SCEPTREPLUS

Final Trial Report

Trial code:	SP10
Title:	SceptrePlus Celery herbicide screen
Crop	Outdoor Celery
Target	Broadleaf weeds
Lead researcher:	Angela Huckle
Organisation:	RSK ADAS, Boxworth, Cambridge, CB23 4NN.
Period:	1st April 2017 to end March 2018
Report date:	December 2018
Report author:	David Norman, Fresh Produce Consultancy Ltd.
ORETO Number: (certificate should be attached)	374

I the undersigned, hereby declare that the work was performed according to the procedures herein described and that this report is an accurate and faithful record of the results obtained

…… ……

Date Authors signature

Grower Summary

Introduction

Since the revocation of approval for prometryne some years ago, linuron has been the mainstay for celery post-emergence contact weed control. Extended harvest intervals for linuron and the more recent loss of metamitron have made weed control more difficult. The revocation of approval for linuron, with use up by 3rd June 2018, puts the future of UK celery production at risk, so finding alternatives quickly is crucial.

The bulk of the UK celery crop is grown on peaty soils. Because of the high organic matter, normally in the range 20-60% OM of these soils, the overall activity of residual herbicides is generally reduced and their length of persistence in the soil is shorter.

This trial therefore concentrated on potential new post-emergence contact herbicides which may be used to partly or fully replace the current use of linuron.

Methodology

Selected treatments were applied after crop planting at two timings; 10 days after planting and 17 days after planting. The treatments were applied using a 2M Azo plot sprayer with plots 2m wide by 6M long. A randomized block design was used with three replicates of each treatment plus untreated controls. The trial treatments applied were AHDB9974, AHDB9995 and AHDB9994. The standards of linuron, pendimethalin and prosulfocarb were also included in some sequences, there were a total of twelve treatments, including untreated controls with 3 replicates giving 36 plots in total. Plots were assessed for weed control by recording % weed ground cover on six occasions after treatment and crop damage by recording phytotoxicity at the same interval.

Results

All of the tested products reduced weed ground cover when compared to the untreated control. The best weed control with the least corresponding crop damage was given by the standard commercial practice treatment of pendimethalin plus linuron followed by a second linuron. Of the new products tested the best weed control was achieved by two applications of AHDB9994. Also giving good weed control was a treatment of pendimethalin plus prosulfocarb plus AHDB 9995 followed by AHDB 9974.

AHDB9994 caused some leaf bleaching on the treated leaf, similar to symptoms seen from clomazone, although the untreated leaves appeared to grow away normally as they do with clomazone. AHDB 9974 also caused some leaf damage, this time leaf scorch on the edge of the older leaves, again new leaves developed normally from the center of the plant.

The site was very weedy with the untreated plots reaching 100% weed cover by 3 weeks after planting. None of the treatments prevented plots from being overcome by weeds with even the best treatments at 70% weed cover at 6 weeks after treatment.

Table One, Summary of Results

Treatment number	T1 (10 days after planting)	T2 (17 days after planting)	Weed Control % weed cover 12 DAT2	Crop Damage 0-5 12 DAT2
1 (standard commercial)	Stomp Aqua 2.5 l/ha + Afalon 0.34 l/ha	Afalon 1.0 l/ha	6*	0
2	Stomp Aqua 2.5 l/ha + AHDB9974 0.25 l/ha	AHDB9974 1.0 l/a	45*	0
3	AHDB9974 0.5 l/ha	AHDB 9974 1.25 l/ha	42*	0.7
4	AHDB9994 0.5 l/ha	AHDB9994 0.5 l/ha	10*	2.0*
5	Stomp Aqua 2.5 l/ha + AHDB9994 0.25 l/ha	AHDB9994 0.75 l/ha	33*	1.3*
6	Stomp Aqua 2.5 l/ha + AHDB9995 2.0 l/ha	AHDB9974 1.25 l/ha	57*	0.3
7	Stomp Aqua 2.5 l/ha + AHDB9995 2.0 l/ha	AHDB9994 1.0 l/ha	40*	1.3*
8	Stomp Aqua 2.5 l/ha + AHDB9995 2.0 l/ha	Defy 5.0 l/ha + AHDB9995 2.0 l/ha	57*	0
9	Stomp Aqua 2.5 l/ha + AHDB9995 2.0 l/ha	AHDB9974 1.0 l/ha	38*	0
10	Stomp Aqua 2.5 l/ha + AHDB9995 2.0 l/ha	AHDB9974 1.25 l/ha	32*	1.0*
11	Stomp Aqua 2.5 l/ha + AHDB9995 2.0 l/ha + Defy 5.0 l/ha	AHDB9974 1.25 l/ha	15*	0.7
12	Untreated	Untreated	100	0
l.s.d @ 5%			27.6	0.6536
s.e.d			6.65	0.3152

Significantly different from untreated control (p=0.05) *

Conclusions and Take Home Message

The treatments AHDB9994, AHDB9995 and AHDB9974 all show promise in controlling weeds in celery. There is no single answer and a programmed approach will be required, further studies should be undertaken on AHDB9994 including at the pre-planting stage.

Objectives

1. To evaluate the effectiveness of AHDB9994, AHDB9974 and AHDB9995 against broadleaf weeds on celery as measured by % weed cover.
2. To monitor the treated crop for phytotoxicity

Trial conduct

UK regulatory guidelines were followed but EPPO guideline took precedence. The following EPPO guidelines were followed:

Relevant EPPO guideline(s)		**Variation from EPPO**
PP 1/152(3)	Design and analysis of efficacy evaluation trials	Nil
PP 1/135(3)	Phytotoxicity assessment	% phytotoxicity recorded as 0-5 score crop damage
PP 1/181(3)	Conduct and reporting of efficacy evaluation trials including GEP	Nil

Deviations from EPPO guidance:

Phytotoxicity was recorded using the following scale:

Crop damage score	**Equivalent to crop damage (% phytotoxicity)**
0	No crop damage
1	20% crop damage
2	40% crop damage
3	60% crop damage
4	80% crop damage
5	complete crop kill 100%

Weed control was assessed as an overall % weed cover for all combined weed species.

