

SCEPTREPLUS

Final Trial Report

Trial code:	2018. SP 28
Title:	AHDB SCEPTREplus allium residual herbicide screen
Crop	Group: field vegetables – Alliums (salad onion)
Target	General broadleaf weeds and grasses, 3WEEDT EPPO1/75(3) Weeds in Allium crops
Lead researcher:	Angela Huckle
Organisation:	RSK ADAS
Period:	16 th May 2018 – 31 st March 2019
Report date:	21 st August 2019
Report author:	Angela Huckle Emily Lawrence
ORETO Number: (certificate should be attached)	409

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

21 Aug 2019

Date



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Authors signature

Trial Summary

Introduction

Lack of comprehensive weed control for alliums is due to a combination of crop sensitivity to available herbicides and insufficient available actives to cover the full weed spectrum. Particularly problematic broad leaf weed types for allium producers are fat hen, field pansy, small nettle, composite and polygonums as well as a range of grasses (AHDB Gap Analysis 2016). A number of growers are currently trialling the use of bandsprayed glyphosate for weed control using directed hooded sprays (approved under EAMU). This method is however, slow and can only be used at early crop growth stages and doesn't control weeds in the crop rows. A combination of approaches for effective weed control is therefore needed; and crop safe approvals for broadacre applied herbicides are still required.

The objective of this trial was to identify crop safe and effective residual herbicides for weed control in alliums, aiming to expand the options available to growers. Salad onions were used as a model crop as they are particularly sensitive to herbicide application.

Method

A randomised replicated residual herbicide trial on salad onion was carried out at a commercial grower site in Warwickshire, on light sand to silt soil. The trial field was drilled on 26th April 2018, with the variety 'Parade'.

The treatments were applied at a pre-emergence timing with a 1.5 m boom, using a knapsack sprayer at 400 L/ha water volume. A randomised block design was used, with three replicates of twenty-two treatments, including two untreated controls. There were sixty-six plots in total, each measuring 1.8 m x 6.0 m.

The trial was assessed on five occasions, focussing on weed species and crop phytotoxicity (safety). Crop effects were scored on a 0-10 scale, and the effects were described e.g. crop loss, yellowing, twisting or scorch for example. In addition to the baseline weed assessment carried out prior to the first treatment application, assessments were carried out at one, three, five, eight and ten weeks after the treatment was applied. For the first two assessments weed plant counts were used whilst at seedling stage, and then % weed ground cover was used once the weeds were larger for the latter three assessments.

Results and discussion

Weed populations were high with 66.6% weed cover in the untreated plots at five weeks after treatment application, which increased to 87.8% by the end of the trial at ten weeks after application. The main weeds present were field pansy and chickweed, with lower proportions of groundsel, common poppy, fools parsley and volunteer oilseed rape. Significant differences in weed control were seen in field pansy and chickweed only.

Eight treatments significantly reduced weed levels for up to ten weeks, or up to harvest when compared with the untreated control ($p < 0.001$). These were Wing-P at 1.0 and 2.0 L/ha, Stomp Aqua 1.0 L/ha + AHDB9898, Stomp Aqua 0.5 L/ha + AHDB9898 ½ rate, Flexidor 1.0 L/ha, Emerger 1.0 L/ha and 2.0 L/ha and AHDB9987 at double rate. With the exception of AHDB9987 at double dose these were all also crop safe. However, it should be noted that 2018 was a safe year for residual herbicides due to the dry weather, as Wing-P would usually be expected to cause crop damage when applied at 2.0 L/ha. Therefore the crop safety results should be treated with caution, and a further trial would be required to confirm crop safety of the promising products.

The lowest rates of Flexidor 0.125 L/ha and Emerger 0.25 L/ha also gave a significant reduction in % weed cover when compared to the untreated, but these were weakly significant and as expected the higher rates of these products give greater weed control.

The best performing products on the weeds present were Emerger 2.0 L/ha, Stomp Aqua 1.0 L/ha + AHDB9898 and the standard Wing-P 2.0 L/ha giving at least a 68% percentage reduction in weed levels at ten weeks after application (Table 6, main report).

