2018 Progress Report to the
BC CRANBERRY RESEARCH COMMITTEE

Project Title: Assessment of new pest management tools that address priority needs of the BC cranberry industry

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Objectives:

- chemigated clethodim for control of annual and perennial grasses
- clethodim + sethoxydim for control of perennial grasses
- dormant broadcast application of glyphosate for perennial weed control
- dormant application of flumioxazin for moss control
- fungicide strategies relevant to BC conditions
- repellency/attractiveness of bloom-applied fungicides to honeybees

Results

Objective 1) Chemigated clethodim for control of annual and perennial grasses
Objective 2) Clethodim + sethoxydim for control of perennial grasses

Methods: Replicated field trials were conducted on cranberry beds infested with different species of annual and perennial grasses. Full rates of Intensity and/or Intensity One were applied at 1000 gpa at full label rate. Comparisons were made to broadcast application and other herbicide combination treatments. Efficacy and phytotoxicity were evaluated and compared to untreated control.

Findings: The efficacy of chemigated clethodim (Intensity and Intensity One) varied by weed species and timings. For early post-emergence barnyard grass, a single chemigation of Intensity provided complete control (Table 1). *S*pring post-emergence applications of clethodim products also controlled velvet grass, sweet vernal grass, creeping bentgrass, six-weeks fescues, and reed canary grass (Tables 2, 3, 4). Creeping bentgrass, six-weeks fescue and reed canary grass, however, were only partially controlled by these treatments. Broadcast treatment of clethodim worked better than chemigation for creeping bentgrass (Table 2) and reed canary grass (Tables 3 and 4), but not as well for velvet grass (Table 2). For the grass species where efficacy was obtained with chemigated clethodim, there was no difference between Intensity and Intensity One. There was no negative treatment effect on yield (Table 2). The combination of clethodim and sethoxydim was better for control of reed canary grass than clethodim (Table 4), but neither treatment provided 100% control.

Discussion: These results indicate that two treatments, the chemigation of clethodim (Intensity or Intensity One), and the broadcast use of a combination of clethodim + sethoxydim, are excellent tools for controlling several of the more important grass weeds in BC cranberry beds.

Table 1. Efficacy of a mid-summer chemigation of Intensity herbicide (clethodim) on barnyard grass control in 2018

	Barnyard grass	
	7/24/2018	8/14/2018
Treatment*	% control	
Control	0	0
Intensity 8 oz prod/ac	98	99
Treatment Prob(F)	0.0001	0.0001

*Treatment applied 7/5/18 @ 1000 GPA ~ 2-3 weeks post-emergence when grass was ~ 3-6" tall.

Table 2. Comparison between broadcast and chemigation applications on the efficacy of a spring clethodim herbicide on the control of several different species in 2018.

	Six-weeks fescue	Velvet grass	Sweet Vernal	Creeping Bentgrass	Farm 1 G1	Farm 2 Pilgrim
	6/26/2018			7/5/2018		
Treatment*	% control				bbl/ac	
Control	0	0	0	0	167	248
Clethodim 8 oz prod/ac chemigated twice	33	93	100	40	205	212
Clethodim 8 prod oz/ac+ 1% Agridex broadcast twice	13	100	66	90		
LSD P=.05	17	15	37	22	68	163
Treatment Prob(F)	0.01	0.0001	0.004	0.001	0.1	0.4

*Treatments applied 3/19/18 and 4/19/18 @ 100 (broadcast) or 1000 GPA (chemigation)

Table 3. Comparison between broadcast and chemigation applications on the efficacy of a spring Intensity herbicide (clethodim) on the control of several different species in 2018			
	Reed canary grass	Six-weeks fescue	Creeping bentgrass
Treatment *	% control 6/26/18		
Control	0	0	0
Intensity 8 oz prod/ac chemigated twice	75	45	80
Intensity one 16 oz prod/gal chemigated twice	75	45	60
Intensity 8 prod oz/ac+ 1% Agridex broadcast twice	53	50	
Intensity one +0.25% x-77 broadcast twice	50	35	
LSD p=.05	16	17	25
Treatment prob(f)	0.0001	0.0002	0.009
*Treatments applied 5/14/18 and 5/16/18 @ 100 (broadcast) or 1000 GPA (chemigation).			

