

APIOPORTHE VEPRIS ON RED RASPBERRY IN NOVA SCOTIA¹

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Abstract

In April 1970 the fungus *Apioportha vepris* was found colonizing red raspberry, *Rubus idaeus*, canes that had been subjected to an unusual period of freezing temperatures in mid September 1969. It was not found on winter-killed canes. This fungus has been found only on *Rubus* spp. and it is not considered to be an active parasite. Isolations made from both perithecia and pycnidia yielded colonies that produced pycnidia of the conidial state, *Phomopsis vepris*, on agar media and mature perithecia on autoclaved stems of red raspberry.

Introduction

On April 7, 1970, floricanes of red raspberry, *Rubus idaeus* L., cv. Newburg, in a dead or dying condition were found in a plantation at Billtown, Kings County, Nova Scotia. The moribund condition of the canes was thought to be the result of severe winter injury. Subsequent examination of red raspberry plantings showed that this condition affected all the cultivars examined and it was widespread throughout Kings, Annapolis and Digby counties.

Most of the affected canes had prominent fungal stromatic pustules containing perithecia and ascospores of *Apioportha vepris* (Delacr.) Welm embedded in the bark. A specimen of *A. vepris* collected at Greenwich, Kings County, has been filed in the National Mycological Herbarium, Plant Research Institute, Ottawa, Ontario, as DAOM 129901.

A. vepris has been recorded only on *Rubus* spp. (1,3,5). Connors (3) listed *A. vepris* on *Rubus macropetalus* Hook in British Columbia (UBC 1960 and DAOM 34168) a report previously published by Barr (2), and on *Rubus* spp. in Nova Scotia on the authority of Wehmeyer (7). Wehmeyer (5) also reported *A. vepris* on *Rubus* spp. from Ontario in Canada, from U.S.A., and from Europe.

Mrs. Ruth (Horner) Arnold, Mycologist, Plant Research Institute, Ottawa, Ontario, in a private communication stated that four collections of *A. vepris* deposited in the National Mycological Herbarium, Ottawa, have not been reported in the literature. Three of these collections were made by H. S. Jackson in Ontario: DAOM 85345, EX TRTC 3335, on *Rubus* sp., Hogg's Hollow, North of Toronto, April 16, 1932, sub *Diaporthe obscura* (Peck) Sacc.; DAOM 85142, EX TRTC 3842, on *Rubus idaeus* L., Bear Island, Lake Timagami, June 17, 1932; and DAOM 82442, EX

TRTC 16357 on *Rubus* sp., Bear Island, Lake Timagami, July 20, 1940. Specimen DAOM 54350 on *Rubus idaeus* L. was collected by D. Creelman at Isle au Haute, Cumberland County, Nova Scotia, June 5, 1953. In addition, *A. vepris* was collected at Kentville on June 20, 1960 on *Rubus idaeus* L. (seedling X) by K. A. Harrison and was filed with the Research Station Pathological collections as specimen KP 2479.

