

ECONOMIC LOSS FROM MUMMY BERRY OF Highbush BLUEBERRY IN COASTAL BRITISH COLUMBIA, 1969¹

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Abstract

Measurement of loss caused by mummy berry of highbush blueberry was made on the variety Rancocas for both ascospore and conidial infection. Using these data, the total loss for all varieties grown in British Columbia in 1969 was calculated to be \$66,462 or 8.14% of the value of the crop.

Introduction

Plan's food supply is menaced by three main factors: bad weather, insect pests, and plant diseases. Although each alone can be destructive, they generally act in concert and for this reason it is often difficult to measure the loss caused by any one factor.

Highbush blueberry production in coastal British Columbia during 1969 was almost a classic example of the interaction of these three factors. Production was down 18% from the 1968 crop of 4,572,000 pounds (Personal communication, G.R. Thorpe, B.C. Department of Agriculture). Part of the loss was caused by blossom bud damage during an unusually severe winter, part by a heavy leafroller infestation and part by mummy berry, a fungus disease caused by *Monilinia vaccinii-corymbosi* (Reade) Honey.

This paper is an attempt to determine the portion of the total loss due to mummy berry.

Materials and methods

Seven fields of the highbush blueberry variety Rancocas were chosen from those of 122 growers as representative of the disease situation. Infection ranged from severe to trace amounts. Rancocas was chosen as a highly Susceptible variety against which the susceptibility of other varieties could be measured (1) and because it is the most widely grown variety.

Bushes were chosen at random throughout each field and the numbers of flower cluster and leaf shoot infections per bush were recorded. Generally, ten bushes were counted per acre, although the number varied according to severity of infection. The data were averaged for each field.

During early July another sample of bushes was chosen at random in the same fields for counts of mummy berries on the bushes and on the ground beneath them. The average number of healthy berries per cluster for each bush was also recorded.

Samples of ripe berries were weighed and counted and the average weight per berry determined.

The average number of infected flower clusters multiplied by the average number of berries per cluster, times the average weight per ripe berry gives the average weight of berries per bush lost from ascospore infection. The average number of mummy berries per bush multiplied by the average weight per ripe berry gives the average weight of berries per bush lost from conidial infection. Adding the losses per bush from ascospore infection and from conidial infection together and multiplying by 800 (the average number of bushes per acre) gives the loss per acre in pounds of marketable fruit. The loss in pounds per acre was multiplied by \$0.20, the estimated final price per pound to the growers in 1969, to obtain a dollar value loss per acre.

On the basis of previous work (1), which compared the relative susceptibility of other varieties with 'Rancocas', the dollar value loss per acre for 'Rancocas' was used to calculate the total loss to the industry.

Results and discussion

Loss in the variety Rancocas due to mummy berry ranged from \$15.20 to \$227.25 per acre and averaged \$98.35 per acre (Table 1). Total loss for all farms for this variety was calculated to be \$21,265 based on a total Rancocas acreage of 216.22.

All the important highbush blueberry varieties grown in coastal British Columbia have been put into three classes of relative susceptibility to both ascospore and conidial infection (1). These are: resistant, moderately susceptible, and susceptible; moderately susceptible is rated as one-half

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that of susceptible. Approximately one-half the loss per acre was due to ascospore or flower cluster infection (Table 1), while the remaining loss was due to the formation of mummy berries by conidial infection. If a variety is classified as susceptible to conidial infection its susceptibility class is 1.0 and if classified as moderately susceptible, 0.5. Multiplying the susceptibility class by \$49.18, the loss per acre from conidial infection for Rancocas, gives the loss per acre from conidial infection for the variety.

However, a further complication appeared with ascospore infection. Not all ascospore infection results in flower cluster infection; leaf shoots may also be infected. The proportion of each type depends on the variety. Fortunately, data on these proportions are available (1). Therefore, to obtain the loss per acre from ascospore infection, \$49.18 was multiplied by 1.0 or 0.5, depending on the susceptibility class, times the percentage of flower cluster infections. Loss per acre from conidial infection added to loss per acre from ascospore infection gives the total loss per acre for the variety.

No attempt was made to estimate losses from leaf infection. Leaf shoots produce

flower cluster buds and losses from the failure to produce buds would not show up until the following season.

The calculation of variety loss (VL) may be summarized in the following formula:

$$VL = [(csc \times Rcl) + (asc \times fci \times Ral)] \times A$$

where csc = conidial susceptibility class
 Rcl = Rancocas conidial loss
 asc = ascospore susceptibility class
 fci = flower cluster infection percentage
 Ral = Rancocas ascospore loss
 A = acreage

For example, for the variety Berkeley, csc = 0.5, Rcl = \$49.18, asc = 0.5, fci = 0.65 (1), Ral = \$49.18 and A = 33.88 (Table 2). Therefore, variety loss = $[(0.5 \times \$49.18) + (0.5 \times 0.65 \times \$49.1811 \times 33.88) = \$1,374.51$.