Table 4. Efficacy of different grass herbicides treatments on reed canary grass control in 2018.			
	Reed canary grass		
	5/29/2018	7/7/2018	9/9/2018
Treatment*	% control		
Control	0	0	0
broadcasted clethodim 8 oz product + Agridex 1 % v/v	48	47	57
chemigated clethodim 8 oz/ac + Agridex 1 % v/v	30	56.7	60
broadcasted clethodim 8 oz/ac + sethoxydim 40 oz product + Agridex 1 % v/v	90	88	70
LSD	14	23	12
Treatment Prob(F)	0.0001	0.0005	0.0001
*Treatments applied 4/24/18 and 7/2/18 @ 100 (broadcast) or 1000 GPA (chemigation)			

Objective 3) Dormant broadcast application of glyphosate for perennials

Methods: Replicated field trials were conducted on cranberry beds infested with different weed species. Glyphosate, Roundup WeatherMAX, were applied at 0.5% at 100 gpa. Treatments were applied during the dormant season to trailing blackberry, buttercup, young spruce tree, slough sedge, tussock and sheep sorrel. Efficacy and phytotoxicity were evaluated and compared to untreated control.

Findings: Dormant application of Roundup WeatherMAX had no effect on yield across a range of rates (Tables 5 & 6). However, noticeable differences were found in spring growth and bud viability (Table 7). Dormant Roundup Max suppressed early sheep sorrel and lotus (Table 8) and provided moderate control of trial blackberry species (Table 9). There was no control of spruce trees (Table 8).

Discussion: Dormant broadcast application of glyphosate suppressed some perennial weed species and didn't affect crop production. However, the level of weed control was minimal and there was some vine damage. This treatment might be useful for managing a bad infestation of trailing brambles where cranberry vine quality had already been compromised. However, the risk to vine damage is too significant to be considered a viable weed management tool in beds with high quality vines.

Table 5. The effect of dormant applications of Roundup WeatherMAX on the yield of Crimson Queen and Pilgrim cranberries.

Treatment *				bbl/ac	
				Crimson	Pilgrim
Control				76	247
Roundup WeatherMAX	50 gpa	0.25	% v/v	76	251
Roundup WeatherMAX	50 gpa	0.5	% v/v	77	283
Roundup WeatherMAX	100 gpa	0.25	% v/v	74	331
Roundup WeatherMAX	100 gpa	0.5	% v/v	72	276
LSD P=.05				38	90
Treatment Prob(F)				1.00	0.29
*Treatments applied 1/3/18 and 1/22/18					

Table 6. The effect of dormant applications of Roundup WeatherMAX on the yield of Stevens and McFarlin Cranberries.

Treatment	bbl/ac		
	Stevens Farm 1	Stevens Farm 2	McFarlin Farm 3
Control	16	26	33
Roundup WeatherMAX @ 0.5 % (v/v) at 100 GPA	9	10	37
Treatment Prob(F)	0.5	0.1	0.8

*Treatments applied 1/22/18 and 2/7/18

Table 7. The phytotoxicity of dormant applications of Roundup WeatherMAX on Stevens and McFarlin Cranberries.

Treatment	Inches of new growth		% terminal buds dead	
	McFarlin	Stevens	McFarlin	Stevens
	5/21/2018			
control	4 a	4 b	0 b	0 a
Roundup WeatherMAX 0.5 % v/v 100 GPA	2.7 a	2 a	17 a	8 a
*Treatments applied 1/22/18 and 2/7/18				

Table 8. The effect of dormant applications of Roundup WeatherMAX on control of young spruce trees, sheep sorrel and lotus in cranberry beds.									
	% control								
	young spruce tree		Sheep sorrel				Lotus	
Treatment	5/3/2018		5/21/2018		8/6/2018		5/21/2018	
Control	0	a	0	b	0	b	0	b
Roundup WeatherMAX 0.5 % v/v 100 GPA	0	a	73.3	a	10	a	70	a
*Treatments applied 1/22/18 and 2/7/18								

Table 9. The effect of dormant applications of Roundup WeatherMAX on control of two species of trailing blackberry in cranberry beds.						
	% Ground cover					
			Bed 1		Bed 2	
	Rubus ursinus		*Rubus pedatus*			
Treatment*	8/6/2018		5/16/2018		5/16/2018	
Control	31.7	a	40	a	32.7	a
Roundup WeatherMAX 0.5 % v/v 100 GPA	0	b	0	b	0	a
*Treatments applied 1/22/18 and 2/7/18						

Objective 4) Dormant application of flumioxazin for moss control.

