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DESICCATION OF LINSEED WITH REGLONE APPLIED THROUGH AN AIR ASSISTED SPRAYER, 1991

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Summary

Linseed desiccation was compared when 3.0 l/ha Reglone (diquat, 200 g ai/l) plus non-ionic wetter was applied at three spray volumes (400, 200 and 100 l/ha) with and without air assistance through a Hardi Twin Boom System Sprayer. Reglone gave good desiccation and did not affect yield, but improved harvesting. The results suggest that air assistance improved desiccation, especially at spray volumes lower than 400 l/ha.

Object

To compare the effect of Reglone (diquat, 200 g ai/l) applied at three spray volumes both with and without air assistance through a Hardi Twin Boom System sprayer.

Introduction

Sufficient desiccation of linseed is required in order to allow proper harvesting. Once the linseed stems start to wind around the combine reel, the crop is virtually impossible to harvest. Each year a number of growers fail to achieve adequate desiccation of linseed and sometimes blame the chemicals or application method they have used. This trial seeks to determine if air assisted sprayers affect the desiccant activity of Reglone.

Materials and methods

Reglone at 3.0 l/ha plus 0.1% Q9 (non-ionic wetter) was used for all application methods. Treatments were as follows:-

1. Conventional hydraulic @ 400 l/ha using Hardi 4110-30 nozzles
2. " " @ 200 l/ha " " 4110-20 "
3. " " @ 100 l/ha " " 4110-12 "
4. Air-assisted hydraulic @ 400 l/ha using Hardi 4110-30 nozzles
5. " " " @ 200 l/ha " " 4110-20 "
6. " " " @ 100 l/ha " " 4110-12 "
7. Untreated

Plot size was 12 m wide (a complete boom width) by 24 m long and treatments were replicated five times in a randomised block design.

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Harvest area was 12 m long by 2.2 m wide with samples from each side of the tramline. At application, samples of linseed for moisture content determination were taken from the non-harvest areas of each untreated plot .

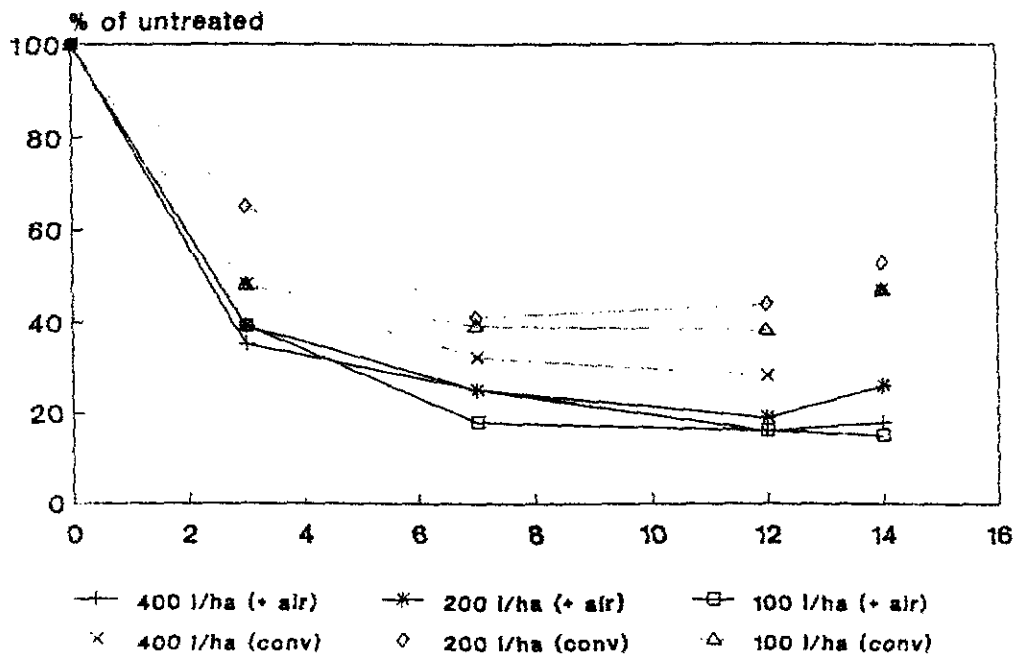
The experiment was carried out on a sandy loam soil at Morley using a commercially grown crop of Barbara.

Results

At spraying, moisture content of stems was 43% and seed 13%.

All Reglone treatments desiccated the linseed stems when compared to the untreated (Figure 1). On 25 August, three days after the treatments were applied, desiccation appeared to be quicker when air assistance was used, but this was only statistically significant between the two 200 l/ha treatments. By 3 September, 100 and 200 l/ha treatments and by 5 September all three spray volumes applied with air assistance had improved desiccation of stems compared to the equivalent treatments applied without air.

