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Horticultural Development Council
18 Lavant Street
PETERSFIELD
GU32 3EW

ADAS Contract Manager: Peter C Rickard
Arthur Rickwood Experimental Husbandry Farm
Mepal
Ely
Cambs
CB6 2BA

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Bulb Onions: Control of Volunteer Potatoes

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Commercial - In Confidence

ADAS

PRINCIPAL WORKER

S R Runham BSc Deputy Farm Director (author of report).

AUTHENTICATION

I declare that this work was done under my supervision according to the procedures described herein and that this report represents a true and accurate record of the results obtained.

..... Date 3 January 91

P C Rickard Contract Manager

Report authorised by:

.....

Dr M J Griffin
R & D Programmes Manager for Horticulture
Ministry of Agriculture Fisheries and Food
Government Buildings
Brooklands Avenue
CAMBRIDGE
CB2 2DR
Tel: 0223 455897

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BULB ONIONS: CONTROL OF VOLUNTEER POTATOES

Summary

Onions cv Hyton were grown on a field which in the previous year had been cropped with potatoes cv Maris Piper. An area was selected where volunteer potatoes occurred fairly uniformly over an area deemed suitable for an initial study of their control. Herbicide programmes containing Dow Shield (or Format), Starane 2 and Totril began on 9 May at the first true leaf stage of the onions and continued until 7 June when the onions were at the third true leaf stage. By the end of the treatment period the mean potato population was reduced from 3.3 stems/m^2 to 1.2/m^2 and their mean vigour score from 6.3 to 2.0. Marked reduction in potato vigour was achieved using programmes which contained all three herbicides but there were some surviving potatoes on all plots indicating that the grower would still need to supplement each herbicide programme with mechanical weed control. In programmes where Totril or low rates of Starane 2 were applied early, and generally those in which Dow Shield was excluded, the onion yield was not depleted compared with the hand-weeded control (34.0 t/ha). Where the programme contained no Totril but only Starane 2 and Dow Shield some yield reduction occurred. The safest yet most effective programme proved to be 0.7 l/ha of Totril at the first leaf stage followed by two applications of Starane 2. This programme reduced the potato population to 1.3 stems/m^2 and vigour score to 1.5 with no onion yield reduction.

Objective

To gain off-label approval for use of fluroxypyr as Starane 2 and to evaluate this chemical when used either as a tank-mix with or in sequence with clopyralid as Dow Shield and ioxynil as Totril.

Introduction

The problem of volunteer potatoes in onions is on the increase. Normal broad-leaved weed herbicides such as Totril and Brasoran 50WP have some action against potatoes but this control is neither complete nor reliable. The use of Starane 2 would increase a grower's armoury against potatoes. The experiment was designed to evaluate Starane 2 in programmes with either Dow Shield or Totril.

Materials and Methods

Site

The experiment was conducted at the Arthur Rickwood EHF on a peaty loam soil (36-66 cm) with 25.6% organic matter over sand and gravel of Prickwillow Series (Bridge Ground Field).

Treatments

1.	Hand-weeded control		
2.	Non-weeded control		
	First application	Second application	Third application
Date	9 May	16 May	7 June
3.	Totril 0.7 l/ha	Totril 0.7 l/ha	Starane 2 1 l/ha
4.	Totril 0.7 l/ha	Totril 1.4 l/ha	Starane 2 1 l/ha
5.	Totril 0.7 l/ha + Starane 2 0.5 l/ha	Totril 0.7 l/ha + Starane 2 0.5 l/ha	Starane 2 1 l/ha
6.	Totril 0.7 l/ha	Totril 0.7 l/ha + Starane 2 0.5 l/ha	Starane 2 1 l/ha
7.	Totril 0.7 l/ha + Starane 2 0.75 l/ha	Totril 0.7 l/ha + Starane 2 0.75 l/ha	Dow Shield 0.5 l/ha
8.	Starane 2 0.75 l/ha	Starane 2 0.75 l/ha	Dow Shield 0.5 l/ha

9.	Starane 2 1 l/ha	Starane 2 1 l/ha	Dow Shield 0.5 l/ha
10.	Starane 2 0.5 l/ha + Format* 0.35 l/ha	Starane 2 0.5 l/ha + Format* 0.35 l/ha	Starane 2 1 l/ha
11.	Starane 2 0.75 l/ha	Starane 2 0.5 l/ha + Format * 0.35 l/ha	Dow Shield 0.5 l/ha
12.	Totril 0.7 l/ha	Starane 2 0.75 l/ha	Starane 2 1 l/ha

* Format, which contains a lower rate of active ingredient clopyralid than Dow Shield, has now been superceded by Dow Shield.