Test site

Item	**Details**
Location address	G's Growers, Rosedene Farm, Methwold Hythe, Norfolk, IP26 4QY
Crop	Celery, Outdoor
Cultivar	Victoria F1
Soil or substrate type	Peaty, circa. 50% organic matter.
Agronomic practice	Transplanted celery from glasshouse raised peat blocks.
Prior history of site	Previous crop maize, typical fenland farm rotation, sugar beet, potatoes, cereals, vegetable and salad crops.

Trial design

Item	Details
Trial design:	Fully randomized block design
Number of replicates:	Three
Row spacing:	28cm
Plot size: (w x l)	2Mx6M
Plot size: (m^2)	12 m^2
Number of plants per plot:	105
Leaf Wall Area calculations	n/a

Treatment details

AHDB Code	Active substance	Product name or manufacturers code	Formulation batch number	Content of active substance in product	Formulation type
	pendimethalin	Stomp Aqua	n/a	455g/l	CS
	linuron	Afalon	n/a	450g/l	SC
	prosulfocarb	Defy	n/a	800g/l	EC
AHDB 9995	N/D	N/D	N/D	N/D	N/D
AHDB 9974	N/D	N/D	N/D	N/D	N/D
AHDB9 994	N/D	N/D	N/D	N/D	N/D

Application schedule

Treatment number	Treatment: product name or AHDB code	Rate of active substance (ml or g a.s./ha)	Rate of product (l or kg/ha)	Application code
1 Standard	Stomp Aqua + Afalon	1137.5 153	2.5 0.34	A
	Afalon	450	1.0	B
2	Stomp Aqua + AHDB 9974	1137.5 100	2.5 0.25	A
	AHDB 9974	400	1.0	B
3	AHDB 9974	200	0.5	A
	AHDB 9974	400	1.0	B
4	AHDB9994	300	0.5	A
	AHDB9994	300	0.5	B
5	Stomp Aqua +AHDB9994	1137.5 150	2.5 0.25	A
	AHDB9994	450	0.75	B
6	Stomp Aqua +AHDB 9995	1137.5 800	2.5 2.0	A
	AHDB 9974	500	1.25	B
7	Stomp Aqua +AHDB 9995	1137.5 800	2.5 2.0	A
	Alconifen	600	1.0	B
8	Stomp Aqua +AHDB 9995	1137.5 800	2.5 2.0	A
	Defy + AHDB9995	4000 800	5.0 2.0	B
9	Stomp Aqua +AHDB 9995	1137.5 800	2.5 2.0	A
9	AHDB9974	400	1.0	B
10	Stomp Aqua +AHDB 9995	1137.5 800	2.5 2.0	A
	AHDB9974	500	1.25	B
11	Stomp Aqua +AHDB 9995 +Defy	1137.5 800	2.5 2.0	A
11	AHDB9974	500	1.25	B
12	Control	Untreated		

Application details

	Application A	Application B
Application date	26/05/17	02/06/17
Time of day	10:18-10:55	09:08-09:42
Crop growth stage (Max, min average BBCH)	13-14	15-16
Crop height (cm)	10	12
Crop coverage (%)	10	12
Application Method	spray	Spray
Application Placement	Foliar	Foliar
Application equipment	Azo plot sprayer	Azo plot Sprayer
Nozzle pressure	2.5 bar	2.5
Nozzle type	Flat fan	Flat fan
Nozzle size	04 f100	04f110
Application water volume/ha	400	400
Temperature of air - shade (°C)	21	19
Relative humidity (%)	n/a	n/a
Wind speed range (m/s)	5.4	2.2
Dew presence (Y/N)	N	N
Temperature of soil - 2-5 cm (°C)	n/a	n/a
Wetness of soil - 2-5 cm	Damp	Damp
Cloud cover (%)	0	100

Untreated levels of pests/pathogens at application and through the assessment period

Common name	Scientific Name	EPPO Code	Infection level pre-application	Infection level at start of assessment period	Infection level at end of assessment period
Broadleaf Weeds % Ground cover	N/A	N/A	0	80%	100%

Assessment details

Evaluation date	Evaluation Timing (DA)*	Crop Growth Stage (BBCH)	Evaluation type (efficacy, phytotox)	What was assessed and how (e.g. dead or live pest; disease incidence and severity; yield, marketable quality)
31/05/17	5/-2	13	E,P	% weed cover, crop damage
07/06/17	12/5	14	E,P	% weed cover, crop damage
14/06/17	19/12	16	E,P	% weed cover, crop damage
21/06/17	26/17	41	E,P	% weed cover, crop damage
28/06/17	33/24	42	E,P	% weed cover, crop damage
12/07/17	47/37	48	E,P	% weed cover, crop damage

* DA – days after application (1st/2nd)

Statistical analysis

Statistical analysis was carried out by Chris Dyer, ADAS statistician by ANOVA using Genstat 12.2 and Duncan's Multiple Range test. There were relatively low scores for crop damage including multiple zero's indicating these results may be less meaningful than the % weed cover results for which there was a full range of scores during the assessments and so a greater level confidence in the results. The percentage weed scores were subject to angular and backward transformations to allow for any uneven variations in weed population across the trial.

Results

Table 1. Mean Crop Damage – Phytotoxicity

	Timing 1	**Timing 2**	**Mean Crop Damage Scores 0-5**			
Treatment Number	**T1**	**T2**	**7th June**	**14th June**	**21st June**	**28th June**
1	Stomp Aqua/Afalon	Afalon	0.00a	0.00a	0.00a	0.00a
2	Stomp Aqua/AHDB9974	AHDB9974	0.00a	0.00a	0.00a	0.00a
3	AHDB9974	AHDB9974	0.00a	0.70abc	0.67bc	0.00a
4	AHDB9994	AHDB9994	2.00c	2.00d	2.00e	2.00c
5	Stomp Aqua/AHDB9994	AHDB9994	0.33b	1.30cd	1.00cd	1.00b
6	Stomp Aqua/AHDB9995	AHDB9974	0.00a	0.30ab	0.00a	0.00a
7	Stomp Aqua/AHDB9995	AHDB9994	0.00a	1.30cde	1.33d	0.67ab
8	Stomp Aqua/AHDB9995	prosulfocarb/AHDB9995	0.00a	0.00a	0.00a	0.00a
9	Stomp Aqua/AHDB9995	AHDB9974	0.00a	0.00a	0.00a	0.00a
10	Stomp Aqua/AHDB9995	AHDB9974	0.00a	1.00bc	0.33ab	1.00b
11	Stomp Aqua/AHDB9995	AHDB9974	0.00a	0.70abc	0.33ab	0.33ab
12	Untreated	Untreated	0.00a	0.00a	0.00a	0.00a
		df	22	22	22	22
		l.s.d	0.2822	0.6536	0.5034	0.8337
		s.e.d	0.1361	0.3152	0.2427	0.4020
		Mean	0.194	0.611	0.472	0.417