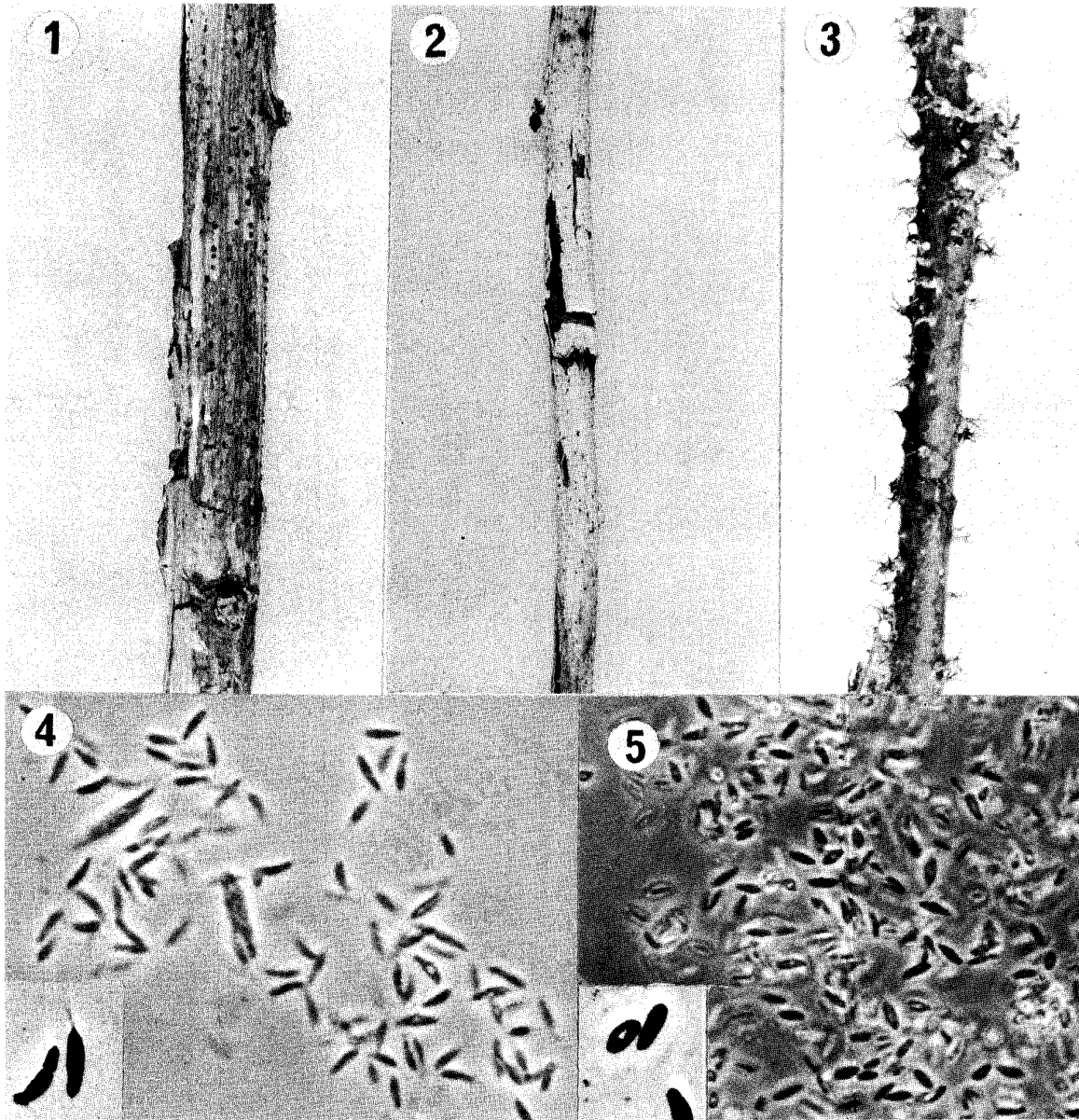
The syndrome of *A. vepris* on red raspberry canes, the fungus and its pathological significance are discussed in this paper.

Symptoms

The syndrome for *A. vepris* appeared to be similar on all red raspberry canes examined. Generally the fungus was most prevalent on dead canes. Many large, erumpent, stromatic pustules (Fig. 1) containing mature perithecia were usually present and they were most numerous near the base of the canes. Moribund canes which later showed weak growth had fewer pustules and perithecia than dead canes. The foci of infection could not be determined consistently. It appeared to be near a bud from which it spread to form an elongated lesion that girdled the stem. The outer dead bark was almost white and sloughed off easily. A few light-coloured lesions (Fig. 2) on moribund canes contained many pycnidia of *Phomopsis vepris* (Sacc.) Höhnelt the imperfect state of *A. vepris*. In Nova Scotia mature perithecia and ascospores (Fig. 4) of *A. vepris* and pycnidia and conidia (Fig. 5) of *P. vepris* on red raspberry canes were similar to those described by Wehmeyer (5). Specimens from Nova Scotia were also compared with an authentic specimen from the Wehmeyer Herbarium by Mrs. Ruth (Horner) Arnold.

Perithecia of the spur blight pathogen, *Didymella applanata* (Niessl.) Sacc. were found occasionally on the same canes as *A.*

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Figures 1-5. *Apioporthes vepris* on raspberry; 1) Stromatic pustules on a dead cane of 'Newburg' red raspberry, collected April 1970; 2) Lesion and pycnidia of *Phomopsis vepris* on cane of 'Newburg' red raspberry, collected April 1970; 3) Stromata and perithecia produced on raspberry stem in vitro; 4) Ascospores of *A. vepris*, X 400; insert ca. X 1000; 5) Conidia of *Phomopsis vepris*, X 400; insert ca. X 1000.

vepris, and they were usually in the immediate vicinity of a bud. spur blight lesions were found on only a few canes.

