PGRO Final Report
HERBICIDES ON SPRING BEANS
SLOT TRIALS 2022

Determining the efficacy of several herbicides in spring beans.

Project title	Determining the efficacy of several herbicides in spring beans.
Sponsor project reference	
Country / Region / EPPO zone	United Kingdom EPPO Maritime zone
Target crop	Spring Beans (Vicia Fabia)
Target pest	Weeds
Experimental permit reference	
GEP	Yes
Report author	Will Evans, Becky Howard
Date issued	November 2022
Trial year	2022
Trials by	PGRO Research Ltd Great North Road Thornhaugh Cambridgeshire PE8 6HJ United Kingdom
Sponsor	Several

Chapters

List of tables

Declarations

We the undersigned hereby declare that the report submitted constitutes the Final Report of the study above and that all data reported here represent a true and accurate record of the results obtained. Every reasonable effort was made to ensure that disease, insect, weed pressures and crop husbandry were as relevant to the trial aims as possible.

Becky Howard

R and D Manager

Objectives

To determine,

- The relative efficacy of several herbicides for the control of weeds in spring beans.
- How the efficacy of the confidential herbicides test against commercial standards Centium, Stomp Aqua, Defy, Nirvana.

Summary

- Weed pressure was relatively low for the first month following drilling.
- Black bindweed and knotgrass were the dominant weeds at the spring bean trial at Stubton in 2022.
- Nirvana showed the best control with the lowest coverage (% area) in the last assessment, with a 97% of weed control considerable significant compared to the untreated. The treatments confidential 3 and Stomp Aqua also gave good results 86% control comparable to the standards and the untreated.

Test items and treatments

Table 1. Test items

Name	Active(s)	Batch/lot
Centium	Clomazone	
Stomp Aqua	Pendimethalin	0023052222
Defy	Pendimethalin/ Clomazone	
Nirvana	Pendimethalin/ Imazamox	0025329168
Basagran	Bentazone	

Table 2. Treatment list

Trt	Description	Rate/ha	Timing
1	Untreated		
2	Centium 360	0.25 l	Pre-emergence
3	Stomp Aqua	2.9 l	Pre-emergence
4	Defy	5.0 l	Pre-emergence
5	Nirvana	4.5 l	Pre-emergence
6	Basagran	1.1 kg	Post-emergence
7	Confidential 1		Post-emergence
8	Confidential 2		Pre-emergence
9	Confidential 3		Pre-emergence

Table 3. Description of application timings

Timing	Growth stage or description of timing	BBCH
Pre-emergence	Germination	00-09
Post emergence	Plant development	15-51

Methods

Trial design - Plots measured 18 m² (1.8 x 10 m) and were arranged in a randomised complete block layout with four replications.

Sprayer details - Treatments were applied using a hand operated compressed air boom sprayer with a width of two meters. Lurmark 02F110 nozzles were used, operating at a pressure of 2 bar for a fine/medium droplet quality.

Assessments - Weeds were identified and recorded as number of weeds present per species in 3 x 0.25 m^2 quadrats. The mean of the 3 were multiplied by 4 and reported as weeds/m^2. Assessments were based on EPPO guidelines PP1/053 (3) + PP1/091 (4). Phytotoxicity was scored on a 0-10 scale, where 10 equated to no phytotoxic symptoms observed and 0 denoted dead crop (EPPO guidelines PP1/135 (4)).

Analysis – STAR statistical software (Version: 2.0.1) was used to perform statistical analyses of all data using Analysis of Variance (95% confidence level).