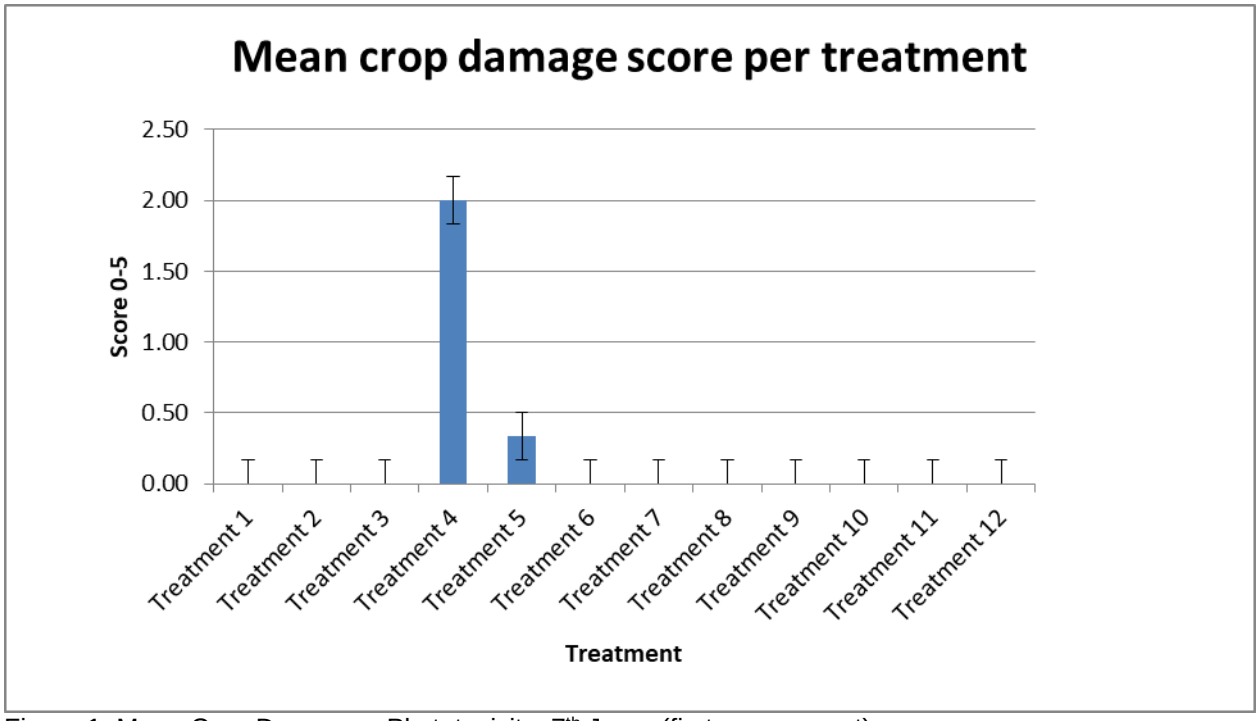

Figure 1, Mean Crop Damage – Phytotoxicity, 7th June, (first assessment)

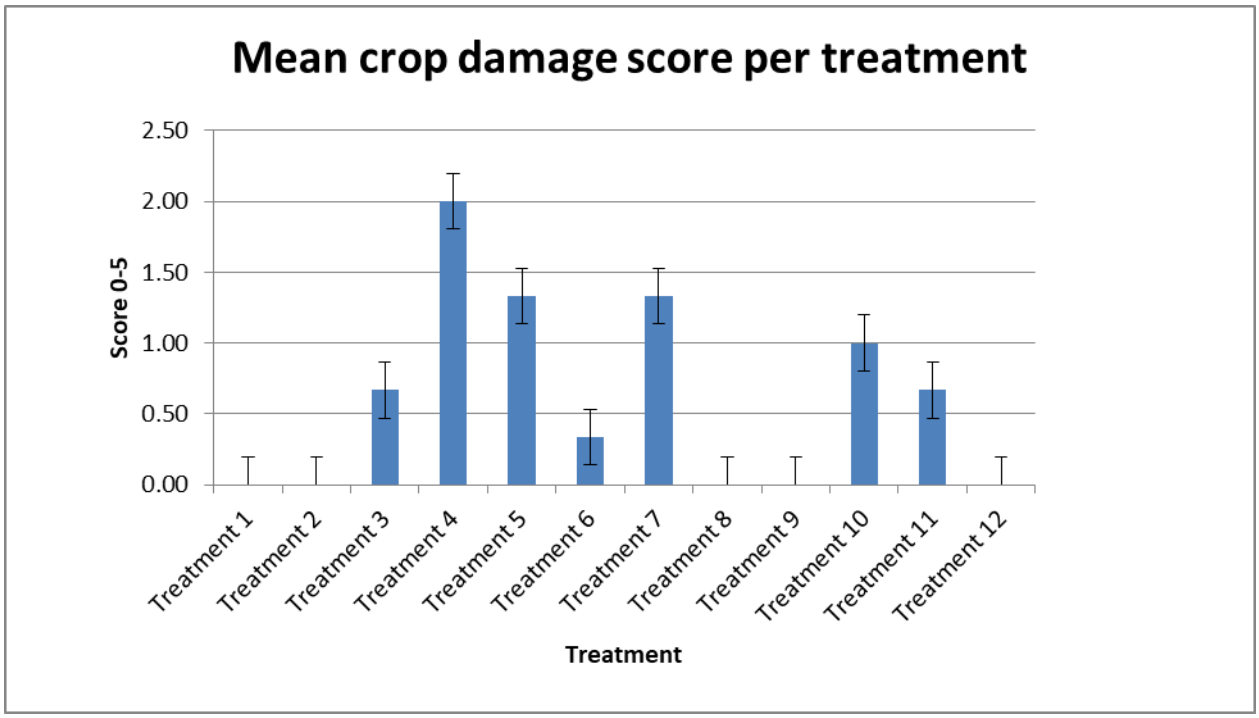

Figure 2 Mean Crop Damage – Phytotoxicity, 14th June (second assessment)

