FECUNDITY OF THE BLACK VINE WEEVIL, *Brachyrhinus sulcatus* (F.), FED ON FOLIAGE OF BLUEBERRY, CRANBERRY AND WEEDS FROM PEAT BOGS[1]

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Introduction

Larvae of the black vine weevil, *Brachyrhinus sulcatus* (F.), severely damaged roots of blueberry (Cram, 1963), and cranberry grown on well-drained peat bogs on Lulu Island and at Pitt Meadows. Adult weevils were observed feeding, or their feeding damage was seen on these plants and on several weeds of peat bogs. A laboratory study was conducted to determine the suitability of the weeds and the economic plants as hosts of this flightless, parthenogenetic weevil, using as criteria weight gain, preoviposition period, rate of egg laying, and egg viability.

Methods

Newly-emerged adults were collected from the duff under blueberry bushes on Lulu Island in mid-June. Only soft, incompletely hardened weevils were used. Single adults were confined at 20° C with 16 hours of shaded fluorescent light in closed plastic snap-cap vials (Anglo 2.5 by 9 cm) each with a leaf from a particular plant. Thirteen replicates of seven plant species were started. Foliage was changed at weekly intervals. The amount consumed by each weevil was judged by a rating scheme. Weevils were weighed when captured, three weeks later, and on the day of first oviposition. Weekly records of total and viable eggs were kept for each weevil. Viability was determined by holding the eggs for four days before counting, by which time the viable eggs had darkened. Counts were discontinued in mid-September when oviposition normally ceases in the field (Cram, 1965a). The data presented are from the first 10 weevils to oviposit in each treatment.

The plants chosen for study were: Himalaya blackberry, *Rubus thyrsanthus* Focke; salal, *Gaultheria shallon* Pursh; labrador tea, *Ledum groenlandicum* Oeder.; cranberry, *Vaccinium macrocarpon* Ait. var. MacFarlane; highbush blueberry, *Vaccinium corymbosum* (Aust.) var. Rancoccus; fireweed, *Epilobium angustifolium* (L.); sheep sorrel, *Rumex acetosclla* L. Selected undamaged current-season foliage from all but cranberry was collected periodically at the same blueberry plantation on Lulu Island and stored in air-tight plastic bags at 0° C until needed. Cranberry was collected from a nearby plantation.

Results

Blackberry and salal produced similar and significantly greater mean weight gains than the other plants after three weeks but none gave significantly different weight gains at the time of first oviposition (Table 1). Blackberry induced a significantly shorter mean preoviposition period than the other plants. Salal and cranberry gave the next shortest followed by labrador tea, fireweed and blueberry; no weevils survived to oviposit when fed sheep sorrel. There appeared to be excessive moisture in the closed vials containing sheep sorrel. The addition of strips of filter paper absorbed the excess moisture but did not halt mortality on this host.

Blackberry produced a significantly greater mean number of total and viable eggs than other plants (Table 1). Weevils fed blackberry laid more than 2.5 times as many eggs as those fed cranberry and 4 times as many as those fed blueberry. Salal produced significantly more eggs than blueberry or fireweed. There was a significant positive correlation between the number of eggs laid and the viability of the eggs, and a

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TABLE 1.--Means and standard deviations of weight gains, preoviposition periods, numbers of total and viable eggs and percentages of viable eggs of B. sulcatus fed excised leaves of various plants growing in peat bogs on Lulu Island.

Plants	Weight Gains		Pre-oviposition Periods	Eggs		
	At 3 weeks	At first egg				
	mg	mg	Days	Total	Viable	% Viability
Blackberry	23.2 (±3.6)a[1]	24.1 (±5.0)a	28 (±2.5)a	380 (±81.4)a	346 (±90.9)a	86 a
Salal	23.2 (±2.7)a	22.0 (±3.7)a	35 (±5.8)b	217 (±105.2)b	187 (±108.9)b	71 ab
Labrador Tea	13.8 (±4.3)bc	24.7 (±3.3)a	45 (±2.8)c	165 (±63.9)bc	150 (±67.7)bc	88 a
Cranberry	17.2 (±6.0)b	22.4 (±6.4)a	38 (±3.2)b	163 (±132.2)bc	133 (±136.0)bc	74 ab
Blueberry	15.6 (±4.7)b	20.1 (±4.4)a	48 (±12.1)c	99 (±58.5)cd	72 (±56.6)cd	59 b
Fireweed	11.2 (±5.0)bc	20.6 (±6.7)a	48 (±7.1)c	53 (±30.8)d	32 (±24.6)d	60 b
Sheep Sorrel	9.4 (±4.0)c	-[2]	-[2]	-[2]		
General mean	16.2 (±4.5)	22.3	40 (±9.7)	180	154	73

[1]Means within the same column which have the same letter are not significantly different at the 5% level, Duncan's New Multiple Range Test.

[2]No survivors

significant negative correlation between weight gain in the first three weeks and the length of the preoviposition period. The amounts of the various plants consumed were not judged to differ significantly.

Discussion

Observations on host selection by adult *B. sulcatus* indicated that they wander randomly at night and encounter hosts fortuitously. They become negatively geotropic at dusk and appear to climb any plant encountered and feed on the foliage, hence the wide range of plants showing leaf notches. It is not certain that weevils reject unsuitable plants after initial feeding but there is an indication that this might be the case with labrador tea which suffered least from feeding in the field (Cram, 1965b).

Since no significant differences occurred between plants in the amounts of leaf consumed but significant differences did occur between plants in initial weight gain, preoviposition period and egg production, certain hosts appear to be nutritionally superior to others for weevil increase. The best-suited hosts, indicated by this laboratory study, appear to be Himalaya blackberry and salal, both serious weeds of blueberry plantations and the headlands of cranberry bogs. Reduction of these weeds in and around commercial plantations might help appreciably to keep the numbers of the black vine weevil below damaging levels.

Summary

The roots of blueberry and cranberry grown in well-drained peat bogs are severely damaged by larvae of the black vine weevil, *Brachyrhinus sulcatus* (F.). The adults feed on the foliage of these commercial plants and several weed plants. A laboratory experiment using excised foliage from seven common plants as food for the adults revealed that Himalaya blackberry and salal were significantly superior hosts, on the evidence of shorter preoviposition periods and higher egg production. Inferior hosts in descending order were: labrador tea, cranberry, blueberry, fireweed and finally sheep sorrel. Adults did not survive to ovipost when fed sheep sorrel. Removing blackberry and salal in and around commercial plantations of blueberry and cranberry might help appreciably in reducing damage by this pest.

References

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