Incidence of bacterial blight of field beans in southwestern Ontario in 1973 and 1974'

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In 1973 and 1974, 76 bean (*Phaseolus vulgaris)* fields (624 hectares) and 97 fields (1,008 hectares), respectively, in the Hensall, Ontario, area were aerially photographed using infrared film to determine the incidence of bacterial blight. In both years, only trace amounts of blight were found. In 1974, 18 fields (99 hectares) were also aerially photographed in the Chatham area. Of the 18, 10 were affected and the overall infected area was 0.2% of the total area photographed. A low incidence of seed-borne infection was primarily responsible for avoiding an epiphytotic, as temperature and humidity conditions were optimum for development and spread of the disease.

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En 1973 et en 1974, on a respectivement pris des photographies aeriennes infrarouge de 76 (624 hectares) et de 97 (1008 hectares) champs de haricots *Phaseolus vulgaris* dans la region de Hensall (Ont.) afin de determiner l'étendue de la brulure bacterienne. Les deux annees, les champs n'ont presente que de petites attaques de la brûlure. En 1974, 18 champs (99 hectares) dans la region de Chatham ont egalement été photographies d'un avion. Sur 18, 10 champs etaient infestes sur une superficie totale egale a 0.2% de la region photographiee. L'epidemie n'a pu être evitee que par suite du faible taux d'infection des semences, car la temperature et l'humidité etaient idéales pour le developpement et la propagation de la maladie.

Over the past **6** years, aerial photographic surveys combined with ground truth surveys in southwestern Ontario have shown a decline in the overall incidence of bacterial blight caused by ***Xanthomonas phaseoli*** (E.F. Sm.) Dows. in field beans. For example, in the Hensall area, where detailed measurements of blight on an acreage basis have been determined by aerial photography followed by scanning procedures **(2,3), 4.63%** and **6.56%** of the crop were infected with blight in **1968** and **1970,** respectively. In **1972,** blight declined to **0.67%** (1). This report indicates a further decline in the incidence of blight in the Hensall area in **1973** and **1974.**

Methods

In **1973, 76** fields representing **624** hectares of field beans were aerially photographed in the Hensall area. In **1974,** field bean acreage increased to **1,008** hectares **(97** fields) under the same flight pathway. As well, **99** hectares **(18** fields) of field beans were aerially photographed in the Chatham area in **1974.**

All photography was taken at a scale of 1:**6,000** at an altitude of flight of **6,900** feet above sea level. A Zeiss camera with **12** inch focal length, and Kodak Aerochrome Infrared **2443** film, **9** x 9 inch format, developed as a positive, were used. In **1973,** photography took place on August **16** in the Hensall area. In **1974,** the photographs were taken on August **26** in the Chatham area and on August **20** in the Hensall area; those dates were optimum for disease recognition in both areas.

Each year extensive ground truth surveys were conducted from August 1 until August **26.** A portion of not less than 1 acre of each field in both areas was examined for symptoms of bacterial blight. Leaf samples were taken of infected plants and forwarded to the laboratory at Ottawa for the identification of the causal agent, either ***Xanthomonas phaseoli*** (E.F. Sm.) Dows. or ***Xanthomonas phaseoli*** var. ***fuscans*** Burkh. (Starr. & Burkh.).

Disease interpretations were made from **9** x **9** inch color IR prints and from ground truth notes. Field infection percentages were determined using the drum scanner method **(4).**

Results and discussion

Hensall area

The incidence of blight in the Hensall area showed a further decline from that of previous years (1). In **1973,** although **19** of **76** fields were infected (Table 1), the levels were too samll to measure and consisted primarily of a few leaves infected on one or more plants in a field. In **1974,** only **4** of **97** fields showed blight, all in trace amounts. Two factors are primarily responsible for this decrease, a lower incidence of seed infection and dry weather conditions.

