

MORLEY RESEARCH CENTRE**Winter linseed: the influence of seed rate, nitrogen and sowing date on the yield of the winter linseed variety Oliver, 1996****Sponsored by Semundo Ltd***J B S Freer and D B Stevens***Summary**

Four target plant populations of 300, 500, 700 and 900 plants/m² were established by sowing 27, 45, 63 and 81 kg/ha of seed respectively of the winter linseed variety Oliver. Sowing was carried out on 3 and 17 October 1995. Nitrogen top dressing was applied on 15 March 1996 at levels of 0, 40 and 80 kg/ha. Actual plant populations closely matched the target populations (except at the highest seedrate) and overwintered populations had a mean survival rate of 85% at the earlier sowing date and 78% at the later sowing date. Whilst both drilling dates survived the winter well the earlier date made more rapid growth in the spring and was more vigorous throughout the season. There was no lodging and the higher populations were more competitive. Yields were higher from the earlier sowing date. It is suspected that the dry season curtailed. Overall, the optimum seed rate was 63 kg/ha (target 700 plants /m²) at the early sowing and in a dry season there was no response to more than 40 kg/ha of nitrogen.

Object

To evaluate the effect of variations of seed rate, nitrogen and time of sowing on the winter linseed variety Oliver.

Method

The winter linseed variety Oliver was sown at four seedrates to produce plant populations of 300, 500, 700 and 900 plants/m². These populations were subjected to three nitrogen fertiliser

*Not for publication without the Director's consent. This report deals primarily with only one years's work, so any conclusions given are provisional

levels and were sown at two times. The seedrates used are shown in Table 1. Seed rate and nitrogen level were fully randomised and replicated three times with sowing date on main plots. Due to this design no statistical comparisons are possible between sowing dates. The seed bed was created using commercial farm machinery at the time of the first sowing date, the second sowing being drilled in to the previously prepared seed bed.

Table 1. *Seedrates used*

Target population (plants/m ²)	Seedrate kg/ha
300	27
500	45
700	63
900	81

Planting and assessment techniques were done according to Morley standard operating procedures.

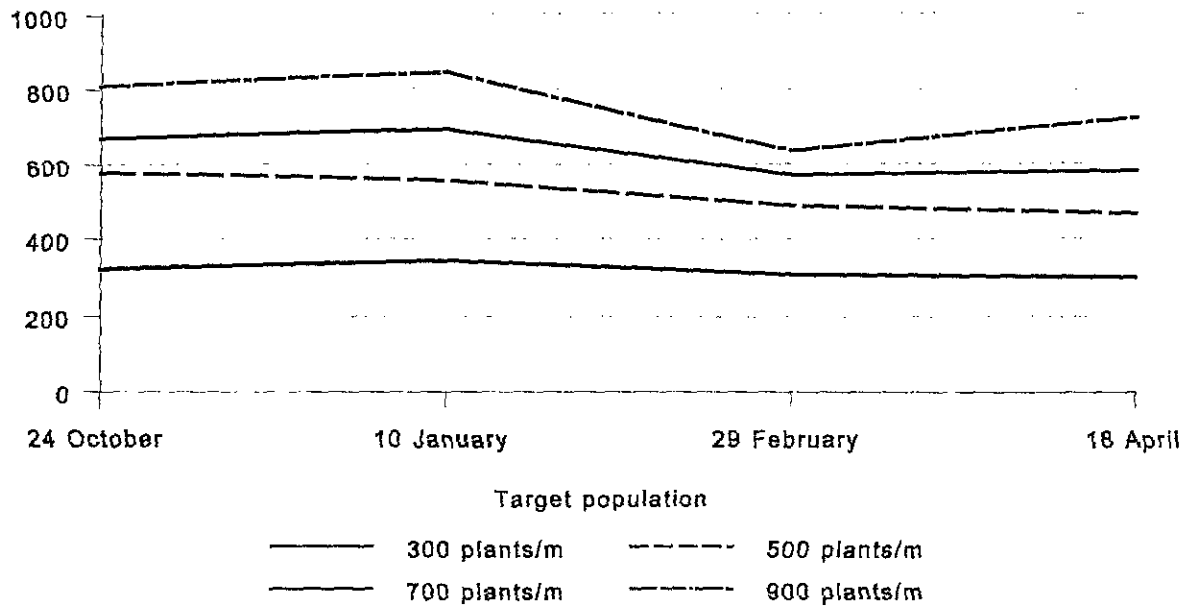
Results and discussion

3 October 1995 sowing date

Plant population

Four significantly different populations were established from the seedrates sown. They closely matched the target populations intended (300, 500, 700 and 900 plants /m²). At the higher population there was more divergence from the target population. This was probably due to inter-plant competition. By 10 January there appeared to have been a secondary germination and plant numbers were slightly higher (Figure 1). Plant populations on 29 February remained close to the target populations except at the highest seedrate. Populations declined by 12.5%, 16.5%, 16.4% and 15% respectively between 10 January (peak establishment) and 18 April. The mean population increased by 5% between 24 October and 10 January and then declined by 18% in the severe conditions of late January and February an overall decline of 15%. There was no further loss between 29 February and 18 April.

