Prevalence, epidemiology and management of blackleg of canola in Western Australia

Ravjit K. Khangura[1] and Paul C. Carmody[2]
Department of Agriculture, Western Australia, South Perth, 6151, Australia, E-mail, rkhangura@agric.wa.gov.au
[2]Centre for Cropping Systems, Department of Agriculture – Western Australia, PO Box 483, Northam, WA 6401, Australia, E-mail, pcarmody@agric.wa.gov.au

ABSTRACT

Surveys for blackleg disease caused by *Leptosphaeria maculans* on canola crops were undertaken throughout the Western Australian (WA) wheatbelt during 2000-2002 to determine the incidence and severity of crown cankers. Blackleg was detected in all the crops surveyed, however, its incidence and severity varied in both the years. The average statewide incidence was 92, 52 and 58% and severity (expressed as percent disease index) was 53, 30 and 39% during 2000, 2001 and 2002 respectively. The low levels of blackleg in 2001 could be attributed to relatively drier conditions in the region that slowed the development and spread of the disease. Current status of blackleg disease in WA and its comparison with the past levels based on surveys conducted in 1996-1999 will be discussed. During 1998-2000, development of pseudothecia of the blackleg fungus was investigated on residues of the previous year's canola crop collected from four different agroclimatic regions in WA. The pseudothecia matured on residues at different times after harvest in various regions. In general, this maturity occurred earlier in the high rainfall regions than in medium and low rainfall regions. Likewise, ascospore discharge commenced early in high rainfall regions (Mount Barker) and late in Northern low rainfall regions of WA (East Chapman). The major ascospore showers took place during May and June in Mount Barker and during July and August in East Chapman. The number of ascospores discharged was extremely low at East Chapman compared to Mount Barker. This information is significant in developing better and cost-effective blackleg management strategies in WA.

Key words: *Leptosphaeria maculans*– epidemiology –survey–ascospores– management

INTRODUCTION

Blackleg caused by *Leptosphaeria maculans*, is one of the most important and serious fungal diseases of canola with the potential to limit canola production. Intensity of this disease depends upon host resistance and favourable environmental conditions in association with the availability of sufficient inoculum when the crop is most vulnerable to attack by this pathogen. In Western Australia, levels of this disease have been monitored since 1996 in order to investigate the dynamics of this disease throughout the Western Australian grainbelt. An understanding of the epidemiology of blackleg could help in developing the most cost-effective blackleg management strategies There are very few reports on the pattern of ascospore discharge of this fungus in Australia (McGee, 1977) and overseas (Pérès *et al*, 1999; McGee and Petrie, 1979). However, there is very little information regarding the epidemiology of this disease under Mediterranean climate of Western Australia.

MATERIALS AND METHODS

Samples were collected from canola crops from various canola growing regions of WA during 2000-2002. About 100 stems were collected for each sample along a 200m transect. Stems were washed and rated for blackleg severity of crown cankers on a 0-3 scale (0= no disease, 3 = more than 50% area of crown circumference girdled by the cankers). Disease incidence (% plants with crown cankers) and percent disease index (PDI) for each sample were calculated to denote the disease severity.

Timing of pseudothecia maturation was studied during 1998-2000 and discharge of ascospores was investigated during 1999-2000 in different agroclimatic regions of WA using Burkard spore traps.

RESULTS

Average incidence and severity of blackleg in WA for the last seven years (1996-2002) is presented in fig. 1. Blackleg levels were high in 1996, declined in 1997-1998, elevated in 1999 and 2000 and again declined in 2001-2002. Both in 2001 and 2002, the rainfall was well below average in most of the canola growing areas of WA. Despite dry seasonal conditions in 2002, the crown canker severity up to 89% was recorded in some moderately resistant canola varieties.

The pseudothecia matured 6-14 weeks earlier in high rainfall areas than the low rainfall areas of WA during the three years of investigations (data not shown). Likewise, the ascospore discharge started earlier in high rainfall regions as a consequence of early maturation of pseudothecia compared with the medium and low rainfall regions (figs. 2 and 3).

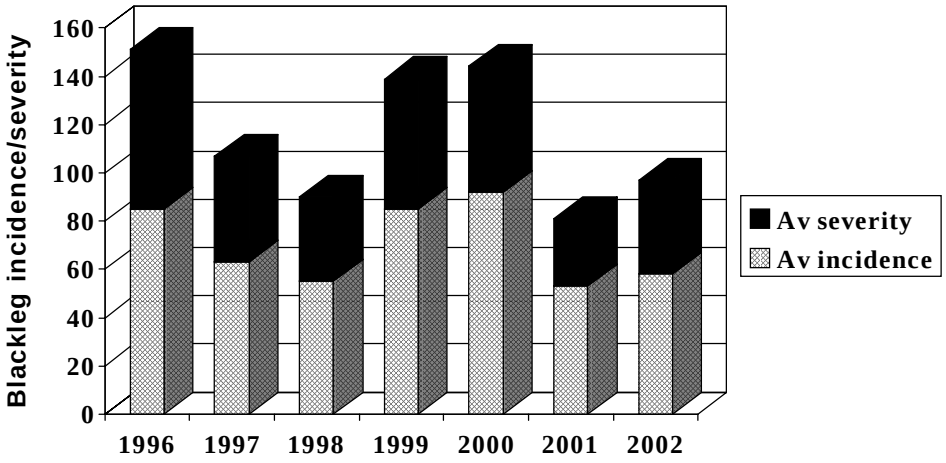

Fig. 1. Average incidence and severity (measured as percent disease index) of blackleg in canola in Western Australia during 1996-2002.