Methods: Replicated field trials were conducted on cranberry beds infested with moss. Flumioxazin was applied at varying rates and timings, using both chemigation and broadcast applications. Efficacy and phytotoxicity were evaluated and compared to untreated control. The relationship between moss density and cranberry yield components was assessed across three Pilgrim beds. Moss density (grams dw/0.33 ft^2) total upright density and fruiting upright density was determined from 30 locations per bed in the spring. Yield was collected from those exact same locations in the August.

Findings: Dormant applications of flumioxazin from 1.5 to 3 oz/ac provided excellent control of moss (Table 10). There were no differences in the level of control between different flumioxazin treatments. Two applications of 1.5 or 3 oz/ac was equally as effective as 4 applications of 1.5 oz/ac. There were no deleterious effects of flumioxazin on short or long-term yield (Tables 11, 12, 13, 14). An increase in yield over the control was noted in one Pilgrim bed from 3 applications of 1.5 oz/ac. As long as vines were dormant there was no effect of timing on crop yield (Table 14). With an increase in moss density there was a decrease in upright density, fruiting upright density and yield (Table 15, Figure 1). There was a better correlation moss dry weight density and upright and fruit upright density, than with yield.

Discussion: Infestation of cranberry beds with moss results in major reduction in upright density. Flumioxazin application during the dormant season was an effective tool in managing moss, with no negative impact on crop yield.

Table 10. Effect of different timings and rates of flumioxazin on moss control in 2017/2018.							
	Stevens farm 1	Crimson farm 1	G1 farm 1	Pilgrim farm 1	Pilgrim farm 2	Pilgrim farm 2	Pilgrim farm 1
Treatment*	Moss burn down rating (1=none, 5=100 black/dead) 1/31/17					%green moss 3/22/18	
Control	1	1	1	1	1	40	91
Flumioxazin 1.5 oz/a 11/20, 12/12, 1/25 &2/6	5	4	4	4	4	0	7
Flumioxazin 1.5 oz/a 11/20, 1/25 &2/6	4	3	3	4	4	0	8
Flumioxazin 1.5 oz/a 11/20 & 2/6	4	2	2	4	4	0	10
Flumioxazin 3.0 oz/a 11/20 & 2/6	4	3	3	4	4	0	8
LSD	0.6	0.6	0.6	0.3	0.2	1	20
Treatment prob(F)	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001

*Treatment applied @ 100 GPA

Table 11. Effects of different timings and rates of flumioxazin on yield of different cranberry varieties in 2017/2018.					
	Stevens farm 1	Crimson farm 1	G1 farm 1	Pilgrim farm 1	Pilgrim farm 2
Treatment*	bbl/ac				
Control	173	265	128	201	102 b
Flumioxazin 1.5 oz/a 11/20, 12/12, 1/25 &2/6	159	255	128	202	136 ab
Flumioxazin 1.5 oz/a 11/20, 1/25 &2/6	148	150	125	230	157 a
Flumioxazin 1.5 oz/a 11/20 & 2/6	197	187	108	148	91 b
Flumioxazin 3.0 oz/a 11/20 & 2/6	175	195	92	235	95 b
LSD	57	99	64	160	50
Treatment prob(F)	0.41	0.12	0.64	0.74	0.05

*Applied at 100 GPA

Table 12. Effect of different timings of flumioxazin at 3 oz/ac on yield of Pilgrim cranberries in 2018.	
Treatment (Date of 3oz/ac application) *	bbl/ac
Control	72
Feb 21	90
Mar 1	78
March 7	103
March 14	61
March 28	49
LSD	37
Treatment prob(f)	0.08
*Applied at 100 GPA	

