FUSICOCCUM CANKER OF HIGHBUSH BLUEBERRY IN NOVA SCOTIA[1]

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Abstract

A survey of highbush blueberry plantings showed that 'Jersey' was the variety most susceptible to fusicoccum canker closely followed by 'Earliblue', 'Johnson' and 'Bluecrop'. 'Coville', 'Berkeley', 'Pioneer' and 'Blueray' were moderately susceptible. 'Burlington' and 'Stanley' were slightly more tolerant and 'Rancocas' and 'Concord' were resistant. Fall inoculations of field grown plants with Fusicoccum putrefaciens were successful but summer inoculations failed. Erad at the rate of one pint per 100 gal. applied before growth commenced in the spring and after growth had ceased in the fall provided the best chemical control of fusicoccum canker.

Introduction

Stem canker (Fusicoccum putrefaciens Shear stat. perf. Godronia cassandrae Pk. f. vaccinii Groves) is causing some concern to growers desiring to increase highbush blueberry plantings in Nova Scotia. This disease is present in many of the highbush blueberry production areas of the north-temperate zone including British Columbia, Michigan, Maine, Massachusetts, England and Finland (1). It was first reported in Nova Scotia in 1948 (2) and is recognized as a factor in limiting production in this area.

The susceptibility of the newer varieties to fusicoccum canker when grown in Nova Scotia, the time of year when field infection occurs and the results obtained from fungicide trials are reported in this paper.

Materials and methods

Canker susceptibility rating

The rate of fusicoccum canker infection was determined from four widely separated highbush blueberry plantings in the Annapolis Valley. These plantings differed to some degree in number and age of plants, soil type and method of culture.

Canker determimtions were made on July 29. August 11, September 6 and 9, 1966. The numbers of plants examined, their ages and the amount of infection were recorded on each date.

Inoculation tests

'Pioneer' plants growing in the field were inoculated in triplicate on October 2, 1957, and on May 2, July 30 and August 28 in 1958 by making an incision in the bark with a scapel and inserting, under the bark, spores from an agar culture. The incisions were wrapped with moistened cotton held in place with cellulose tape. Three days after inoculation the cotton was removed. Controls consisted of incisions without inoculum.

Fungicide trials

Four plots, each containing approximately equal numbers of 'Coville', 'Berkeley' and 'Bluecrop' plants, were treated as follows:

Plot 1. All stems with cankered areas painted with Murphy canker paint[4] (2% organic mercury) on September 29, 1964, and an overall spray of Elgetol at the rate of 2 qt./100 gal. was applied on May 5, 1966.

Plot 2. An overall spray of Erad[5] at the rate of 5 pints/100 gal. was applied on September 25 and October 13 in 1964 and on May 7, 1965, and an overall spray of thiram[6] at the rate of 4 lb./100 gal. plus Rhoplex AC-33[7] at the rate of 7 gal./ 100 gal. was applied on May 5, 1966.

Plot 3. An overall spray of Erad at the rate of 1 pint/100 gal. was applied on September 25 and October 13. 1964; May 7, 1965 and May 5, 1966. Fall applications were made just prior to leaf fall and spring applications prior to the commencement of growth.

Plot 4. Controls.

In addition Erad at 1 pint/100 gal. was applied, on September 25, October 13, 1964; May 7, 1965,

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5 Erad (phenyl mercury acetate 10%) Green Cross Insecticides, Montreal, Quebec

6 Thiram (Thylate 65W) tetramethylthiuram disulphide 65%

7 Semi-permanent sticker. Rhom & Haas Company of Canada Ltd., 2 Manse Road, West Hill, Ontario.

and May 5, 1966 to two rows of blueberries containing two or more plants of the varieties 'Jersey', 'Burlington', 'Rancocas', 'Stanley', 'Pioneer', 'Johnson', and 'Concord'.

Plots were scored for the amount of infection in 1964 and for dying stems, number of cankers per plant and number of cankers per stem in 1966. The number of old stubs infected with Godronia cassandrae Pk. f. vaccinii Groves (the perfect stage) were also recorded.

Cankers were collected from all plots on May 10, 1965 and held in a moist chamber. Spores were placed in a drop of water on a slide to determine viability.

Cankers were collected from all plots on September 27, 1965 and isolations were made on potato dextrose agar media from the edge of cankers to determine if F. putrefaciens was still active.

Results

Canker susceptibility rating

Data (Table 1) taken from four commercial plantings showed that 'Jersey' was the most susceptible variety followed closely by 'Earliblue', 'Johnson' and 'Bluecrop'. 'Coville', 'Berkeley', 'Pioneer' and 'Blueray' were moderately susceptible. 'Burlington' and 'Stanley' were slightly more tolerant and 'Rancocas' and 'Concord' were resistant.

Dead plants, infected with F. putrefaciens, in a 4-year-old planting of 'Earliblue' suggested that the canker is capable of killing this variety.

Inoculation tests

Fusicoccum infection was evident 6 days after wound inoculations were made on October 2, 1957 (Table 2). By April 24, 1958, the cankers were from $\frac{3}{4}$ to $2\frac{1}{4}$ in. long and producing pycnidia and conidia. Early May inoculations caused a slight infection around the inoculation site. This was followed by cankering in late August. No infection occured in July when the plants were growing vigorously. The successful inoculations of August 28 and October 2 coincided with the slowing down or cessation of active growth.

