

Dynamics of fungal diseases of canola in Western Australia

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ABSTRACT

Commercial canola crops were surveyed in Western Australia during 2008-2010 growing seasons to determine the occurrence of various diseases in canola production. A total of 99, 74 and 53 samples were collected during 2008, 2009 and 2010 respectively. About 100 stems were collected for each sample along a 200m transect. Stems were washed and rated for incidence and severity of internal infection of blackleg. Plants were also assessed for the incidence of the diseases Sclerotinia stem rot caused by *Sclerotinia sclerotiorum*, club root caused by *Plasmodiophora brassicae* (from samples collected from northern areas only) and powdery mildew caused by *Erysiphe cruciferarum*.

All four fungal diseases (Blackleg, Sclerotinia, club root and powdery mildew) were detected during the 2008 survey while in 2009 and 2010 surveys, only three main diseases (Blackleg, Sclerotinia and club root) were detected. Prevalence of blackleg was highest (100%) followed by that of Sclerotinia stem rot, and club root respectively in all three years of survey. Averaged across all samples, the mean percent disease index (internal infection) of blackleg was 27, 48 and 28% and the mean incidence of Sclerotinia stem rot was 11, 9 and 3% during 2008, 2009 and 2010 respectively. Likewise, the average incidence of club root from northern areas was 11, 25 and 7% during 2008, 2009 and 2010 respectively. Seasonal conditions, particularly the dry conditions experienced in 2010, were significant modifiers of the incidence and severity of diseases observed in this survey.

Key words: Blackleg – canola – disease survey – Sclerotinia – club root

INTRODUCTION

Canola is a major oilseed crop in Western Australia with the estimated area planted to canola being 845, 000 ha in the 2010 growing season (AOF Crop Report, 2011). Blackleg (*Leptosphaeria maculans*) is a serious disease in many oilseed-rape growing regions of the world. Substantial production losses from blackleg have been reported in many canola producing countries (Hall *et al* 1993; Seidel *et al.* 1984; Lacoste *et al.* 1969, Fitt *et al.* 1997 and Lamey 1995). Since the previous blackleg surveys conducted in Western Australia (Khangura and Barbetti, 2001), there has been a boom and bust of canola varieties with major gene resistance to blackleg (Sprague *et al* 2006). Apart from blackleg there are other important fungal diseases present in canola such as Sclerotinia stem rot, club root and powdery mildew. Currently there is no information available on the intensity and occurrence of these diseases in Western Australia. The lack of this information on the incidence or severity of canola diseases, other than blackleg, in Western Australia prompted this survey. Monitoring disease levels in commercial crops for canola diseases is essential to define threats from a particular disease and implement appropriate management strategies to reduce production losses.

MATERIALS AND METHODS

Samples were collected from canola crops across the low, medium and high rainfall zones of the Western Australian grainbelt. About 100 stems were collected in each sample along a 200m transect. Stems were washed and rated for severity of internal infection of blackleg on a 0-4 scale (0= no disease, 4 = more than 75% stem cross section showing internal necrosis). Disease incidence (% plants with crown cankers) and disease severity expressed as percent disease index (PDI) for each sample were calculated. Plants were also assessed for the incidence (% plants infected) of Sclerotinia stem rot caused by *Sclerotinia sclerotiorum*, club root caused by *Plasmodiophora brassicae* and powdery mildew caused by *Erysiphe cruciferarum*.

RESULTS

A total of 74, 95 and 53 samples were collected from canola crops in 2008, 2009 and 2010 respectively. In 2008, about 16% samples were cultivar (cv) Beacon, 15% Thunder, 14 % Cobbler, 12% each Tornado and Bravo, 7% Stubby, 5% Rottnest and 4% Tanami. In 2009, about 30% samples were cv Cobbler, 20% Thunder, 13% Tanami, 7% Tornado, 5% Beacon, 4% each Barra and Bravo and 2% Rocket. In 2010, Cobbler was the most dominant cultivar represented by 45% of samples. A majority of the crops were sown in paddocks where there had been at least a two to three year break since the previous canola crop. Prevalence of disease (percentage crops affected) was highest (100%) for blackleg followed by Sclerotinia stem rot, and club root for each of the three years (Table 1). Powdery mildew was only detected in the samples in 2008 (Fig. 1). When averaged across all samples, the incidence of blackleg was highest compared with that of other diseases (Fig. 1). Average severity or internal infection of blackleg was 23, 41 and 28 during 2008, 2009 and 2010 respectively. Club root was detected only from samples collected from the northern region as the samples from the southern areas were very dry and symptoms of club root were not visible.