Figure 1. *Plant population of linseed (plants/m²) sown on 3 October from establishment to start of spring growth.*



Plant density

The plant density score (Table 2.) and ground cover assessment (Table 3.) show that the lower populations were less effectively competing with weeds. Plant density increased with plant population up to 700 target plants /m².

Table 2. *Plant density score (1=no plants, 9=100% ground cover) of linseed sown on 3 October 1995 on 19 December 1995 (78 days after sowing)*

Seed rate (kg/ha)	Nitrogen (kg/ha)			Mean
	0	40	80	
27	5.3	4.3	4.7	4.8
45	7.3	7.7	7.5	7.5
63	8.3	8.2	8.2	8.2
81	8.5	8.8	8.8	8.7
LSD		0.97		0.56
Mean	7.4	7.3	7.3	
LSD		NS		
SE per plot (22 df) = ± 0.57 or 7.9 CV(%)				

LSD = least significant difference at 95% probability level NS = not significant at 95% probability level

Table 3. *Plant density (% ground cover) of linseed sown on 3 October 1995 on 18 March 1996 (179 days after sowing).*

Seed rate (kg/ha)	Nitrogen (kg/ha)			Mean
	0	40	80	
27	46.7	50.0	48.3	48.3
45	71.7	73.3	71.7	72.2
63	83.3	85.0	81.7	83.3
81	88.3	85.0	86.7	86.7
LSD		9.19		5.31
Mean	72.5	73.3	72.1	
LSD		NS		
SE per plot (22 df) = ± 0.57 or 7.9 CV(%)				

Crop competitiveness

There were no differences in crop competition when assessed on 12 June or on 15 July (Tables 4 - 5).

Table 4. *Crop competitiveness score (0=very weak, 10=very competitive) of linseed sown on 3 October 1995 on 12 June 1996*

Seed rate (kg/ha)	Nitrogen (kg/ha)			Mean
	0	40	80	
27	8.6	8.5	8.8	8.6
45	8.9	9.0	8.8	8.9
63	9.0	9.2	9.2	9.1
81	9.0	9.1	9.2	9.1
LSD		NS		NS
Mean	8.9	9.0	9.0	
LSD		NS		

SE per plot (22 df) = ± 0.57 or 7.9 CV(%)

Table 5. *Crop competitiveness score (0=very weak 10=very competitive) of linseed sown on 3 October 1995 on 15 July 1996*

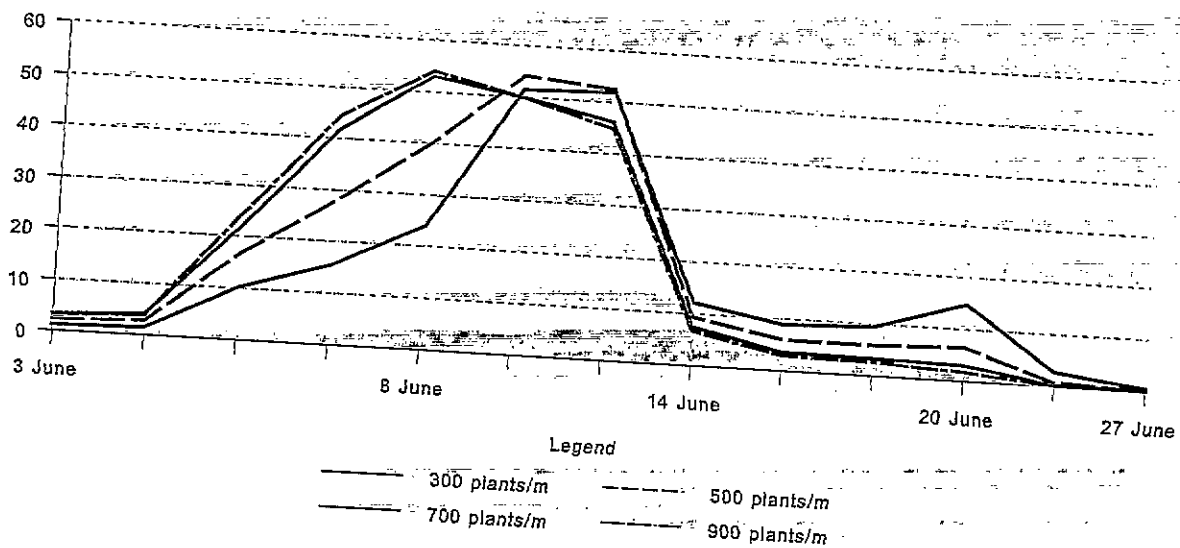
Seed rate (kg/ha)	Nitrogen (kg/ha)			Mean
	0	40	80	
27	8.5	8.4	8.9	8.6
45	9.2	9.1	8.9	9.0
63	9.1	9.2	9.3	9.2
81	9.2	9.2	9.2	9.2
LSD		0.37		0.22
Mean	9.0	9.0	9.1	
LSD		NS		

SE per plot (22 df) = ± 0.57 or 7.9 CV(%)

Flowering

There were significant differences in the duration of flowering associated with each plant population. Assessments of the percentage of each plot in flower showed that the lowest seedrate (27 kg/ha) resulted in an extended flowering period from the onset of flowering on 3 June until the end of flowering on 27 June. Plots sown at the higher seedrates (63 and 81 kg/ha) tended to confine most of their flowering to a six-day period between 6 and 12 June whereas the lower seedrates (27 and 45 kg/ha), whilst starting at the same time, were still flowering on 20 June. Nitrogen level had no effect on flowering.

