Peach X-disease in southwestern Ontario

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Peach X-disease, first observed in a few peach orchards in southwestern Ontario in 1971, has since spread, affecting more than 50% of the 140 orchards surveyed in Essex County and five out of eight orchards surveyed in Kent and Elgin counties. The survey conducted in 1977 covered nearly 70% of peach trees grown in southwestern Ontario. Typically, less than 2% of the trees were infected in an affected orchard, although there were cases of higher incidence. The disease was found on most of the popular peach cultivars. Mature trees appeared to be more subject to the disease; it was rare among trees newly-planted or under four years old. Infected chokecherry trees, wild reservoir host of the disease agent, were found along the fence lines adjacent to many of the affected orchards.

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La virose X du pêcher, dont on a constaté les premiers cas en 1971 dans quelques vergers du sud-ouest de l'Ontario, s'est répandue depuis, touchant plus de 50 % des 140 vergers etudies dans le comte d'Essex et cinq vergers sur huit dans les comtes de Kent et d'Elgin. L'etude menée en 1977 portait sur pres de 70 % des pêchers cultivés dans le sud-ouest de l'Ontario. En regle generale, moins de 2 % des arbres etaient atteints dans chaque verger infeste, bien qu'on ait releve des cas de frequence plus élevée. La virose attaquait la plupart des cultivars couramment en usage. Les arbres plus âgés semblaient plus exposes a la maladie que les arbres nouvellement plantes ou ages de moins de quatre ans lesquels etaient rarement atteints. Des cerisiers a grappe infectes, hôtes sauvages du virus, poussaient le long des clôtures bordant nombre de vergers infestés.

In Ontario, X-disease in peach ***(Prunus persica*** (L.) Batsch) was first observed in the Niagara Peninsula in 1941 (1). It was also reported from Michigan in the same year and from Ohio in 1944 (1). By then, it had spread from Massachusetts to Wisconsin and had become a major disease of peach in New York. It had been considered a virus disease but has since been shown to be due to a mycoplasma-like organism (3,5). Sour cherry ***(P. cerasus*** L.) and sweet cherry ***(P. avium*** L.) are the other important economic hosts of this disease. Eastern chokecherry ***(P. virginiana*** L.) is the most important wild reservoir host and the disease is spread from it to stone fruits by a number of leaf hopper species (2,8). A detailed illustrated review of peach X-disease has been published recently (1). X-disease symptoms were observed, for the first time in Essex County, in a few peach orchards, in 1971. Chokecherry trees with the disease symptoms were present in adjacent fence rows. Preliminary surveys from 1971 to 1976 showed that X-disease appeared to be gradually spreading to other orchards in the same area. County-wide surveys were made in Essex and Kent in 1977 to assess its incidence in individual orchards and the extent of its distribution in the main peach growing areas of southwestern Ontario.

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Survey

The X-disease survey was made in July and August when the symptoms were more distinct. Care was taken to distinguish X-disease symptoms from those produced by nitrogen deficiency, ***Leucostoma*** canker and bacterial spot ***(Xanthomonas pruni)***. Nitrogen deficiency produced reddish necrotic spots and shot-holes bounded by veins. Although bacterial spot caused shot-holes, chlorosis and defoliation, leaf spots and shot-holes were relatively regular and smaller; the leaves did not curl up and defoliate in the manner of X-disease. Leaves on branches with canker were underdeveloped, chlorotic and drooping. The leaf symptoms used to identify X-disease included blotchy, irregular, water-soaked areas across the veins turning pale yellow and red before leaving shot-holes; leaves curling up and dropping, leaving a large number of leaf scars and only a few terminal leaves. Generally, only part of a tree was thus affected, contrasting with the normal appearance of the rest of the tree in midseason. X-disease is known to cause dieback of branches in the following year but it was hard to distinguish it from that induced by winter injury and canker. Infected chokecherry was recognized by its premature fall coloration contrasting with the surrounding greenery.

The survey covered 140 farms in Essex County, ***8*** large farms in Kent County and one in Elgin County, altogether comprising nearly 70% of the peach trees grown in southwestern Ontario.

