INTERACTION OF TIME OF SOWING AND WEED MANAGEMENT ON LUPIN YIELD

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Aims

- To better understand the trade-offs between lupin yield and weed management when lupins are sown using different strategies; dry sowing vs delayed sowing.
- To investigate if shielded spraying can effectively control the large weed populations that often arise after dry sowing.

BACKGROUND

This trial included lupins sown using three strategies; Dry sown vs sowing sown soon after an opening rain, vs delayed sowing so as to control the first flush of weeds prior to sowing.

The lupins were sown in two row spacings, 25cm and 50cm. For each row spacing some plots were left un-weeded as controls and some were sprayed as per normal. An additional treatment of shielded herbicide application was used on some of the 50cm row plots.

Growers need to know the effect of altering time of sowing and sowing tactic (dry sown vs wet sown) on costs in terms of lupin yield and the benefits in terms of weed control. Shielded herbicide application is one method that might be used to enable continued early sowing and effective weed control. A wide range of herbicides can be applied through plastic shields that direct chemical between the rows of the lupin crop. Because non selective herbicides can be used the impact of weeds that have developed resistances to selective herbicides is reduced.

TRIAL DETAILS						
Property	Bruce White, Winchester					
	3 times of sowing					
	2 row spacings; 25cm and 50cm Weed management used : 25cm unsprayed 25cm sprayed as per normal					
Treatments						
	50cm unsprayed					
	50cm sprayed as per normal					
	50cm Shield sprayed with non selective herbicide applied between rows and selective					
	herbicides applied on the row.					
Plot size & replication	20m x 2m x 4 replications					
Soil type	Gravelly sand					
Sowing dates	23/4/07 (Dry), 28/5/07 (Soon after rain), 26/6/07 (Delayed sowing)					
Seeding rate	100 kg/ha Mandelup lupin					
Fertiliser (kg/ha)	At seeding 100 kg/ha Superphos, deep banded					
Paddock rotation	2004 = Lupin, 2005 = Wheat, 2006 = Barley					
	Immediately before each sowing knockdown and 1.5 L/ha Simazine					
	10/7/07: Select 250 mL/ha.					
	18/7/07: Shielded herbicide treatment applied to lupins sown on 23/4/07 and 28/5/07.					
	100 mL/ha Brodal [®] & 400 mL/ha Simazine directed onto row. 1.0 L/ha Spray-seed [®]					
	between rows.					
Herbicides	18/7/07: Broadcast herbicide treatment applied to lupins sown on 23/4/07 and 28/5/07.					
	100 mL/ha Brodal [®] & 400 mL/ha Simazine.					
	31/7/07: Shielded herbicide treatment applied to lupins sown on 26/6/07. 100 mL/ha					
	Brodal [®] & 400 mL/ha Simazine directed onto row. 1.0 L/ha Spray-seed [®] between rows.					
	31/7/07: Broadcast herbicide treatment applied to lupins sown on 26/6/07. 100 mL/ha					
	Brodal [®] & 400 mL/ha Simazine.					
Growing Season Rainfall	148mm					

RESULTS

Crop establishment averaged 43 plants per square metre. Establishment was better at later sowings, in better soil moisture. Time of sowing 1 averaged 40 plants per square metre and time of sowing 3 averaged 45 plants per square metre. The biomass production of lupin plants sown at the first time of sowing was also reduced compared to the other times of sowing; due to the lower plant density. Unsprayed plots contained on average 30 weeds, shielded sprayed plots 23 weeds and those sprayed with conventional herbicide 11 weeds. Hence in this instance shielded spraying was not as effective at controlling weeds as broadcast herbicide application.

Yields averaged 697 kg/ha. Plots sown at the first time of sowing yielded the most, 747 kg/ha. Plots sown at the last time of sowing yielded the least, 654 kg/ha. Shield sprayed plots yielded poorly compared to conventionally sprayed plots; 589 kg/ha compared to 744 kg/ha. This occurred because lupin plants were damaged by herbicide drift during the shield spraying operation. It is important to note that due to the dry start to the season lupin plants were small when the weeds required spraying. This reduced the safety of shielded spraying compared to what has been achieved in previous years. Where drift damage had not occurred these 50cm plots out-yielded the 25cm plots. When the shield sprayed treatment was not included in the analysis the 50cm plots yielded 806 kg/ha compared to 643 kg/ha for the 25cm spacings. This is consistent with previous research showing that in dry seasons wide row spacings are a good option.

			Establish- ment (p/m2)		Weeds per plot 26/9		Biomass 5/9		Biomass 26/9		Grain protein (%)	
Sowing	Row	Weed										
time	spacing	management	Av.	SE	Av.	SE	Av.	SE	Av.	SE	Av.	SE
23/4/07	25cm	Nil	36	1	13	2	132	17	142	6	33.5	0.4
	25cm	Broadcast	36	4	11	6	120	32	136	18	33.0	0.3
	50cm	Nil	41	1	34	15	121	20	96	19	34.2	0.5
	50cm	Broadcast	44	3	9	4	115	17	126	22	32.6	0.1
	50cm	Shield spray	42	7	23	9	104	23	102	21	34.8	0.3
28/5/07	25cm	Nil	37	3	40	4	156	13	156	14	34.7	0.4
	25cm	Broadcast	45	2	7	3	112	12	149	20	33.8	0.5
	50cm	Nil	42	5	35	9	104	19	123	14	33.5	0.2
	50cm	Broadcast	46	3	11	5	115	17	143	13	33.1	0.6
	50cm	Shield spray	50	4	29	11	118	11	126	32	34.1	0.3
26/6/07	25cm	Nil	38	1	17	7	92	10	95	3	33.7	0.3
	25cm	Broadcast	42	4	14	7	106	9	111	12	33.9	0.2
	50cm	Nil	50	3	39	18	102	5	125	24	33.6	0.4
	50cm	Broadcast	47	4	17	7	92	23	130	12	33.3	0.2
	50cm	Shield spray	51	5	18	6	107	6	102	10	34.1	0.4
Average			43	3	21	8	113	16	124	16	34	0.3

Table 1: Lupin establishment, biomass, grain protein and weeds per plot.



Figure 1: Yield of lupins sown at different times in either 25cm or 50cm row spacings under a range of herbicide treatments.

Table 2: Lupin yields (kg/ha).

		Weed management				
Sowing time	Row spacing	NIL	Broadcast	Shield sprayed	Av. TOS	Av. Row spacing
1	25	741	706		747	643
	50	757	943	586		734
2	25	642	660		712	
	50	754	872	631		
3	25	546	561		634	
	50	786	724	551		
Av. weed management		704	744	589		
Sowing t	142 ns					
Row space	57 hs					
Weed ma	69 hs					

COMMENTS

Spray-seed[®] drift during shielded spraying damaged the lupin plants in this trial. Lupins yielded well when sown in rows 50cm apart.

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