Figure 2. *Percent plot in flower of linseed sown on 3 October 1995*



Stem stiffness and crop height

Lower seedrates tended to produce a stiffer score although there was no lodging. Nitrogen had no significant effect. The lowest seedrate and plant population resulted in a slightly shorter crop. There was no significant effect from differing nitrogen levels.

Table 6. Stem stiffness score (1=very weak 9=very stiff) of linseed sown on 3 October 1995 on 29 July 1996.

Seed rate (kg/ha)	Nitrogen (kg/ha)			Mean
	0	40	80	
27	7.0	7.2	6.8	7.0
45	6.4	6.2	6.7	6.5
63	6.4	6.1	5.7	6.1
81	6.6	5.9	5.8	6.1
LSD		0.74		0.42
Mean	6.6	6.4	6.3	
LSD		NS		
SE per plot (22 df) = ± 0.57 or 7.9 CV(%)				

Table 7. Crop height (cm) of linseed sown on 3 October 1995 on 7 August 1996.

Seed rate (kg/ha)	Nitrogen (kg/ha)			Mean
	0	40	80	
27	54.1	55.2	57.5	55.6
45	58.8	61.1	57.3	59.0
63	60.7	60.7	62.3	61.2
81	57.0	58.8	61.5	59.1
LSD		3.49		2.01
Mean	57.6	58.9	59.7	
LSD		NS		
SE per plot (22 df) = ± 0.57 or 7.9 CV(%)				

Fertile stems

Seedrates resulted in significant differences in the number on fertile tillers (Table 8), however the number of tillers per plant were very similar for the four seed rates at 1.8, 1.7, 1.7 and 1.6 respectively. Nitrogen level had no effect on fertile tillers.

Table 8. Number of fertile stems/m² of linseed sown on 3 October 1995 on 10 June 1996.

Seed rate (kg/ha)	Nitrogen (kg/ha)			Mean
	0	40	80	
27	516	504	576	532
45	762	814	769	782
63	928	1032	944	968
81	1068	1173	1176	1139
LSD		122.4		70.7
Mean	819	881	866	
LSD		NS		
SE per plot (22 df) = ± 0.57 or 7.9 CV(%)				

Crop maturity

There was no difference in crop maturity on 29 July (Table 9.).

Table 9. Crop maturity score (0=100% plot green 10=100% plot brown) of linseed sown on 3 October 1995 on 29 July 1996.

Seed rate (kg/ha)	Nitrogen (kg/ha)			Mean
	0	40	80	
27	8.0	7.9	8.0	8.0
45	8.0	8.3	8.1	8.1
63	8.0	8.2	8.2	8.1
81	8.0	8.2	8.2	8.1
LSD		NS		NS
Mean	8.0	8.1	8.1	
LSD		NS		
SE per plot (22 df) = ± 0.57 or 7.9 CV(%)				

Seed yield

Yield increased as seed rate rose from 27 kg/ha to 45 kg/ha and from 45 kg/ha to 63 kg/ha but not thereafter (Table 10). There was a yield increase from applying 40 kg/ha nitrogen but no advantage from applying 80 kg/ha. There was an interaction between seed rate and nitrogen level. At nil and 40 kg/ha of nitrogen, yield increased significantly as seedrate was increased from 27 to 45 kg/ha. Only at the highest level of nitrogen tested (80 kg/ha) did the response to seedrate continue to 63 kg/ha of seed. There was no response to the highest seedrate at any nitrogen input tested.

Table 10. *Seed yield (t/ha at 91% dry matter) of linseed sown on 3 October 1995.*

Seed rate (kg/ha)	Nitrogen (kg/ha)			Mean
	0	40	80	
27	1.99	2.16	2.20	2.11
45	2.06	2.30	2.22	2.19
63	2.13	2.34	2.41	2.29
81	2.03	2.26	2.30	2.20
LSD		0.121		0.070
Mean	2.05	2.27	2.28	
LSD		0.061		

