MANAGEMENT OF BLACKLEG OF CANOLA BY MANIPULATING TIME OF SOWING IN COMBINATION WITH FUNGICIDES

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ABSTRACT

Three different times of sowing (starting from the break of the season with two subsequent sowings at 2 week intervals) and various fungicide treatments were evaluated for the management of blackleg in canola. The trials were conducted at four different locations viz. East Chapman, Merredin, Wongan Hills and Mt. Barker. Blackleg severity was significantly reduced when the sowing was delayed until 1st or 2nd week of July, however, there were yield penalties due to the shortened growing season. All the fungicide treatments substantially reduced blackleg at all locations and yields were improved with most of the fungicide treatments at all locations except for East Chapman. A fungicide treatment aimed at providing maximum protection indicated that varieties with low resistance like Karoo suffer serious yield losses up to 52% under moderate to severe disease pressure conditions. Results suggest a future potential use for some fungicide treatments, such as seed dressing with fluquinconazole and a combination of seed dressing and foliar application of either flusilazole or prochloraz.

KEYWORDS:, Blackleg, canola, chemical control, time of sowing

INTRODUCTION

Canola (*Brassica napus* L.) is currently a major oilseed crop in Western Australia (WA). Unfortunately, blackleg caused by (*Leptosphaeria maculans* (Desm.) Ces. & de Not.) is a major constraint to the sustainability of a canola industry in WA and Australia (Salisbury et al., 1995). A survey of canola crops in WA during 1996-1999 indicated very high levels of blackleg occurring in the WA crops (Khangura and Barbetti, 2001). The fungus survives on stubble and forms pseudothecia on crop residues from the previous year and the concentration of air-borne ascospores is highest in late autumn-early winter and declines after winter (RK Khangura and MJ Barbetti, unpublished data). Therefore, it is possible that the crops sown very early could be less exposed to high levels of ascospores than crops sown later, such as June-July. A decline in blackleg severity has been correlated with late plantings in July in eastern Australia (McGee and Emmett, 1977). Currently, blackleg management strategies in WA include long rotations, use of resistant varieties, removal of infected residues by raking and burning where feasible, distancing canola from previous year's residues and use of the fungicide Impact® (Barbetti *et al*, 2001; Khangura and Barbetti, 2001, Khangura *et al*., 2001). Apart from Impact®, some other fungicide treatments have also shown promise for the control of blackleg (RK Khangura and MJ Barbetti, unpublished data). The aims of these studies were to evaluate the effect of different times of sowings (TOS) in combination with various fungicide treatments on blackleg disease severity and seed yield of canola.

METHODS

Trials were conducted at Merredin, Wongan Hills, Mt. Barker and East Chapman to investigate the effect of time of sowing (TOS) on blackleg disease and yield. In all trials cv Karoo was sown in paddocks containing 2 year old canola residues. At all locations except for Merredin, the canola

stubbles had been raked and burnt after the crop. The trial was sown at three different times. The first time of sowing was planned to be sown at the break and subsequent two sowings at three week intervals. But unfortunately, due to the late start of the season, the trials were not sown as planned. The first TOS was in the 3rd week of May, the second TOS was in the 2nd-3rd week of June and the third TOS was in the 1st-2nd week of July. For each TOS, various fungicides treatments were applied, viz. nil, Impact®, fluquinconazole seed dressing (SD) @ 6.6g a.i./kg seed, fluquinconazole SD + one foliar application of Flusilazole® @ 100g a.i./ha, fluquinconazole SD + two foliar applications of Prochloraz® @ 247g a.i./ha, two foliar application of Flusilazole® @ 100g a.i /ha, and fluquinconazole SD + Impact® + three foliar application of Flusilazole® @ 100g a.i /ha. The last treatment was intended to provide maximum possible fungicide protection and was included to evaluate yield loss from blackleg. The trial design was a split plot design with the TOS as main plots and the fungicide treatments as the sub plots. At the end of the season 35 plants were assessed for blackleg crown cankers for each plot and the percent disease index was calculated for each treatment. All the plots were harvested to obtain the seed yield.