Treatment application

All treatments were applied in 250 l/ha water using an Oxford Precision sprayer with Teejet 8002 nozzles at 2 bar pressure. All treatments were by experimental permit only and all onions off this trial were destroyed as the off-label use for Starane 2 on this crop had not been approved at this time.

Husbandry

Onions cv Hyton were drilled on 23 February. They received normal commercial inputs (Appendix I), except herbicides during the growing season. A standard herbicide programme was applied until the first true leaf stage, when the treatments commenced, and continued from 18 June, at the end of the treatment period. Hand-weeded control plots were hoed during the period of herbicide treatment application and the whole trial hoed on 23 July. The trial was harvested on 17 August, placed into store to be dried, and removed for yield and quality assessment on 6 September.

Assessments

Onion and potato stem numbers and vigour scores were recorded before the treatments commenced, prior to the third treatment application, and at the end of the treatment period. The yield in size grades and onions quality was recorded after a period of drying and curing.

Design and analysis

The trial was a randomised block with four replicates. Each plot was a 1.68 m bed width x 6 m in length with four rows per bed at 350-250-350 mm spacing to allow space for two rows of a barley cover crop to be drilled on the bed between the inner and outer rows. The data were subjected to analyses of variance.

Results and Discussion

The onion plant population on 14 May was on average 56 plants/m^2 with no significant differences between replicates or treatments (Table B, Appendix III). On 15 May the trial suffered hail damage which appeared as a fairly uniform incidence across the area. By 1 August the mean onion plant population was 47 plants/m^2 with significant ($P<0.05$) differences between the replicates; the replicate adjacent to the headland had a lower population which was mainly due to Fortrol damage from an application on 18 June. However, this damage did not significantly affect the yield of this replicate. There were no significant differences between the treatments in terms of onion plant populations. The number of potato stems per plot was recorded on 14 May when the first treatments had been applied but no potato plant loss yet effected. There were on average 33 stems per plot or 3.3/m^2. There were significant ($P<0.001$) differences between the replicates, with a trend across the site, but not between the treatments (Tables C and D, Appendix IV).

Onion and potato vigour were recorded on 5 June after the initial effects of the first two treatment applications could be observed. Vigour scores are given in Table 1.

At this time, the onions were at the third leaf stage and no significant differences in vigour were observed between treatments. The potatoes were most severely checked by treatments 5 and 7 (two Totril plus Starane 2 tank-mixed applications) and treatment 9 (two applications of 1 l/ha of Starane 2).

Table 1. Onion and potato plant vigour scores on 5 June.

Treatment First	Second	Third	Plant vigour scores Onions*	Potatoes#
1 Hand weeded control			8.8	10.0
2 Non-weeded control			8.5	10.0
3 T(0.7)	T(0.7)	S(1.0)	8.0	6.0
4 T(0.7)	T(1.4)	S(1.0)	8.0	6.3
5 T(0.7) + S(0.5)	T(0.7) + S(0.5)	S(1.0)	7.8	3.3
6 T(0.7)	T(0.7) + S(0.5)	S(1.0)	8.0	5.5
7 T(0.7) + S(0.75)	T(0.7) + S(0.75)	DS(0.5)	7.8	3.0
8 S(0.75)	S(0.75)	DS(0.5)	8.3	6.8
9 S(1.0)	S(1.0)	DS(0.5)	7.5	4.8
10 S(0.5) + F(0.35)	S(0.5) + F(0.35)	S(1.0)	8.0	6.3
11 S(0.75)	S(0.5) + F(0.35)	DS(0.5)	7.8	7.0
12 T(0.7)	S(0.75)	S(1.0)	8.0	6.5
Mean			8.0	6.3
SED (33 df)			0.37	0.81
CV %			6.5	18.3

* Onions
- 0 = dead
- 7 = leaves green, curled & twisted
- 9 = slight leaf tipping
- 10 = vigorous + healthy

Potatoes
- 0 = dead
- 3 = small, stunted, yellow & misshapen but will re-grow
- 5 = small, yellow and misshapen but already growing away
- 7 = green, misshapen
- 10 = vigorous + flowering

Even so, all potatoes still survived and a third application was made on 7 June. In some cases, 2 l/ha of Starane 2 had already been applied and, as approval was unlikely to be sought for a total application of more than this quantity, then Dow Shield was used instead. On 2 July, the potato number and vigour and the onion plant vigour was recorded; these results are given in Table 2.