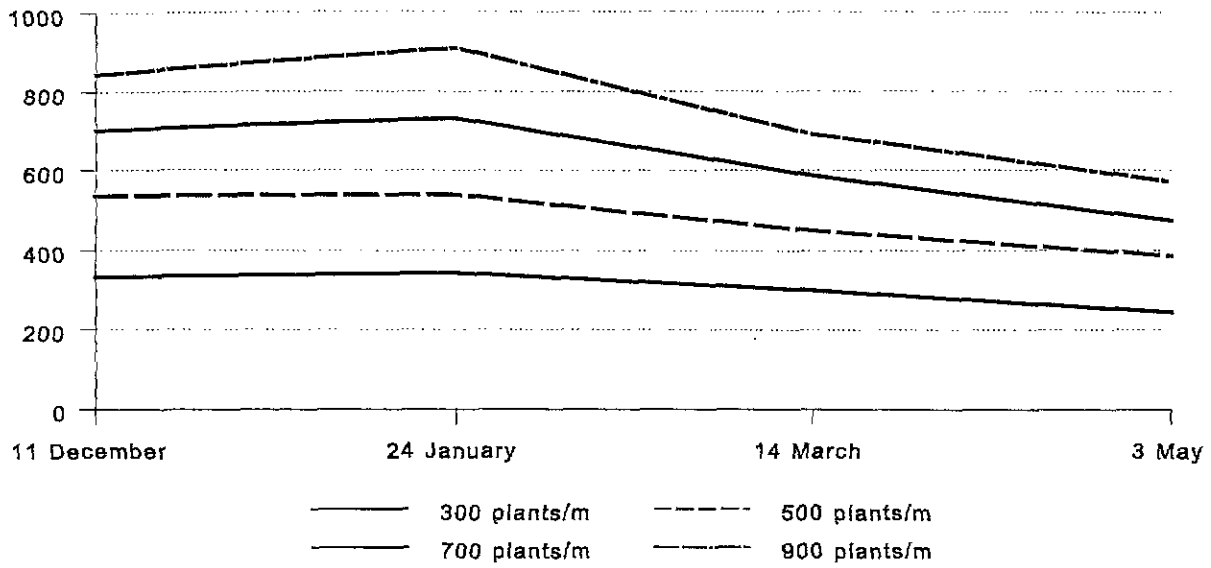
SE per plot (22 df) = ± 0.57 or 7.9 CV(%)

NAS 986 - 17 October 1995 sowing

Plant population

The established plant populations were close to the target and significantly different from each other. As with the earlier sowing there appeared to have been a second germination during the early winter. Overwintered populations remained significantly different from each other. The percentage survival (comparing the peak population on 24 January) for each population was 86%, 80%, 75% and 69% respectively. Final spring populations showed a greater reduction overall compared with the early sowing date.

Figure 3. *Plant population of linseed (plants/m²) sown on 17 October from establishment to start of spring growth*



Plant density

The plant density scores (Tables 11 & 12) showed a similar pattern to the plant population counts. Plant density score showed a close correlation to plant population.

Table 11. *Plant density score (1=no plants, 9=100% ground cover) of linseed sown on 17 October 1995 on 19 December 1995 (64 days after sowing).*

Seed rate (kg/ha)	Nitrogen (kg/ha)			Mean
	0	40	80	
27	2.17	2.50	2.00	2.22
45	2.83	3.17	3.00	3.00
63	3.33	3.33	3.17	3.28
81	4.00	3.83	3.67	3.83
LSD		0.390		0.225
Mean	3.08	3.21	2.96	
LSD		0.195		
SE per plot (22df) = ± 0.57 or 7.9 CV(%)				

Table 12. *Plant density score (% ground cover) of linseed sown on 17 October 1995 on 18 March 1996 (165 days after sowing).*

Seed rate (kg/ha)	Nitrogen (kg/ha)			Mean
	0	40	80	
27	9.3	12.3	9.3	10.3
45	25.0	30.0	28.3	27.8
63	40.0	43.3	41.7	41.7
81	46.7	46.7	48.3	47.2
LSD		5.54		3.20
Mean	30.3	33.1	31.9	
LSD		NS		
SE per plot (22df) = ± 0.57 or 7.9 CV(%)				

Crop competitiveness

Lower populations were less competitive than the higher populations (Tables 13 & 14).

Table 13. *Competitiveness score (0=very weak 10=very competitive) of linseed sown on 17 October 1995 on 12 June 1996*

Seed rate (kg/ha)	Nitrogen (kg/ha)			Mean
	0	40	80	
27	6.1	6.5	6.1	6.2
45	7.0	7.0	6.5	6.8
63	7.1	7.0	7.1	7.1
81	7.0	7.4	7.4	7.3
LSD		0.56		0.32
Mean	6.8	7.0	6.8	
LSD		NS		
SE per plot (22 df) = ± 0.57 or 7.9 CV(%)				