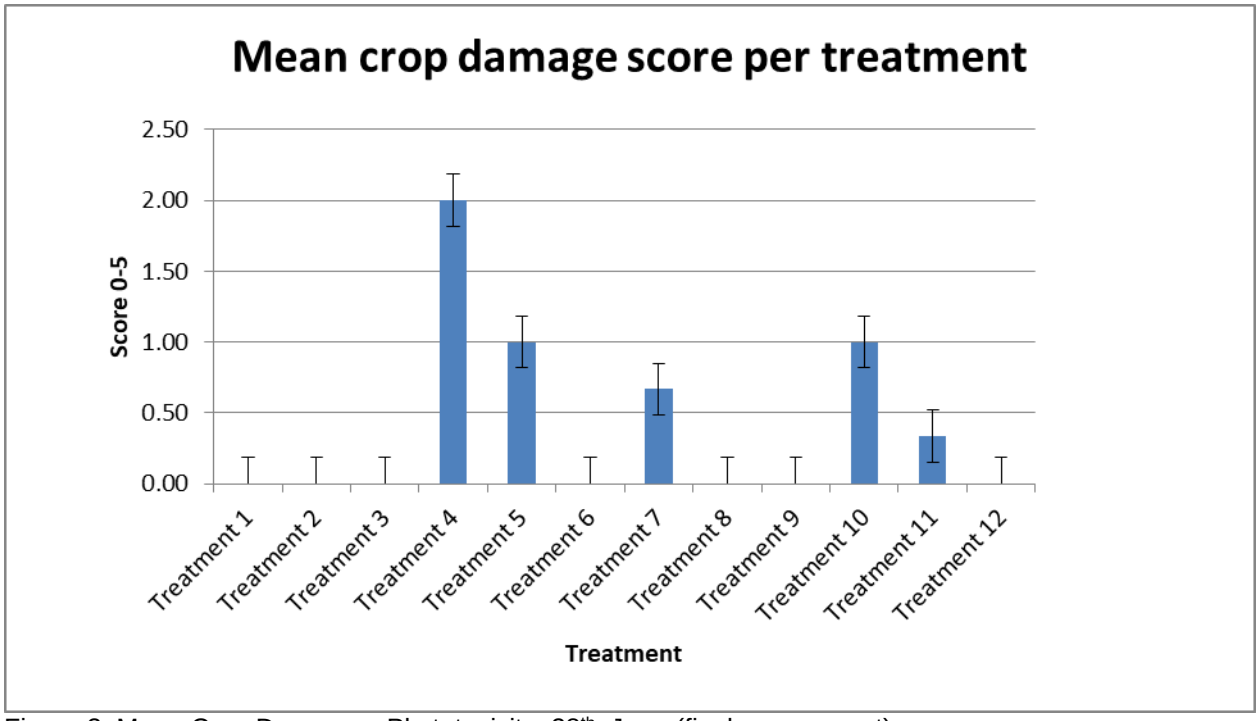

Figure 3. Mean Crop Damage – Phytotoxicity, 28th June (final assessment)

Table 2. Weed % Ground cover scores

Table3 Percentage reduction in weed levels compared to untreated control

	Timing 1	Timing 2	Weed Scores - % Reduction in Weed Levels Compared to Untreated					
			31st May	7th June	14th June	21st June	28th June	12th July
Treatment	T1	T2	% reduction	% reduction	% reduction	% reduction	% reduction	% reduction
1	StompAqua/ Afalon	Afalon	94.02	97.36	94.33	75.11	50.00	25.00
2	Stomp Aqua/AHDB9974	AHDB9974	82.35	78.38	55.36	23.18	6.70	3.69
3	AHDB9974	AHDB9974	84.45	84.28	58.68	33.10	1.15	1.15
4	AHDB9994	AHDB9994	92.24	96.14	90.00	71.70	46.65	29.20
5	Stomp Aqua	AHDB9994 DB9994	74.47	77.85	67.89	42.66	17.86	3.02
6	Stomp Aqua/AHDB9995	AHDB9974	32.22	50.00	42.66	16.36	2.37	2.37
7	Stomp Aqua/AHDB9995	AHDB9994	50.60	43.16	60.29	41.45	11.61	2.37
8	Stomp Aqua/AHDB9995	prosulfocarb/ AHDB9995	40.22	39.36	43.02	43.31	19.31	29.67
9	Stomp Aqua/AHDB9995	AHDB9974	60.81	60.64	62.78	37.54	11.61	1.15
10	Stomp Aqua/AHDB9995	AHDB9974	62.89	68.37	71.31	51.87	23.18	15.36
11	Stomp Aqua/AHDB9995	AHDB9974	80.62	91.95	86.54	65.82	46.65	29.20
12	Untreated Mean		84.00	100.00	100.00	100.00	100.00	100.00