Trial site and Diary

Table 4. Trials diary

Activity	Timing	BBCH	Date
Drilling			14-Mar-22
Application	Pre-emergence	00-09	28-Mar-22
	Post-emergence	13-25	09-May-22
Weed Count	A1	00-09	28-Mar-22
	A2	00-09	05-April-22
	A3	11	14-April-22
Plant Count	A4	11-13	20-April-22
Weed Count/ Phytotoxicity	A5	13-17	04-May-22
	A6	19	17-May-22
Weed ground cover (%)	A7	81-88	15-July-22

Table 5. Site details for Stubton trial 2022

Test site information	
Town	Stubton
Postcode	NG23 5JH
N	52°59'20.16"
W	0°49'52.53"
Site description	Low weed pressure, mid-field.
Soil analysis	pH: 7.6; P: index 1, K: index 1, Mg: index 2; OM: 4.7%(LOI); Sand: 60%, Silt: 18%. Clay: 22%
Crop	Spring Beans
Variety	Lynx

Results

Weed Counts

There were no significant differences between treatments on 28th March. Weed numbers were low at this time (Table 6).

Table 6. Mean number of weeds recorded per square metre at A1 on 28th March, in spring beans at Stubton in 2022.

No.	Treatments	Black grass	Chickweed	Field pansy	Groundsel	Mayweed	Red dead nettle	Vol cereal
1	Control, Untreated	0.5	0	0	0	0	1.0	1.0
2	Centium 360	0	0	0	1.0	0	1.0	1.0
3	Stomp Aqua	0	0	0	0	0	1.0	0
4	Defy	0	0	1.0	0	0	0	0
5	Nirvana	0	0	1.0	1.0	0	0	0
6	Basagran	0	1.0	1.0	3.0	0	0	0
7	Confidential 1	0	0	0	2.0	0	0	0
8	Confidential 2	0	0	0	0	1.0	0	0
9	Confidential 3	0	0	1.0	1.0	0	1.0	1.0
F-value		1	1	0.65	1.55	1	0.54	1.08
p-value		0.4613 ns	0.4613 ns	0.7269 ns	0.192 ns	0.4613 ns	0.8182 ns	0.4123 ns

Means with the same letter are not significantly different, ns = not significant

There were no significant differences between the treatments on 5th April 2022 (Table 7).

Table 7. Mean number of weeds recorded per square metre at A2 on 5th April, in spring beans at Stubton in 2022.

No.	Treatments	Black grass	Chickweed	Field pansy	Groundsel	Mayweed	Oil seed rape	Red dead nettle	Vol cereal
1	Control, Untreated	0	0	1.0	1.0	0	2.0	3.5	0
2	Centium 360	0	1.0	0	0	0	3.0	2.0	0
3	Stomp Aqua	0	0	0	0	0	0	1.0	0
4	Defy	0	0	1.0	0	0	0	1.0	0
5	Nirvana	0	0	0	0	0	0	1.0	0
6	Basagran	1.0		0	0	0	0	1.0	0
7	Confidential 1	0	0	2.0	0	1.0	0	2.0	0
8	Confidential 2	1.0	0	1.0	1.0	0	2.0	1.0	1.0
9	Confidential 3	0	0	2.0	0	0	3.0	3.5	0
F-value		0.84	0.84	0.55	1	1	1.53	0.3	1
p-value		0.577 ns	0.5774 ns	0.8052 ns	0.4613 ns	0.4613 ns	0.1997 ns	0.9575 ns	0.4613 ns

Means with the same letter are not significantly different, ns = not significant

There were significant differences in the number of black bindweed plants per treatment at the assessment on 14th April 2022. All treatments apart from the post-emergence treatments controlled black bindweed compared to the untreated plots. Defy and Nirvana, with the two confidential treatments, gave the best levels of control compared to the untreated control plots. Only treatment 8 gave statistically significant control of black bindweed compared to the untreated control (Table 8). The post-emergence application had not been applied at this time.

