Response of canola to wider row spacing in southern New South Wales

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ABSTRACT

There has been a trend in recent years for row spacing to be increased in order to cope with zero till and stubble retention cropping systems. However, wider rows have been reported to reduce grain yield in a range of crops. We report here the results from canola trials, with a number of varieties and a range of row spacings, grown as part of the Variety Specific Agronomy Packages (VSAP) project. The trials were located across a wide range of rainfall and soil types in southern New South Wales. Site mean yield ranged from 0.1 to 3.7 t/ha. Yield response to wider rows was variable, ranging from no response to significant yield reductions. The implications of these findings on potential machinery set up for stubble retention systems will be discussed.

INTRODUCTION

Increased interest in no-tillage and stubble retention has focused attention on row spacing. The traditional row spacing in southern NSW has been 18 cm (7”), but there is a trend for farmers to use wider row spacing. The interest in wider row spacing is due to the perceived advantages of: increased stubble handling ability of seeding equipment, lower draft of equipment, lower cost of machinery, soil water saved for the grain filling period, faster sowing speeds (as soil throw between neighbouring rows is reduced), and ability to use incorporated by sowing (IBS) herbicides such as Trifluralin and Pendimethalin at higher label rates than a conventional system. However, there are also a number of potential disadvantages of wide row spacing including slower to reach full ground cover of crop, increased evaporation from soil surface, reduced competitiveness with weeds, increased need to separate the fertilizer band from the seed as higher rates of fertiliser can become toxic when concentrated in wider rows and grain yield reduction.

In Australia, Felton et al. (2004) found yield of 50 cm row space similar to 30 cm. Kleeman and Gill (2010) found yield of 40 cm row spacing lower yielding than 20 cm and Sanderson and Lee (1998) found yield of 35cm row spacing lower yielding than 23cm row spacing. In Canada, wider rows have been reported to reduce establishment (Anon, 2001; Hartman, 2003; Xie et al., 1998) and the grain yield (Anon, 2001; Hartman, 2003; Hendrickson and Henson, 2005; Xie et al., 1998) of canola. These studies all used different row spacings, 20, 25 & 30 cm, 10, 20, & 30 cm and 25, 38 & 51 cm respectively. However, widening row space from 15 and 30 cm has been reported to have no effect on grain yield in Canada (Johnson and Hanson, 2003). This paper reports on canola row spacing experiments conducted in southern New South Wales between 2007 and 2010.

MATERIALS AND METHODS

Ten canola row space by variety experiments were grown in the field in southern New South Wales in the period from 2007 to 2010 (Table 1). The locations represent a transect across southern New South Wales from high rainfall, high yielding environments to low rainfall low yielding environments. The row space widths in the experiments varied because of the capability of the sowing equipment available. The combinations of row spacings evaluated are presented in Table 1. They represent a range from narrow (15 cm) to very wide (75 cm). All experiments were sown with district practice fertiliser treatments and sprayed to control weeds, diseases and pests as required.

The varieties used changed each year depending on the most common commercial varieties being sown in the year of the trial. Data for individual varieties are not reported. The 10

experiments represent a wide range in mean yields, ranging from 0.10 to 3.74 t/ha (Table 1). These differences were brought about by large differences in growing season rainfall between experiments and between years.

RESULTS

Row spacing had a significant effect on grain yield in seven of the 10 experiments (Table 1 and Fig. 1). In most cases shifting from narrowest to wider row spacing reduced grain yield. However in two experiments at Burrumbuttock the medium row spacing (25cm) was higher yielding than both the narrow and the wider row spacing (Fig. 1).

Table 1. Canola row spacing experiments grown in southern NSW and the significance of variety, row space treatments and interactions.