AHDB9898 and Emerger would be useful additions to be taken forward for approval, or included in programmes for crops where they are already approved (e.g. Emerger -bulb onions EAMU 1616/19). Further trials with tank mixes would be useful to determine if these products are still crop safe when mixed with other commonly used products

Table 1. Summary of crop damage and % weed cover (transformed data) at five weeks after treatment application, 13th June 2018. Figures in **bold** are significantly different from the untreated.

Treatment	Crop damage (0-10)	Mean weed cover (%)
Untreated	10.0	66.6
Wing-P 1.0 L/ha	10.0	34.1
Wing-P 2.0 L/ha	10.0	8.1
Stomp Aqua 0.5 L/ha AHDB 9898 ½ rate	10.0	45.5
Stomp Aqua 1.0 L/ha AHDB 9898	10.0	24.3
Flexidor 0.125 L/ha	10.0	55.9
Flexidor 0.25 L/ha	10.0	66.3
Flexidor 0.5 L/ha	10.0	62.4
Flexidor 1.0 L/ha	9.0	46.9
AHDB 9918 ¼ N	10.0	70.5
AHDB 9918 ½ N	9.0	61.3
AHDB 9918 N	10.0	57.3
AHDB 9918 2N	9.7	60.8
Emerger 0.25 L/ha	10.0	33.0
Emerger 0.5 L/ha	10.0	54.8
Emerger 1.0 L/ha	10.0	19.3
Emerger 2.0 L/ha	10.0	8.1
AHDB 9987 ¼ N	10.0	58.9
AHDB 9987 ½ N	9.7	70.5
AHDB 9987	9.0	35.2
AHDB 9987 2N	2.7	43.9
p value	<0.001	<0.001
d.f.	43	43
L.S.D.	1.921	23.51

Crop Damage – Red = unacceptable, Yellow = marginal, Green = safe
Weed control – Red = > 50% weed cover, Yellow = 25-50% weed cover, Green = <25% weed cover

Conclusions

- Emerger 2.0 L/ha and Stomp Aqua 1,0 L/ha + AHDB9898 gave equivalent to or better weed control than the standard (Wing-P 2.0 L/ha)
- The promising treatments should be tested further alone and in tank mixes for crop safety as 2018 gave unexpectedly safe results in the standard control.

Take home message

Emerger and AHDB9898 would be useful additions to approvals for use in alliums to improve crop pre-emergence weed control.

Objectives

1. To compare a number of novel residual herbicides with the commercial standard (Wing-P) for selectivity (crop safety) and efficacy in salad onions.

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
EPPO PP1/135(4)	Phytotoxicity assessment	None
EPPO PP1/152(4)	Guideline on design and analysis of efficacy evaluation trials	None
EPPO PP1/225 (2)	Minimum effective dose	None
EPPO PP1/181 (4)	Conduct and reporting of efficacy evaluation trials including good experimental practice	None
EPPO PP 1/214(3)	Principles of acceptable efficacy	None
EPPO PP 1/224(2)	Principles of efficacy evaluation for minor uses	None

Deviations from EPPO guidance:

Protocol conforms to EPPO 1/075(3) for Weeds in allium crops with the exception below:

“Replicates: at least 4”. This study only had 3 replicates – the large number of treatments provides acceptable number of residual degrees of freedom.

Test site

Item	Details
Location address	Field: Cobbels Reeves Hunningham CV33 9EG Warwickshire Grid reference: SP 39681 69403
Crop	Salad onion
Cultivar	Parade
Soil or substrate type	Slightly acid loamy and clayey soils with impeded drainage
Agronomic practice	See Appendix A
Prior history of site	See Appendix A

Trial design

Item	Details
Trial design:	Randomised block
Number of replicates:	3
Row spacing:	4 rows per 1.8 m bed
Plot size: (w x l)	1.8 m x 6 m
Plot size:	10.8 m ²
Number of plants per plot:	N/K
<i>Leaf Wall Area calculations</i>	N/A