Experimental

Pustules of *A. vepris* in cane tissues were cut horizontally and bits of perithecium contents were transferred aseptically to potato dextrose agar, potato malt agar, 2%

malt agar, and Leonian's agar. Pycnidia teased from the bark were also plated on these media. The fungus from both sources grew on Leonian's agar and potato malt agar but not on potato dextrose agar or 2% malt agar. The ingredients of the 2 media, Leonian and potato malt, which supported growth of the fungus were the same as those given by Tuite (4). Pure cultures were obtained by making single hyphal tip transfers to Leonian's agar which was used

for all subsequent work. Cultures were incubated at 18°C in the dark. The perithecium and pycnidium sources of inoculum gave rise to identical colonies. Pycnidia and conidia formed in all cultures and they were similar to those found in the bark on the light-coloured lesions.

To produce the perithecial state in vitro, autoclaved stems of *R. idaeus* were inoculated with *A. vepris* from both perithecium and pycnidium sources. Stems were cut into 7.5 cm sections each of which was placed in a test tube containing 5 ml distilled water. After autoclaving at 121°C for 15 minutes six stem sections were inoculated for each inoculum source with a small, ca 2 x 2 mm, agar plug cut from a colony growing on Leonian's agar. They were incubated for 1 month at room temperature and then at 0°C for 11 months. Perithecia containing mature asci and ascospores developed on all the stem sections (Fig. 3). Isolates obtained from the perithecia in the stromatic pustules and those obtained from the pycnidia teased from the bark of the light-coloured lesions produced identical stromatic structures with mature perithecia and ascospores. A specimen of the perithecia produced in vitro and prepared slides of conidia and ascospores were filed in the Mycological Herbarium, Ottawa, as DAOM 138594 and DAOM 138595, respectively.

Discussion and conclusions

As far as the author is aware *A. vepris* has not been shown to be pathogenic to *Rubus* spp. Its reported occurrence at irregular intervals suggests it may be a weak parasite or a colonizer of injured tissue. In the fall the bark of primocanes may contain many incipient infections of *A. vepris*. A sudden severe injury or killing of tissue when *A. vepris* inoculum was abundant may have resulted in rapid and complete colonization of the injured or dead raspberry floricanes.

Because *A. vepris* was widespread on red raspberry canes in the spring of 1970, the canes may have been predisposed to infection in the fall or early winter of 1969. The number of days having minimum air temperatures 4 ft above ground level of 32°F or less, and rainfall data for the Kentville area from September to December, 1966-70, were as follows:

Year	No. days with minimum air temp. <32°F				Rainfall (inches)			
	Sep.	Oct.	Nov.	Dec.	Sep.	Oct.	Nov.	Dec.
1966	0	4	15	24	3.2	5.9	2.5	3.4
1967	0	6	17	27	3.8	3.9	3.0	5.0
1968	0	0	23	24	2.7	7.5	7.2	3.7
1969	1	8	14	26	4.1	1.8	3.6	3.9
1970	0	5	15	30	3.3	5.3	5.6	0.8

During these years freezing temperatures occurred in September only in 1969, when on September 20 air temperatures recorded in the Annapolis Valley ranged from 27° to 32°F (-2.8° to 0°C). Three days prior to the freeze a rainfall of 1.14 inches (2.9 cm) was recorded at Kentville. Meteorological data recorded at the Research Station, Kentville, showed grass minimum temperatures of 26°, 26°, 31°, and 27°F (-3.3°, -3.3°, -0.6°, and -2.8°C) for September 20, 21, 22, and 23, respectively. Air and grass temperatures below freezing did not occur again until October 2. The sudden onset of sub-freezing temperatures for four successive days during a period of excessive moisture may have severely injured raspberry canes in the Annapolis Valley. These frost-injured canes may have been particularly susceptible to *A. vepris*. The abundance of stromatic pustules on the lower portion of the canes early in the spring of 1970 indicated that the injury was most severe and fungal colonization most active in this region. It is not uncommon to have freezing temperatures in October, November and December, but by that time of year canes have usually become dormant as a result of gradual cooling conditions and decreasing daylength.

From previous reports and on the basis of this occurrence *A. vepris* cannot be considered an active pathogen of *Rubus* spp. It was found early in the spring on raspberry stems thought to have been injured by frost in September of the previous year. In Nova Scotia cold-temperature injury is common on red raspberry floricanes and the amount of winterkilling varies from year to year. Canes are often killed back from the tips for varying distances but are seldom completely killed. *A. vepris* has not been found on winter-killed canes.

Acknowledgments

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