Figure 1. *Desiccation of linseed*



All Reglone treatments desiccated seed bolls compared to the untreated, but there was no significant difference between them.

On 29 August, Reglone treatment increased the ease with which seed could be separated from the boll compared to the untreated. However, there was no significant difference between treatments.

On 5 September, the day before harvest, all Reglone treatments reduced moisture content of the stems compared to the untreated (Figure 2). At 100 l/ha, air assistance had reduced moisture content of the stems compared to the conventional spray at 100 l/ha without air. The difference between the two 200 l/ha treatments just failed to reach statistical significance on the Anova

test.

- All Reglone treatments reduced moisture content of the seed heads compared to the untreated, but there was no significant difference between them.

There was no significant difference in seed yield at harvest between any of the treatments. Moisture content of the seed was significantly lower on all treated plots compared to the untreated (Figure 3). The 100 and 200 l/ha treatments applied with air assistance also reduced moisture content of the seed compared to the equivalent conventional treatments applied without air.

The harvestability scores (Figure 4) showed that all Reglone treatments significantly increased the ease of harvesting compared to the untreated, but there was no significant difference between individual Reglone treatments.

There was no significance between thousand grain weights at harvest.

Figure 2. *Stem moisture contents*
(5 September 1991)

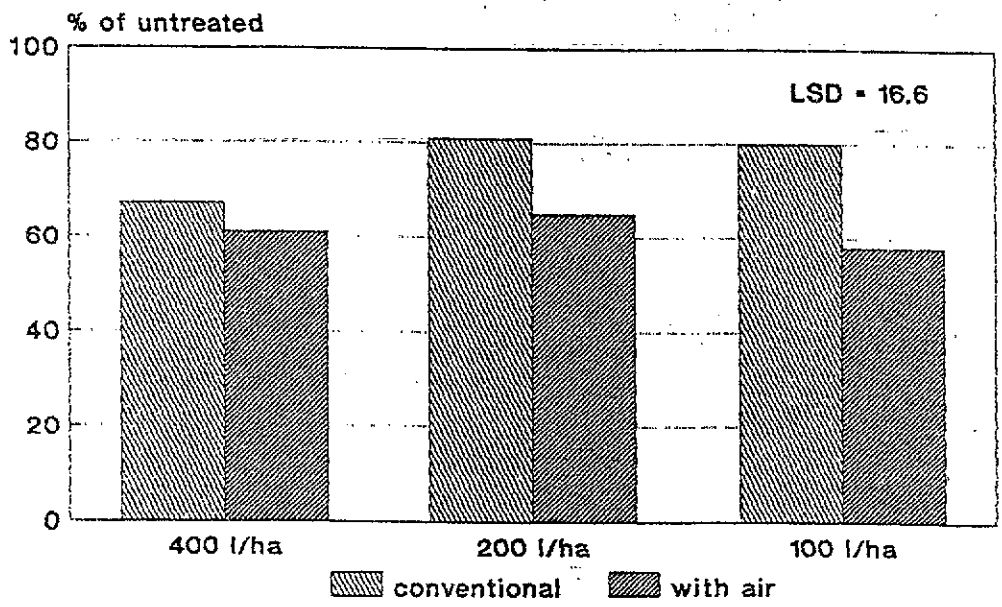


Figure 3. *Moisture content of seed*
(at harvest)