Table 2. Onion and potato plant vigour scores and potato stem population on 2 July.

Treatment	First	Second	Third	Plant vigour scores Onions	Potatoes	Stem population potatoes (stems/m²)	
1	Hand-weeded control			9.5	4.5	0.3	
2	Non-weeded control			6.4	9.0	4.0#	
3	T(0.7)	T(0.7)	S(1.0)	8.3	1.8	1.4	
4	T(0.7)	T(1.4)	S(1.0)	8.0	2.8	1.5	
5	T(0.7) + S(0.5)	T(0.7) + S(0.5)	S(1.0)	7.8	2.8	1.4	
6	T(0.7)	T(0.7) + S(0.5)	S(1.0)	7.8	3.0	1.2	
7	T(0.7) + S(0.75)	T(0.7) + S(0.75)	DS(0.5)	9.0	4.8	1.2	
8	S(0.75)	S(0.75)	DS(0.5)	8.3	3.8	1.0	
9	S(1.0)	S(1.0)	DS(0.5)	8.1	2.5	1.5	
10	S(0.5) + F(0.35)	S(0.5) + F(0.35)	S(1.0)	7.9	2.0	1.5	
11	S(0.75)	S(0.5) + F(0.35)	DS(0.5)	9.0	1.8	1.3	
12	T(0.7)	S(0.75)	S(1.0)	8.0	1.5	1.3	
Mean				8.2	2.0	1.2	
SED (33 df)				0.64	3.3		
(30 df)				–	–	0.42	
CV %				11.2	26	53	35

not included in the analysis

The onions remained fairly vigorous after the third treatments had been applied. Vigour was significantly ($P<0.01$) reduced where the potatoes and other weeds had not been controlled and completely overgrown the onions by this date. When the crop had been observed immediately after each herbicide application it appeared to suffer leaf flattening and curling from Starane 2 or Dow Shield but by 2 July all such effects were

gone and the crop was growing away. The potato vigour was greatly reduced by 2 July. Potato stem number was also reduced by this date. The most effective reduction in vigour was from treatments 3, 11 and 12, but treatments 4, 5, 6, 9, and 10 also gave a considerable reduction in potato vigour. However, no treatment completely killed the potatoes as shown by the live plant stem number recorded on 2 July. In all cases the crop would have required mechanical weeding prior to harvest.

By 2 July the main other weeds in the trial site were Fat-hen, Cleavers, Sow-thistle and Knotgrass. Fat-hen appeared on all plots but was not present in the surrounding 'farm crop' of cv Hyton which had received three closely timed Totril applications over the treatment period of the experiment. Cleavers were present on some plots of all treatments except programme 10 where early tank mixes of Starane 2 and Format were followed by Starane 2 1 l/ha at the third leaf stage. Knotgrass was controlled by most treatments but was present on plots of treatment 6. Sow-thistle was very effectively suppressed using Format or Dow Shield but some remained on all plots except for treatments 6, 8 and 11 on 2 July and was subsequently mechanically removed.

The total yield of onions following drying is given in Table 3. There were significant ($P<0.5$) differences between the herbicide treatments with greatest yield depressions occurring for treatments 8, 9, 10 and 11; however; none of the herbicide treatments reduced yield significantly compared with the hand-weeded control. These programmes contained no Totril, but combinations of Starane 2 and Dow Shield (or Format). Early applications of 0.75 to 1 l/ha of Starane 2 followed by Dow Shield, or Starane 2 plus Format tank mixes followed by either Dow Shield or Starane adversely affected yield.

Table 3. Total yield of onions.