This procedure was followed for all varieties to obtain a grand total loss of \$66,462 for all growers (Table 2).

The total estimated value of the 1969 crop is \$750,000. The percentage loss to the industry is, therefore,

$$\frac{66,462}{750,000 + 66,462} \times 100 = 8.14\%$$

Table 1. Loss due to mummy berry disease in the highbush blueberry variety Rancocas on seven farms in 1969

Rancocas acreage	Fruit lost (lb) from			Loss*		
	Flower cluster infection	Mummies	Total	\$/acre	Total \$/farm	
8.0	3179	5911	9090	\$227.25	\$1818.00	
5.0	550	372	922	36.88	184.40	
4.5	2360	622	2982	32.53	596.40	
4.0	2853	998	3851	92.55	770.20	
2.0	101	51	152	15.20	30.40	
4.0	282	970	1252	62.60	250.40	
5.0	127	409	536	21.44	107.20	
Total	32.5	9452	9333	18,785	\$688.45	\$3757.00
Average/acre		291	287	578	\$ 98.35	

* Based on a price to the grower of \$0.20/lb.

Table 2. Loss due to mummy berry disease in highbush blueberry in British Columbia, 1969

Variety	Susceptibility rating			Loss per acre			Acres! *	Total loss
	Flower cluster	Asco-spore	Conidia	Asco-spore	Conidia	Total		
Atlantic	0.00	0.0	0.0	0.00	0.00	0.00	0.93	\$ 0.00
Berkeley	0.65	0.5	0.5	15.98	24.59	40.57	33.88	1,374.51
Bluecrop	0.29	1.0	0.5	14.26	24.59	38.85	134.12	5,210.56
Blueray	0.59	1.0	0.5	29.02	24.59	53.61	11.13	596.68
Burlington	0.62	1.0	1.0	30.49	49.18	79.67	2.70	215.11
Charlotte	0.60	1.0	1.0	29.51	49.18	78.69	4.50	354.11
Collins	0.94	1.0	0.0	46.23	0.00	46.23	6.13	283.39
Concord	0.76	0.5	1.0	18.69	49.18	67.87	45.68	3,009.62
Coville	0.76	1.0	0.5	37.38	24.59	61.97	34.03	2,108.84
Dixi	0.42	0.0	0.0	0.00	0.00	0.00	97.43	0.00
Earliblue	0.23	1.0	1.0	11.31	49.18	60.49	15.71	950.30
Fraser	0.92	0.0	0.0	0.00	0.00	0.00	13.07	0.00
Grover	0.77	0.0	0.0	0.00	0.00	0.00	0.15	0.00
Jersey	0.74	0.5	1.0	18.20	49.18	67.38	83.77	5,644.42
Johnston	0.98	0.0	0.5	0.00	24.59	24.59	0.33	8.11
June	0.53	1.0	1.0	26.07	49.18	75.25	56.55	4,255.39
Pacific	1.00	0.0	0.5	0.00	24.59	24.25	0.01	0.25
Pemberton	0.58	0.5	0.0	14.26	0.00	14.26	57.43	818.93
Pioneer	0.67	1.0	0.5	32.95	24.59	57.54	4.65	267.56
Rancocas		1.0	1.0	49.18	49.18	98.35	216.22	21,265.24
Rubel	0.51	0.0	1.0	0.00	49.18	49.18	64.68	3,180.96
Stanley	0.12	1.0	0.0	5.90	0.00	5.90	37.43	220.84
Weymouth	0.63	1.0	1.0	30.98	49.18	80.16	66.17	5,304.19
Seedlings	0.50	0.5	0.5	24.59	24.59	49.18	38.14	1,875.73
Mixed Vars.	0.50	0.5	0.5	24.59	24.59	49.18	178.39	8,773.22
Scammell)								
Cabot)								
Phyllis)								
Ivanhoe)								
Evelyn)								
GN87)	Susceptibility rating unknown, averaged for computation					49.18	13.30	654.09
Shirley)								
Herbert)								
Wareham)								
1613)								
Total							1,216.20	\$66,462.07

* Rancocas loss determined by count.

** Acreage based on 1968 survey by British Columbia Department of Agriculture.

This figure of 8.14%, based on measurement and calculation, although lower than previously published losses of 10% in 1965 (2) and 15% in 1966 (3), is probably not significantly different from the earlier figures even though the latter were only estimates.

Literature cited

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