Treatment details

AHDB Code	Product name	Active substance	Formulation batch number	Content of active substance in product (g/L)	Formulation type
N/A	Emerger	aclonifen	EV56006446	600	Suspension Concentrate
AHDB 9898	N/D	N/D	N/D	N/D	N/D
AHDB 9996	N/D	N/D	N/D	N/D	N/D
N/A	Stomp Aqua	pendimethalin	15161381	455	Capsule Suspension
AHDB 9987	N/D	N/D	N/D	N/D	N/D
AHDB 9918	N/D	N/D	N/D	N/D	N/D
AHDB 9975	N/D	N/D	N/D	N/D	N/D

Application schedule

Trt. No.	Treatment: product name or AHDB code	Rate of active substance(s) (g/ha)	Rate of product (L/ha)
1	Untreated	-	-
2	Untreated	-	-
3	Wing-P 1.0 L/ha	250 + 212.5	1.00
4	Wing-P 2.0 L/ha	500 + 425	2.00
5	Stomp Aqua 0.5 L/ha AHDB 9898 ½ rate	227.5 + 216	0.50 0.30
6	Stomp Aqua 1.0 L/ha AHDB 9898	455 + 432	1.00 0.60
7	Flexidor 0.125 L/ha	62.5	0.125
8	Flexidor 0.25 L/ha	125	0.25
9	Flexidor 0.5 L/ha	100	0.20
10	Flexidor 1.0 L/ha	500	1.00
11	AHDB 9918 ¼ N	60	0.12
12	AHDB 9918 ½ N	120	0.24
13	AHDB 9918 N	240	0.48
14	AHDB 9918 2N	480	0.96
15	Emerger 0.25 L/ha	150	0.25
16	Emerger 0.5 L/ha	300	0.50
17	Emerger 1.0 L/ha	600	1.00
18	Emerger 2.0 L/ha	1200	2.00
19	AHDB 9987 ¼ N	300	0.50
20	AHDB 9987 ½ N	600	1.00
21	AHDB 9987	1200	2.00
22	AHDB 9987 2N	2400	4.00

Application details

Timing A	
Application date	05/05/2018
Time of day	11:00 – 13:30
Crop growth stage (Max, min average BBCH)	BBCH00 (pre-em)
Crop height (cm)	N/A
Crop coverage (%)	N/A
Application Method	spray
Application Placement	soil
Application equipment	Oxford Precision Sprayer (knapsack)
Nozzle pressure	2.0
Nozzle type	Flat fan
Nozzle size	03F110
Application water volume/ha	400
Temperature of air - shade (°C)	19.1 – 22.4
Relative humidity (%)	32 – 29
Wind speed range (mph)	0.1 – 0.2
Dew presence (Y/N)	N/K
Temperature of soil - 10cm (°C)	N/K
Wetness of soil - 2-5 cm	damp
Cloud cover (%)	20

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

Common name	Scientific Name	EPPO Code	Weed level early-assessment period (3 weeks)	Weed level mid-assessment period (5 weeks)	Weed level at end of assessment period (10 weeks)
Broad leaved weeds and grasses	N/A	3WEEDT	14 <i>(untreated average/m²)</i>	17 weeds + 84% <i>(untreated average/m²)</i>	99 weeds + 99% <i>(untreated average/m²)</i>

Assessment details

Evaluation date	Evaluation Timing (DA)*	Crop Growth Stage (BBCH)	Evaluation type (efficacy, phytotoxicity)	What was assessed and how (e.g. dead or live pest; disease incidence and severity; yield, marketable quality)
18/05/2018	7	101	Efficacy, phytotoxicity	Total number of weeds (cotyledon stage) per plot. Phytotoxicity (scale 0-10, 0 = Dead).

Evaluation date	Evaluation Timing (DA)*	Crop Growth Stage (BBCH)	Evaluation type (efficacy, phytotoxicity)	What was assessed and how (e.g. dead or live pest; disease incidence and severity; yield, marketable quality)
01/06/2018	21	103	Efficacy, phytotoxicity	Total number of weeds (per species) per plot Phytotoxicity (scale 0-10, 0 = Dead).
13/06/2018	33	104	Efficacy, phytotoxicity	Weed species presence and count (no. in plot). Phytotoxicity (scale 0-10, 0 = Dead).
11/07/2018	57	106	Efficacy, phytotoxicity	Weed plot coverage (%) Phytotoxicity (scale 0-10, 0 = Dead).
24/07/2018	70	107	Efficacy, phytotoxicity	Weed plot coverage (%) Total number of weeds (per species) per plot, including breakdown per species. Phytotoxicity (scale 0-10, 0 = Dead).