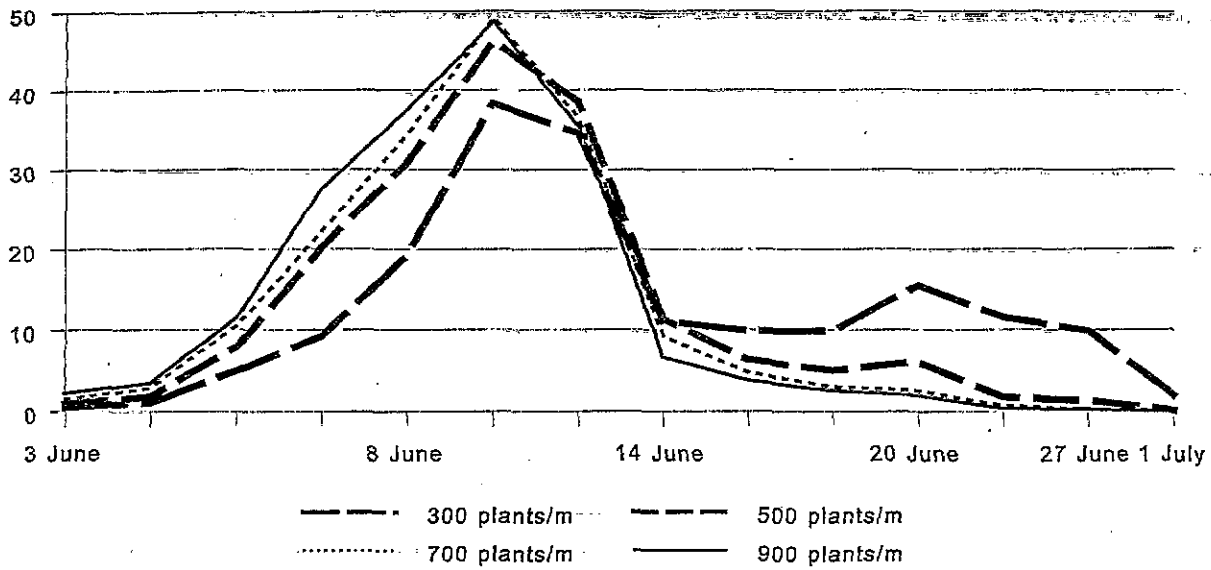
Table 14. *Competitiveness score (0=very weak 10=very competitive) of linseed sown on 17 October 1995 on 16 July 1996*

Seedrate (kg/ha)	Nitrogen (kg/ha)			Mean
	0	40	80	
27	5.8	6.3	5.7	5.9
45	6.7	6.6	6.4	6.5
63	6.9	6.9	6.8	6.9
81	6.9	7.0	7.3	7.1
LSD		0.57		0.33
Mean	6.6	6.7	6.5	
LSD		NS		
SE per plot (22 df) = ± 0.57 or 7.9 CV(%)				

Flowering

There were significant differences in the duration of flowering associated with plant population. This was most noticeable with the lowest population where the flowering period was more extended than the three higher populations (Figure 4).

Figure 4. Percent plot in flower of linseed sown on 17 October 1995



Stem stiffness and crop height

There was no difference in stem stiffness (Table 15) but the crop was very short (Table 16) with the lowest seedrate producing the shortest crop. There was no significant effect caused by nitrogen.

Table 15. *Stem stiffness score (0=very weak 10=very stiff) of linseed sown on 17 October 1995 on 29 July 1996.*

Seedrate (kg/ha)	Nitrogen rate			Mean
	0	40	80	
27	9.4	9.3	9.4	9.4
45	9.1	9.1	9.1	9.1
63	9.1	9.0	9.1	9.1
81	9.1	9.0	9.0	9.0
LSD		0.13		0.07
Mean	9.2	9.1	9.2	
LSD		NS		
SE per plot (22 df) = ± 0.57 or 7.9 CV(%)				

Table 16. *Crop height (cm) of linseed sown on 17 October 1995 on 7 August 1996.*

Seed rate (kg/ha)	Nitrogen (kg/ha)			Mean
	0	40	80	
27	37.0	35.8	35.0	36.0
45	41.2	42.8	40.7	41.6
63	41.7	42.6	40.3	41.5
81	44.0	43.6	45.2	44.2
LSD		4.42		2.55
Mean	41.0	41.2	40.3	
LSD		NS		
SE per plot (22 df) = ± 0.57 or 7.9 CV(%)				

Fertile stems

Tillers per plant showed a greater variation at the later sowing than at the early timing being 1.8, 1.6, 1.5 and 1.5 respectively (Table 17).

Table 17. *Number of fertile stems/m² of linseed sown on 17 October 1995 on 10 June 1996.*

Seed rate (kg/ha)	Nitrogen (kg/ha)			Mean
	0	40	80	
27	401	459	472	444
45	625	644	623	631
63	718	757	723	733
81	829	826	854	836
LSD		82.2		47.5
Mean	643	672	668	
LSD		NS		

SE per plot (22df) = ± 0.57 or 7.9 CV(%)

Crop maturity

There was no difference in maturity. This may have been due to the rapidity of senescence due to the very dry conditions (Table 18).

Table 18. *Maturity score (0=100% plot green 10=100% plot brown) of linseed sown on 17 October 1995 on 30 July 1996*

Seed rate (kg/ha)	Nitrogen (kg/ha)			Mean
	0	40	80	
27	6.3	6.6	6.5	6.5
45	7.6	7.4	7.5	7.5
63	7.5	7.9	7.8	7.7
81	7.7	7.8	7.8	7.8
LSD		0.55		0.32
Mean	7.3	7.4	7.4	
LSD		NS		
SE per plot (22df) = ± 0.57 or 7.9 CV(%)				

Seed yield

Yield increased with each rise in seed rate and when 40 kg/ha was applied (Table 19).

