Incidence of yellow leaf spot (*Pyrenophora tritici-repentis*) of wheat in Victoria

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Summary

Yellow leaf spot (YLS) (*Pyrenophora tritici-repentis*) was detected in all major wheat-growing regions (Wimmera, Mallee and North East) of Victoria, through systematic surveys conducted by the Crop Information Service of the Victorian Department of Agriculture and Rural Affairs, in 1986.

The incidence and severity of YLS varied with cultural practices and previous paddock history. The survey data showed that the incidence of YLS in the Mallee was favoured by a wheat/wheat rotation linked to minimum tillage and stubble retention practices. In North East Victoria where the wheat/wheat rotation and stubble rotation practices are common, the incidence of YLS was low. This is attributed to the practice of stubble burning which reduces inoculum levels and thus disease incidence in this region.

The average severity of YLS was generally low, less than 10% of leaf area affected. It is unlikely that YLS caused any significant yield losses in 1986 in Victoria.

Introduction

Yellow leaf spot (YLS) of wheat, caused by the fungus *Pyrenophora tritici-repentis* (Died.) Drech., (conidial state *Drechslera tritici-repentis* (Died.) Shoem.), was first recorded in Victoria at Ultima, south west of Swan Hill, in 1983 (Clarke and Brown 1984) some 33 years after it was first recorded in New South Wales and Queensland (Valder and Shaw 1952). The first records for Western Australia and South Australia were in 1970 (Khan *et al.* 1971).

Over the past 10 years there has been an increase in the use of stubble retention and reduced tillage practices in Victoria. These cropping techniques are reported to increase the incidence and severity of YLS (Rees and Platz 1979, de Boer pers. comm.). Under experimental conditions, yield losses of 49% have been recorded (Rees *et al.* 1982).

Therefore as part of the Victorian Department of Agriculture and Rural Affairs, (DARA) Crop Information Service (CIS) survey in 1986, data was collected on the incidence and severity of YLS in relation to various cropping practices. This paper reports on this survey, by crop scouts, in the Mallee, Wimmera and North East regions of Victoria, and examines the significance of this relatively new disease in the context of changing tillage and rotation practices.

Methods

Selection of crops

The main wheat-growing areas of Victoria were identified from the Australian Bureau of Statistics' figures (ABS 1984/85). By determining the area sown to wheat in each shire, a proportional weighting was given to the number of crops surveyed in these shires. Each shire was divided into sampling areas based on 10×16 km grids (corresponding to a 2×2 grid of the CIS mapping system). Areas within shires which did not include arable land, e.g. desert and mountain areas, were excluded. For each shire, the grid or grids and crops to be sampled were selected at random. A total of 223 wheat crops were sampled four times, at intervals of 4 weeks, from August to November.

Sampling methods

In each crop a triangular path was followed over an area which best represented the crop in terms of soil type, topography and crop growth. Plants at 10 sites at least 20 m apart were assessed for the incidence and severity of YLS. During each subsequent sampling, the same triangular path was followed. At each site a 0.5-m row length was examined. The top four fully expanded leaves were assessed for overall disease incidence and severity.

Damage ratings

Three measurements of damage were taken:

1. Percentage of plants affected. At each sampling site, visual estimates of the proportion of plants affected was noted. The average figure for the 10 sites was recorded. The ratings were:

Rating	*% plants affected*
None	0
Trace	1–5
Few	6–10
Common	11–25
Abundant	26–50
Extreme	>51

2. Severity of disease on plants. At each site the percentage leaf area affected was estimated and the average of the 10 sites recorded. The ratings were:

Disease severity	*% leaf area affected*
Healthy plants	0
A few lesions, overall leaf colour, green	1–5
Lesions obvious, and forming patches, overall leaf colour, green	6–10
Lesions occupy up to one quarter of leaf area	11–25
Lesions occupy up to one half of leaf area	26–50
More than above	>51