Treatment	First	Second	Third	Total yield (t/ha)
1	Hand-weeded control			34.0
2	Non-weeded control			-
3	T(0.7)	T(0.7)	S(1.0)	34.9
4	T(0.7)	T(1.4)	S(1.0)	33.9
5	T(0.7) + S(0.5)	T(0.7) + S(0.5)	S(1.0)	34.8
6	T(0.7)	T(0.7) + S(0.5)	S(1.0)	35.3
7	T(0.7) + S(0.75)	T(0.7) + S(0.75)	DS(0.5)	35.1
8	S(0.75)	S(0.75)	DS(0.5)	30.8
9	S(1.0)	S(1.0)	DS(0.5)	28.4
10	S(0.5) + F(0.35)	S(0.5) + F(0.35)	S(1.0)	30.7
11	S(0.75)	S(0.5) + F(0.35)	DS(0.5)	29.7
12	T(0.7)	S(0.75)	S(1.0)	35.9
Mean				33.0
SED (30 df)				2.45
CV %				10

It is not known why there was such a poor correlation between onion plant vigour scores on 2 July and final yields. But it could possibly have been that the translocated activity of Dow Shield (or Format) was slow to take effect. The inclusion of Starane 2 in programmes with Totril appeared to be relatively safe.

The marketable yield (mean 29.0 t/ha) is given in Table E, Appendix IV. It followed a similar pattern with low marketable yields for treatments 8, 9, 10 and 11. Treatment 9 gave 23.3 t/ha; this treatment had in fact had the lowest onion plant vigour on 5 June but appeared to have made

some recovery by 2 July. The safest effective programme was treatment 12 (Totril at 0.7 l/ha at the first true leaf stage followed by Starane 2 at 0.75 l/ha at first leaf + 7 days stage and Starane 2 1 l/ha at the third true leaf stage).

There were on average 0.5% of total defects with no significant differences between either replicates or treatments. The quality of all onions off the trial was excellent.

Conclusions

1. Herbicide programmes containing Totril, Starane 2 or Dow Shield (Format) were applied from the first true leaf stage of the onions to control potatoes which were well established and growing vigorously but without complete success. Following all herbicide sequences, potatoes survived (with approximately half their original stem population still capable of producing vigorous foliage in this experiment).

2. Severe reduction in potato plant vigour occurred with several programmes which combined all three herbicides. Using these programmes would allow the grower early control of potatoes even though it is likely that he would still need to mechanically weed the crop at some time prior to harvest.

3. Yield reduction occurred for four programmes where either Starane 2 or Starane 2 plus Format tank mixes were used at an early stage in the growth of the onion crop with later applications of either Dow Shield or Starane 2.

4. The safest most effective programme was Totril at the first true leaf stage followed by two applications of Starane 2.

Recommendations

1. The trial should be repeated using artifically planted potatoes to ensure a better uniformity of potato populations.

2. The trial should be repeated on peat soil, and extended to include a mineral soil type of either sand or silt.

3. If possible the control of potatoes at different potato growth stages should be explored. The effect of herbicides on daughter tubers of potatoes should be explored by recovering them from the soil and growing on during the following season.

4. A further study is required on the effect of potato volunteers on crop growth and yield at each stage of crop growth, so that both herbicide and mechanical weeding schedules can be most appropriately timed.

Appendix I

Management of trial site

Previous cropping	1989	Potatoes
	1988	Winter wheat
	1987	Winter wheat
Crop diary		
Cultivations	2 January	plough and press
	22 February	power harrow (Kuhn)
	22 February	drill cv Hyton
	14 March	drill barley cv Atem cover crop (wind erosion control)
	15 May	handweed control plots
	12 June	handweed control plots
	23 July	trial hand-hoed
Herbicides	19 March	4.32 kg/ha ai propachlor as 9 l/ha cp Ramrod plus 2.25 kg/ha ai chlorpropham as 5.6 l/ha cp CIPC and 0.6 kg/ha ai paraquat as 3 l/ha Power Paraquat in 600 l/ha water
	7 April	0.56 kg/ha ai chloridazon and 0.45 kg/ha ai chlorbufam as 2.25 l/ha Alicep in 450 l/ha water
	21 April	Alicep as above
	1 May	0.03 l/ha ai fluazifop-P-butyl as 0.125 l/ha cp Fusilade in 250 l/ha water (plus Agral wetter) to check barley
	9 May	first treatment application against potatoes
	17 May	second treatment application against potatoes
	31 May	0.125 l/ha ai fluazifop-P-butyl as 1 l/ha cp Fusilade in 250 l/ha water (plus Agral) to kill barley cover crop
	7 June	third and final treatment application
	18 June	1.75 kg/ha ai cyanazine at 3.5 l/ha cp Fortrol in 500 l/ha water
Fungicides	22 February	benomyl + thiram seed dressing
Insecticides	22 February	1.48 kg/ha ai carbofuran as 29.5 kg/ha cp Yaltox