Results

In Essex County, X-disease was found on 76 farms, being about 54% of those surveyed. All of them were

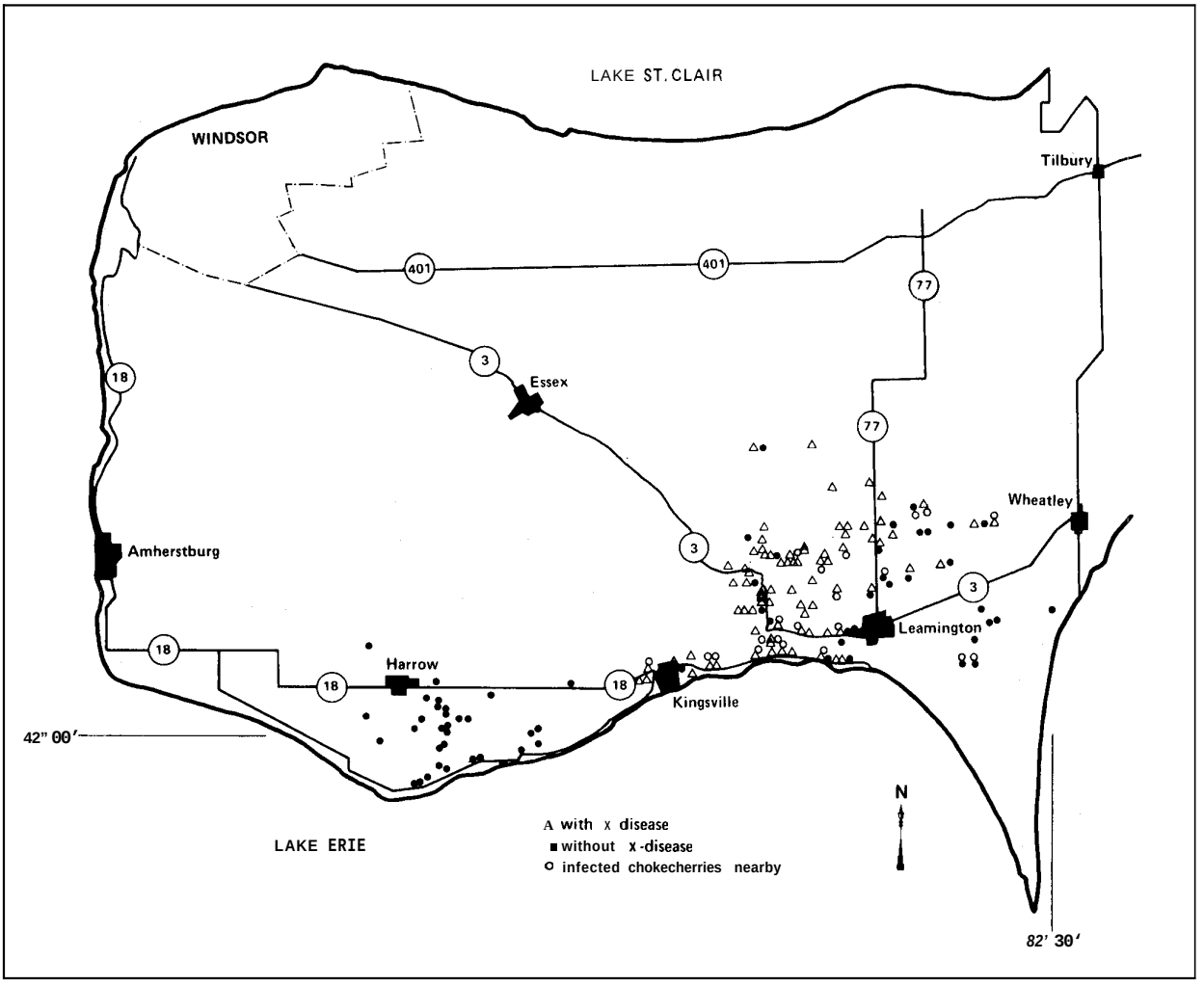

Figure 1. Distribution of peach X-disease in peach orchards of Essex County.

located in the southeastern part of the county between Essex, Kingsville and Wheatley (Fig. 1). As shown in Table 1, the disease incidence was one percent or less on 45 farms, and ranged up to 10% on 28 farms; three farms were severely affected with 13%, 23%, and 67% of the trees infected respectively. X-diseased chokecherry trees were present near, or had been recently removed from 42% of the affected orchards, and apparently healthy chockcherry trees were present near 16 other orchards.

