Survey for rupestris stem-pitting and corky bark diseases of grapevine in the Niagara peninsula, Ontario

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To determine the incidence of rupestris stem-pitting (RSP) and corky bark (CB) diseases in grapevine, dormant wood was collected from ten susceptible varieties from 350 vineyards across the Niagara peninsula. Chipbuds taken from twenty vines of each cultivar available at each site were grafted onto *Vitis rupestris* St. George for the detection of RSP and onto LN33 to differentiate RSP from CB. The cuttings were rooted, planted in nursery rows and observed over 3 years for the presence of RSP or CB symptoms. The plants were dug in November 1987, trunk sections were peeled, and the wood was examined for the characteristic pitting and grooving of the two diseases. Buds from wood collected in the Niagara vineyards failed to produce disease symptoms on St. George or LN33 typical of RSP or CB. Detailed questionnaires sent to over 350 growers similarly did not identify any significant production losses or dedine in vine vigor which might be attributable to RSP or CB.

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Afin de determiner l'incidence de la maladie du bois strié de rupestris (BSR) et de l'écorce ligneuse (EL) dans les vignes, on a recueilli du bois dormant issu de dix variétés vulnérables. Le bois provenait de 350 vignobles de la péninsule du Niagara. Des implants tissulaires puisés dans 20 différentes vignes de chacun des cultivars disponibles, A chacun des sites, ont été greffés sur *Vitis rupestris* St. George afin de détecter le BSR et sur LN33 pour différencier le BSR de l'EL. Les boutures ont été enracinées et plantées en pépinière. Elles ont été ainsi gardées en observation pendant 3 ans, au cas 00 on détecterait les symptômes du BSR et de l'EL. Les plants ont été arrachés en novembre 1987. Des sections de tronc ont été écorcées et le bois a été examine au cas 00 les caractéristiques des deux maladies s'y trouveraient (stries et sillons). Des burgeons ramassés dans les vignes du Niagara et greffés sur les cultivars St. Georges ou LN33, tous les deux sensibles au BSR ou à l'EL, n'ont affiché aucun des symptômes de ces maladies. Un questionnaire détaillé, envoy6 A 350 producteurs, n'a pas non plus révélé de pertes importantes dans la production ou la vigueur des vignes qui auraient pu être attribuées au BSR ou A l'EL.

Introduction

Rupestris stem-pitting (RSP) and corky bark (CB) diseases of grapevine are widespread throughout many of the viticultural regions of the world (3,4). Both diseases produce no obvious symptoms on the leaves or fruit of most *Vitis vinifera* cultivars, but cause a slow decline in vine vigor and production (2,4,5,6). Both diseases may delay bud break in the spring, while in some cultivars CB may cause stunting at bud break and shoot dieback later in the growing season (3,4,6). Both diseases are graft transmissible and are spread mainly through propagation. RSP was introduced into North America from grape wood that was imported from western Europe since 1950 (4), and is now widespread in many French American and American hybrids in vineyards across the northern and eastern United States (1,6). Symptoms associated with these diseases have not been reported in the grape industry in southern Ontario. However, since these diseases may remain latent on scion or rootstock cultivars, there is a potential for a serious decline in grape production which has a yearly farm gate value of 23 million dollars. In this study, the incidence and distribution of RSP and CB was assessed to determine their potential impact on grape production in the Niagara peninsula.

Materials and methods

Surveys were made of 350 grape growers across the Niagara peninsula (Fig. 1) and grapevine varieties for this study were selected on the basis of their production and susceptibility to rupestris stem-pitting disease (RSP). Varieties sampled included Baco Noir, DeChaunac, Gamay, Gamay Beaujolais, Gewurtztraminer, Le Commandant, Niagara, Chardonnay, Pinot Noir and Riesling. Two meters of dormant wood was collected from each of 20 vines per variety available at each site from late October 1983 through February 1994. The wood was stored in polybags at 4°C for up to 4 months until used for grafting. Healthy wood of the

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10 varieties was obtained from the virus-indexed nuclear stock planting at this station and used as controls.

Dormant cuttings (20–30 cm long) were collected from plants of *Vitis rupestris* St. George which was used as an indicator for RSP and from Cultivar LN33 which was used to differentiate RSP from corky bark. The cuttings were treated with 0.5% (aq.) Chinosol W (Hoechst Aktiengesellschaft, Frankfurt. Germany) to control rot and stored at 4°C until grafting.

A chipbud of the candidate selections was grafted onto St. George or LN33 approximately 5 cm below the growing shoot of the indicator. Wood from vines infected with a California isolate of RSP and CB was obtained from the Center for Plant Health, Agriculture and Agri-Food Canada, Sidney, British Columbia, and chipbud grafted as infected standards. Virus-free chipbuds grafted onto uninfected rootstocks were used as non-infected controls. The grafts were wrapped with grafting tape, covered with grafting wax, and rooted in Perlite (Grace and Co. Canada, Ajax, Ontario) in a mistbed for 2 months. Rooted cuttings were transferred to a cold frame for hardening off, and then planted in nursery rows in May 1984. The cuttings were spaced 45 cm apart in rows with 1 m between the rows. The plants were evaluated annually over 3 years for the presence of RSP or CB symptoms, based on examination for leaf and shoot symptoms and differences in bud break and vine vigor. Differences in time of leaf abscission in the fall and bud break in the spring were noted.

