COMPARISON OF HISTORICAL VARIETIES OF RAPESEED AND CANOLA IN AUSTRALIA

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ABSTRACT

A range of rapeseed and canola varieties which had been released in Australia in the last 15 years was tested at three sites over two years. The level of resistance to blackleg has increased markedly and recently released varieties yield well in the presence of blackleg. At sites where blackleg did not occur, however, yields of recent varieties were not greatly higher than earlier released varieties. Glucosinolate and erucic acid content were greatly reduced but oil, protein and oleic acid content have not been increased by breeding. Recently released varieties have tended to be shorter than older varieties but days to flowering have changed little.

INTRODUCTION

Oilseed brassica breeding began in Australia in the early 1970's with three public breeding programs which were later followed by two private companies. Breeding objectives were to produce high yielding canola quality varieties with high levels of resistance to blackleg. During the 1980's and early 1990's new varieties were released which had increased yields and improved quality (Potter *et al.*, 1989,1991). The aim of this study was to compare a range of Australian rapeseed and canola varieties which had been released over the last 15 years and measure the advances in yield, quality and disease resistance achieved by the breeding programs.

EXPERIMENTAL

In order to ensure that sowing seed used had similar quality, a range of Australian and Canadian varieties (e.g. Target) was grown over summer under irrigation at the same site. Trials were then sown at Bordertown (South Australia), Horsham (Victoria) and Wagga Wagga (New South Wales) in June of 1993 and

1994. Plot size was 10m by 6 or 8 rows, with 3 or 4 replicates. All trials were weed free and had adequate fertiliser but the drought conditions of 1994 reduced yields, particularly at Wagga Wagga. Where blackleg occurred it was scored on a 0-10 scale, with 0 = no plant survival and 10 = 91-100% plant survival. The VBR (Variety blackleg rating) was then calculated:

VBR = (varietal score-minimum score)*10 / (maximum score-minimum score)

Plots were harvested by machine to determine grain yield and the grain quality was analysed using an NIRSystems 4500 scanning NIR spectrophotometer and a Varian 3700 gas chromatograph.

RESULTS AND DISCUSSION

Blackleg scores (VBR) for varieties released in the late 1980's and early 1990's indicate the increased resistance of these varieties to blackleg and the associated high grain yields where blackleg occurred (Table 1). (At one site where blackleg occurred a high coefficient of variation for grain yield was measured and that site was not included in Table 1). However, yields achieved by the same varieties in the absence of blackleg were not that much higher than those of varieties released in the early 1980's. This may be due to the later than optimal sowing date in both years caused by the late start to the season.

TABLE 1. Mean yield, blackleg score, quality, height and days to flowering of rapeseed and canola varieties in 1993 and 1994

Year of release	Variety	% Mean yield		Blackleg	Total glucosinolates	Height	Days
		Without blackleg (4 sites)	With blackleg (1 site)	Mean VBR (2 sites)	Whole seed @ 8.5% moisture	(cm)	Sowing to flower
1966	Target	84.5	37.4	1.58	45	118	108
1979	Wesway	93.5	97.3	3.78	32	114	105
1980	Wesroona	105.5	117.0	8.16	13	116	103
1984	Wesbrook	81.1	91.6	6.18	14	108	99
1987	Shiralee	94.0	118.5	8.68	9	116	103
1987	Maluka	98.8	105.6	7.01	11	102	100
1988	Taparoo	110.2	101.9	5.61	10	102	97
1989	Eureka	105.9	110.4	8.94	7	111	101
1990	Barossa	109.5	123.2	10.0	7	110	103
1990	Yickadee	102.6	126.5	9.21	9	108	103
1992	Oscar	102.4	128.8	9.48	6	111	104

Canola quality increased rapidly with low erucic acid (<2%, data not shown) and low glucosinolate varieties being released from 1984. Glucosinolate levels rapidly decreased so that recent varieties had levels of less than half the value needed for canola quality (Table 1). However, while these quality factors improved, the oil and protein content did not improve (at three sites in 1993 the mean oil and protein content were 42.8 and 32.1 percent respectively). Likewise the oleic acid content of varieties changed little (mean of 61.2 percent except for Target which contained only 28.9 percent oleic acid). The only exception for quality was Yickadee which produces higher than average oil, protein and oleic acid contents, the only variety to produce similar oil and protein to Target. The variety Dunkeld, released in 1993, and only included in these trials in 1994, also has high oil and protein content (data not shown).

While varieties of canola are now earlier to flower than Target (and other Canadian varieties tested in 1994) there was little difference in flowering date for most varieties tested except for some specific varieties which were developed for early districts (e.g. Taparoo). The most recent varieties released also are slightly shorter than varieties released up to the mid 1980's (Table 1). This has been a deliberate selection because of the risk of lodging of tall crops, particularly in years when crops can be sown early, and also because tall crops are more difficult to windrow than shorter crops.

Breeding aims in the Australian programs continue as in the past, that is: high levels of blackleg resistance, higher grain yields and achieving low erucic acid and glucosinolates. However, greater oil and protein content are now major objectives in all breeding programs. Also, more testing is being undertaken to develop specific genotypes for specific environments so that a greater range of maturity types is being evaluated than in the past. These include earlier and later flowering lines as well as triazine resistant lines. Canola production in Australia is expanding out of the traditional areas into a range of different environments and new varieties are needed to perform well in these areas.

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