In Kent County, 8 farms with 8845 trees were surveyed. Five farms were affected with the disease incidence ranging up to two percent. The total disease incidence for all the trees was less than one percent. Diseased chokecherry trees were found near three of the affected farms.

In terms of age groups, it was found that the disease incidence was relatively higher among peach trees 4 to 10 years old, and very few of those less than 4 years were affected (Table 2). The total disease inciderice was 1.16% in Essex County and 0.91% in Kent County.

X-disease distribution in an affected peach orchard and its relation to diseased chokecherry trees is shown in Figure 2. Generally, the infected peach trees appeared to be mature and in clusters. The distance between affected orchards and infected chokecherry trees in the adjacent fence lines or wood lots varied from 20 lo more than 1000 feet. There were also instances where infected chokecherries could not be found. The disease was found in at least 24 peach cultivars, including most of the popular ones (Table 3).

Discussion

Ever since X-disease was first observed in Essex County peach orchards in 1971, an epidemic seemed imminent since it is disseminated by several leaf hopper vector species; coincidentally the persistent contact insecticide DDT had been withdrawn from use on peach in 1969. It

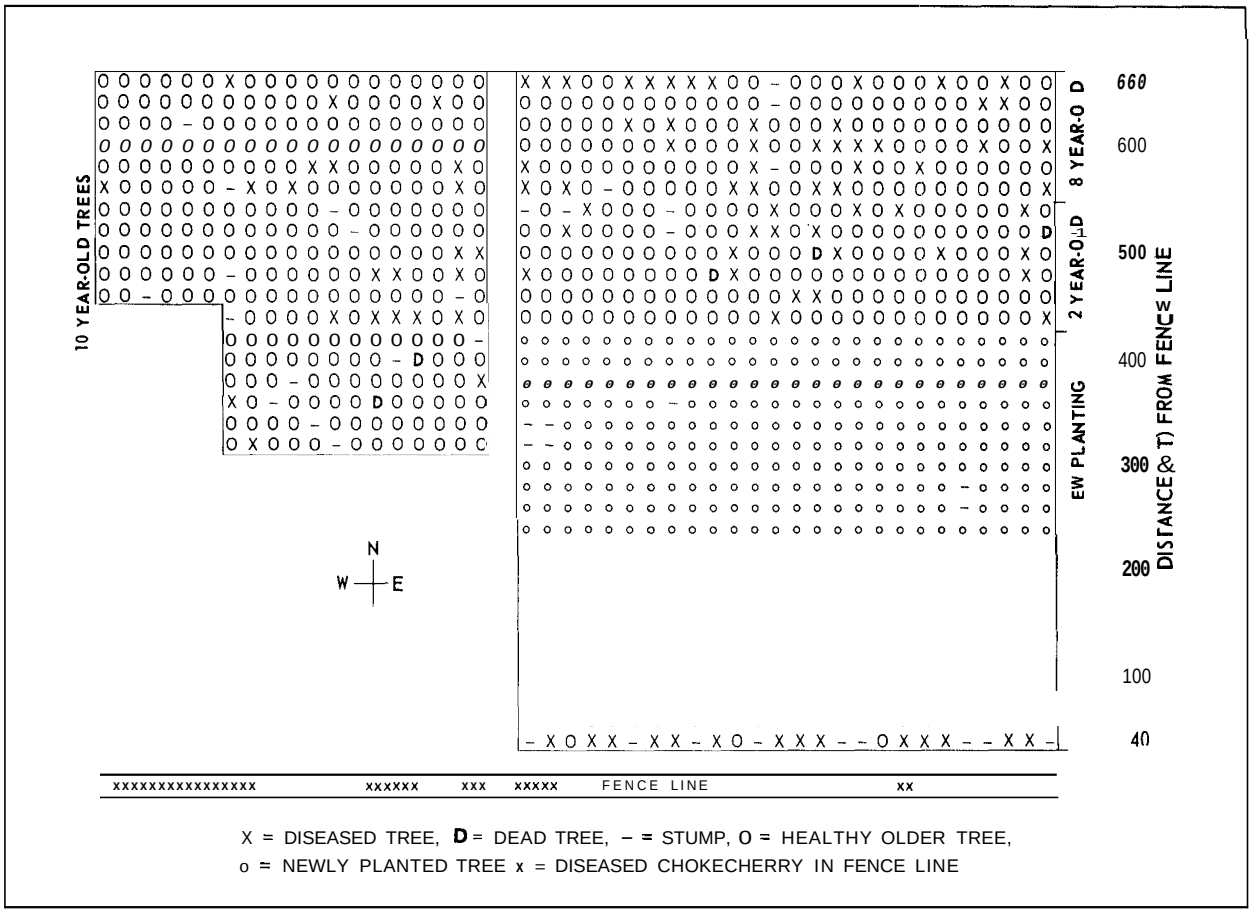

Figure 2 – Distribution of X-disease in an Essex County peach orchard

Table 1. incidence of X-disease in peach orchards of Essex County fruit farms in 1977

Farms	Number	% of surveyed farms	% of affected farms
Surveyed	140		
With X-disease	76	54.28	
With up to 1% disease incidence	45	32.14	59.21
With 2 to 10% disease incidence	28	20.00	36.84
With >10% disease incidence	3	2.14	3.94
With X-diseased chokecherries	21	22.86	42.10
From which X-diseased chokecherries were recently removed	11		
With healthy chokecherries	16	11.43	

Table **2.** Age groups, number and percent of peach trees affected by X-disease in Essex and Kent county fruit farms in **1977**

Age (years)	Essex			Kent*			Total % of X-diseased trees
	Trees	X-diseased trees No.	%	Trees	X-diseased trees No.	%	
1-3	**17,978**	**14**	**0.08**	**1060**	**0**	**0**	**0.07**
4-10	**101,454**	**1429**	**1.41**	**6767**	**81**	**1.19**	**1.39**