* DA – days after application

Statistical analysis

The trial was in a randomised block design, with treatments replicated three times.

As the distribution of weeds was uneven across the trial – which is not unexpected in field situations – there was a need to transform this data prior to analysis. To determine treatment efficacy, an angular transformation was performed then the back transformed means presented, from which the % reduction in weeds was calculated using Abbotts formula.

All data were analysed by ANOVA using Genstat 18.4 by Chris Dyer at RSK ADAS.

Results

Phytotoxicity

The results of phytotoxicity assessments from three dates are presented in **Table 2**. These were scored on a scale from 0 to 10, with 0 being 'dead', and 10 being 'no effect'. Plots deemed to have a commercially acceptable level of damage were scored 8 or above.

Phytotoxicity was recorded using the following scale:

Crop tolerance score	Equivalent to crop damage (% phytotoxicity)
0	complete crop kill 100%
1	80-95% damage
2	70-80%
3	60-70%
4	50-60%
5	40-50%
6	25-40%
7	15-25%
8*	10-15%
9	5-10%
10	no damage

* 8 = acceptable damage, i.e. damage unlikely to reduce yield, and acceptable to the farmer.

Vigour

Due to weed competition in the latter stages of the trial it became difficult to score phytotoxicity. Therefore vigour was scored instead and this is also presented in **Table 2** for the two final assessment dates. These were scored on a scale from 0 to 10, with 0 being 'dead', and 10 being 'good vigour'.

Nearly all of the treatments were crop safe to salad onions with the exception of AHDB 9987 which caused stunting and a reduction in plant population (assessed visually) if applied at label rate or above.

Table 2. Mean phytotoxicity and vigour scores at five dates throughout the trial period (Phytotoxicity; 0 to 10; 0 = complete crop death, 10 = no damage). Scores ≥ 8 deemed commercially acceptable damage, those < 8 (unacceptable damage) are highlighted in red.

	Mean crop damage scores			Vigour scores	
	18 th May	1 st June	13 th June	11 th July	24 th July
Untreated	10.0	10.0	10.0	7.5	4.8
Wing-P 1.0 L/ha	10.0	10.0	10.0	9.7	9.3
Wing-P 2.0 L/ha	10.0	10.0	10.0	10.0	10.0
Stomp Aqua 0.5 L/ha AHDB 9898 ½ rate	10.0	10.0	10.0	9.3	8.7
Stomp Aqua 1.0 L/ha AHDB 9898	10.0	10.0	10.0	10.0	10.0
Flexidor 0.125 L/ha	10.0	10.0	10.0	7.0	6.0
Flexidor 0.25 L/ha	10.0	10.0	10.0	7.7	5.0
Flexidor 0.5 L/ha	10.0	10.0	10.0	8.7	7.3
Flexidor 1.0 L/ha	10.0	10.0	9.0	9.0	9.3
AHDB 9918 ¼ N	10.0	10.0	10.0	7.7	5.3
AHDB 9918 ½ N	10.0	10.0	9.0	6.0	6.3
AHDB 9918 N	10.0	10.0	10.0	7.7	5.3
AHDB 9918 2N	10.0	10.0	9.7	7.0	6.7
Emerger 0.25 L/ha	10.0	10.0	10.0	9.0	8.3
Emerger 0.5 L/ha	10.0	10.0	10.0	8.7	7.0
Emerger 1.0 L/ha	10.0	10.0	10.0	9.3	9.3
Emerger 2.0 L/ha	10.0	10.0	10.0	10.0	10.0
AHDB 9987 ¼ N	10.0	10.0	10.0	8.0	6.3
AHDB 9987 ½ N	10.0	10.0	9.7	6.0	4.7
AHDB 9987	8.7	8.3	9.0	7.0	5.7
AHDB 9987 2N	7.0	7.0	2.7	5.7	5.0
p value	<0.001	<0.001	<0.001	<0.001	<0.001
d.f.	43	43	43	43	43
L.S.D.	0.7832	0.2476	1.921	2.425	1.203