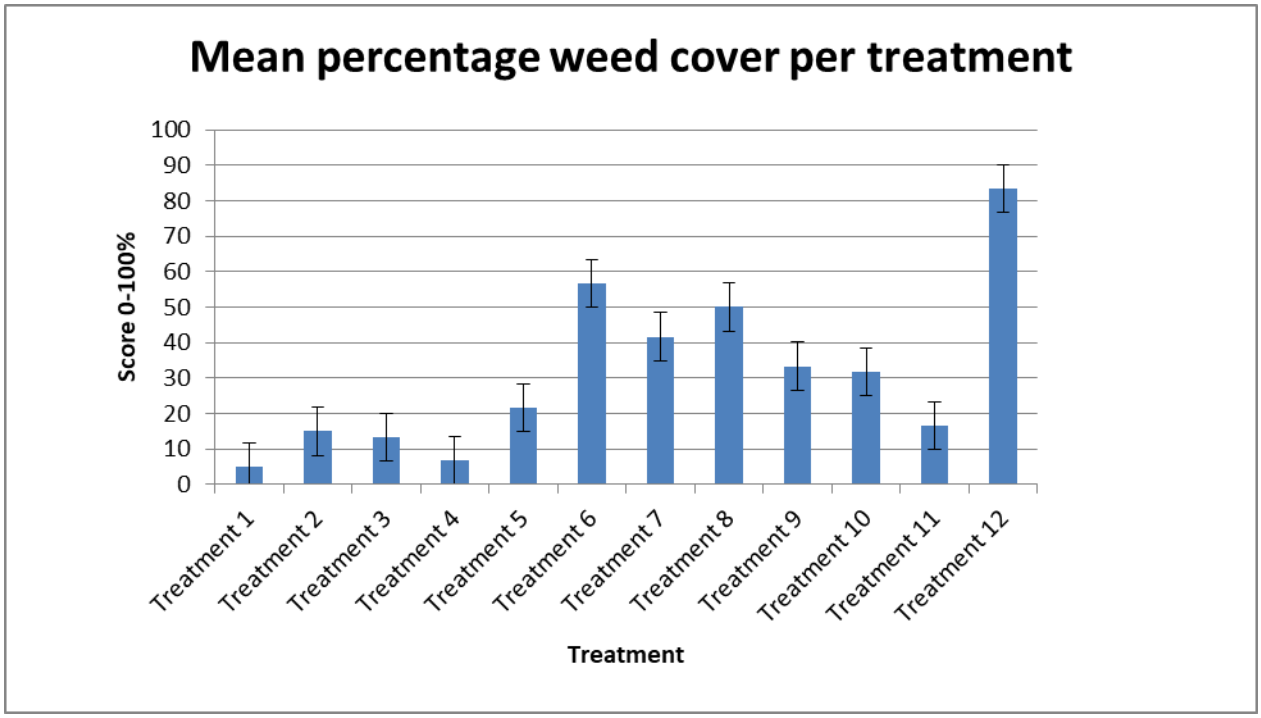

Figure 4. Mean % Weed Cover 31st May (first assessment)

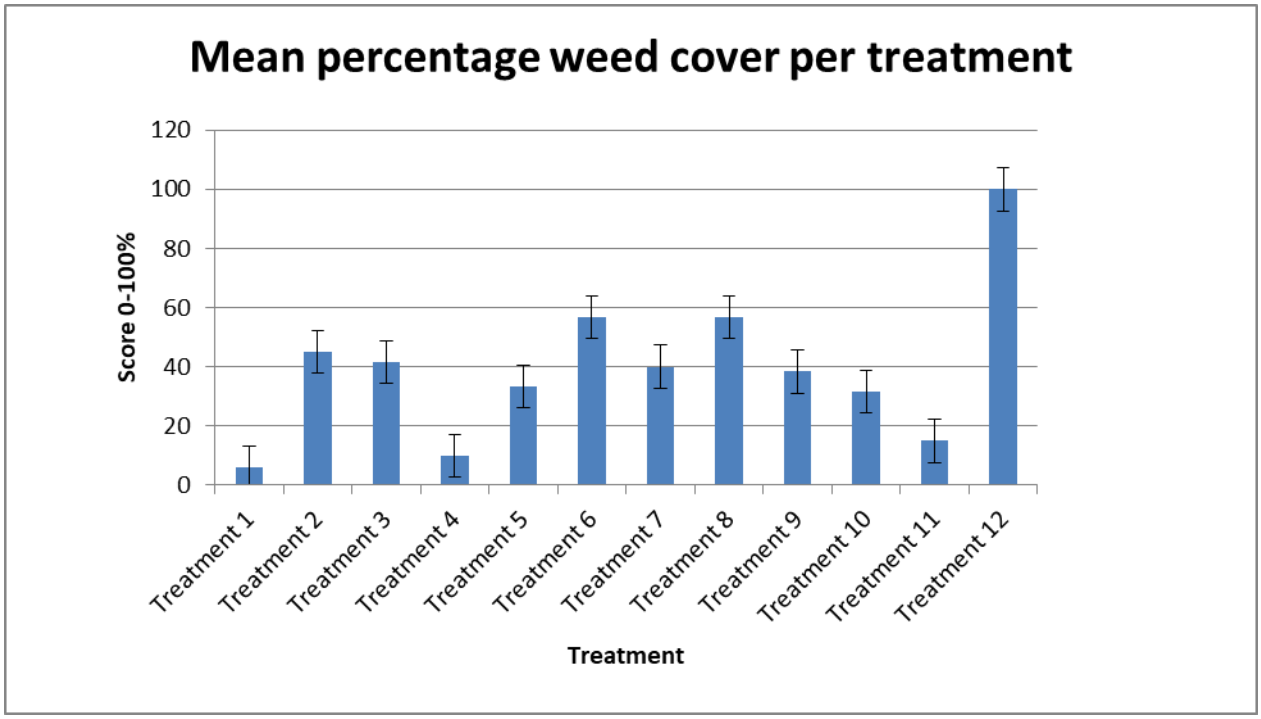

Figure 5. Mean % weed cover 14th June (third assessment)