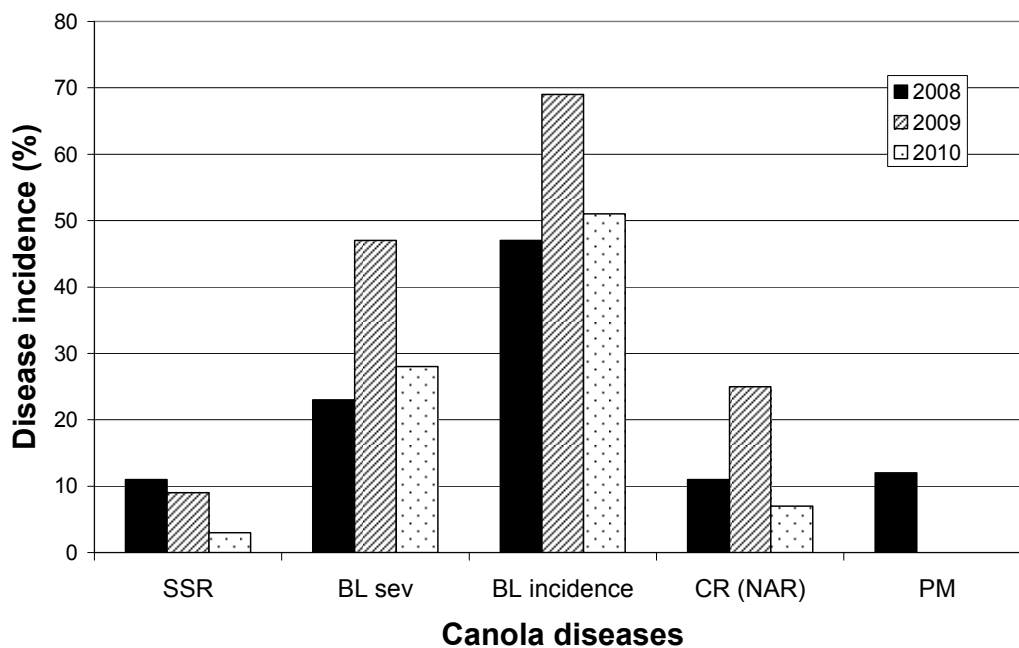


Fig. 1. Average incidence (% plants infected) across all samples of various canola diseases in Western Australia during 2008-2010. (SSR = Sclerotinia stem rot, BL = Blackleg, CR = club root, PM = powdery mildew, BL sev = Blackleg severity)

Table 1: Prevalence (% of crops with any level of infection) and range (incidence of infection within crops) of various canola diseases during 2008-2010.

Disease	2008		2009		2010	
	Range	Prevalence	Range	Prevalence	Range	Prevalence
SSR	0-85	62	0-77	40	0-30	20
BL [§]	1.5-85	100	0.4-92	100	3-84	100
CR [‡]	0-44	47	3-65	96	0-42	18
PM	0-98	20	0	0	0	0

SSR = Sclerotinia stem rot; BL = Blackleg; CR = Club root; PM = Powdery mildew.

[§]Internal infection.

[‡]Samples from only northern areas were observed for the presence of club root.

DISCUSSION

Levels of various diseases were variable in the three years of survey. This clearly indicates that seasonal conditions are a major factor influencing the outcome of various diseases. High levels of blackleg observed in 2009 may be due to conducive seasonal conditions. Some crops suffered high yield losses from blackleg as a result of tighter rotations in conjunction with sowing moderately susceptible varieties without a fungicide protection. Blackleg levels were lower in the northern agricultural region than reported from previous surveys conducted during 2001-2004 (data not shown). Low levels of blackleg in the northern region were expected due to continuous dry conditions during the past few years and as a result there have been limited sowing opportunities.

Sclerotinia stem rot incidence appears to have risen in the past few years. However, in 2010 incidence of Sclerotinia was extremely low despite high levels of petal infection (R. Khangura, unpublished data) probably due to the dry seasonal conditions experienced. High levels of SSR during 2008 and 2009 caused substantial yield losses in some canola crops and this warrants implementation of good Sclerotinia management strategies in order to reduce losses from Sclerotinia. Growers should avoid sowing close to paddocks that had high incidence of Sclerotinia in the past few years. In high risk situations, growers should use fungicides recommended for the control of Sclerotinia in canola.

Although club root didn't emerge as a serious problem, its widespread occurrence in the northern region means that growers are required to maintain good hygiene practices to prevent the spread of this pathogen with machinery to club root free paddocks. Other options to prevent the spread of club root are control of Brassica weeds, long rotations and sow club root free seed. This disease is recognised as a key disease in Alberta, Canada as it has spread rapidly and caused significant losses of yield in canola crops.

High levels of powdery mildew were also found in some crops only in 2008. Impact of powdery mildew on canola yields is yet unknown. Further work is required to determine the effect of powdery mildew on canola production.

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