Weed control – mean percentage weed cover and counts

The results for weed counts are presented in **Table 3**, and results for the mean percentage weed cover per treatment are presented in **Table 4**. Early assessments were carried out as weed counts while the weeds were small, and then the method changed to % weed cover as weeds grew larger. The weed cover by species from the final assessment is presented in **Table 5**. The percent reduction in weed cover compared to the untreated control was calculated from these figures (using Abbotts formula), and results for each treatment are listed in **Table 6**.

Table 3. Mean weed counts at one and three weeks after treatment application. Treatments significantly different from the untreated are shown in **bold**.

Trt. No.	Treatment: product name or AHDB code	Mean weed counts	
		18 th May	1 st June
UTC*	Untreated	15.0	14.17
3	Wing-P 1.0 L/ha	19.3	9.3
4	Wing-P 2.0 L/ha	15.0	1.7
5	Stomp Aqua 0.5 L/ha AHDB 9898 ½ rate	8.3	7.3
6	Stomp Aqua 1.0 L/ha AHDB 9898	7.3	1.0
7	Flexidor 0.125 L/ha	14.0	11.3
8	Flexidor 0.25 L/ha	18.3	15.0
9	Flexidor 0.5 L/ha	8.0	14.0
10	Flexidor 1.0 L/ha	6.7	6.7
11	AHDB 9918 ¼ N	12.0	15.7
12	AHDB 9918 ½ N	12.3	16.7
13	AHDB 9918 N	9.7	13.0
14	AHDB 9918 2N	9.0	10.0
15	Emerger 0.25 L/ha	7.0	8.3
16	Emerger 0.5 L/ha	9.3	14.0
17	Emerger 1.0 L/ha	6.3	6.3
18	Emerger 2.0 L/ha	0.3	0.3
19	AHDB 9987 ¼ N	11.7	11.7
20	AHDB 9987 ½ N	16.0	17.0
21	AHDB 9987	9.0	10.7
22	AHDB 9987 2N	5.0	9.7
p value		0.062	<0.001
d.f.		43	43
L.S.D.		10.28	7.86

Table 4. Mean percentage weed cover (%) at five, eight and ten weeks after treatment application (transformed). Treatments significantly different from the untreated are shown in **bold**.

Trt. No.	Treatment: product name or AHDB code	Mean weed cover (%)					
		13 th June		11 th July		24 th July	
		Ang	Back-trans	Ang	Back-trans	Ang	Back-trans
UTC*	Untreated	66.6	84.3	85.7	99.4	87.8	99.8
3	Wing-P 1.0 L/ha	34.1	31.5	35.2	33.3	43.1	46.6
4	Wing-P 2.0 L/ha	8.1	2.0	26.3	19.6	29.2	23.8
5	Stomp Aqua 0.5 L/ha AHDB 9898 ½ rate	45.5	50.8	37.6	37.2	40.9	42.9
6	Stomp Aqua 1.0 L/ha AHDB 9898	24.3	16.9	25.8	18.9	34.1	31.5
7	Flexidor 0.125 L/ha	55.9	68.5	65.7	83.1	66.8	84.4