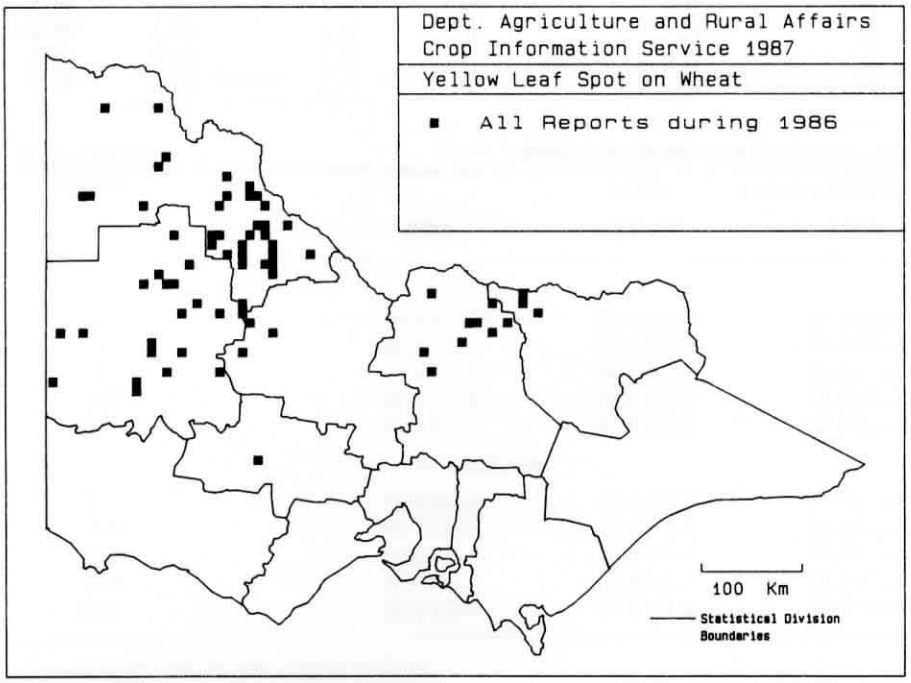

Figure 1 Distribution of YLS in wheat in Victoria, in 1986.

3. Percentage of total crop area affected. An overall assessment was made after examining the 10 sites. The ratings were:

Rating	*% area affected*
None	0
Very light	1–5
Light	6–10
Medium	11–25
Heavy	26–50
Very heavy	>51

Other data recorded

To complete the documentation on each crop the following information was also recorded: grower's name and crop location (grid reference), variety, tillage practice, soil type, growth stage, sowing date, area sown, spread of disease (spotty, patchy, bands, uniform), previous cropping history and chemicals used.

Recording and processing of data

All figures were recorded on CIS Crop Report forms, and then transferred to the DARA micro-vax computer for sorting and summarizing.

Results

YLS occurred in all regions surveyed (Fig. 1). Incidence (percentage of crops affected) varied from light in the North East (12%), through common in the Wimmera (25%), to very common in the Mallee (45%). Severity, (percentage leaf area affected), was light, generally 10% or less. However, percentage plants and crop area affected varied between regions.

Wimmera

Overall, 25% of crops were affected by YLS. Only two of the 52 crops surveyed had used minimum tillage, and both were affected. The remaining 50 crops used full tillage and of these 11 (22%) were affected by YLS. Previous paddock history appeared to have little influence on incidence when crops were sown after full tillage (Table 1).

The severity of YLS was generally light (1–5% leaf area affected). Although the percentage of plants affected varied between 1 and more than 51%, in most crops the percentage of crop area and leaf area affected was less than 10%.

Mallee

Of the 74 crops surveyed, 45% were affected by YLS. Of the 19 crops where minimum tillage was used, YLS was frequently recorded in crops where wheat followed wheat (Table 1). Of the 50 crops sown after the traditional full tillage in a fallow–wheat rotation, 40% were affected by YLS.

The percentage leaf area affected was generally less than 10%. Disease was, however, widespread within the crops, with generally high percentages of plants and crop area being affected (Table 2).