Table 13. Effect of different rates of flumioxazin applied over two years on yield of Stevens cranberries in 2016/ 2017/2018.		
	bbl/ac	
Treatment (flumioxazin oz/ac) *	2017	2018
0	140	198
1.5	116	181
3	124	167
6	89	136
Treatment Prob(F)	0.22	0.24
* Applied 2/14/16, 1/27/17 & 2/14/18 @ 100 GPA		

Table 14 . Effect of flumioxazin applied in 2017 on the yield of G1 cranberries in 2017 and 2018.		
	bbl/ac	
Treatment *	2017	2018
Control	181	95
Flumioxazin @ 6 oz/ac	162	87
Treatment prob(f)	0.38	0.85
* Applied in February 2017 in the IR4 research project		

Table 15. The correlation in moss coverage (dry weight/ surface area) and yield components on three Pilgrim cranberry beds in 2018.*						
	Total uprights		Fruiting upright		Grams fruit	
Pilgrim bed #,	Correlation Coefficient	P Value	Correlation Coefficient	P Value	Correlation Coefficient	P Value
Bed 1	-0.67	0.00004	-0.61	0.00038	-0.11	0.55
Bed 2	-0.69	0.000008	-0.61	0.00036	-0.44	0.015
Bed 3	-0.55	0.0016	-0.38	0.037	-0.4	0.029
Beds 1, 2 & 5	-0.57	0.000000005	-0.35	0.0008	-0.23	0.03
*30 samples per bed. moss collect April, yield and upright in August in 0.33 ft^2 samples						

Moss infestation of Pilgrim Beds vs upright density and yield

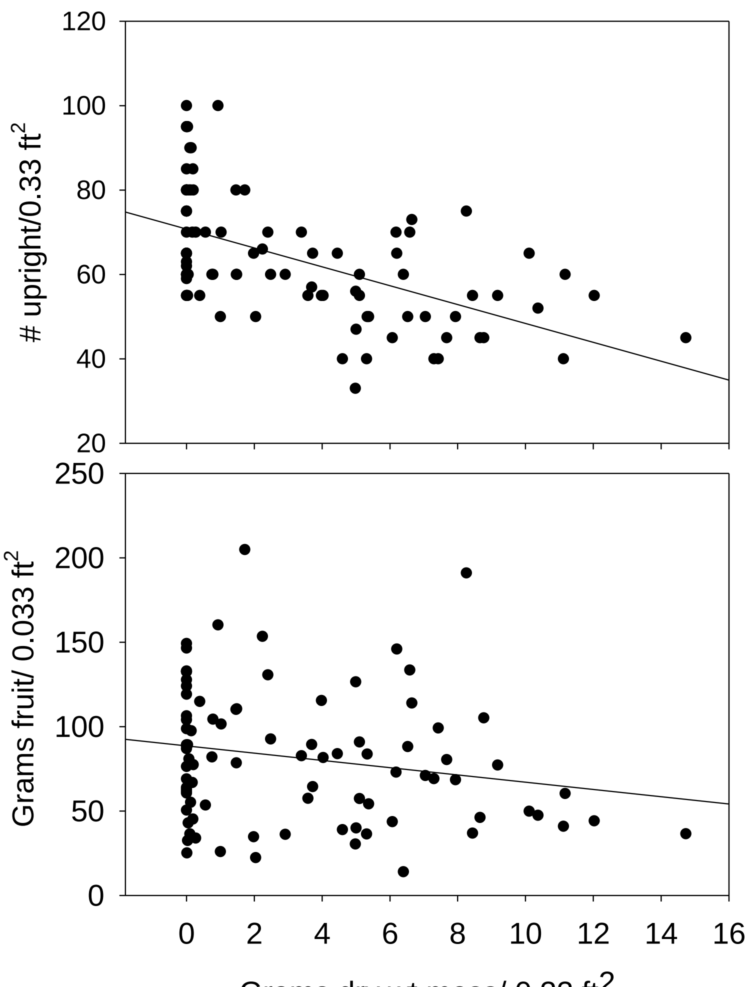

Figure 1. Linear regression of moss density (dry weight) in the spring and upright density and yield of Pilgrims cranberry (n=90).