The plants were dug in November 1987 and trunk sections were autoclaved for 20 minutes at 121°C to soften the bark. The bark and wood on each trunk was examined for severity of pitting and/or grooving.

Results and discussion

Questionnaires received from 350 growers did not identify any significant production losses or decline in vine vigor. Thirty-two growers indicated declining yields in the cultivar Niagara, but field inspection of these vineyards attributed losses primarily to poor cultural conditions or other disease problems. An additional thirty-eight growers cited production losses in vinifera cultivars which were generally attributable to phylloxera infestations (*Daktulosphaira vitifoliae* (Fitch), severe powdery mildew infections (*Uncinula necator* (Schw.) Burr.), or crown gall infection (*Agrobacterium vitis* (Ophel and Kerr). Symptoms typical of RSP or CB were not evident in field plantings during this study.

Buds from the plant materials collected in vineyards failed to produce symptoms which were typical of RSP or CB on St. George or LN33 respectively. No differences were observed in budbreak or leaf abscission between test and control vines. St. George indicator plants, inoculated with RSP-infected buds and grown in the station plots, developed swollen graft unions and pitting of the woody cylinder directly below the inoculation bud which are typical symptoms of RSP (6). Infected vines had poor vigor and were more susceptible to winter injury than healthy plants. Within 3 years of inoculation, 70% of the infected control plants were dead. No symptoms were produced on LN33 that were grafted with buds from the Niagara vineyards, confirming the absence of CB disease. The infected controls produced stunting and spongy bark with longitudinal fissures on the LN33 indicator and the underlying woody cylinder was frequently pitted or grooved. Low levels (ca. 1 %) of grapevine fanleaf virus (GFLV) were detected in grafted St. George, producing diffuse foliar chlorotic spots and rings. GFLV identity was confirmed by enzyme-linked immunosorbent assay.

Routine indexing of diagnostic samples collected from commercial vineyards after 1987 were free of RSP or CB.

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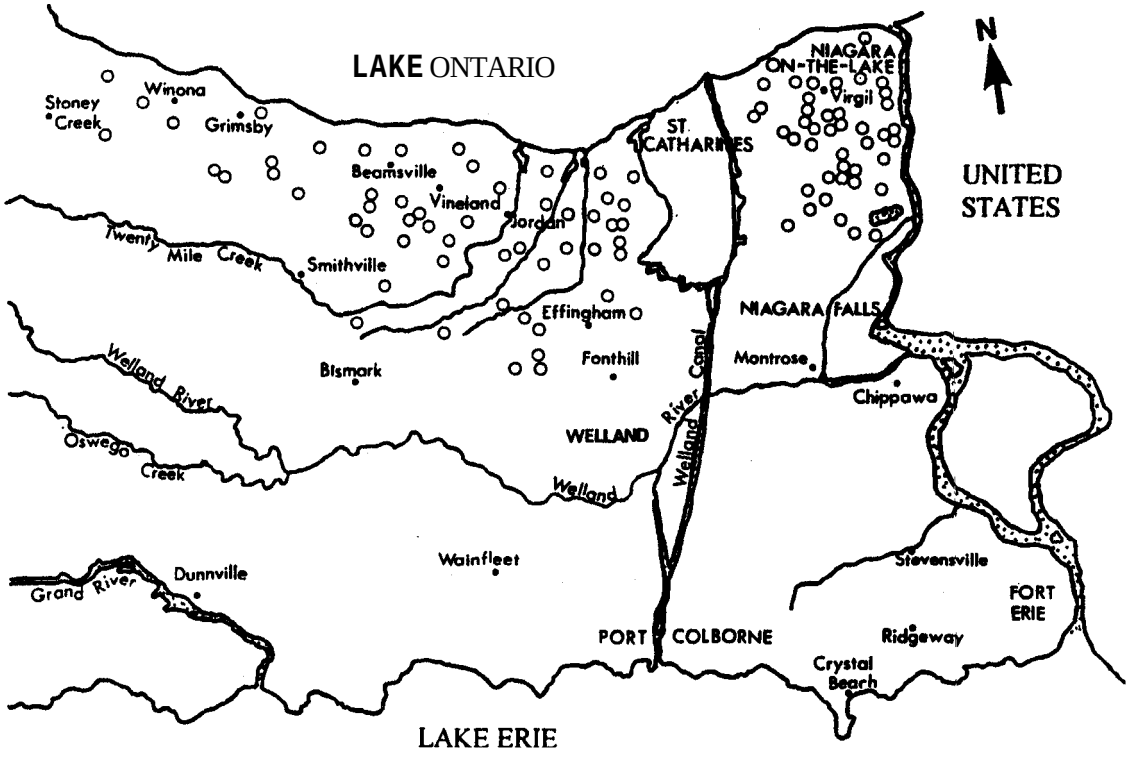

Fig. 1. Distribution of sampling sites across the Niagara peninsula in the rupestris stem-pitting and corky bark disease survey. Many circles represent more than one site and more than one grapevine variety.