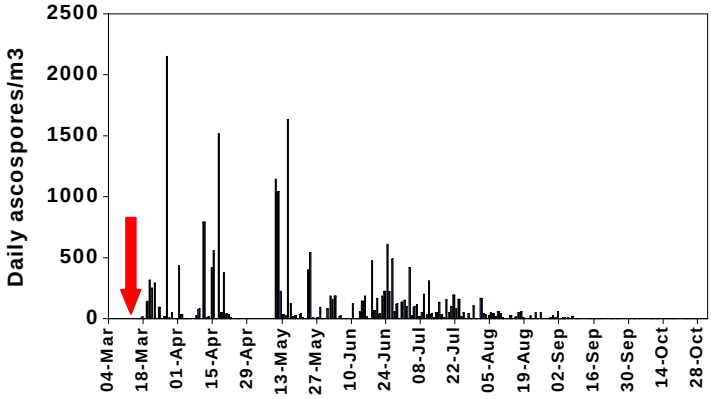

Fig. 2. Daily ascospore discharge pattern of blackleg from 1-year-old residues at Mt. Barker (high rainfall) during 2000. The arrow indicates timing of pseudothecia maturation.

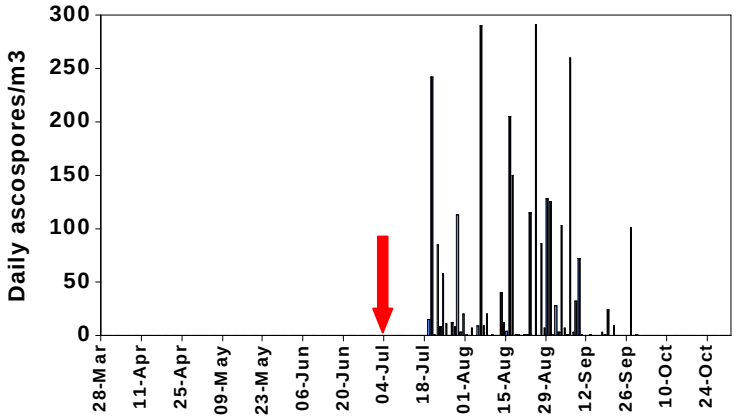

Fig. 3. Daily ascospore discharge pattern of blackleg from 1 year old residues at East Chapman (low to medium rainfall) during 2000. The arrow indicates timing of pseudothecia maturation.

DISCUSSION

The comparative low levels of blackleg in 2001-2002 could possibly be attributed to dry seasonal conditions, and growing highly resistant canola varieties. However, the high level of disease in moderately resistant varieties could possibly be due to the synchronisation of the ascospore showers with the susceptible seedling stage. A shift towards growing highly resistant varieties has helped to lower overall blackleg levels. Growers still need to assess their risk from blackleg, especially if growing moderately resistant varieties in order to minimise losses. The epidemiological data in these investigations is being utilised to develop a model to predict the timing of ascospore discharge in various regions of WA in order to avoid ascospore showers at the seedling susceptible stage (Salam *et al*., 2003).

ACKNOWLEDGEMENTS

We gratefully acknowledge various Development Officers of the Department of Agriculture, and Agribusiness consultants for helping with collection of canola samples, Dr M. Barbetti for his suggestions, Mr Tim Trent and Mr M. Aberra for excellent technical assistance. The Grains Research and Development Corporation of Australia provided funding for this project.

REFERENCES

Pérès A., B. Poisson, A.. Penaud, L. Jain and Pilorge, 1999: *Leptosphaeria maculans* (*Phoma lingam*): A summary of three years of epidemiological studies (1995, 1996 and 1997). Proceedings of the 10th International Rapeseed Congress, 1999, Canberra, Australia. On-line publication /au/gcirc/3/105.

McGee, D.C., 1977: Blackleg (*Leptosphaeria maculans* (Desm.) Ces. et de Not.) of rapeseed in Victoria: sources of infection and relationships between inoculum, environmental factors and disease severity. Australian Journal of Agricultural Research, 28: 53-62.

McGee, D.C. and G.A. Petrie, 1979: Seasonal patterns of ascospore discharge by *Leptosphaeria maculans* in relation to blackleg of oilseed rape. Phytopathology, 69: 586-589.

Salam M.U., R.K. Khangura, A.J. Diggle, and M.J. Barbetti, 2003: Blackleg Sporacle: A model for predicting onset of pseudothecia maturity and seasonal ascospore showers in relation to blackleg of canola. Phytopathology (In Press).