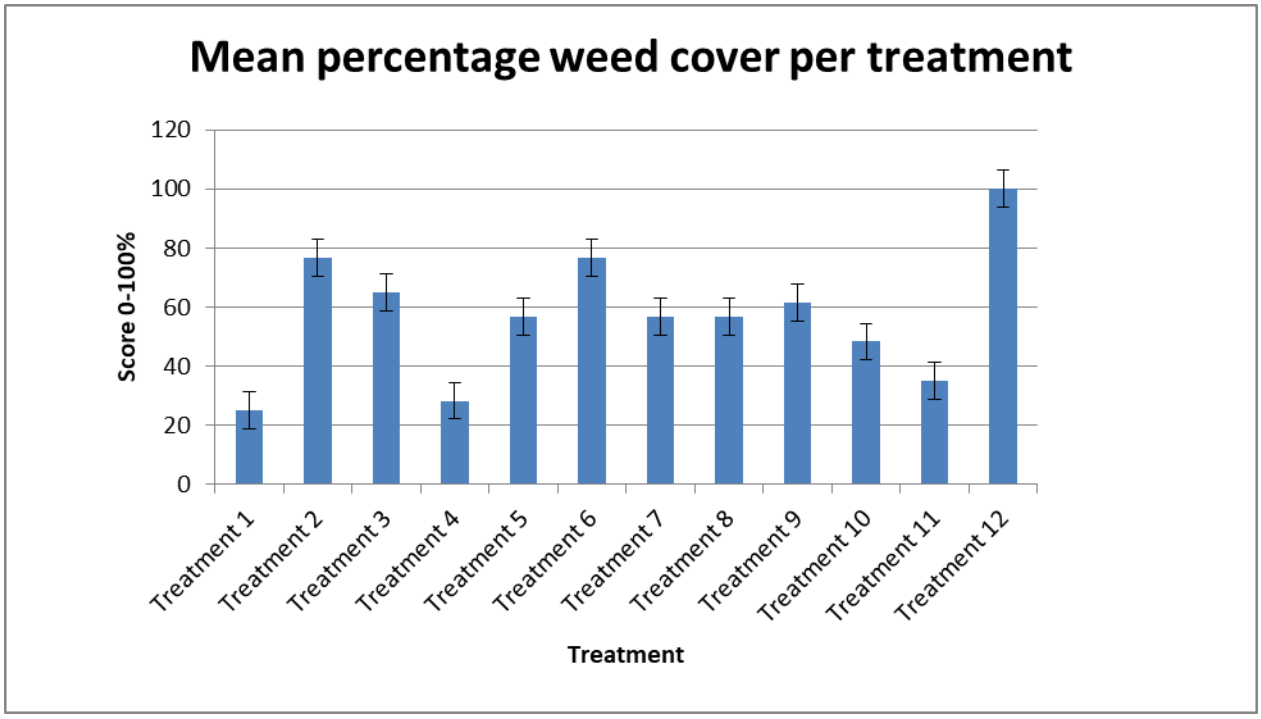

Figure 6. Mean % weed cover 21st June (fourth assessment)

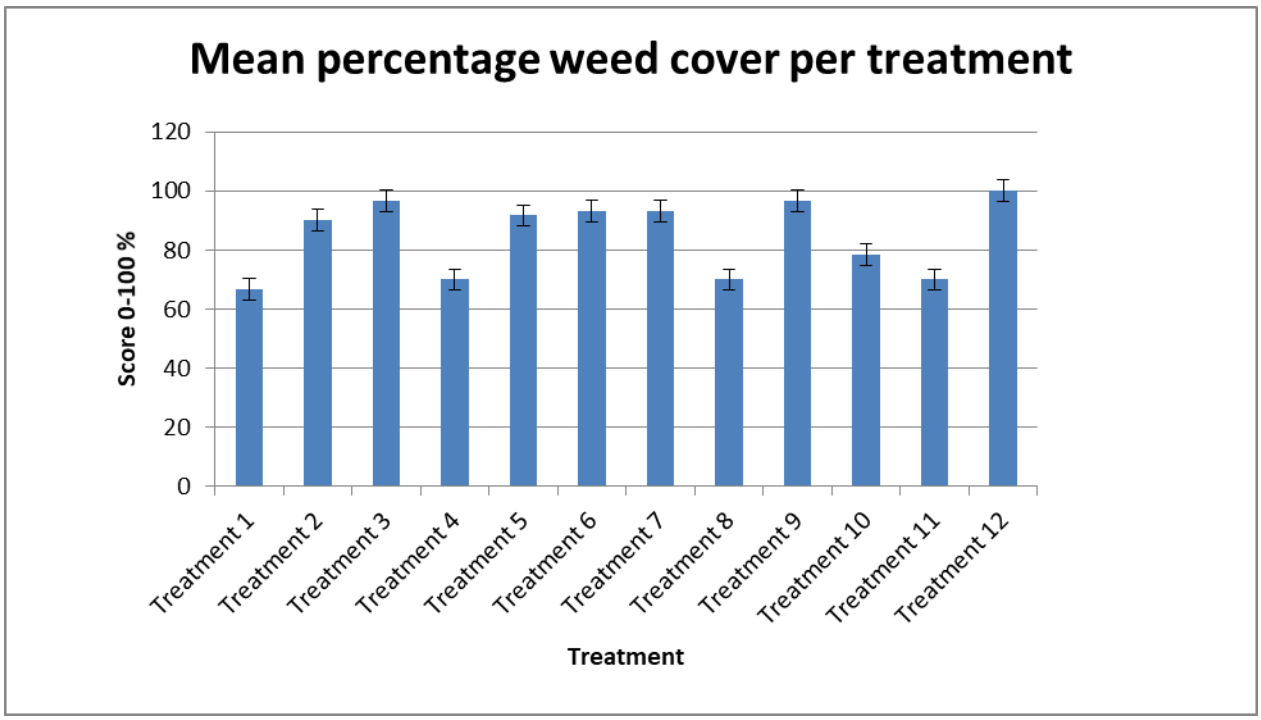

Figure 7. Mean % weed cover 12th July (sixth and final assessment)

Notes on Assessments

Weed ground cover as % weed cover, was assessed and recorded for each of the six assessment dates. Crop damage was assessed at all assessments, but there was no damage at the first assessment date of 31st May, so there are no results for this date. By the time of the final assessment date on the 12th July the crop was overgrown by weeds and so no crop damage scores could be taken at this assessment date either. At all assessment dates the % weed cover was recorded. The site is a black peaty fen soil and weed pressure

was extremely high. This is a normal soil type for growing celery and this level of weeds is regularly expected.

Discussion

All of the tested products reduced weed ground cover when compared to the untreated control. The best weed control with the least corresponding crop damage was given by the standard commercial practice treatment of pendimethalin plus linuron followed by linuron.
Of the new products tested the best weed control was achieved by two applications of AHDB9994. Also giving good weed control was a treatment of pendimethalin plus prosulfocarb plus AHDB 9995 followed by AHDB 9974.