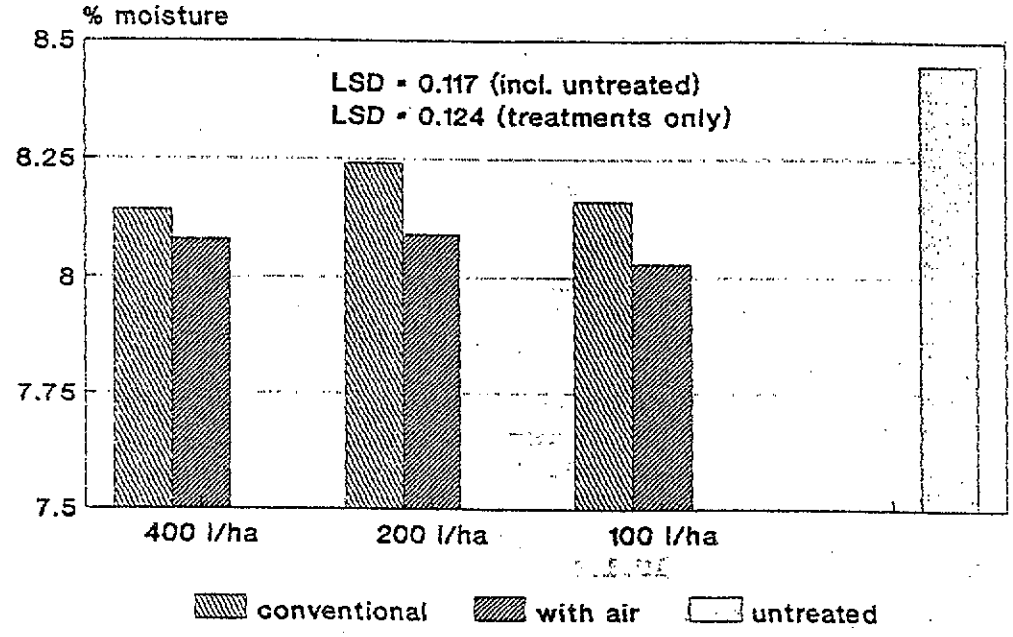
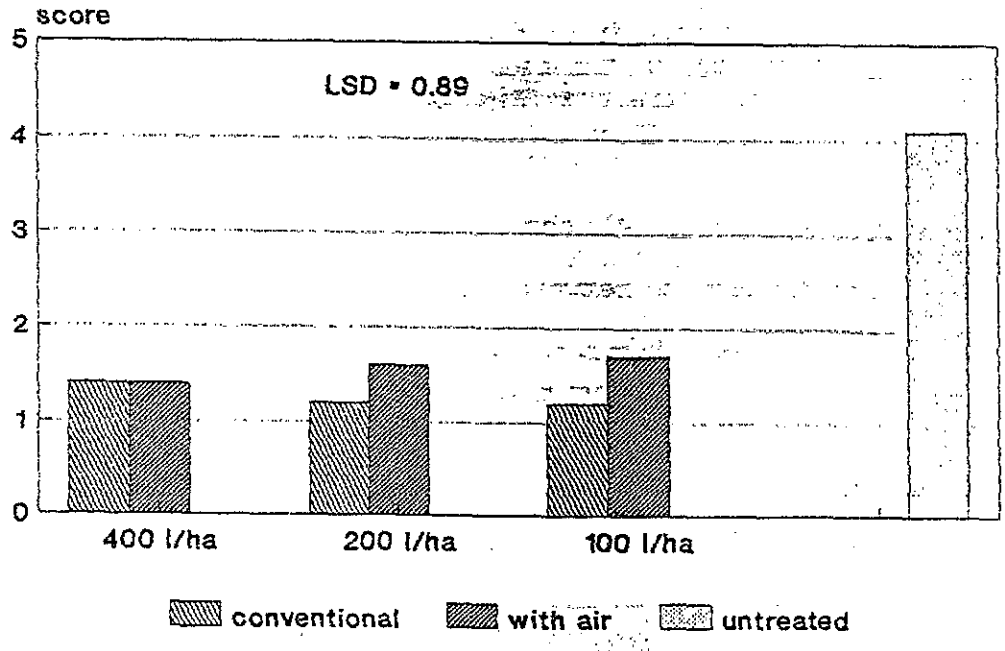


Figure 4. *Harvestability scores*
(1 to 10 scale where 1 = easy)



Bulk samples from the untreated and the 400 l/ha treatments with and without air assistance were sent to the Leatherhead Food Research Association for analysis (Table 1). The results indicated that there was unlikely to be differences between treatments.

Table 1. Analysis of bulk samples by Food Research Association

	Admixture	Oil content (TQ)	Moisture and volatile matter	Iodine value
Untreated	0.58%	40.08%	8.07%	192
Conventional hydraulic @ 400 l/ha	0.99%	40.06%	7.77%	190
Air-assisted hydraulic @ 400 l/ha	0.87%	40.34%	7.74%	191

Discussion

The use of Reglone gave good desiccation of linseed stems. Air assistance appeared to improve the activity of Reglone, especially at 100 and 200 l/ha spray volumes. Without air assistance, 400 l/ha tended to give slightly better desiccation than the two lower volumes, but differences were small.

Seed yield was similar for all treatments and there was no adverse effect from the use of Reglone on the quality parameters (although these were only assessed on three bulk samples). The quality parameters of the linseed for those treatments that were assessed were well within the EC standards given

in FOSFA no. 9 contract.

However, there were potential problems when harvesting untreated plots. Stems were not picked up by the combine reel in this trial, but the small plots used in trials mean that there is less chance for this to happen. In commercial practice, once any material starts to wrap on the combine, then harvesting has to cease until the linseed is dry enough for combining to continue. The harvestability scores reflect the potential for harvesting delays and for problems to occur when linseed is not desiccated prior to harvest.