Table 19. *Seed yield (t/ha at 91% dry matter) of linseed sown on 17 October 1995*

Seed rate (kg/ha)	Nitrogen (kg/ha)			Mean
	0	40	80	
27	1.26	1.32	1.33	1.31
45	1.36	1.50	1.49	1.45
63	1.37	1.47	1.52	1.45
81	1.45	1.54	1.61	1.53
LSD		0.141		0.082
Mean	1.36	1.46	1.49	
LSD		0.071		
SE per plot (22df) = ± 0.57 or 7.9 CV(%)				

Appendix

The following information is presented as an appendix.

Field details

Method

Experiment diary

Results

Table A1. Plant population (plants/m²) of linseed sown on 3 October 1995 on 24 October 1995 (22 days after sowing).

Table A2. Plant population (plants/m²) of linseed sown on 3 October 1995 on 10 January 1996 (100 days after sowing).

Table A3. Plant population (plants/m²) of linseed sown on 3 October 1995 on 29 February 1996 (150 days after sowing).

Table A4. Plant population (plants/m²) of linseed sown on 3 October 1995 on 18 April 1996 (210 days after sowing).

Table A5. *Percent plot in flower of linseed sown at four different seed rates on 3 October 1995 between 3 and 27 June 1996.*

Table A6. *Percent plot in flower of linseed sown at three different nitrogen levels on 17 October 1995 between 3 and 27 June 1996.*

Table A7. Plant population (plants/m²) of linseed sown on 17 October 1995 on 11 December 1995 (55 days after sowing).

Table A8. Plant population (plants/m²) of linseed sown on 17 October 1995 on 24 January 1996 (100 days after sowing).

Table A9. Plant population (plants/m²) of linseed sown on 17 October 1995 on 14 March 1996 (150 days after sowing).

Table A10. Plant population of linseed sown on 17 October 1995 on 3 May 1996 (210 days after sowing).

Table A11. Percent plot in flower of linseed sown at four different seed rates on 17 October 1995 between 3 and 27 June 1996.

Table A12. Percent plot in flower of linseed sown at three different nitrogen levels on 17 October 1995 between 3 and 27 June 1996.

Field details

Site	Manor Farm, Morley Research Centre			
Field reference	Home Close [ref 3M]			
Crop	winter linseed			
Variety	Oliver			
Previous crop 1995	winter wheat			
	1994	sugar beet		
	1993	winter wheat		
	1992	winter beans		
Soil type and series	sandy loam over chalky bouldre clay (Ashley series)			
Soil analysis	pH	P	K	Mg
6 September 1993	8.0	3.3	1.2	2.1
Seed	C1 generation			
Seedrate	see trial details			
Date sown	see trial details			
Nutrients applied	Rate (kg/ha) see trial details			
Cultivations	5 October 1995	ploughed and pressed power harrowed		

Applications to crop

Date	GS	Item	Dose/ha
13 March 1996		Ally (metsulfuron-methyl, 20% w/w)	20 g
30 April		Vindex (bromoxynil, 240g + clopyralid, 50g)	0.75 l
26 July		Roundup Biactive (glyphosate, 360g)	3.00 l

Method

This is an abbreviated version of the standard operating procedures used at Morley Research Centre.

1 Plot layout

- 1.1 Plots were sown with an Oyjord drill. The drilled plots were 24 m long and 1.56 m wide from outside row to outside row (14 rows at 12.0 cm spacing). Plots were separated by a buffer of the same size with a 54 cm gap between successive plots and buffers. This gave an effective plot width of 2.10 m, which was used for harvest yield calculations. Treatments were applied to the plot and to half of the buffer at each side.
- 1.2 Common treatments such as insecticides, herbicides, fungicides and growth regulators were applied across all plots with farm machinery using wheelings, 12 m apart. For harvest purposes, plot length was reduced to 9.0 or 9.5 m depending on track and tyre size.

2 Agronomic factors

- 2.1 Plant population was determined by making six counts of a 30.5 x 30.5 cm quadrat per plot.
- 3.4 Crop height was determined by measuring the average height from ground level to the base of the capsules, of a group of 5-10 fertile tillers at 10 sites per plot.
- 3.5 Fertile tiller population was determined by recording the number of capsule bearing stems in eight 30.5 x 30.5 cm quadrats per plot.

3. Weather records

- 3.1 Weather data were obtained from a Campbells "Automatic Weather Station". Recordings are taken every minute and summarised every fifteen minutes, hourly, and daily.

4 Harvest details

- 4.1 Plots were harvested using a Sampo 2010 combine which was modified for plot work and used electronic weighing (Novatech M864 Loadmeter). Trials were harvested by replicate.

