars, including 'Tulameen' and 'Lauren', did not fruit significantly in 2011 due to the severity of winter damage. Therefore, fruit was unavailable for evaluation at the farmers' market.

Table 4. Study 1 – Fruit size at peak harvest (g/fruit).

Cultivar	2008	2009	2010	Mean
Cascade Delight	2.9	2.4	2.4	2.6
Tulameen	2.6	1.7	2.4	2.2
Cowichan	2.1	2.0	2.3	2.2
Royalty	2.4	1.5	2.2	2.0
Titan	1.9	1.9	2.2	2.0
Willamette	2.0	2.2	1.8	2.0
Georgia	2.3	1.8	1.8	2.0
Chemainus	2.2	1.8	1.9	2.0
Cascade Bounty	1.6	1.6	2.2	1.8
Coho	2.4	1.4	1.6	1.8
Cascade Dawn	1.6	1.9	1.8	1.8
Moutere	2.0	1.6	1.7	1.8
Reveille	2.1	1.8	1.4	1.8
Saanich	1.9	1.4	1.8	1.7
Canby	2.0	1.7	1.4	1.7
Lauren	1.7	2.1	1.3	1.7

Table 5. Study 1 – A comparison of berry taste preferences of summer-bearing raspberry cultivars from the USU Kaysville research farm.

Cultivar	Taste panel preference ¹			Farmers' market survey ²		
	Rank (1 to 6, low to high)			% of votes cast		
	16-Jul-09	22-Jul-10	average	21-Jul-11	14-Aug-11	Rank
Cascade Delight	4.0	3.9	4.0	8.7%	6.4%	6
Tulameen	3.8	3.9	3.8			
Cascade Bounty	2.9	3.8	3.3	6.4%	4.0%	7
Georgia	3.1	3.6	3.3	6.3%	9.0%	8
Canby	3.1	3.4	3.3	11.5%		2
Willamette	3.0	3.3	3.2	8.8%	4.5%	5
Cowichan	2.5	3.7	3.1	9.8%	11.0%	4
Reveille	3.1	3.0	3.0	5.8%		9
Saanich	2.9	3.0	3.0	13.5%	11.9%	1
Coho	2.8	3.1	2.9		11.6%	4
Cascade Dawn	2.7	3.1	2.9	10.2%	13.8%	3
Lauren	2.7	3.1	2.9			
Titan	2.8	2.8	2.8	4.8%		11
Chemainus	2.3	3.1	2.2	5.1%	17.2%	10
Royalty	2.3	2.9	2.6	4.3%	6.2%	12
Moutere	2.4	2.8	2.6	4.1%	4.5%	13

¹The taste panel consisted of 10 individuals that rated overall preference based on fruit firmness, flavor and appearance.

²The farmers' market survey in 2011 was based on the number of votes for preference cast by participants with each participant given 10 votes. Rank is for votes cast on 21 July.

Table 6. Study 1 –Infestation of summer raspberry canes with raspberry horntail (number per foot of row) at Kaysville, UT, in 2009–2011.

Cultivar	Infestation
Royalty	0.04 a*
Moutere	0.13 a
Cascade Dawn	0.21 ab
Cowichan	0.26 abc
Coho	0.26 abc
Cascade Delight	0.29 abc
Lauren	0.31 abc
Tulameen	0.37 abc
Reveille	0.47 abc
Chemainus	0.49 abc
Canby	0.54 bc
Georgia	0.60 c
Cascade Bounty	0.63 cd
Titan	0.68 cd
Willamette	0.85 cd
Saanich	0.99 d

*Cultivar means were compared with analysis of variance. Means followed by the same letter are not significantly different at $P \leq 0.05$.

Horntail Preference (Study 1)

There was a wide range in raspberry horntail preference of summer-bearing cultivars (Table 6). ‘Royalty’ and ‘Moutere’ had the fewest infested canes. The highest infestation rates of 0.6 or more infested canes per foot of row included ‘Georgia’, ‘Cascade Bounty’, ‘Titan’, ‘Willamette’, and ‘Saanich’. The popular summer-bearing cultivar ‘Canby’ showed intermediate horntail infestations that were significantly higher than ‘Royalty’ and ‘Moutere’. Susceptibility to winter injury of some cultivars may make them more attractive to attack by raspberry horntail (Tables 1 and 6).

Parasitism of horntail larvae was detected from late June through mid-August of 2009–2011. Parasitism peaked in late July at nearly 70%, and averaged 40% overall. Two primary parasitoid wasp species were found: (1) an ichneumon wasp, a solitary wasp whose larva feeds externally on a horntail larva, and (2) a pteromalid wasp, a social wasp whose larvae feed in groups of 3–20 larvae on a single horntail larva (Figure 5). Despite high infestation rates in raspberry cultivars most attractive to raspberry horntail, these two parasitic wasps contributed to substantial reduction in horntail survival.