Conclusions

The results suggest that lower spray volumes than 400 l/ha could be used if application was by air assisted sprayers like the Hardi Twin. The trial showed that Reglone was not affecting yield and was unlikely to affect quality parameters. However, the use of Reglone appeared to reduce harvesting problems and the risk of delays.

Acknowledgements

The sponsorship of this work by ICI Agrochemicals (Product Application Section) and the help of Ian Stott and his colleagues of ICI with the field work is gratefully acknowledged.

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APPENDIX - NAS 933 1991

DESICCATION OF LINSEED WITH REGLONE APPLIED THROUGH AN AIR-ASSISTED SPRAYER, 1991

Experimental diary

Soil type	sandy loam (Ashley series), Brockholes Field at Morley Manor Farm
Previous crop	sugar beet (1989 harvest) winter wheat (1990 harvest)
Fertiliser	6 October 1990, 250 kg/ha PK as Morley blend 25 April 1991, 90 kg/ha urea (46%)
Variety	Barbara
Drilled	26 March at 83 kg/ha
Plot size	24 m long by 12 m wide
Herbicides	24 May 1991, 1.4 l/ha Vindex (clopyralid, 50 g ai/l + bromoxynil, 240 g ai/l)
Other sprays	None

Experimental conditions

At spraying on 22 August 1991

Weather - sunny spells, humid, 21°C increasing to 26°C, few spots of rain 1.5 h before spraying but dry during application, wind SE force 1 to 2.

Soil - dry.

Crop - mature (moisture content 43% stems and 13% seeds).

Assessments

22 August 1991	- samples taken from untreated plots for moisture content analysis into sealed plastic bags.
24 August 1991	- pre-spraying moisture contents finished. (Dried to constant weight at 100°C in oven.)
25 August 1991	- vigour of stems, leaves and seed bolls.
29 August 1991	- linseed desiccation scores of leaves, stems and seed bolls.
	- seed shedding ability.
3 September 1991	- linseed desiccation scores.
5 September 1991	- linseed desiccation scores.

5 September 1991 - samples taken for moisture contents of stems and seed heads. (Dried to constant weight at 100°C in oven that evening.)
6 September 1991 - harvest
10 September 1991 - harvest moisture contents determined. (100g dried in oven at 100°C to constant weight.)

Linseed desiccation visual scores used a 0 to 5 linear scale where 0 = completely desiccated and 5 = green growth without desiccation. Seed shedding assessments also used the same 0 to 5 scale where 0 = impossible to separate when rubbed, 1 = hard, 2 = moderately hard, 3 = possible, 4 = easily separated when rubbed and 5 = fall off when squeezed) after rubbing in palms of hands.

A Class Matador combine modified for plot purposes was used to remove the cross discards between plots and then a 2.2 m swathe cut from each plot. The actual harvested lengths were measured and these ranged from 19.5 to 20.4 m and plot yields were corrected for this.

Harvestability assessments were carried out by the harvester driver using a 1 to 10 linear scale where 1 = easy to harvest and 10 = impossible.

Thousand grain weights were assessed on 250 complete grains selected at random from the combine sample.

Calibrations

4110-12 nozzles at 2 bar = 300 ml/30 sec = 100 l/ha
4110-20 nozzles at 1.75 bar = 600 ml/30 sec = 200 l/ha
4110-30 nozzles at 2 bar = 1200 ml/30 sec = 400 l/ha

Speed = 100 m in 50 s = 7.2 kph using Ford 7610 tractor fitted with 9.5 x 44 wheels and using high first low gear at 1950 engine rpm.

Airspeed 10 cm below outlet = 15 m/s (measured with a normal anemometer - these traditionally read low and it is likely that a hot wire anemometer reading would be nearly twice this figure.

For 100 l/ha mixed up 100 l/ha = 3 l Reglone + 100 ml Q9 (50 l left after treatments applied)
For 200 l/ha mixed up 200 l/ha = 3 l Reglone + 200 ml Q9 (85 l left after treatments applied)
For 400 l/ha mixed up 400 l/ha = 3 l Reglone + 400 ml Q9 (170 l left after treatments applied)

Results

Table A1. Desiccation scores on stems
(0 to 5 scale where 0 = complete desiccation and 5 = none)