Fertiliser	23 November	157 kg/ha P_2O_5 + 314 kg/ha K_2O
	30 March	40 kg/ha N
	16 May	40 kg/ha N
Trace elements	20 April	8 kg/ha $MnSO_4$ in 250 l/ha water (plus Agral wetter)
	15 May	as above
	27 June	as above
Irrigation	21 June	25 mm @ SMD 26 mm
	18 July	25 mm @ SMD 55 mm
Harvest	17 August	

Appendix II

Table A. Ingredients of Commercial Products used in the experiment.

Product	Active Ingredient
Totril	A rate of 0.7 l/ha ($\frac{1}{4}$ full rate) contains 0.16 kg/ha ai ioxynil.
Starane 2	A rate of 1 l/ha contains 200 g/ha ai fluroxypyr.
Dow Shield	A rate of 1 l/ha contains 200 g/ha ai clopyralid.*
Format*	A rate of 1 l/ha contains 100 g/ha ai clopyralid

* Format is an old formulation which is now superceded by Dow Shield.

Appendix III

Table B. Onion plant populations (plants/m^2) on 14 May and 1 August.

Treatment				Plants/m^2		
	First	Second	Third	14 May		1 August
1	Hand-weeded control			53		45
2	Non-weeded control			52		-
3	T(0.7)	T(0.7)	S(1.0)	54		51
4	T(0.7)	T(1.4)	S(1.0)	59		48
5	T(0.7) + S(0.5)	T(0.7) + S(0.5)	S(1.0)	57		50
6	T(0.7)	T(0.7) + S(0.5)	S(1.0)	54		47
7	T(0.7) + S(0.75)	T(0.7) + S(0.75)	DS(0.5)	55		49
8	S(0.75)	S(0.75)	DS(0.5)	61		45
9	S(1.0)	S(1.0)	DS(0.5)	58		47
10	S(0.5) + F(0.35)	S(0.5) + F(0.35)	S(1.0)	61		47
11	S(0.75)	S(0.5) + F(0.35)	DS(0.5)	55		44
12	T(0.7)	S(0.75)	S(1.0)	56		46
Mean				56		47
SED (33 df)				4.5	(30 df)	37
CV %				11	(30 df)	11

Appendix IV

Table C. Number of potatoes (stems/m^2) on 14 May.

Treatment First	Second	Third	Number of potatoes stems/m^2
1 Hand-weeded control			2.9
2 Non-weeded control			3.0
3 T(0.7)	T(0.7)	S(1.0)	4.0
4 T(0.7)	T(1.4)	S(1.0)	3.9
5 T(0.7) + S(0.5)	T(0.7) + S(0.5)	S(1.0)	3.0
6 T(0.7)	T(0.7) + S(0.5)	S(1.0)	2.7
7 T(0.7) + S(0.75)	T(0.7) + S(0.75)	DS(0.5)	3.7
8 S(0.75)	S(0.75)	DS(0.5)	2.8
9 S(0.1)	S(1.0)	DS(0.5)	3.8
10 S(0.5) + F(0.35)	S(0.5) + F(0.35)	S(1.0)	3.9
11 S(0.75)	S(0.5) + F(0.35)	DS(0.5)	3.3
12 T(0.7)	S(0.75)	S(1.0)	3.3
Mean			3.3
SED (33 df)			0.67
CV %			28

Table D. Mean stem population per replicate.

Replicate	Mean potato plant population (stems/m^2)
1	4.4
2	3.4
3	3.1
4	2.5

Appendix IV

Table E. Marketable yield (t/ha) and yield (t/ha) of over 60 mm diameter bulbs.

