MORLEY RESEARCH CENTRE

Plant population, nitrogen and growth regulator for winter linseed, 1997

J B S Freer

Summary

The variety Oliver was sown at target populations of 300, 500, 700 or 900 plants/m². On 11 November 324, 512, 691 and 826 plants/ m² had established. These populations were subjected to either 40 or 80 kg/ha nitrogen with or without New 5C Cycocel during stem extension. Whilst all treatments leaned to some degree, lodging was most severe at the highest plant population and when 80 kg/ha N had been applied. The application of Cycocel when the crop was 70 – 100 mm tall had no effect on the amount of lodging or leaning. Yields were very low (mean 0.83 t/ha). The seed did not fill and Pasmo disease *(Mycosphaerella linicola)* is suspected to have caused this. There were no significant treatment effects.

Object

To examine the relationship between plant population, fertility and the effect of a plant growth regulator on the standing ability and yield of winter linseed.

Method

The trial was drilled on 25 September 1996 into a fine seedbed. Fertiliser was applied by hand on 17 March 1997 and the plant growth regulator on 1 April 1997. Experimental methods were according to standard Morley proceedures and the experiment was harvested on 4 August.

*Not for publication without the Director's consent.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

Results

Table 1. *Plant population on 11 November 1997 (plants/m²)*

	Nitrogen level (kg/ha)				
	Growth regulator				
	40		80		Mean
Target population (plants/m²)	Nil	New 5C Cycocel	Nil	New 5C Cycocel	
300	327	327	332	310	324
500	499	513	517	518	512
700	692	658	698	716	691
900	831	857	806	809	826
LSD		66.6			33.3
Mean (N x PGR)	587	589	588	588	
LSD		NS			
Mean	588		588		
LSD		NS			
SE per plot (30 df)					40.0
CV(%)					6.8

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

Four distinct populations were established and these were very close to the target populations.

Table 2. *Lodging on 30 July 1997 (% plot lodged more than 45°)*

	Nitrogen level (kg/ha) Growth regulator				
	40		80		Mean
Target population (plants/m²)	Nil	New 5C Cycocel	Nil	New 5C Cycocel	
300	5.0	11.0	23.0	42.0	20.0
500	16.0	8.0	33.0	53.0	28.0
700	11.0	15.0	43.0	32.0	25.0
900	23.0	13.0	53.0	60.0	38.0
LSD			16.2		8.1
Mean (N x PGR)	14.0	12.0	38.0	47.0	
LSD			NS		
Mean (N)		13.0		42.0	
LSD			5.7		
SE per plot (30 df)					±9.69
CV(%)					35.0

There was more lodging at the highest plant population and increasing the nitrogen from 40 to 80 kg/ha also increased lodging significantly. The application of a growth regulator had no effect on the amount of lodging.

Table 3. *Leaning on 30 July 1997 (% plot leaning more than 10°)*

	Nitrogen level (kg/ha)				
	Growth regulator				
	40		80		Mean
Target population (plants/m²)	Nil	New 5C Cycocel	Nil	New 5C Cycocel	
300	28.3	35.0	71.7	83.3	54.6
500	36.7	31.7	73.3	86.7	57.1
700	41.7	56.7	83.3	73.3	63.7
900	60.0	43.3	86.7	86.7	69.2
LSD		21.42			10.71
Mean (N x PGR)	41.7	41.7	78.7	82.5	
LSD		NS			
Mean	41.7		80.6		
LSD		7.57			
SE per plot (30 df)					±12.85
CV(%)					21.0

Leaning was widespread and there was more at the highest population and at the higher nitrogen rate. An application of growth regulator had no effect on the amount of leaning

Table 4. *Yield of seed (t/ha at 91% dm)*

	Nitrogen level (kg/ha) Growth regulator				
	40		80		Mean
Target population (plants/m²)	Nil	New 5C Cycocel	Nil	New 5C Cycocel	
300	0.93	0.86	0.78	0.83	0.85
500	0.86	0.83	0.81	0.75	0.82
700	0.90	0.90	0.75	0.87	0.86
900	0.86	0.83	0.70	0.75	0.79
LSD			0.133		NS
Mean (N x PGR)	0.89	0.86	0.76	0.80	
LSD			NS		
Mean		0.87		0.78	
LSD			0.047		
SE per plot (30 df)					0.080
CV(%)					9.6

Yields were disappointing but the reasons are unclear. The seed was poorly filled and post flowering diseases such as pasmo *(Mycosphaerella linicola),* alternaria and botrytis are suspected of reducing the yield. The crop also suffered from thrip attack pre-flowering which was treated but may have contributed to poor seed set. There were no significant differences in yield

Discussion

Actual populations were close to the target indicating good establishment conditions. The crop grew well in the autumn and over-wintered satisfactorily. There was some evidence of thrips at green bud stage and these were controlled. Heavy rainfall in June allowed disease to establish and this is probably the cause of the poor yields. High populations and 80 kg/ha nitrogen caused more lodging and leaning in a higher yielding crop these effects may well have carried through to grain yield. An application of fungicide combined with the growth regulator is planned next season to eliminate disease. Using tebuconazole may also enhance the growth regulatory effect.

Appendix

The following information is presented as an appendix which is available on request.

Method
Field details
Experiment diary

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 fertiliser, insecticides, herbicides and fungicides were applied across all plots with farm machinery using wheelings, 24 m apart. For harvest purposes, plot length was reduced to 20 m.

2 Spraying details

2.1 Treatments were applied using a CO_2 powered backpack sprayer, utilising 'Cornelius' vessels and a 4 m boom (eight nozzles at 0.5 m spacings) with Lurmark F 110 - 03 nozzles at 2 bar pressure, to give 200 l/ha spray volume at 1.6 m/s forward speed.

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 Agronomic factors

4.1 Plant population was determined by making eight counts of a 30.5 x 30.5 cm quadrat per plot.

5 Harvest details

5.1 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.

Field details

Site	Wood Farm, Morley Research Centre
Field reference	Blofelds
Crop	Winter linseed
Variety	Oliver
Previous crop	1996 winter wheat 1995 sugar beet 1993 winter beans 1993 winter wheat
Soil type and series	sandy clay loam Beccles series

Soil analysis (index)	pH	P	K	Mg
29 August 1994	7.8	2	2	2

Seed	C1 generation		
Seedrate	as treatment		
Date sown	25 September 1996		
Nutrients applied	Date	Fertiliser	Rate (kg/ha)
Phosphate	8 September 1996	Payne 0:24:24	30 P_2O_5
Potash	8 September 1996	Payne 0:24:24	30 K_2O
Nitrogen*	6 March 1997	Double Top	39 N
Sulphur	6 March 1997	Double Top	17 S

* The nitrogen was applied to all plots and an additional 40 kg/ha was applied by hand to the 80 kg/ha plots on 17 March.

Cultivations	ploughed and pressed power harrowed

Applications to crop

Date	Item	Dose/ha
11 November 1996	Basagran	1 l/ha
10 March 1997	Vindex	1 l/ha
24 March	Ally	30 g/ha
2 May	Fusilade non ionic wetter	1.3 l/ha 0.2 l/ha
11 July	Roudup Biactive	2.5 l/ha

Experiment diary

Date	Treatments applied or action
25 September 1996	Experiment drilled
11 November	Plant count assessment
17 March 1997	Fertiliser applied
1 April	Cycocel applied
30 July	Lodging and leaning assessed
4 August	Crop harvested