	25 Aug.	29 Aug.	3 Sept.	5 Sept.
Untreated	4.6	4.4	3.2	3.4
Conventional hydraulic @ 400 l/ha	2.2	1.4	0.9	1.6
" " @ 200 l/ha	3.0	1.8	1.4	1.8
" " @ 100 l/ha	2.2	1.7	1.2	1.6
Air-assisted hydraulic @ 400 l/ha	1.6	1.1	0.5	0.6
" " " @ 200 l/ha	1.8	1.1	0.6	0.9
" " " @ 100 l/ha	1.8	0.8	0.5	0.5
LSD for comparisons including untreated	0.86	0.68	0.50	0.60
LSD for other comparisons	0.88	NS	0.48	0.66
SE per plot (24 df) =	±0.66	±0.52	±0.38	±0.46
or as % GM	26.7%	29.5%	32.2%	31.1%

(LSD = least significant difference at 95% probability level)
(NS = no significant difference)

Table A2. Stem and head moisture contents (%), 5 September 1991

	Stem	Head
Untreated	50.62	12.96
Conventional hydraulic @ 400 l/ha	33.80	11.02
" " @ 200 l/ha	41.05	11.29
" " @ 100 l/ha	40.57	10.60
Air-assisted hydraulic @ 400 l/ha	30.84	10.78
" " " @ 200 l/ha	32.77	11.00
" " " @ 100 l/ha	29.26	10.49
LSD for comparisons including untreated	7.637	1.144
LSD for other comparisons	8.388	NS
SE per plot (24 df) =	±5.850	±0.876
or as % GM	15.8%	7.8%

Table A3. Seed yield (t/ha @ 91% dm) and seed moisture

	Yield	Moisture
Untreated	2.83	8.45
Conventional hydraulic @ 400 l/ha	2.95	8.14
" " @ 200 l/ha	2.96	8.24
" " @ 100 l/ha	2.75	8.16
Air-assisted hydraulic @ 400 l/ha	2.82	8.08
" " " @ 200 l/ha	2.86	8.09
" " " @ 100 l/ha	2.87	8.03
LSD for comparisons including untreated	NS	0.117
LSD for other comparisons	NS	0.124
SE per plot (24 df) =	±0.138	±0.089
or as % GM	4.8%	1.1%

Table A4. Harvestability scores, 6 September 1991
(1 to 10 scale where 1 = easy and 10 = impossible)

Untreated	4.1
Conventional hydraulic @ 400 l/ha	1.4
" " @ 200 l/ha	1.2
" " @ 100 l/ha	1.2
Air-assisted hydraulic @ 400 l/ha	1.4
" " " @ 200 l/ha	1.6
" " " @ 100 l/ha	1.7
LSD for comparisons including untreated	0.89
LSD for other comparisons	NS
SE per plot (24 df) =	±0.68
or as % GM	37.7%

Table A5. Desiccation scores of seed bolls
(0 to 5 scale where 0 = complete desiccation and 5 = none)

	25 August	29 August (trans. data)*
Untreated	1.6	0.6 (1.25)*
Conventional hydraulic @ 400 l/ha	1.0	0.0 (1.00)
" " @ 200 l/ha	1.0	0.2 (1.08)
" " @ 100 l/ha	1.0	0.0 (1.00)
Air-assisted hydraulic @ 400 l/ha	1.0	0.0 (1.00)
" " " @ 200 l/ha	1.0	0.0 (1.00)
" " " @ 100 l/ha	0.8	0.0 (1.00)
LSD for comparisons including untreated	0.36	(0.137)*
LSD for other comparisons	NS	(NS)*
SE per plot (24 df) =	±0.28	±0.26
or as % GM	26.1%	226.5%

* Figures in brackets transformed to /x+1 for statistical analysis

Table A6. Score of seed boll separability on 29 August 1991

(0 to 5 scale where 0 = impossible to separate
and 5 = fall off when squeezed)

Untreated	2.8
Conventional hydraulic @ 400 l/ha	4.0
" " @ 200 l/ha	3.8
" " @ 100 l/ha	4.0
Air-assisted hydraulic @ 400 l/ha	4.0
" " " @ 200 l/ha	4.0
" " " @ 100 l/ha	4.4
LSD for comparisons including untreated	0.88
LSD for other comparisons	NS
SE per plot (24 df) =	±0.67
or as % GM	17.4%

Table A7. Thousand grain weights (@ 91% dm)
24 October 1991

Untreated	9.79
Conventional hydraulic @ 400 l/ha	9.77
" " @ 200 l/ha	9.83
" " @ 100 l/ha	9.69
Air-assisted hydraulic @ 400 l/ha	9.69
" " " @ 200 l/ha	9.74
" " " @ 100 l/ha	9.91
LSD for comparisons including untreated	NS
LSD for other comparisons	NS
SE per plot (24 df) =	±0.217
or as % GM	2.2%