Treatment				Yield (t/ha)	
First		Second	Third	Marketable (over 40 mm)	Large (over 60 mm)
1	Hand-weeded control			31.0	3.2
2	Non-weeded control			-	-
3	T(0.7)	T(0.7)	S(1.0)	30.7	1.8
4	T(0.7)	T(1.4)	S(1.0)	29.7	2.0
5	T(0.7) + S(0.5)	T(0.7) + S(0.5)	S(1.0)	31.2	1.7
6	T(0.7)	T(0.7) + S(0.5)	S(1.0)	31.9	2.2
7	T(0.7) + S(0.75)	T(0.7) + S(0.75)	DS(0.5)	31.6	2.0
8	S(0.75)	S(0.75)	DS(0.5)	25.9	1.8
9	S(1.0)	S(1.0)	DS(0.5)	23.3	0.9
10	S(0.5) + F(0.35)	S(0.5) + F(0.35)	S(1.0)	26.2	1.1
11	S(0.75)	S(0.5) + F(0.35)	DS(0.5)	25.1	1.0
12	T(0.7)	S(0.75)	S(1.0)	32.6	3.5
Mean				29.0	1.9
SED (30 df)				2.72	0.95
CV %				13	70

Appendix V

Results of an adjacent observation trial (the chemicals included are not approved for this use and subjected to experimental permit only).

Four non-approved herbicide programmes (Table F) were applied to an area of onions adjacent to the main trial with three replicates of each treatment programme. All other inputs, application methods and assessments were the same as for the main trial.

Table F. Herbicide programmes for volunteer potato control (in observation area only).

Date of Application Crop growth stage	16 May First true leaf	31 May Second true leaf	7 June Third True leaf
1	Dosaflo 0.6 l/ha	Dosaflo 0.6 l/ha	Dosaflo 1 l/ha
2	Dosaflo 0.6 l/ha	Dosaflo 1 l/ha	Dosaflo 1 l/ha
3	Linuron 50 1 kg/ha	Dosaflo 1 l/ha	Dosaflo 1 l/ha
4	Dosaflo 0.6 l/ha + Linuron 50 0.5 kg/ha	Dosaflo 1 l/ha	Dosaflo 1 l/ha

Dosaflo contains 500 g/l ai metoxuron
Linuron 50 contains 500 g/l ai linuron

Results

There were on average 2.4/m^2 potato stems on 15 May with no significant differences between replicates or treatments. The onion population on 15

May was 56 plants/m^2 and was uniform over the trial area. On 5, 12 and 26 June, onion and potato vigour scores were recorded. The onion plants remained fairly vigorous over this period similar to the adjacent main trial and with no significant differences between the four herbicide programmes. The potato plant vigour was greatly reduced by all four herbicide programmes. As with the adjacent main trial, Fortrol was applied on 18 June. By 26 June, the mean potato vigour score was 1.9 indicating that the potatoes were 'virtually dead' with only 0.3 stems/m^2 on average. (The potato vigour scores and populations were lower on this observation area than on the main trial). There was a slight recovery by 6 July such that on 23 July the area had to be hand hoed prior to harvest on 17 August. On 1 August, the onion plant population was 50 plants/m^2. The yield after drying was 28.4 t/ha with no significant differences between the treatments. This yield was lower than the mean for the main trial (33 t/ha). It is not known how much of this yield reduction could be attributed to the use of Dosaflo and Linuron 50 in the herbicide programmes, and how much to the Fortrol damage which was evident on both this area and on other areas similarly positioned in relation to the sprayer boom (ie close to the headland and at the beginning of a spray run).

Comment

Dosaflo alone and at the lower rate (0.6 l/ha at first and second leaf stages) would appear to be a useful herbicide for use in onions. However, its efficacy and safety on both organic and on mineral soils requires further investigation.

Appendix VI

Weather data.