Objective 5: Assess fungicide strategies relevant to BC conditions, which reduce fruit rot and are compatible with chemigation.

Methods: Replicated field trials were conducted on a Stevens cranberry bed with a high level of fruit rot. Plots were 6' x 6' in 7 replications per site. The first experiment compared different commercial fungicides (Quadris Top, Propulse, Switch, Proline, Proline + Bravo and Nucop copper) during bloom. Fungicides were applied three times across early, middle and late bloom. The second experiment compared different formulation of copper. Total yield, yield of good fruit and percent field rot were assessed. These experiments were conducted immediately adjacent to each other. Data were pooled from both experiments to allow for a separate analysis of treatments that were in both experiments. Fruit rot studies were also conducted in the two Willapa Red beds used in the pollination plots (Objective 6). Fungicide treatments were overlaid on top of the control, and the three Proline and Bravo applications, to evaluate an additional fungicide (Proline or Bravo) at fruit set.

Findings: There was no fungicide effect on total yield for either experiment (Tables 16, 17, 18). Switch increased the yield of good fruit compared to Proline or the control treatment (Table 17). Quadris Top and Switch had lower fruit rot than the control, but not significantly lower fruit rot than the other fungicide treatments. There was no difference in fruit rot between copper fungicides, although NuCop had numerically lower rot than other copper products. When the data were analyzed with pooled replication between experiments, both the Proline + Bravo and NuCop had lower field rot than the untreated control (Table 18). There were no significant treatment effects on the Willapa Red fruit rot data collected in the pollination study (Table 19). There was a trend, however, for plots with Bravo applied at bloom or fruit set to have lower field rot.

Similar fungicide treatments were applied multiple times to Stevens during bloom in studies done in 2016 and 2017. In 2016, 2017 and 2018, the % increase the yield of good fruit (after removal of field rot) compared to the untreated control was 27,17, and 23, respectively for Quadris Top; 58, 42 and 39, respectively for Switch; and 56, 14 and 40, respectively for Propulse. Averaged over three years Switch and Propulse, increase the yield of useable Stevens cranberry by 17% compared to Quadris Top.

Discussion: Inferences from these experiments should be made in the context of our dry summer that minimized the conditions favorable for field rot. Nevertheless, there were some minor treatment differences. In terms of increase yield and reduced field rot, Switch was the best overall fungicide treatment. This product is a combination of FRAC 9+12 (Cyprodinil + fludioxonil) and is registered for chemigation on cranberries in BC. Alternating its use with Quadris Top (difenoconazole + azoxystrobin), a FRAC 3 & 11 fungicide, should provide excellent resistance management and fruit rot protection. None of the fungicide treatments had a negative effect on yield. Overall, some of the copper treatments were equivalent to the non-copper chemical fungicide for reducing fruit rot. This would support Dr. Sabaratnam's finding that some copper fungicides are very effective in inhibiting the growth of mycelium and spore germination of cranberry fruit-rot pathogens.

Table 16 . Effect of different fungicide treatments during bloom and yield, good fruit and fruit rot of Stevens cranberries in 2018.			
Treatment*	Total bbl/ac	Good fruit bbl/ac	% rot @ harvest
Control	242 a	199 b	15.9 a
Quadris Top 3 times @ 14 oz/ac	242 a	233 ab	3.7 b
Switch 3 times @ 14 oz/ac	296 a	282 a	3.1 b
Propulse 3 times @ 10.3 oz/ac	240 a	227 ab	5.4 ab
Proline 3 times @ 5 oz/ac	222 a	202 b	5.1 ab
Proline twice @ 5 oz/ac + Bravo @ 6 pt/ac	245 a	228 ab	5.5 ab
NuCop 3 times @ 6 lb/a	226 a	210 ab	5.5 ab
Treatment Prob(F)	0.08	0.04	0.02
*Treatments applied at early, middle and late bloom (6/6/18, 6/15/18,and 6/25/18). Plots were 6' x 6' with 7 replications per treatment. Means followed by same letter do not significantly differ (P=.05, Student-Newman).			

