Competitive crops

This trial investigates opportunities to reduce the dependence on grass herbicides for the control of grass weeds in wheat

Summary: High sowing rates (120kg) and narrow row spacings (17 cm or 7 inches) had the highest yield in all wheat varieties tested. These results were repeatable over two dry seasons (1997 and 1998). Weed numbers were reduced when crops were most competitive (narrow row spacing and high sowing rates).

Background

The dependence on the fop and dim group of herbicides for controlling grass weeds such as ryegrass and wild oats in wheat and barley has resulted in these weeds becoming resistant to these groups of herbicides. The trend in the farming community towards minimum tillage in the last decade has resulted in wider row spacings at sowing which has increased the space available for weed growth. Increasing crop cover may be an effective control option for grass weeds and it will be cheaper compared to using grass herbicides.

Method

Three different wheat varieties were sown at two sites (Birchip and the Resistant Ryegrass site) at three sowing rates (60, 90 and 120kg) and three row spacings (17, 22 and 34 cm, or 7, 9 and 14 inches). All treatments were replicated and measurements included crop establishment, weed cover and yield.

Results

At both sites yields increased significantly with the higher sowing rates and narrow row spacings (Table 2.9).

Table 2.9 Wheat yield (t/ha) at Birchip (three varieties, three row spacings and three sowing rates)

	Frame			Goldmark			Silverstar		
row width cm / **sow rate kg/ha**	**17**	**22**	**34**	**17**	**22**	**34**	**17**	**22**	**34**
60	2.56	2.41	1.89	2.40	2.30	1.71	2.43	2.21	1.55
90	2.64	2.48	2.11	2.42	2.41	1.88	2.57	2.63	1.74
120	2.71	2.59	2.08	2.65	2.63	1.94	2.63	2.38	1.97
Significant diff: sow rate	**P<0.01 LSD=0.08**								
row width	**P<0.01 LSD=0.09**								

At the Resistant Ryegrass site the varieties sown were Frame, Goldmark and Rosella. The frost in October reduced yields by at least 50%. At this site Rosella was by the best performer in yield. The higher yield trend with higher sowing rates and narrower row spacings was exactly the same at the Resistant Ryegrass site as at Birchip (Table 2.10)

Table 2.10 Wheat yield (t/ha) at Resistant Ryegrass Site (three varieties, three row spacings and three sowing rates)

	Frame			Goldmark			Rosella		
row width cm sow rate kg/ha	17	22	34	17	22	34	17	22	34
60	0.49	0.51	0.43	0.51	0.45	0.47	1.48	1.67	1.18
90	0.75	0.70	0.53	0.88	0.72	0.63	1.58	1.57	1.30
120	0.93	0.87	0.72	0.94	0.93	0.76	1.84	1.70	1.43
Significant diff: sow rate	P<0.001 LSD=0.12								
row width	P<0.001 LSD=0.11								

Grain quality also improved with narrower spacings and higher sowing rates (Table 2.11). As the sowing rate increased and row spacings were narrower the screenings decreased. Frame had lower screenings compared to Goldmark and Silverstar. Conversely, protein contents were highest for the lowest sowing rate (eg. Goldmark 60 kg: 10.5%, 90kg: 10.4% and 120kg: 10.0%). Frame had the highest protein content (10.5%), followed by Goldmark (10.3%), followed by Silverstar (9.8%).

Table 2.11 Screenings (%) in wheat at Birchip (three varieties, three row spacings and three sowing rates)

	Frame			Goldmark			Silverstar		
row width cm sow rate kg/ha	17	22	34	17	22	34	17	22	34
60	3.7	4.1	5.0	6.6	6.2	12.7	6.3	7.4	8.7
90	3.3	3.9	4.2	6.3	5.9	9.1	6.5	6.3	7.5
120	2.8	3.2	4.8	6.0	6.4	8.3	5.8	6.7	7.9
Significant diff: sow rate	P<0.05 LSD=1.6								
row width	P<0.001 LSD=1.5								

Grass weed numbers were much less when wheat was sown at high rates and narrow row spacings (Table 2.12). The trends were the same at the Resistant Ryegrass site although at this site the ryegrass numbers were still unacceptably high at the narrowest row spacings and highest sowing rate.

Table 2.12 Ryegrass (stalks/m^2) at Birchip (three varieties, three row spacings and three sowing rates)

	Frame			Goldmark			Silverstar		
row width cm sow rate kg/ha	17	22	34	17	22	34	17	22	34
60	65	212	259	189	159	246	94	154	301
90	124	154	245	111	166	190	58	157	265
120	60	116	281	132	146	187	36	60	203
Significant diff: sow rate	P<0.05, LSD=35								
row width	P<0.01, LSD=35								

Interpretation

The 1997 and 1998 seasons were dry in the Birchip district. In both years the highest yielding crops were those sown at the highest rate (120 kg/ha) and at the narrowest row spacing tested (17cm or 7 inches). The lowest wheat yields were sown at the widest row spacing (34cm or 14 inches) at the lowest sowing rate (60 kg). Screenings were lowest at the highest sowing rate and narrowest row spacings, this could be due to a higher number of primary tillers with larger grain at the highest sowing rates.

Grass weed numbers were successfully reduced at narrower row spacings and higher sowing rates. There were no significant differences between the three varieties in their ability to compete with weeds. The strongest competitive response was from row width, followed by sowing rate.

Commercial Practice

Significant yield benefits can be obtained at narrower row spacings and higher sowing rates. In two dry years (1997 and 1998) these results were repeatable. Effective weed control was obtained at the narrower row spacings and high sowing rates as long as weed numbers were not too high.