>10	**27,647**	**262**	**0.95**	**1018**	**0**	**0**	
Total	**147,079**	**1705**	**1.16**	**8845**	**81**	**0.91**	**1.14** (For **155 924** trees)

*Includes one farm from Elgin County

Table 3. A list of peach cultivars on which X-disease was found in southwestern Ontario in **1977**

Babygold 5	Glohaven
Babygold **7**	Golden Jubilee
Babygold **8**	Harbinger
Canadian Harmony	Harbelle
Candor	Harbrite
Cresthaven	Harken
Earliglo	Loring
Earlired	Madison
Early Elberta	Olinda
Elberta	Redhaven
Envoy	Reliance
Garnet Beauty	Sunhaven

is significant that about the same time there was a resurgence of the disease in the Niagara Peninsula **(W.R.** Allen and T.R. Davidson, personal communication) and Michigan **(A.L.** Jones, personal communication) where it continues to be a problem. There is reason to believe that the disease is new to Essex and Kent counties since many of the same orchards had been regularly visited by plant pathologists and extension personnel over the years. X-disease is reported to occur among chokecherries even in remote areas where stone fruits are not grown **(1).** In Canada, chokecherry is transcontinental in distribution and is commonly found in rich moist soils, in open situations on cleared land bordering wooded areas (4). It is possible, then, to speculate that X-disease spread to southwestern Ontario as a disease of the wild chokecherry and has since been affecting the peach orchards here. Eradication of infected chokecherries has been shown to be of critical importance to the disease control among stone fruits **(1).** The task requires a great deal of concerted effort on the part of the growers and adjacent woodland owners; and it assumes monumental proportions considering the wide distribution of the eastern chokecherry.

It is intriguing to note that, typically, only **1-2%** of peach trees in a given orchard are effected, whereas the disease is epidemic in three orchards. This puzzling situation will only be clarified through definitive studies on the host-range and transmission of X-disease. For the present, however, short-term measures of therapeutic remission of the disease in peaches with a tetracycline antibiotic have been successful (6, 7).

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