Prevalence and severity of sclerotinia stalk rot of tobacco on Prince Edward Island, 1985 and 1986

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Survey results showed that the prevalence of sclerotinia stallk rot of tobacco increased from 40% of fields in 1985 to 76% in 1986. Infection levels were relatively low in 1985 at 1% of the total plants surveyed, increasing to 6.1% in 1986. Relative severity varied widely, from slight symptom expression to dead plants. On a rating scale of 0 to 10 (disease free to severe) the severity on diseased plants ranged from 1 to 10 with a mean rating of 3.7. Yield losses in some fields were estimated to be as high as 10%.

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Les résultats d'une enquête ont montré que la prevalence du pourridié sclérotinien de la tige du tabac a augment6 de 40% des champs en 1985 à 76% en 1986. Le niveau d'infection relativement bas en 1985, 1% des plants examinés, a augment6 jusqu'a 6.1% en 1986. La sévérité relative de la maladie variait beaucoup allant de symptômes légers jusqu'à la mort des plants. Sur une échelle de 0 à 10 (sain a sévère) la sévérité de la maladie variait de 1 a 10 sur les plants atteints avec une moyenne de 3.7. Les pertes de rendement dans certains champs ont été estimées jusqu'à 10%.

Introduction

Flue cured tobacco (*Nicotiana tabacum* L.) is an important cash crop on Prince Edward Island, particularly in the eastern portion of the Island where approximately 1500 ha. are grown on sandy loam soils. Tobacco producers on Prince Edward Island had reported a ***Botrytis*** sp. infection problem on the lower stalk regions which was causing premature leaf fall and in advanced stages stem breakage. A survey was undertaken in 1985 to determine the incidence and severity of botrytis stalk rot.

The survey indicated that the problem producers were experiencing was being enhanced and confused with sclerotinia stalk rot. While ***Botrytis*** sp. infections were occurring it appeared that sclerotinia stalk rot may have been the more serious of the two diseases. ***Sclerotinia sclerotiorum*** (Lib.) de Bary incited stalk rot (rattle box) has been recorded on flue-cured tobacco in Ontario but it was not considered at the time to be a serious problem (3). To determine the extent of sclerotinia stalk rot on Prince Edward Island a two year survey was instigated.

Methods

Tobacco fields in the main production area on Prince Edward Island were randomly selected. Ten fields were surveyed in 1985 and 17 in 1986. Incidence was recorded in 1985 and 1986, while severity was also rated in 1986. For severity a 0 to 10 scale was used; zero indicated no visible symptoms, a rating of 5 designated plants with lesions approximately 5 cm in length or which girdled the stem, leaves often appeared wilted at this point, a rating of ten indicated plants which were dead.

After proceeding 10 paces into the field, ten consecutive plants were each assessed for sclerotinia stalk rot. Further samples were taken on a regular basis, approximately 30 to 50 m between samples, while following a capital letter 'M' configuration through the field, on several of the smaller fields on inverted 'V' configuration was used. A total of at least 100 plants were rated for disease in each field. The period of assessment was during the mid to late harvest period, after the bottom leaves had already been removed.

Results and discussion

Sclerotinia stalk rot of tobacco was characterized by canker like lesions which formed at the base of the stalk and occasionally at the point of attachment for lower leaves. The lesions were tan to black in colour with a white mycelial mass often present. Lesion margins were a darker colour than the central portion. Black sclerotial bodies were present on the surface and when the stalks were split open the pith region would often contain sclerotial bodies. Sclerotia were of various sizes with the largest being 5 × 20 mm. Leaves on infected plants often appeared wilted and yellow to dead. Symptom expression tended to be most evident at the time of harvesting, however indications of early infections were found. In the more severly infected fields gaps in plant stand and the presence of sclerotial bodies where plants should have been indicated their possible loss to early ***Sclerotinia*** infection.

In 1985 the severity of sclerotinia stalk rot was relatively low on individual plants and was not ratedl. While severity was not rated in 1985, sclerotinia stalk rot was found in 40% of the fields suirveyed (Table 1). This increased to 76% of fields surveyed in 1986. The incidence of sclerotinia stalk rot also increased dramatically from 1985 to 1986. In 1985 a total of 1% of the plants rated demonstrated symptoms of ***S. sclerotiorum*** infection. Sclerotinia stalk rot increased to 6.1% of plants surveyed in 1986 with up to 20% in one of the fields surveyed. The mean severity rating for diseased plants was **3.7** but ranged as high as a rating of 10 (plants dead).