RESULTS

The main effects of fungicides indicated that blackleg disease was substantially reduced and the yield improved in most of the fungicide treatments at all the locations. The maximum protection fungicide treatment controlled blackleg and improved yield by 47, 56 and 46 and 16% at Merredin, Wongan Hills, Mount Barker and East Chapman, respectively, compared with the nil treatment (Figs. 1-4). The main effect of time of sowing indicated that the blackleg severity was significantly reduced when the crops were sown late in the 1st-2nd week in July at Wongan Hills, Mt. Barker and East Chapman but not at Merredin where the TOS had no effect on the disease severity. The yield was significantly decreased at Merredin when the crops were sown in the 3rd-4th week of June and subsequently the yield was further reduced when the sowing was delayed further until 1st-2nd week of July. However, at Wongan Hills and Mt. Barker, the first and the 2nd TOS did not affect the seed yield but it was significantly reduced with the 3rd TOS compared to the 1st TOS. At East Chapman, the seed yield was significantly reduced when sown in the 3rd week of May compared with 2nd-3rd week of June. However, the seed yield was drastically reduced when sown in July (Table 1). Blackleg caused variable yield losses when crops were sown at different times at different locations. Yield losses were lower at East Chapman compared with the other locations at all the times of sowings. When the crops were sown in May, the yield losses from blackleg were 20% from Wongan Hills and Mt. Barker and 9% from Merredin. However, when the crops were sown in June, blackleg caused almost similar yield losses at Merredin, Wongan Hills and Mt. Barker. Despite the reduced disease severities in July at all the locations except Merredin, losses from blackleg were still high (52 and 40%) at Merredin and Wongan Hills, respectively (Fig. 5).

Table 1: Effect of time of sowing on percent disease index (PDI) and seed yield (kg/ha) of canola at four different locations in WA.

Sowing Date	Merredin		Wongan Hills		Mt. Barker		East Chapman	
	PDI	Yield	PDI	Yield	PDI	Yield	PDI	Yield
First (3rd week in May)	57	1623	47	1334	52	2222	55	646
Second (3rd -4th week in June)	57	1219	40	1306	55	1963	41	829
Third (1st –2nd week in July)	56	673	29	753	40	1668	32	374
l.s.d.	n.s.	293	9	236	6	790	7	114

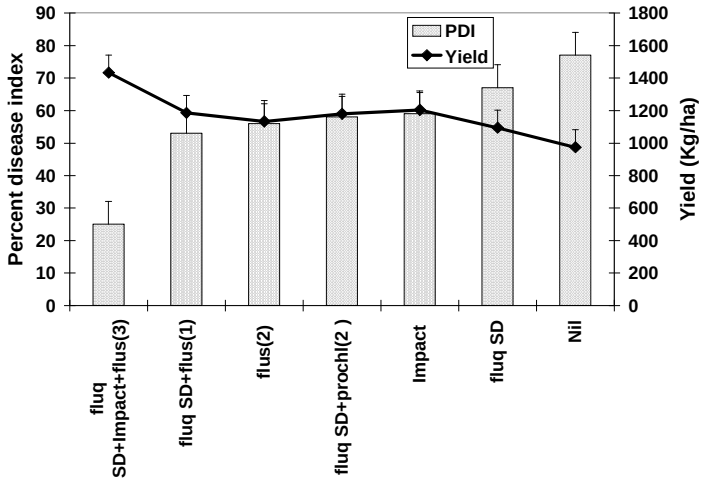

Fig. 1: Effect of various fungicide treatments percent disease index (PDI) of blackleg and seed yield of canola at Merredin. (fluq= fluquinconazole, flus = flusilazole, prochl = prochloraz, SD = seed dressing, figures in brackets indicate number of foliar sprays)

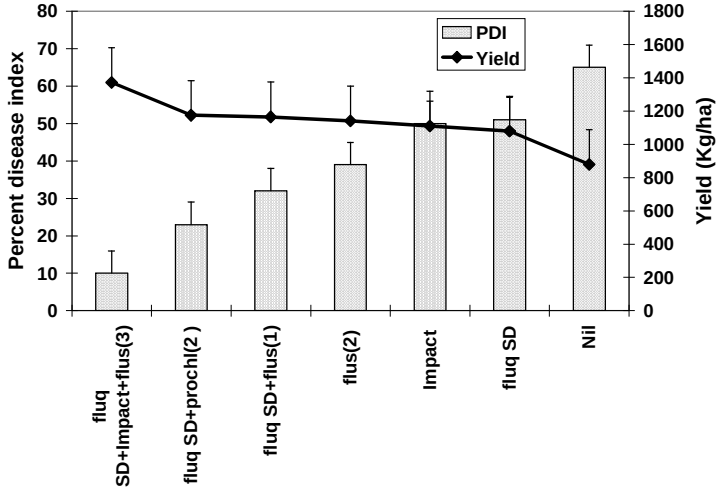

Fig. 2: Effect of various fungicide treatments on percent disease index (PDI) of blackleg and seed yield of canola at Wongan Hills.