Study 2 (2011–2014)

As a follow-up study, seven summer-bearing raspberry cultivars were planted in 2011 at the Kaysville research farm. Two cultivars (‘Cascade Bounty’ and ‘Chemainus’) were repeated from Study 1, and five new cultivars were evaluated including ‘Prelude’, ‘Nova’, ‘Cascade Gold’, ‘ORUS 1142-1’, and ‘Octavia’. Plot layout and management were similar to Study 1. In the 2013–2015 growing seasons, plots were evaluated for yield, fruit size, cane survival, and raspberry horntail preference.

Results (Study 2)

Yield

‘Nova’, ‘Prelude’ and ‘Cascade Bounty’ had the greatest winter cane survival in the second experiment (Table 7), resulting in the largest yields (Table 8). ‘Chemainus’, ‘Octavia’, and 1142-1 all had lower than 50% average winter survival and had correspondingly low yield.

‘Cascade Gold’ had the largest fruit size, followed by ‘Chemainus’ (Table 9). Although high-yielding, ‘Cascade Bounty’ had the smallest fruit size in Study 2. However, ‘Cascade Gold’ had a high incidence of misshapen fruit, with an open end resulting from a gap between drupelets. These fruits appeared to result from a condition called “doubling.” This is common to sweet cherry and peach, and sometimes apple, and results from heat or drought stress during flower bud initiation.

Table 7. Study 2 –Winter survival of summer-bearing raspberry cultivars. Values are percent florican survival.

Cultivar	2013	2014	2015	Mean
C. Bounty	98.8	93.8	81.3	91.3
Prelude	88.8	93.8	86.3	89.6
Nova	91.3	81.3	90.0	87.5
C. Gold	-	56.3	67.5	61.9
ORUS 1142-1	-	30.0	51.7	40.8
Octavia	32.5	45.0	35.0	37.5
Chemainus	27.5	38.8	38.8	35.0

Table 8. Study 2 –Yield of summer-bearing raspberries, expressed as pounds of fruit per row (lbs./ft).

Cultivar	2013	2014	2015	Mean
Nova	0.99	1.67	1.71	1.46
Prelude	0.36	1.99	1.70	1.35
C. Bounty	0.93	1.83	1.22	1.32
Chemainus	0.19	1.03	0.82	0.68
Octavia	0.26	0.65	0.89	0.60
C. Gold	-	0.68	0.51	0.60
ORUS 1142-1	0.04	0.39	0.49	0.30

Table 9. Study 2 –Fruit weight at peak harvest (g/fruit).

Cultivar	2013	2014	2015	Mean
C. Gold	-	5.30	2.97	4.14
Chemainus	5.13	3.65	1.73	3.50
Octavia	2.68	3.78	3.02	3.16
Nova	1.85	2.50	2.28	2.21
ORUS 1142-1	2.03	3.20	1.30	2.18
Prelude	1.58	2.80	2.13	2.17
C. Bounty	1.55	2.91	1.65	2.04

Table 10. Study 2 – Infestation of summer raspberry canes with raspberry horntail (number per foot of row per year) at Kaysville, UT, in 2013 and 2014.

Cultivar	Number of Infestations
Octavia	0.01
C. Gold	0.05
ORUS 1142-1	0.12
Chemainus	0.18
Prelude	0.26
C. Bounty	0.68
Nova	1.07

Horntail Preference (Study 2)

Raspberry horntail injury was lower in most cultivars in Study 2 than Study 1. Cultivars tested in Study 2 did not show a significant difference in raspberry horntail preference (Table 10). However, field location did affect horntail incidence with the greatest incidence on the edges.

Summary

Following is an overview of the performance of each cultivar, and recommendation for its planting in northern Utah.

Recommended



Canby: average yields and moderate winter cane injury. Favored in consumer taste trials. Moderately attractive to raspberry horntail. Preferred cultivar in Utah for many years.



Cascade Bounty: high yielding and low winter cane injury. The conical, firm fruits are adapted to machine harvest. Variable taste trial results. Highly attractive to raspberry horntail in study 1.



Cowichan: average yields with good cane survival, and ranked well in taste trials. Firm fruits may be suited to machine harvest. Relatively unattractive to raspberry horntail.



Georgia: high yielding cultivar with good cane survival. 'Georgia' is a recent Maryland release that is not widely available. Taste preference rankings were average. Highly attractive to raspberry horntail.



Nova: high yielding and had good winter survival. Moderate fruit size. Highly attractive to raspberry horntail.



Prelude: high yielding and had good winter survival. Moderate fruit size. Moderately attractive to raspberry horntail.