Table 17 . Effect of different fungicide treatments during bloom and yield, good fruit and fruit rot of Stevens cranberries in 2018.			
Treatment	bbl/ac total	bbl/ac good	% field rot
Control	228	207	9.5
Proline twice @ 5 oz/ac + Bravo @ 6 pt/ac	197	186	5.4
Cueva 0.5%	190	171	9.8
Cueva 1%	224	200	11.1
Double Nickel 1 qt/ac	211	193	7.6
NuCop 50 DF 6 lb/ac	200	190	5.4
CopperSulfate cuprofix ultra 5 lb/ac	209	193	7.6
Treatment Prob(F)	0.9	0.9	0.3
*Treatments applied at early, middle and late bloom (6/7/18, 6/15/18,and 6/26/18) . Plots were 6' x 6' in 5 replications per site.			

Table 18 . Effect of different fungicide treatments during bloom and yield, good fruit and fruit rot of Stevens cranberries in 2018.*			
Treatment**	bbl/ac total	bbl/ac good	% field rot
Control	237	200	16.1 a
Proline twice @ 5 oz/ac + Bravo @ 6 pt/ac	232	216	7.0 b
Nucop 50 DF 6 lb/ac	223	209	6.5 b
Treatment Prob(F)	0.8	0.8	0.003
* This table provides an analysis of matching treatments from Tables 16 and 17. The experiments were immediately adjacent to each other and allowed for pooled replication (3 replications from plots in Table 17 and 7 replications from Table 16. **Treatments applied at early, middle and late bloom (6/7/18, 6/15/18,and 6/26/18). Means followed by same letter do not significantly differ (P=.05, Student-Newman).			

Table 19 . Effect of different fungicide treatments during bloom and yield, good fruit and fruit rot of Willapa Red cranberries in 2018.*						
	Bed 1	Bed 2	Bed 1	Bed 2	Bed 1	Bed 2
Treatment	Total bbl/ac		bbl/ac good		% field rot	
Control	171	291	164	270	6.5	3.4
Proline 5 oz/ac @ set	169	271	165	265	2.2	2.5
Bravo @ set	205	294	199	289	1.5	1.4
Proline 5 oz/ac - 3 applications during bloom	230	282	226	258	7.9	1.8
Proline -5 oz/ac - 3 applications during bloom + Bravo 6 pt/ac @ set	220	210	217	201	1.9	0.9
Bravo 6 pt/ac - 3 applications during bloom	200	239	198	235	1.5	1.0
Bravo 6 pt/ac - 3 applications during bloom + Proline 5 oz/ac @ set	162	274	162	267	1.8	0.0
Treatment Prob(F)	0.6	0.4	0.6	0.4	0.2	0.1
* Treatments during bloom applied 6/5/18, 6/11/18 and 6/18/18. Treatment at fruit set applied 6/26/18. Three replications of 6' by 12', with application volume @ 100 GPA.						

Objective 6) Repellency/ attractiveness of bloom -applied fungicides to honeybees.

Method: Replicated field trials were conducted on Demoranville, Welker, Haines, Stevens and Willapa Red cranberry beds. Plots were 12' x 12' in 3 replications per site. Treatments included three applications of Bravo or Proline during bloom. Foraging bee density (#/plot) was counted 3 times a week for four weeks during bloom. Yield was collected at harvest. Comparisons were made to an untreated control and a fish fertilizer plot.

Findings: There were no consistent treatment effects on the foraging density of honey bees or bumble bees (Table 20). The only significant treatment effect was an increase in bumble bee density compared to the other treatment in one of the Willapa Red beds. There was no treatment effect on yield or fruit size (Table 21). However, there was a trend to reduce yield for three Proline applications during bloom compared to the control across most of the varieties. This was not noted with the Bravo treatment. The mean change in yield compared to the control averaged across all varieties and replication was -17 and +33 bbl/ac for Proline and Bravo, respectively (Table 22).