The overall amount of blight has declined steadily in the Hensall area since **1968** (Fig. **1).** Several growers of Select field bean seed are located in this area, with the result that there is a strong influence on other growers to use disease-free seed. The effectiveness of the Select Seed Program (the use of disease-free pedigreed seed initially, followed by field inspection of the crop and laboratory analysis of the seed to maintain disease-free status in the ensuing crop) has been monitored in this area by the aerial IR photographic survey,

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Table 1. Incidence of bacterial blight of field beans in Hensall and Chatham areas, 1973 and 1974

Location	No. fields surveyed	Area (ha)	No. fields affected: Ground truth survey	No. fields affected: Aerial IR survey	Causal organism: *X. phaseoli*	Causal organism: *X. phaseoli var. fuscans*
Chatham 1974	18	99	6	10	6	0
Hensall 1973	76	624	19	—*	14†	1
Hensall 1974	97	1,008	4	—*	3	1

* Infection level in trace amounts not detectable by aerial photography.

† In addition to the 14 pathogenic *X. phaseoli* types, 4 nonpathogenic *X. phaseoli* cultures were isolated.

Although the number of infected fields did not show a decline until 1973 (Fig. 1), the amount of blight has declined to the point where it cannot be dtermined by the drum scanner method (4).

Chatham area

In 1974, 10 of 18 fields in the Chatham area were infected (Table 2). Weather conditions for blight were excellent and disease development within infection foci was severe. Pod infection was well advanced in some foci by August 20. Although weather conditions were ideal, the overall infection level in the crops was only 0.2 percent, primarily because of low levels of seed infection.

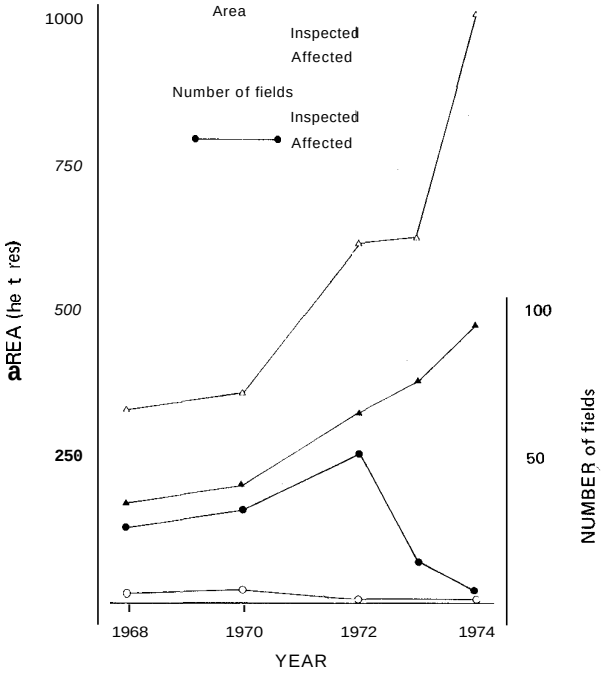

Figure 1. Area of field beans and incidence of bacterial blight in Hensall, Ontario, area, 1968-74.

Table 2. Incidence of bacterial blight in the Chatham area, 1974

Field no.	Total area (ha)	Infected area (ha)	Percent infection
1	6.19	0	0
2	3.99	0	0
3	4.29	0.0846	1.972
4	4.18	0	0
5	9.78	0.0016	0.018
6	9.49	0,0146	0.153
7	0.54	0	0
8	0.59	0.0048	0.808
9	5.22	0.0129	0.245
10	9.60	0.0530	0.554
11	18.76	0.0129	0.070
12	8.06	0	0
13	1.56	0.0053	0.338
14	1.37	0	0
15	8.52	0.0073	0.084
16	0.57	0	0
17	4.26	0.0004	0.013
18	3.30	0	0
Total	100.27	0.1974	
Overall % infection			0.2

Pathogens isolated

Xanthomonas *phaseoli* was the main cause of blight in 1974 (Table 1). Seventeen pathogenic cultures of *X. phaseoli* and two pathogenic cultures of *X. phaseoli* var. fuscans were isolated from infected leaf material.

Literature cited

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