Fungicide trials

Erad at the rate of one pint/100 gal. applied in 1964, 1965 and 1966 gave the best control of fusicoccum canker (Table 3). Erad at the sate of 5 pints /100 gal. in 1964 and 1965 followed by thiram in 1966 was somewhat less effective (Table 3). Murphy canker paint applied in 1964 followed by Elgetol in 1966 substantially reduced cankers on 'Berkeley' and 'Coville' but was less effective on the more susceptible variety 'Bluecrop' (Table 3).

A single application of Murphy paint in September 1964 inhibited sporulation for 12 months but isolations of F. putrefaciens could be obtained from the edges of most cankers 4 to 12 months after being sprayed or painted. A number of young cankered branches were killed due to the phytotoxicity of the paint.

Actively growing 'Jersey' plants sprayed with Erad at the rate of one pint/100 gal. were severely injured. Treated plants had black necrotic spots on the foliage, dead shoot tips and in some instances shoots blackened and killed back 12 to 15 inches. In contrast, non-dormant 'Berkeley', 'Coville' and 'Bluecrop' plants were uninjured at the 5-pint rate.

Table 1. The susceptibility of highbush blueberry varieties to fusicoccum canker in 1966

Variety	No. of plants	Age of plants (years)	% infected	Average
Jersey	296	6	71	
	11	16	82	
	9	18	78	77
Earliblue	24	4	71	71
Johnson	7	18	71	71
Bluecrop	17	5	65	
	9	11	78	
	22	12	58	67
Coville	15	12	60	60
Berkeley	22	5	50	
	35	12	50	50
Pioneer	2	18	50	50
Blueray	15	5	47	47
Burlington	257	6	37	
	10	16	50	
	35	18	42	43
Stanley	10	18	30	30
Rancocas	12	16	0	
	2	18	0	0
Concord	2	18	0	0

Table 2. Infection of highbush blueberry, variety 'Pioneer', with F. putrefaciens

Date inoculated	Canker produced
October 2, 1957	t
May 2, 1958	+*
July 30, 1958	-
August 28, 1958	t

*Slight activity occurred around incision after inoculation but canker size did not increase until late August.

Table 3. Effectiveness of fungicides for control of fusicoccum canker in the highbush blueberry

Treatment	Varieties	Number of plants	Number of stems	Per cent plants infected 1964	Per cent plants infected 1966	Average number of Fusicoccum Cankers per plant 1966	Average number of Fusicoccum Cankers per stem 1966	Number of stubs infected with Godronia 1966	Infected dying sterns in August, 1966
Murphy canker paint in 1964 Elgetol, 2qt./100 gal. in 1966	Berkeley	15	76	40	13.3	0.07	0.01	0	1
	Coville	15	120	50	26.6	0.26	0.02	3	0
	Bluecrop	7	111	57	71.3	1.85	0.06	0	1
Erad, 5 pt./100 gal. in 1964 and 65 Thiram 4-100 + Rhoplex AC, 7-100 in 1966	Berkeley	14	110	33	35.7	0.21	0.03	7	2
	Coville	15	148	47	46.6	0.33	0.03	7	0
	Bluecrop	7	95	85	42.8	1.42	0.08	4	0
Erad, 1 pt./100 gal. in 1964, 1965, 1966	Berkeley	14	111	57	28.0	0.42	0.04	5	1
	Coville	14	161	50	50.0	0.57	0.04	10	2
	Bluecrop	6	73	57	50.0	0.33	0.01	2	0
Control	Berkeley	15	123	50	60.0	0.87	0.06	21	5
	Coville	15	143	33	60.0	1.46	0.08	18	1
	Bluecrop	9	110	57	77.7	1.88	0.10	7	1

Fusicoccum cankers placed in a moist chamber three days after receiving Erad at the rate of 5 pints /100 gal. produced no viable conidia within a 16-day period. Twenty per cent of the conidia from cankers which received the one-pint rate were viable following 11 days in a moist chamber. Conidia from the surface of cankers treated with Murphy paint remained non-viable for 12 months.

Discussion

The results of this study clearly indicate that highbush blueberry growers in Nova Scotia should avoid planting canker-susceptible varieties such as 'Jersey' and 'Earliblue'. 'Rancocas', 'Stanley', 'Concord' and 'Burlington' are more resistant to the disease but unfortunately they lack certain desirable horticultural traits such as fruit size. The moderately resistant and horticulturally superior varieties 'Blueray' and 'Berkeley' are better suited to this area.

We have found that infection occurs mainly in the late summer and fall. McKeen (4) also reported fall infection in British Columbia while Zuckerman (6) reported spring infection in Massachusetts. Attempts to inoculate actively growing plants in the greenhouse were unsuccessful (3).

The control of canker is attributed to applications of Erad at the one-pint rate which inhibited conidial development on the surface of cankers when the plants were in a susceptible stage. Preliminary screening tests indicated Erad that at the ½-pint rate was ineffective (unpublished results). Nelson (5) has also obtained control of fusicoccum canker on the highbush blueberry in Michigan with fall applications of organic mercury. Creelman (3) and Zuckerman (6) reported no control of fusicoccum canker with spring and summer fungicide applications.

Our data suggests that, in view of the prevalance of fusicoccum canker in Nova Scotia, commercial highbush blueberry growers would be well advised to spray with Erad at the rate of 1 pint/100 gal. before growth commenced in the spring and again in the fall when growth has ceased. Growers setting out new platings should consider planting 'Blueray' and 'Berkeley' because they are moderately resistant to the canker and horticulturally superior to other varieties.

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