Table 1 Number of crops affected by YLS, in relation to tillage practice and previous paddock history

	No. of crops affected (+) or unaffected (−) by YLS											
Previous paddock history	**Wimmera**				**Mallee**				**North East**			
	M. till.		**F. till.**		**M. till.**		**F. till.**		**M. till.**		**F. till.**	
	+	−	+	−	+	−	+	−	+	−	+	−
Wheat	1	–	1	4	9	1	1	–	2	14	2	13
Fallow	1	–	6	27	–	2	19	31	–	–	–	8
Grain legumes	–	–	2	4	2	4	–	–	2	13	–	16
Pasture	–	–	2	4	–	1	2	2	–	2	6	19
Sub. total	2	–	11	39	11	8	22	33	4	29	8	56
Total crops	52				74				97			

Table 2 Frequency of severity ratings of YLS in relation to region

	Wimmera			**Mallee**			**North East**		
Rating cats (%)	**Plants aff.**	**Leaf area aff.**	**Crop area aff.**	**Plants aff.**	**Leaf area aff.**	**Crop area aff.**	**Plants aff.**	**Leaf area aff.**	**Crop area aff.**
1–5	4	12	8	10	27	8	2	8	6
6–10	3	2	3	0	28	5	1	3	3
11–25	1	0	0	4	1	2	4	1	2
26–50	5	0	1	8	0	13	1	0	0
>51	1	0	2	34	0	28	4	0	1

Table 3 Frequency of YLS on the major wheat varieties by region

Variety	**Wimmera Number**		**Mallee Number**		**North East Number**		**Percentage crops affected**
	Aff.	**Unaff.**	**Aff.**	**Unaff.**	**Aff.**	**Unaff.**	
Oxley	7	8	3	–	4	19	35
Matong	3	3	–	–	2	40	13
Millewa	3	13	9	24	–	11	20
Halberd	2	1	8	2	–	–	77
Condor	–	3	12	11	–	5	38

North East

Minimum tillage was used in 34% of the 97 crops surveyed, the remainder using full tillage. Under both systems 12% of crops were affected by YLS (Table 1). The recommended rotations of lupins/wheat/wheat, with or without minimum tillage, and pasture/wheat with full tillage all showed a low incidence of YLS.

The severity of YLS was light. The percentage plants affected ranged from 1 to more than 51%, whilst percentages of leaf area and crop area affected were generally 10% or less (Table 2).

Varieties

The frequency at which YLS occurred within varieties varied from 13% in Matong to 77% in Halberd (Table 3).

Discussion

Over the past decade the use of stubble retention and reduced tillage practices have steadily increased in Victoria (in 1986, 24% of wheat crops used minimum tillage). These practices have reduced cultivation costs, improved soil structure and reduced soil erosion. They have also increased the likelihood of YLS epidemics (Rees and Platz 1979).

The survey data indicate that YLS may not have reached levels which would significantly affect yields. Nevertheless, the situation deserves close scrutiny, especially in the Mallee where frequency of this disease is high. Data reported exposed the link between stubble retention practices and disease, and suggests that stubbble burning is an effective method of control.

Evidence suggests that epidemic development of YLS in Victoria may be slower than in north eastern areas of Australia. The reasons for this are unclear but could be associated with climatic conditions and cultural practices. For example, in the Mallee, where the incidence of YLS was higher than in other regions, the lower rainfall there could lower severity levels, thus slowing the development of an epidemic. On the other hand, in the North East where rainfall is ideal for YLS, incidence was low, possibly due to the cultural practice of stubble burning. The incidence and severity of YLS in the North East could have been masked by the more aggressive diseases, stripe rust and *Septoria tritici* blotch.

The incidence of YLS in Matong may have been low because it was grown in the Wimmera and North East where cropping practices may suppress this disease. Its degree of resistance is therefore uncertain. The cultivar Halberd, however, would appear to be susceptible to YLS. Although grown in the Mallee where incidence was higher than other areas, it was sown mainly using full tillage, which is reported to reduce the incidence of YLS. This supports findings in Western Australia (Loughman and Wilson 1986).

No attempt was made to try to relate severity of disease with yield loss, as there are confounding factors such as rainfall, soil type and other diseases, e.g. stripe rust and take-all.

Acknowledgments

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