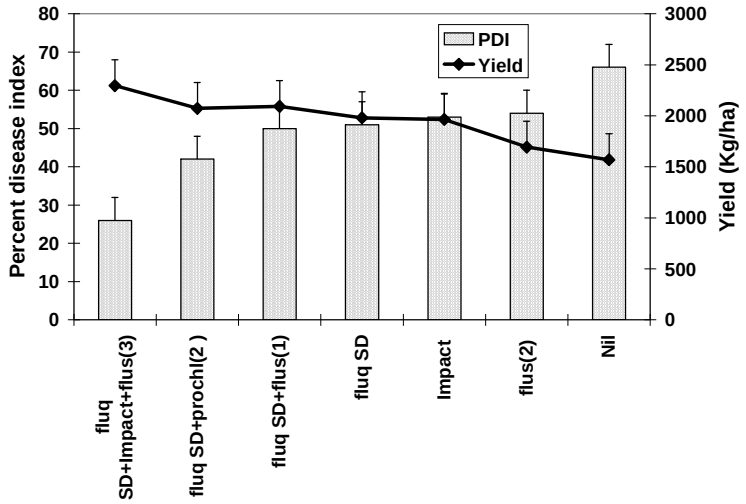

Fig. 3: Effect of various fungicide treatments on percent disease index (PDI) of blackleg and seed yield of canola at Mt. Barker.

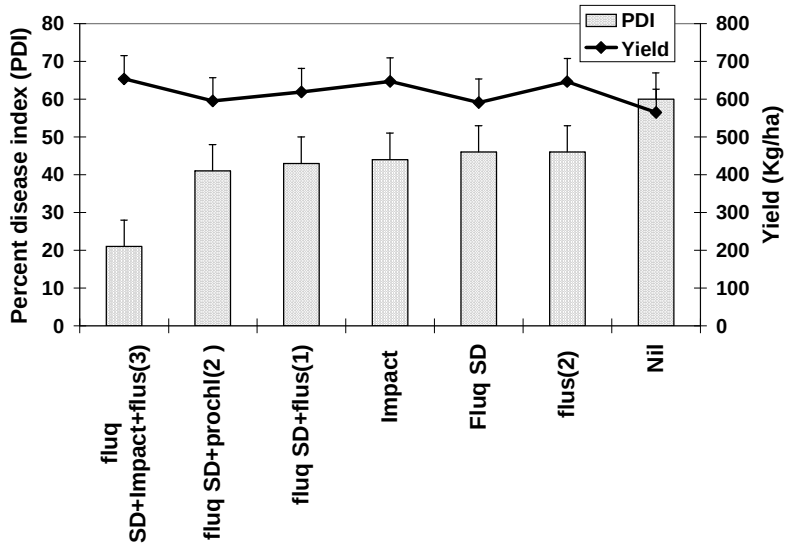

Fig. 4: Effect of various fungicide treatments on percent disease index (PDI) of blackleg and seed yield of canola at E. Chapman.

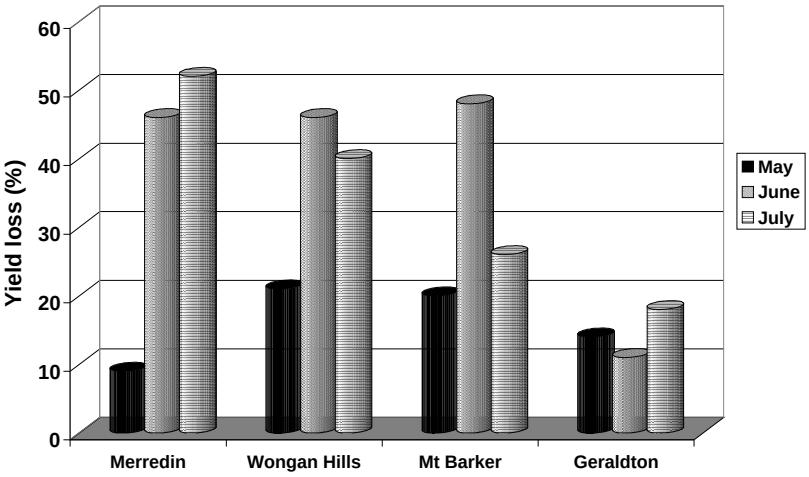

Fig. 5: Yield loss (%) from blackleg at different times of sowing at different locations.

CONCLUSIONS

Our results indicated that all the fungicides tested effectively controlled blackleg and improved yield in canola. When not controlled, blackleg caused huge yield losses even though the environmental conditions were not very favourable for this disease in the 2000 growing season. The disease severity was significantly lower when the crops were sown in the first-second week of July compared with the crops sown in May or June at all the locations except Merredin. However, the late sowing resulted in yield penalties due to shortened growing season, hence, there was no economic benefit in delaying sowings until July in order to minimise damage from blackleg. It is likely that if the crops were sown at the normal time in late April or early May, the crops would have escaped major ascospore showers especially in Northern areas of WA.

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