The increased incidence and severity in 1986 when compared to 1985 may have been a reflection of high moisture and cool temperatures during July 1986 when compared to 1985 and the 77 year averages (Table 2). Apothecia of S. ***sclerotiorum***

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Table 1. Prevalence, incidence and severity of sclerotinia stalk rot of tobacco on Prince Edward Island, 1985 and 1986.

	Year	
	1985	1986
Number of fields surveyed	10	17
Prevalence *	4	13
Incidence **		
Mean	1	6.1
Range	0 - 4	0 – 20
Severity ***		
A) On all fields surveyed		
Mean	–	0.3
Range	–	0 – 1.3
B) On all infected plants		
Mean	–	3.7
Range	–	1 – 10

*Prevalence – number of fields with at least one plant with sclerotinia stalk rot
**Incidence – Percent of plants with sclerotinia stalk rot
***Severity on a 0 – 10 scale, disease free to severe (plants dead)

Table 2. Mean monthly temperatures and total precipitation on Prince Edward Island in 1985 and 1986, as measured at the Charlottetown Research Station.

		Year		
		1985	1986	77 yr. avg.
Total precipitation (mm)	June	163.6	78.4	77.9
	July	26.2	148.2	78.7
	August	90.4	71.6	86.5
Mean daily temp. (°C)	June	14.1	13.4	14.8
	July	19.7	16.5	18.9
	August	17.9	17.7	18.5

are not found during dry weather but have been found to be associated with heavy rains within one week prior to their formation (1). From the weather data for P.E.I. it would appear that the higher than normal rainfall in July of 1986 may have stimulated apothecia production and hence spore release to a greater extend than in 1985. If stalk infection is related to plant maturity, as has been indicated for leaf infection (2,5) the high moisture levels in June of 1985 may have resulted in the major apothecial development and spore release being in advance of availability of host material at a suitable level of maturity for infection.

Hartill indicated that *S. sclerotiorum* ascospores were trapped only when apothecia were found near the trap, indicating the source of inoculum was most likely the field itself (1). Avoiding infected fields is recommended given the relationship between spores released and number of sclerotia formed in the previous crop (4). In 1986 sclerotinia stalk rot was high in fields which were in rotation with non-susceptible hosts such as cereals however the length of the rotations may have been insufficient to satisfactorily reduce the density of sclerotia in the soil.

While disease loss assessments were not undertaken in the current survey, it was evident that sclerotinia stalk rot on P.E.I. could result in significant yield losses, and possible quality effects. Low severity levels did not appear to severly affect the plant. Moderate infections (ratings of 3 to 5) did decrease the plants ability to stand in the field. Infected plants were often found broken over, or were easily broken at the point of infection indicating reduced wind resistance. Plants damaged in this manner are usually not harvested.

In addition to direct losses due to stem breakage, infection of the lower stalk areas may have reduced the harvestable yield by causing the leaves to wilt and by advancing their maturity. Leaves on infected plants appeared to be more susceptible to ***Alternaria*** sp. infection.

These factors led to a significant percentage of the plants with sclerotinia stalk rot to be left unharvested even when stalk breakage was not a contributing factor. Several of the surveyed fields in 1986 had mean severity ratings on plants with scletotinia stalk rot that were in excess of 5 and with greater than 15% of the plants in the field exhibiting sclerotinia stalk rot. In these fields yield losses were significant, with an estimated 10% of the plants unharvested. Indirect evidence of early season mortality would indicate a further contributing factor to yield reduction from sclerotinia stalk rot.

One field in 1986, not part of the actual survey, was found to have an infection level of greater than 75%. The field was plowed down shortly after the first leaves were harvested due to poor curing. Direct losses from sclerotinia stalk rot would also have been significant as disease severity was at a level where stem strength was being affected, and wilting was starting to occur. The poorer quality of wilted leaves and the secondary ***Alternaria*** sp. infection would have precluded their harvest, as would stem breakage. Whether or not the poor curing was related to the sclerotinia stalk rot was not determined, however, the circumstantial evidence would indicate a possible relationship between infection and early leaf maturity.

In the 1986 Prince Edward Island tobacco crop, sclerotinia stalk rot was the most apparent yield limiting disease of those observed during harvest.

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