Trt. No.	Treatment: product name or AHDB code	Mean weed cover (%)					
		13 th June		11 th July		24 th July	
		Ang	Back-trans	Ang	Back-trans	Ang	Back-trans
8	Flexidor 0.25 L/ha	66.3	83.8	79.5	96.7	85.7	99.4
9	Flexidor 0.5 L/ha	62.4	78.5	67.0	84.7	72.4	90.8
10	Flexidor 1.0 L/ha	46.9	53.4	51.9	61.9	56.7	69.9
11	AHDB 9918 ¼ N	70.5	88.8	81.1	97.6	81.1	97.6
12	AHDB 9918 ½ N	61.3	76.8	76.0	94.1	75.0	93.3
13	AHDB 9918 N	57.3	70.8	67.8	85.7	75.0	93.3
14	AHDB 9918 2N	60.8	76.2	65.5	82.8	71.7	90.2
15	Emerger 0.25 L/ha	33.0	29.7	52.4	62.8	62.2	78.3
16	Emerger 0.5 L/ha	54.8	66.8	61.3	76.9	81.4	97.7
17	Emerger 1.0 L/ha	19.3	10.9	40.1	41.5	47.0	53.4
18	Emerger 2.0 L/ha	8.1	2.0	23.7	16.2	27.3	21.1
19	AHDB 9987 ¼ N	58.9	73.3	75.7	93.9	80.0	96.9
20	AHDB 9987 ½ N	70.5	88.8	79.5	96.7	79.5	96.7
21	AHDB 9987	35.2	33.2	67.4	85.3	68.9	86.9
22	AHDB 9987 2N	43.9	48.0	64.5	81.5	59.9	74.8
p value		<0.001		<0.001		<0.001	
d.f.		43		43		43	
L.S.D.		23.51		19.16		20.48	

* Untreated control; treatments 1 and 2

Table 5. Mean percentage weed cover per six main weed species at ten weeks after treatment application. Treatments significantly different from the untreated are shown in **bold**.

Trt. No.	Treatment: product name or AHDB code	Mean weed cover (%)					
		Field pansy	Chick weed	Common poppy	Groun dsel	Fools parsley	Vol OSR
UTC*	Untreated	38.3	38.3	5.5	4.2	4.2	3.3
3	Wing-P 1.0 L/ha	9.3	5.0	3.3	6.7	10.3	11.7
4	Wing-P 2.0 L/ha	2.3	0.7	0.0	2.0	12.3	7.7
5	Stomp Aqua 0.5 L/ha AHDB 9898 ½ rate	13.3	13.3	0.0	1.7	8.3	6.7
6	Stomp Aqua 1.0 L/ha AHDB 9898	0.0	0.0	0.0	6.0	17.7	9.3
7	Flexidor 0.125 L/ha	23.3	25.0	10.0	1.7	8.3	1.7
8	Flexidor 0.25 L/ha	38.3	25.0	5.7	2.7	13.3	13.3
9	Flexidor 0.5 L/ha	23.3	36.7	5.7	13.3	0.0	4.3
10	Flexidor 1.0 L/ha	23.3	23.3	5.0	3.3	10.0	3.3
11	AHDB 9918 ¼ N	35.0	35.0	5.0	3.3	8.3	6.7
12	AHDB 9918 ½ N	36.3	36.3	0.7	1.7	0.7	5.0
13	AHDB 9918 N	35.0	23.3	1.7	0.0	3.3	16.7
14	AHDB 9918 2N	35.0	35.0	1.7	0.0	10.0	0.0
15	Emerger 0.25 L/ha	21.0	22.7	0.0	2.0	10.0	12.7
16	Emerger 0.5 L/ha	35.0	35.0	0.0	5.0	18.3	3.3
17	Emerger 1.0 L/ha	15.0	15.0	0.0	0.0	13.3	8.3
18	Emerger 2.0 L/ha	4.0	1.7	2.7	1.7	11.7	0.0
19	AHDB 9987 ¼ N	41.3	16.3	5.0	0.0	9.0	18.3
20	AHDB 9987 ½ N	40.0	26.7	2.3	0.0	6.7	16.7
21	AHDB 9987	30.0	25.0	8.3	0.0	11.7	5.0
22	AHDB 9987 2N	35.0	25.0	1.7	0.0	5.0	5.0
p value		<0.001	0.001	0.042	NS	NS	NS
d.f.		43	43	43	43	43	43
L.S.D.		15.28	21.32	6.264	-	-	-

Table 6. Percentage reduction in weed cover at five, eight and ten weeks after treatment application (calculated using Abbotts formula) – negative values show an increase in weed cover.