5 Post harvest determinations

- 5.1 Moisture content was determined by taking a 200 g sub sample, oven drying for 40 hours at 100 - 102° C, and weighing at ambient temperature.

Experiment diary

Date	Treatments applied or action
3 October 1995	First sowing of winter linseed
17 October	Second sowing of winter linseed
24 October	Plant count on first sowing (GS 8 true leaves 3 cm high)
11 December	Plant count on second sowing (2-6 expanded leaves)
19 December	Plant density assessment on first (tillering) and second sowing (fourth leaf)
10 January	Plant count on first sowing (6 cm high)
24 January	Plant count on second sowing (6 cm high)
29 February	Plant count on first sowing (7 cm high)
14 March	Plant count on second sowing (4 cm high)
15 March	Nitrogen applied (7-8 cm high)
18 March	Estimate of ground cover (tillering)
18 April	Plant count on first sowing (tillering)
3 May	Plant count on second sowing (15 - 25 cm high)
12 June	Competitiveness score
10 June	Fertile stem count first and second sowing (end of flowering)
3 June - 1 July	Flowering assessments
15 July	Competitiveness score
29 July	Stem stiffness score
30 July	Maturity score
7 August	Crop height measurement
20 August	Harvested

Results

Table A1. *Plant population (plants/m²) of linseed sown on 3 October 1995 on 24 October 1995 (22 days after sowing).*

Seed rate (kg/ha)	Nitrogen (kg/ha)			Mean
	0	40	80	
27	326	329	309	322
45	516	524	513	518
63	676	726	612	671
81	814	818	796	809
LSD		70.1		40.4
Mean	583	599	557	
LSD		NS		
SE per plot (22 df) = ± 0.57 or 7.9 CV(%)				

Table A2. *Plant population (plants/m²) of linseed sown on 3 October 1995 on 10 January 1996 (100 days after sowing).*

Seed rate (kg/ha)	Nitrogen (kg/ha)			Mean
	0	40	80	
27	379	353	302	344
45	584	533	553	557
63	659	703	722	695
81	895	868	801	855
LSD		69.8		40.3
Mean	629	614	594	
LSD		NS		
SE per plot (22 df) = ± 0.57 or 7.9 CV(%)				

Table A3. *Plant population (plants/m²) of linseed sown on 3 October 1995 on 29 February 1996 (150 days after sowing).*

Seed rate (kg/ha)	Nitrogen (kg/ha)			Mean
	0	40	80	
27	298	328	302	309
45	498	504	462	488
63	592	571	553	572
81	658	643	609	637
LSD		60.2		34.7
Mean	512	512	481	
LSD		NS		
SE per plot (22 df) = ± 0.57 or 7.9 CV(%)				

Table A4. *Plant population (plants/m²) of linseed sown on 3 October 1995 on 18 April 1996 (210 days after sowing).*

Seed rate (kg/ha)	Nitrogen (kg/ha)			Mean
	0	40	80	
27	309	309	283	301
45	462	473	460	465
63	592	598	551	581
81	698	757	723	726
LSD		50.0		28.8
Mean	515	534	504	
LSD		NS		
SE per plot (22 df) = ± 0.57 or 7.9 CV(%)				

Table A5. Percent plot in flower of linseed sown at four different seed rates on 3 October 1995 between 3 and 27 June 1996

% plot in flower	3 June	4 June	6 June	7 June	8 June	11 June	12 June	14 June	16 June	18 June	20 June	24 June	27 June
300 plants/m ²	1.2	1.4	10.2	15.4	23.9	51.4	51.9	12.1	8.9	9.4	14.8	2.7	0.5
500 plants/m ²	2.3	2.8	16.7	27.8	39.8	54.2	52.4	9.3	6.0	5.9	6.5	0.8	0.2
700 plants/m ²	3.3	4.1	22.0	41.6	53.1	49.9	46.1	7.4	3.6	3.3	3.1	0.2	0.0
900 plants/m ²	3.1	3.9	24.4	44.3	54.1	49.9	44.9	6.7	3.0	2.8	1.8	0.2	0.0
LSD	1.44	1.74	6.18	6.62	5.59	NS	4.65	1.55	1.42	2.10	4.60	0.80	0.24
SE per plot(%)	1.47	1.78	6.32	6.76	5.72	3.78	4.75	1.58	1.46	2.14	4.71	0.82	0.24
CV(%)	59.4	58.1	34.5	20.9	13.4	7.4	9.7	17.8	27.2	40.0	72.1	83.7	128.3

Table A6. Percent plot in flower of linseed sown at three different nitrogen levels on 3 October 1995 between 3 and 27 June 1996