Royalty: large, purple-fruited cultivar. Very high yield and excellent winter survival. Unique black raspberry flavor. Not attractive to raspberry horntail.

Worth a Try



Cascade Delight: average yields and fairly low winter cane injury. Large berries, fruited into late summer. Popular flavor among farmers' market customers. Fairly unattractive to raspberry horntail.



Cascade Dawn: low yields, relatively good winter cane survival. Popular at market taste trial. Mild flavor with berries that do not release until fully ripe. Not suitable for machine harvest. Unattractive to raspberry horntail.



Cascade Gold: moderate winter cane survival, and relatively low yields. However, if a yellow-fleshed summer-bearing raspberry is desired it is an acceptable choice for Utah. Unattractive to raspberry horntail.



Chemainus: good yields with moderate winter cane injury in Study 1 and high injury in Study 2. Taste preference varied widely. Suitable for fresh and machine harvest. Moderately attractive to raspberry horntail injury.



Reveille: the earliest fruiting cultivar in this study with high cane survival and yields. Consumer ratings were neutral. Moderately attractive to raspberry horntail.



Saanich: average yields, but susceptible to winter cane injury. Firm, glossy fruit ranked number one among farmers' market participants. Very attractive to raspberry horntail.



Willamette: lower yielding cultivar due to winter cane injury. Medium sized, deep red fruits ranked average in taste trials. Very attractive to raspberry horntail, but resistant to Raspberry Bushy Dwarf virus.

Not Recommended

Lauren: lowest yielding cultivar in Study 1 due to severe winter cane injury. Ranked average in the taste panel. Moderately attractive to raspberry horntail.

Moutere: low yield, and least favored in taste trials. Relatively unattractive to raspberry horntail.

Octavia: susceptible to winter cane injury and only moderate yields. Unattractive to raspberry horntail.

Titan: low yield due to winter cane injury. Fruits are quite large, conical in shape and produce over a long season, but were not favored in consumer taste trials. Highly attractive to raspberry horntail.

Not Recommended, continued

<p>Tulameen: low yield due to winter injury. Large fruit ranked well among taste panel participants. Ripened mid to late season and may overlap with fall fruiting cultivars in some years. Moderately attractive to raspberry horntail.</p>	<p>Coho: among the lowest yielding in Study 1, high incidence of winter cane injury. The bright red fruits were popular among farmers' market taste trial participants. Moderately attractive to raspberry horntail</p>		
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Disclaimers

The following were co-authors on an earlier edition of this fact sheet: Britney Hunter, Shawn Olsen, and Thor Lindstrom.

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Related Information Links

- Alston, D., B. Black, B., & Murray, M. (2019). *Raspberry horntail*. [Fact sheet, ENT-132-09]. Utah State University Extension. All Current Publications, Paper 669. https://digitalcommons.usu.edu/extension_curall/669
- Black, B., Cardon, G. & Ransom, C. (2009). *Iron chlorosis in berries*. [Fact sheet, Horticulture/Fruit/2009-02pr]. Utah State University Extension. All Current Publications, Paper 709. https://digitalcommons.usu.edu/extension_curall/709
- Black, B., Hill, R. & Cardon, G. (2008). *Caneberry irrigation*. [Fact sheet, Horticulture/Fruit/2008-04pr]. Utah State University Extension. All Current Publications, Paper 1696. https://digitalcommons.usu.edu/extension_curall/1696
- Heflebower, R., Hunter, B., Olsen, S., Black, B., Alston D., & Lindstrom, T. (2013). *A comparison of 10 fall bearing raspberry cultivars for northern Utah*. [Fact sheet, Horticulture/Fruit/2013-01pr]. Utah State University Extension, All Current Publications, Paper 671. https://digitalcommons.usu.edu/extension_curall/671
- Hunter, B., Heflebower, R., Olsen, S., Black, B., Alston, D. & Lindstrom, T. (2015). *A comparison of 16 summer-bearing raspberry cultivars for northern Utah*. [Fact sheet, Horticulture/Fruit/2015-02pr]. Utah State University Extension. All Current Publications, Paper 698. https://digitalcommons.usu.edu/extension_curall/698
- Maughan, T., & Black, B. (2018). Late-season raspberry production in high tunnels: Varieties. [Fact sheet, Horticulture/HighTunnels/2018-02pr]. Utah State University Extension. All Current Publications, Paper 1868. https://digitalcommons.usu.edu/extension_curall/1868
- Maughan, T. & Black, B. (2015). *Raspberry management for Utah*. [Fact sheet, Horticulture/Fruit/2015-03pr]. Utah State University Extension. All Current Publications, Paper 700. https://digitalcommons.usu.edu/extension_curall/700

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