Trt. No.	Treatment: product name or AHDB code	% weed reduction		
		13 th June	11 th July	24 th July
3	Wing-P 1.0 L/ha	62.62	66.55	53.28
4	Wing-P 2.0 L/ha	97.63	80.31	76.12
5	Stomp Aqua 0.5 L/ha AHDB 9898 ½ rate	39.65	62.57	57.01
6	Stomp Aqua 1.0 L/ha AHDB 9898	79.87	80.91	68.49
7	Flexidor 0.125 L/ha	18.65	16.47	15.45
8	Flexidor 0.25 L/ha	0.53	2.75	0.42
9	Flexidor 0.5 L/ha	6.77	14.75	9.01
10	Flexidor 1.0 L/ha	36.67	37.68	29.99
11	AHDB 9918 ¼ N	-5.48	1.82	2.23
12	AHDB 9918 ½ N	8.74	5.36	6.57
13	AHDB 9918 N	15.88	13.82	6.57
14	AHDB 9918 2N	9.57	16.72	9.75
15	Emerger 0.25 L/ha	64.70	36.87	21.62
16	Emerger 0.5 L/ha	20.71	22.58	2.10
17	Emerger 1.0 L/ha	87.03	58.31	46.50
18	Emerger 2.0 L/ha	97.63	83.70	78.96
19	AHDB 9987 ¼ N	13.05	5.58	2.88
20	AHDB 9987 ½ N	-5.48	2.75	3.15
21	AHDB 9987	60.58	14.28	12.89
22	AHDB 9987 2N	43.02	18.01	25.03

Discussion

Weed levels were high with 66.6% weed cover in the untreated plots at five weeks after treatment application, which rose to 87.8% by the end of the trial at ten weeks after application. The main weeds present were field pansy and chickweed, with a little groundsel, common poppy, fools parsley and volunteer oilseed rape. Significant differences in weed control were seen in field pansy and chickweed only.

Eight treatments significantly reduced weed levels for up to ten weeks, or up to harvest when compared with the untreated control ($p < 0.001$). These were Wing-P at 1.0 and 2.0 L/ha, Stomp Aqua 1.0 L/ha + AHDB9898, Stomp Aqua 0.5 L/ha + AHDB9898 ½ rate, Flexidor 1.0 L/ha, Emerger 1.0 L/ha and 2.0 L/ha and AHDB9987 at double rate. With the exception of AHDB9987 at double dose these were all also crop safe. It should be noted however, that 2018 was a safe year for residual herbicides due to the dry weather, as Wing-P would usually be expected to cause crop damage when applied at 2.0 L/ha. Therefore the crop safety results should be treated with caution, and a further trial would be required to confirm crop safety of the promising products.

The lowest rates of Flexidor 0.125 L/ha and Emerger 0.25 L/ha also gave a significant reduction in % weed cover when compared to the untreated, but these were only just significant and as expected the higher rates of these products give greater weed control.

The best performing products on the weeds present were Emerger 2.0 L/ha, Stomp Aqua 1.0 L/ha + AHDB9898 and the standard Wing-P 2.0 L/ha giving at least a 68% percentage reduction in weed levels at ten weeks after application (Table 6)

AHDB9898 and Emerger would be useful additions to be taken forward for approval, or included in programmes for crops where they are already approved (e.g. Emerger -bulb onions). Further

trials with tank mixes would be useful to determine if these products are still crop safe when mixed with other commonly used products.

Conclusions

- Emerger 2.0 L/ha and Stomp Aqua 1,0 L/ha + AHDB9898 gave equivalent to or better weed control than the standard (Wing-P 2.0 L/ha)
- The promising treatments should be tested further alone and in tank mixes for crop safety as 2018 gave unexpectedly safe results in the standard control.

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Appendix

- a. Crop diary – events related to growing crop

Site 1:

Crop	Cultivar	Drilling date	Row width (m)
Salad onion	Parade	26 th April	5 rows per 1.8m bed

Previous cropping

Year	Crop
2017	NK
2016	NK
2015	NK

Cultivations

Date	Description	Depth (cm)
20/10/2017	NK	
	NK	

Active ingredients(s)/fertiliser(s) applied to trial area

Date	Product	Rate (kg/ha)
N/A	Awaiting from sandfields	

Pesticides applied to trial area

Date	Product	Rate (L/ha)
N/A	Awaiting from sandfields	

Details of irrigation regime

Date	Type, rate and duration	Amount applied (mm)
9/5/2018	Boom	8
16/5/2018	Boom	15
22/5/2018	Boom	10
22/6/2018	Boom	15

- b. Table showing sequence of events by date – this relates to treatments and assessments.