% plot in flower	3 June	4 June	6 June	7 June	8 June	11 June	12 June	14 June	16 June	18 June	20 June	24 June	27 June
Nil	2.6	3.0	18.6	31.3	41.2	49.9	47.8	8.2	5.2	4.9	4.7	0.8	0.1
40 kg/ha	2.0	2.5	16.1	31.3	43.4	52.8	50.2	9.9	5.7	5.9	8.0	1.2	0.2
80 kg/ha	2.8	3.7	20.3	34.2	42.8	51.3	48.5	8.5	5.2	5.2	6.9	1.0	0.2
LSD	NS	NS	NS	NS	NS	NS	NS	1.34	NS	NS	NS	NS	NS
SE per plot(%)	1.47	1.73	6.32	6.76	5.72	3.78	4.75	1.58	1.45	2.14	4.71	0.82	0.24
CV(%)	59.4	58.1	34.5	20.9	13.4	7.4	9.7	17.8	27.2	40.0	72.1	83.7	128.3

Table A7. *Plant population (plants/m²) of linseed sown on 17 October 1995 on 11 December 1995 (55 days after sowing).*

Seed rate (kg/ha)	Nitrogen (kg/ha)			Mean
	0	40	80	
27	324	352	317	331
45	551	541	515	536
63	712	694	699	702
81	859	841	832	844
LSD		64.5		37.3
Mean	611	607	591	
LSD		NS		
SE per plot (22df) = ± 0.57 or 7.9 CV(%)				

Table A8. *Plant population (plants/m²) of linseed sown on 17 October 1995 on 24 January 1996 (100 days after sowing)*

Seed rate (kg/ha)	Nitrogen (kg/ha)			Mean
	0	40	80	
27	354	334	339	342
45	519	563	540	541
63	717	755	727	733
81	887	930	909	909
LSD		63.1		36.4
Mean	619	645	629	
LSD		NS		
SE per plot (22df) = ± 0.57 or 7.9 CV(%)				

Table A9. *Plant population (plants/m²) of linseed sown on 17 October 1995 on 14 March 1996 (150 days after sowing)*

Seed rate (kg/ha)	Nitrogen (kg/ha)			Mean
	0	40	80	
27	310	292	294	299
45	455	457	442	451
63	600	591	571	587
81	668	711	698	692
LSD		67.5		39.0
Mean	508	513	501	
LSD		NS		
SE per plot (22 df) = ± 0.57 or 7.9 CV(%)				

Table A10. *Plant population of linseed sown on 17 October 1995 on 3 May 1996 (210 days after sowing)*

Seed rate (kg/ha)	Nitrogen (kg/ha)			Mean
	0	40	80	
27	238	249	241	243
45	387	400	370	386
63	471	477	479	476
81	563	564	588	572
LSD		51.9		30.0
Mean	415	422	420	
LSD		NS		
SE per plot (22 df) = ± 0.57 or 7.9 CV(%)				

Table A11. Percent plot in flower of linseed sown at four different seed rates on 17 October 1995 between 3 June & 1 July 1996

% plot in flower	3 June	4 June	6 June	7 June	8 June	11 June	12 June	14 June	16 June	18 June	20 June	24 June	27 June	1 July
300 plants/m ²	0.6	1.1	4.9	9.2	19.2	38.3	34.6	11.1	9.9	9.9	15.6	11.6	9.9	2.1
500 plants/m ²	1.0	1.8	7.8	20.1	30.9	46.2	38.6	11.3	6.3	5.0	6.1	1.8	1.4	0.2
700 plants/m ²	1.6	2.9	10.4	22.1	34.4	49.1	36.6	9.2	4.8	3.0	2.6	0.7	0.4	0.1
900 plants/m ²	2.3	3.4	11.4	27.6	37.6	48.7	35.4	6.7	3.8	2.6	2.0	0.4	0.4	0.0
LSD	0.91	1.46	3.59	5.20	5.03	4.10	NS	2.69	1.83	1.80	3.26	2.71	3.19	1.16
SE per plot(%)	0.93	1.49	3.67	5.32	5.15	4.19	4.59	2.75	1.87	1.85	3.33	2.78	3.27	1.19
CV(%)	69.4	64.9	42.5	26.9	16.9	9.2	12.6	28.7	30.3	36.1	50.9	76.7	108.6	202.0

Table A12. Percent plot in flower of linseed sown at three different nitrogen levels on 17 October 1995 between 3 June & 1 July 1996

% plot in flower	3 June	4 June	6 June	7 June	8 June	11 June	12 June	14 June	16 June	18 June	20 June	24 June	27 June	1 July
Nil	1.3	1.9	7.5	15.6	25.8	42.8	37.3	9.6	5.8	5.4	6.7	3.8	3.4	0.7
40 kg/ha	1.4	2.7	9.8	22.8	33.4	46.8	35.2	9.8	6.6	4.9	5.5	3.2	2.7	0.4
80 kg/ha	1.4	2.4	8.6	20.9	32.3	47.2	36.4	9.4	6.3	5.0	7.5	3.9	2.9	0.7
LSD	NS	NS	NS	4.50	4.36	3.55	NS	NS	NS	NS	NS	NS	NS	NS
Seperplot(%)	0.93	1.49	3.67	5.32	5.15	4.19	4.59	2.75	1.87	1.85	3.33	2.78	3.27	1.19
CV(%)	69.4	64.9	42.5	26.9	16.9	9.2	12.6	28.7	30.3	36.1	50.9	76.7	108.6	202.0