AHDB9994 caused some leaf bleaching on the treated leaf, similar to symptoms seen from clomazone, although the untreated leaves appeared to grow away normally as they do with clomazone. AHDB 9974 also caused some leaf damage, this time leaf scorch on the edge of the older leaves, again new leaves developed normally from the center of the plant.

The site was very weedy with the untreated plots reaching 100% weed cover by 3 weeks after planting. None of the treatments prevented the plots from being overcome by weeds with even the best treatments at 70% weed cover at 6 weeks after treatment. In the commercial crop alongside the trial the standard herbicide program was supplemented by a mechanical tractor hoe. This wasn't used through the trial area as it would have compromised assessments.

The standard treatment performed as expected and was comparable to commercial practice.

Conclusions

AHDB9994, AHDB9995 and AHDB9974 all show promise in controlling weeds in celery.

AHDB9994 and AHDB9974 caused some crop damage, but this may be acceptable commercially considering the lack of other options.

There is no single answer and a programmed approach to weed control in celery will be required following the expiry of approval for linuron on 3rd June 2018.

Further studies should be undertaken on AHDB9994 including at the pre-planting stage.

AHDB9974 now appears unlikely to be progressed to a UK approval on celery and efforts should be concentrated on AHDB9994 and AHDB9995.

Acknowledgements
Thanks to Peter Shropshire of G's Growers, Norfolk Farms, for providing the experimental site and Peter Hammond of Fresh Produce Consultancy for carrying out the spray applications.

Appendix

Photograph 1, AHDB9994 damage on older leaves

Photograph 2, Trial Area General 31/05/17

Photograph 3, Trial Area General 7th June 2017

Photograph 4, Trial area general 14th June 2017

Crop Diary

Date	Description	Amount/ha	
20 January 2017	base fertiliser P,K,Mg	0-12-35-11.5 - 760kg/ha	
16 May 2017	Victoria Celery block plants	92,000/ha	
16 May 2017	boom irrigation	25mm/ha	
01 June 2017	Plenum	0.4	
	Hallmark Zeon	0.05	
	Amistar	1	
	Manganese sulphate	4	
	Magnesium sulphate	4	
22 June 2017	Plover	0.5	
	Plenum	0.4	
	Hallmark zeon	0.05	
	Manganese sulphate	4	
	Magnesium sulphate	4	
06 July 2017	Amistar	1	
	Aphox	0.28	
	Hallmark zeon	0.05	
	Manganese sulphate	4	
	Magnesium sulphate	4	

20 July 2017	Switch	1	
	Tracer	0.2	
	Manganese sulphate	4	
	Magnesium sulphate	4	
	Plenum	0.4	
27 July 2017	Tracer	0.2	
	Aphox	0.28	
	Manganese sulphate	4	
	Magnesium sulphate	4	
05 August 2017	Harvest		

Trial Diary

Date	Action	Person
16/05/2017	trial planted	Grower
26/05/2017	T1, spray	Peter Hammond
31/05/2017	assessment 1	David Norman
02/06/2017	T2, spray	Peter Hammond
07/06/2017	assessment 2	David Norman
14/06/2017	assessment 3	David Norman
21/06/2017	assessment 4	David Norman
28/06/2017	assessment 5	David Norman
12/07/2017	assessment 6	David Norman

Raw Data from Assessments
31st May

Rep	Treatment		Weeds % Ground cover	Crop Damage 0-5
1	1	Treatment 1	5	0
1	2	Treatment 2	20	0
1	3	Treatment 3	10	0
1	4	Treatment 4	5	0
1	5	Treatment 5	15	0
1	6	Treatment 6	50	0
1	7	Treatment 7	50	0
1	8	Treatment 8	40	0
1	9	Treatment 9	20	0
1	10	Treatment 10	20	0
1	11	Treatment 11	10	0
1	12	Treatment 12	80	0
2	1	Treatment 1	5	0
2	2	Treatment 2	15	0
2	3	Treatment 3	20	0
2	4	Treatment 4	5	0
2	5	Treatment 5	20	0
2	6	Treatment 6	60	0
2	7	Treatment 7	50	0
2	8	Treatment 8	60	0
2	9	Treatment 9	30	0
2	10	Treatment 10	25	0
2	11	Treatment 11	25	0
2	12	Treatment 12	90	0
3	1	Treatment 1	5	0
3	2	Treatment 2	10	0
3	3	Treatment 3	10	0
3	4	Treatment 4	10	0
3	5	Treatment 5	30	0
3	6	Treatment 6	60	0
3	7	Treatment 7	25	0
3	8	Treatment 8	50	0
3	9	Treatment 9	50	0
3	10	Treatment 10	50	0
3	11	Treatment 11	15	0
3	12	Treatment 12	80	0

7th June

Rep	Treatment		Weeds % Cover	Crop Damage 0-5
1	1	Treatment 1	3	0
1	2	Treatment 2	20	0
1	3	Treatment 3	10	0
1	4	Treatment 4	5	2
1	5	Treatment 5	20	0
1	6	Treatment 6	30	0
1	7	Treatment 7	70	0
1	8	Treatment 8	50	0
1	9	Treatment 9	20	0
1	10	Treatment 10	10	0
1	11	Treatment 11	3	0
1	12	Treatment 12	100	0
2	1	Treatment 1	2	0
2	2	Treatment 2	25	0
2	3	Treatment 3	30	0
2	4	Treatment 4	2	2
2	5	Treatment 5	10	0
2	6	Treatment 6	70	0
2	7	Treatment 7	60	0
2	8	Treatment 8	80	0
2	9	Treatment 9	50	0
2	10	Treatment 10	50	0
2	11	Treatment 11	20	0
2	12	Treatment 12	100	0
3	1	Treatment 1	3	0
3	2	Treatment 2	20	0
3	3	Treatment 3	10	0
3	4	Treatment 4	5	2
3	5	Treatment 5	40	1
3	6	Treatment 6	50	0
3	7	Treatment 7	40	0
3	8	Treatment 8	50	0
3	9	Treatment 9	50	0
3	10	Treatment 10	40	0
3	11	Treatment 11	5	0
3	12	Treatment 12	100	0