Experiment Acronym	Location	Year	Row Space treatments (cm)	Site Mean yield (t/ha)	Significance		
					Variety	Row Space	Variety *Row Space
CRSA07COWA2	Cowra	2007	15,30	0.65	*	*	ns
CRSA07MERI2	Merriwagga	2007	15,60	0.10	*	ns	ns
CRSA08BURU2	Burrumbuttock	2008	18,36	0.49	**	ns	ns
CRSA08CONA2	Condobolin	2008	21,42,63	0.41	**	*	*
CRSA08COWA2	Cowra	2008	18,36	3.74	**	*	*
CRSA09COWA2	Cowra	2009	18,24,36	2.99	**	**	ns
CRSA09BURU2	Burrumbuttock	2009	18,24,36	1.73	**	**	ns
CRSA10BURU2	Burrumbuttock	2010	18,24,30,36	2.00	**	*	ns
CRSA10MERI2	Merriwagga	2010	25,50,75	2.53	**	**	ns
CRSA10WARI2	Wagga Wagga	2010	18,24,36	3.29	**	ns	*

** - significant p<0.01, * - significant P=0.05, ns - not significant

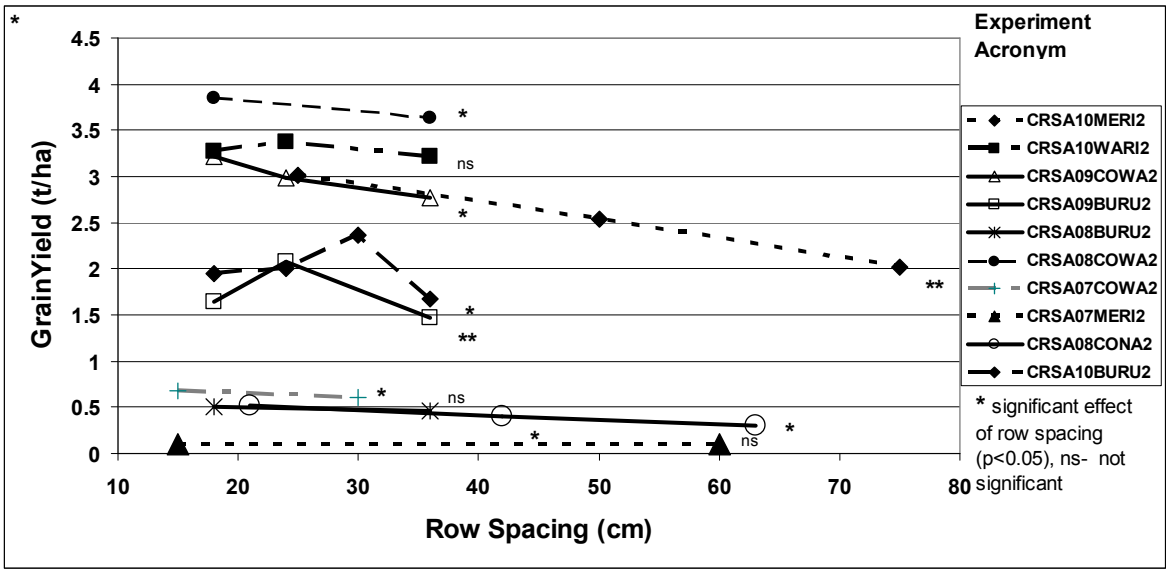

Fig. 1. Grain yield response to spacing in 10 experiments grown in southern New South Wales between 2007 and 2010.

There were significant interactions between variety and row spacing in three of the 10 experiments (Table 1).

DISCUSSION

Grain yield reductions as row space increased above the lowest spacing of 15 to 25 cm occurred in 7 of the 10 experiments. There was however considerable inconsistency in the response to wider rows. The two trials at Burrumbuttock had higher yield in the 24 cm row spacing compared to the 18 and 36 cm row spacing. This effect is inconsistent and is not clear whether shifting from 18 to 24 cm has an effect on grain yield. The reductions in grain yield in response to wider rows spacing occurred in both high and low yielding experiments. On balance it seems that widening rows from 18 to 36 cm reduces yield. However, these yield reductions are inconsistent and consequently difficult to quantify. It is clear that widening row spacing to more than 36 cm reduces grain yield. These effects appear to be less pronounced and less consistent than yield losses in cereals when row space is increased from 18 to 36 cm.

Canola does seem to be less sensitive to row spacing than the cereals. It therefore seems logical to set row spacing of seeding equipment based on the best row spacing for cereals. This row spacing will also be appropriate for canola.

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