Date	Event
22/06/2018	Assessment – baseline weed assessment; timing A treatments applied.
05/07/2018	Assessment – crop phytotoxicity, weed species presence.
12/07/2018	Assessment – weed species/area; timing B treatments applied.
25/07/2018	Assessment – crop phytotoxicity.

c. Climatological data during study period from each site.

Date	Temperature °C (minimum)	Temperature °C (maximum)	Rainfall* (mm)
22/06/2018	11	21	
23/06/2018	17	23	
24/06/2018	17	24	
25/06/2018	23	28	
26/06/2018	22	29	
27/06/2018	18	28	
28/06/2018	15	27	
29/06/2018	17	27	
30/06/2018	19	28	
01/07/2018	18	30	
02/07/2018	19	28	
03/07/2018	21	27	
04/07/2018	18	26	
05/07/2018	22	29	
06/07/2018	20	29	
07/07/2018	21	29	
08/07/2018	24	29	
09/07/2018	20	28	
10/07/2018	19	25	
11/07/2018	17	25	
12/07/2018	16	26	
13/07/2018	18	26	
14/07/2018	18	26	
15/07/2018	18	27	
16/07/2018	19	27	
17/07/2018	16	23	
18/07/2018	21	24	
19/07/2018	16	27	
20/07/2018	17	27	
21/07/2018	19	26	
22/07/2018	21	29	
23/07/2018	22	27	
24/07/2018	20	27	
25/07/2018	18	26	

*Not available

d. Trial design

6 m Buffer zone													
TREATMENT	DISCARD	12	10	5	3	11	22	9	2	18	15	14	DISCARD
BLOCK	DISCARD	3	3	3	3	3	3	3	3	3	3	3	DISCARD
PLOT	DISCARD	56	57	58	59	60	61	62	63	64	65	66	DISCARD
TREATMENT	DISCARD	13	19	7	6	17	16	20	4	8	21	1	DISCARD
BLOCK	DISCARD	3	3	3	3	3	3	3	3	3	3	3	DISCARD
PLOT	DISCARD	45	46	47	48	49	50	51	52	53	54	55	DISCARD
TREATMENT	DISCARD	16	12	14	8	3	5	11	20	10	7	2	DISCARD
BLOCK	DISCARD	2	2	2	2	2	2	2	2	2	2	2	DISCARD
PLOT	DISCARD	34	35	36	37	38	39	40	41	42	43	44	DISCARD
TREATMENT	DISCARD	15	17	13	21	6	19	4	18	9	1	22	DISCARD
BLOCK	DISCARD	2	2	2	2	2	2	2	2	2	2	2	DISCARD
PLOT	DISCARD	23	24	25	26	27	28	29	30	31	32	33	DISCARD
TREATMENT	DISCARD	10	20	8	12	15	11	14	19	16	3	18	DISCARD
BLOCK	DISCARD	1	1	1	1	1	1	1	1	1	1	1	DISCARD
PLOT	DISCARD	12	13	14	15	16	17	18	19	20	21	22	DISCARD
TREATMENT	DISCARD	22	6	4	9	5	13	17	1	2	21	7	DISCARD
BLOCK	DISCARD	1	1	1	1	1	1	1	1	1	1	1	DISCARD
PLOT	DISCARD	1	2	3	4	5	6	7	8	9	10	11	DISCARD
6 m Buffer zone													

e. ORETO certificate



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:

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Biologicals and Semiochemicals**

Date of issue: 1 June 2018
Effective date: 18 March 2018
Expiry date: 17 March 2023

Signature 
Authorised signatory

Certification Number

ORETO 409


HSE
Chemicals Regulation Division


Department of
**Agriculture and
Rural Development**