14th June

Rep	Treatment		Weeds % Cover	Crop Damage 0-5
1	1	Treatment 1	5	0
1	2	Treatment 2	50	0
1	3	Treatment 3	40	0
1	4	Treatment 4	10	2
1	5	Treatment 5	25	1
1	6	Treatment 6	50	1
1	7	Treatment 7	60	1
1	8	Treatment 8	35	0
1	9	Treatment 9	15	0
1	10	Treatment 10	5	1
1	11	Treatment 11	5	1
1	12	Treatment 12	100	0
2	1	Treatment 1	3	0
2	2	Treatment 2	60	0
2	3	Treatment 3	60	1
2	4	Treatment 4	10	2
2	5	Treatment 5	15	2
2	6	Treatment 6	80	0
2	7	Treatment 7	30	2
2	8	Treatment 8	75	0
2	9	Treatment 9	50	0
2	10	Treatment 10	50	1
2	11	Treatment 11	30	0
2	12	Treatment 12	100	0
3	1	Treatment 1	10	0
3	2	Treatment 2	25	0
3	3	Treatment 3	25	1
3	4	Treatment 4	10	2
3	5	Treatment 5	60	1
3	6	Treatment 6	40	0
3	7	Treatment 7	30	1
3	8	Treatment 8	60	0
3	9	Treatment 9	50	0
3	10	Treatment 10	40	1
3	11	Treatment 11	10	1
3	12	Treatment 12	100	0

21st June

Rep	Treatment		Weeds % Cover	Crop Damage 0-5
1	1	Treatment 1	25	0
1	2	Treatment 2	80	0
1	3	Treatment 3	70	0
1	4	Treatment 4	25	2
1	5	Treatment 5	50	1
1	6	Treatment 6	80	0
1	7	Treatment 7	90	1
1	8	Treatment 8	60	0
1	9	Treatment 9	30	0
1	10	Treatment 10	25	0
1	11	Treatment 11	20	0
1	12	Treatment 12	100	0
2	1	Treatment 1	20	0
2	2	Treatment 2	80	0
2	3	Treatment 3	90	1
2	4	Treatment 4	30	2
2	5	Treatment 5	40	1
2	6	Treatment 6	100	0
2	7	Treatment 7	30	2
2	8	Treatment 8	50	0
2	9	Treatment 9	75	0
2	10	Treatment 10	70	1
2	11	Treatment 11	60	1
2	12	Treatment 12	100	0
3	1	Treatment 1	30	0
3	2	Treatment 2	70	0
3	3	Treatment 3	35	1
3	4	Treatment 4	30	2
3	5	Treatment 5	80	1
3	6	Treatment 6	50	0
3	7	Treatment 7	50	1
3	8	Treatment 8	60	0
3	9	Treatment 9	80	0
3	10	Treatment 10	50	0
3	11	Treatment 11	25	0
3	12	Treatment 12	100	0

28th June

Rep	Treatment		Weeds % Cover	Crop Damage 0-5
1	1	Treatment 1	50	0
1	2	Treatment 2	100	0
1	3	Treatment 3	100	0
1	4	Treatment 4	50	2
1	5	Treatment 5	80	0
1	6	Treatment 6	100	0
1	7	Treatment 7	100	0
1	8	Treatment 8	90	0
1	9	Treatment 9	80	0
1	10	Treatment 10	70	2
1	11	Treatment 11	50	1
1	12	Treatment 12	100	0
2	1	Treatment 1	50	0
2	2	Treatment 2	90	0
2	3	Treatment 3	100	0
2	4	Treatment 4	60	2
2	5	Treatment 5	75	2
2	6	Treatment 6	100	0
2	7	Treatment 7	80	1
2	8	Treatment 8	70	0
2	9	Treatment 9	70	0
2	10	Treatment 10	80	0
2	11	Treatment 11	60	0
2	12	Treatment 12	100	0
3	1	Treatment 1	50	0
3	2	Treatment 2	80	0
3	3	Treatment 3	90	0
3	4	Treatment 4	50	2
3	5	Treatment 5	90	1
3	6	Treatment 6	80	0
3	7	Treatment 7	70	1
3	8	Treatment 8	80	0
3	9	Treatment 9	100	0
3	10	Treatment 10	80	1
3	11	Treatment 11	50	0
3	12	Treatment 12	100	0

12 July

Rep	Treatment		Weeds % Cover	Crop Damage 0-5
1	1	Treatment 1	50	
1	2	Treatment 2	100	
1	3	Treatment 3	90	
1	4	Treatment 4	50	
1	5	Treatment 5	100	
1	6	Treatment 6	100	
1	7	Treatment 7	100	
1	8	Treatment 8	70	
1	9	Treatment 9	90	
1	10	Treatment 10	60	
1	11	Treatment 11	50	
1	12	Treatment 12	100	
2	1	Treatment 1	50	
2	2	Treatment 2	100	
2	3	Treatment 3	100	
2	4	Treatment 4	80	
2	5	Treatment 5	75	
2	6	Treatment 6	100	
2	7	Treatment 7	80	
2	8	Treatment 8	80	
2	9	Treatment 9	100	
2	10	Treatment 10	100	
2	11	Treatment 11	80	
2	12	Treatment 12	100	
3	1	Treatment 1	100	
3	2	Treatment 2	70	
3	3	Treatment 3	100	
3	4	Treatment 4	80	
3	5	Treatment 5	100	
3	6	Treatment 6	80	
3	7	Treatment 7	100	
3	8	Treatment 8	60	
3	9	Treatment 9	100	
3	10	Treatment 10	75	
3	11	Treatment 11	80	
3	12	Treatment 12	100	

Certificate of

Official Recognition of Efficacy Testing Facilities or Organisations in the United Kingdom

This certifies that

RSK ADAS Ltd

complies with the minimum standards laid down in Regulation (EC) 1107/2009 for efficacy testing.

The above Facility/Organisation has been officially recognised as being competent to carry out efficacy trials/tests in the United Kingdom in the following categories:

Agriculture/Horticulture
Biologicals and Semiochemicals
Stored Crops

Date of issue: 16 December 2016
Effective date: 5 December 2016
Expiry date: 17 March 2018

Certification Number
ORETO 374

Signature _____
Authorised signatory

HSE
Chemicals Regulation Division

Department of
Agriculture and
Rural Development