	Temperature (°C) Extremes			Accumulated day Degrees above 6°C		Mean Soil temp	Daily sunshine (hours)		Rainfall (mm)	
	Air Max	Min	Grass Min	Current Year	23 yr Mean	at 10 cm	Current Year	23 yr Mean	Current Year	23 Yr Mean
Feb	18.2	-1.9	-7.5	73	20	5.6	3.1	2.4	77.5	31.6
Mar	22.1	-2.7	-8.1	108	48	6.7	4.0	3.2	14.4	42.7
Apr	22.3	-5.4	-9.9	97	86	8.4	6.3	4.7	27.6	37.5
May	26.6	-2.6	-4.5	214	170	14.6	8.0	6.1	16.3	49.4
Jun	24.9	3.1	-2.2	246	256	15.4	4.0	6.4	40.8	51.3
Jul	31.2	2.8	-1.1	344	326	18.3	7.8	6.0	23.9	42.1
Aug	35.2	6.0	0.9	403	325	19.0	7.6	6.3	14.9	49.8
Total				**1485**	**1231**		**40.8**	**35.1**	**215.4**	**304.4**

Notes: For the purposes of this table:

1. Readings taken at 0900 hours GMT.
2. A temperature of at least 6°C (42°F) is normally considered necessary for plant growth. Accumulated temperatures (day degrees) above 6°C are a measure of plant growth during the month.

Comment In a relatively warm and dry season yields of bulb onions were lower than average but skin quality was excellent and the number of defective bulbs very low.

5/ADS/496

Appendix VII

Contract between ADAS (hereinafter called the "Contractor") and the Horticultural Development Council (hereinafter called the "Council") for a research/development project.

PROPOSAL

1. TITLE OF PROJECT Contract No: FV54b

BULB ONIONS: CONTROL OF VOLUNTEER POTATOES USING FLUROXYPYR AND CHLOPYRALID (ARTHUR RICKWOOD EHF)

2. BACKGROUND AND COMMERCIAL OBJECTIVE

To gain either a label recommendation or off label approval for use of Fluroxypyr as Starane 2, and to evaluate this chemical when used either as a tank mix with, or in sequence with, Chlorpyralid (as Dow Shield) for control of volunteer potatoes.

3. POTENTIAL FINANCIAL BENEFIT TO THE INDUSTRY

The incidence of volunteer potatoes in onion crops is on the increase. Farmers can deal with the problem within the crop either by hand hoeing (£50/ha x 3 £150/ha) or by applying spot applications of glyphosate (a very slow job costing some £100/ha). If the grower could apply up to 2 l/ha of Starane 2 (perhaps as 3 low rate applications) the cost would be £30/ha and there would be no need to find extra labour. The financial benefit to the onion industry is £420,000 assuming all fields affected to a greater or lesser extent (Note that Dow Shield is more than three times as expensive as Starane 2). Starane 2 has additional weed control advantages (eg cleavers, knotgrass).

4. SCIENTIFIC/TECHNICAL TARGET

To enable farmers to use Starane 2 legally and to suggest usage (rates and timing) criteria for the off-label certificate.

5. CLOSELY RELATED WORK

Much work has already been undertaken by Dow Elanco on the use of Starane 2 on onions. They could supply safety, toxicity and residue data. However, they cannot supply efficacy data.

6. DESCRIPTION OF THE WORK

A field of uniformly distributed potato groundkeepers in onions was divided into four replicates with 12 treatment plots each of which, by chance, contained several potatoes. These were to be sprayed using fluroxypyr (as Starane 2), chlorpyralid (as Dow Shield or Format) or Ioxynil on three low dose sequences. The potatoes were to be counted before and after each spray programme. Potato and onion vigour was to be assessed before, during and after each spray programme. Other weed control effects were also to be noted. The crop safety and efficacy of each programme would be repeated after final yield data was obtained.

7. COMMENCEMENT AND DURATION

The trial commenced May 1990, and all data will be completed by January 1996. M.J.S.

8. STAFF RESPONSIBILITIES

Contract Manager	P C Rickard
Site Leader	S R Runham

9. LOCATION

Arthur Rickwood EHF - peaty soil type (hopefully to be extended to another soil type in 1991).

10. COST

Agreed cost £850.

11. PAYMENT

On each quarter day the Council with pay to the Contractor in accordance with the following schedule:

Quarter/Year	1990
1	-
2	425
3	-
4	425

TERMS AND CONDITIONS

The Council's standard terms and conditions of contract shall apply.

Signed for the Contractor (s)

Signature.....

Position R&D Programmes Manager

Date 9/11/90

Signed for the Contractor (s)

Signature.....

Position.....

Date.....

Signed for the Council

Signature.....

Position CHIEF EXECUTIVE

Date 5.11.90