Discussion: Previous studies using sugar water have shown that honey bees are actually attracted to sugar water feeders amended with the xenobiotic, chlorothalonil (Liai et al. 2017). Bees consuming this fungicide have higher rates of infection by the parasite *Nosema* (Pettis et al. 2012), reduced queen body size, fewer workers and lower colony biomass (Berauer et al, 2015). This study indicated that when the fungicides Proline and Bravo are applied during bloom they neither repel or attract pollinators. Considering their extensive use on cranberries during bloom, this is a reassuring finding. Although there is still a big concern for the potential negative effects of fungicides on pollinator health (Berauer et al, 2015; Pettis et al. 2012*)*, bees are not preferentially collecting cranberry pollen tainted with these fungicides. It can also be inferred that neither of these treatments affected yield compared to the untreated control. However, one particular finding was noted. When averaged across all varieties, plots with three Proline treatments had lower yield (bbl/ac) than plots with three Bravos (243±16 vs. 293±23), respectively. This suggests that overuse of the Proline during bloom over time could have consequences to overall production.

Table 20. Effect of fungicide and fish fertilizer on pollinator forage density during peak bloom.

Treatment*	Demoranville	Haines	Welker	Willapa Red site 1	Willapa Red site 2	Stevens
	Honey bee foraging density (#/8m^2)**					
Control	0.48	0.73	1.33	1.46	0.94	1.20
Proline 5 oz/ac	0.48	0.52	1.67	1.32	0.81	1.20
Bravo 6 pt/ac	0.48	0.69	1.11	1.39	0.93	1.27
Fish Fertilizer (Pacific Gro @ 1 gpa)	0.43	1.00	0.94	1.17	1.00	1.00
Treatment F test Prob(F)***	ns	ns	ns	ns	ns	ns
	Bumble bee foraging density (#/8 m^2)*					
Control	0.24	0.81	0.89	1.01	0.92 b	0.87
Proline 5 oz/ac	0.62	0.60	0.72	0.82	0.85 b	0.73
Bravo 6 pt/ac	0.57	0.79	0.78	0.69	1.33 a	0.47
Fish fertilizer (Pacific Gro @ 1 gpa)	0.71	0.67	0.83	1.14	0.93 b	0.53
Treatment F test Prob(F)***	ns	ns	ns	ns	0.03	ns

* Treatments applied 6/5/18, 6/11/18 and 6/18/18 @ 100 GPA
**Forage counts were taken 7, 16, 16, 9, 5, 5 & 6 times during full bloom for Demoranville, Haines, Welker, Willapa Red site 1, Willapa site 2, and Stevens, respectively.
*** ns= treatments not significant at 5%, or significance level, means separated by Student-Newman-Keuls Method

Table 21. Effect of fungicide and fish fertilizer on yield and fruit size.						
	Demoranville	Haines	Welker	Willapa Red site 1	Willapa Red site 2	Stevens
Treatment*	Yield (bbl/ac)#					
Control	343	253	334	219	238	176
Proline 5 oz/ac	312	251	279	270	187	164
Bravo 6 pt/ac	353	182	355	266	226	200
Fish Fertilizer (Pacific Gro @ 1 gpa)	421	248	376	302	239	172
F test significance**	ns	ns	ns	ns	ns	ns
	Fruit Size (g/berry)#					
Control	1.68		1.62	1.04		1.13
Proline 5 oz/ac	1.64		1.51	1.04		1.24
Treatment Prob(F)	ns		ns	ns		ns

* Treatments applied 6/5/18, 6/11/18 and 6/18/18 @ 100 GPA
** ns= treatments not significant at 5%, or significance level, means separated by Student-Newman-Keuls Method
#Picked 8/27/18

Table 22. Comparison in difference in yield between fungicide treatments across all six pollination study plots shown in Table 21.		
	Difference between fungicide treated plots and control	
Treatment	bbl/ac	% changed in bbl/ac
Proline	- 17	-1.4 %
Bravo	+ 33	+14.7 %
Treatment Prob(F)	0.04	0.01

* Treatments applied 6/5/18, 6/11/18 and 6/18/18 @ 100 GPA. Comparisons were made across each replication for every variety (n=23).

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