Table 8. Mean number of weeds recorded per square metre on the 14th of April (A3) 2022 in spring beans at Stubton

No.	Treatments	Brassica	Field pansy	Fat hen	Groundsel	Ivy speedwell	Mayweed	Black bindweed	Red dead nettle	Thistle	Vol cereal
1	Control, Untreated	3.7	0	0.7	0.7	0.3	0.3	10.7 b	0.7	0	1.3
2	Centium 360	0	0.3	0	0.3	0	0	2.3 ab	0.7	0	0.7
3	Stomp Aqua	1.0	0	0	0	0	0	4.7 ab	0	0.3	0
4	Defy	1.0	0.7	1.0	0	0	0	1.0 ab	0	0	0.7
5	Nirvana	0	0.3	0	0	0	0	1.7 ab	0	0	0.3
6	Basagran	1.0	0.3	0	0.7	0	0	7.0 ab	0	0	0.3
7	Confidential 1	1.0	0	0.3	0.3	0	0	5.3 ab	0.3	0.3	0.7
8	Confidential 2	0.3	0	0.3	0	0	0.3	0 a	1.0	0	0
9	Confidential 3	1.7	0.3	0	0.7	0	0	0.7 ab	1.3	0	0.3
F-value		1.42	0.6	1.33	1.15	1	1	2.65	1.27	0.84	0.75
p-value		0.2398 ns	0.7685 ns	0.2765 ns	0.3689 ns	0.4613 ns	0.4613 ns	0.0306	0.3033 ns	0.5774 ns	0.6509 ns

Means with the same letter are not significantly different, ns = not significant

Most weeds were present in low numbers in the spring beans at Stubton on 4th May 2022. Black bindweed was the dominant weed species present and there were no significant differences between the treatments in control of black bindweed. Centium 360, Stomp Aqua, Nirvana and treatment 9 gave significant control of knotgrass compared to the untreated plots (Table 9). The post-emergence spray had not been applied at this time.

Table 9. Mean number of weeds recorded per square metre on the 4th of May 2022 (A5) in spring beans at Stubton.

No.	Treatments	Annual meadow grass	Black bindweed	Black grass	Brassica	Chickweed		Fat hen	Field pansy	Groundsel	Ivy speedwell	Knotgrass	
1	Control, Untreated	0.67	21.0	0	3.7	0	a	3.0	0.7	1.7	0.3	18.7	b
2	Centium 360	0	17.7	0	0	0	a	0.7	0.3	0.3	0	2.7	a
3	Stomp Aqua	0.0	23.3	0	1.3	0	a	0.7	0.3	0	0	0.3	a
4	Defy	0	16.3	0	2.0	0	a	0.7	1.3	7.0	0	3.7	ab
5	Nirvana	0	8.3	0	0	0	a	0	0.3	0	0	0	a
6	Basagran	0	21.0	0	2.0	1.0	b	2.0	0.3	1.3	0	14.7	ab
7	Confidential 1	1.3	12.3	0	3.3	0	a	1.3	0.3	1.3	0	13.0	ab
8	Confidential 2	0	6.3	0.3	0.3	0	a	0	0	0.7	0	4.7	ab
9	Confidential 3	0.0	2.3	0	1.0	0	a	0	0.3	1.3	0	0	a
F-value		1	0.7	1	1.19	2.45		1.58	0.83	0.9	1	4.75	
p-value		0.4613 ns	0.6883 ns	0.4613 ns	0.346 ns	0.0424		0.182 ns	0.5864 ns	0.5355 ns	0.4613 ns	0.0014	

Means with the same letter are not significantly different, ns = not significant

Continuation **Table 9.** Mean number of weeds recorded per square metre on the 4th of May 2022 (A5) in spring beans at Stubton.

No.	Treatments	Mayweed	Orache	Red Dead Nettle	Sow thistle	Thistle	Vol Cereal	Vol OSR
1	Control, Untreated	0.3	2.3	0.7	0.7	0	1.0	0
2	Centium 360	0	1.7	1.3	0	0	2.0	0
3	Stomp Aqua	0.3	0.7	0	0	0.7	1.3	0
4	Defy	0	0.7	0.3	0	0	1.0	0
5	Nirvana	0	0.3	0	0	0	0.3	0
6	Basagran	0	2.3	1.0	0	0	0.3	0
7	Confidential 1	0	4.0	1.0	0.3	0.7	1.0	0
8	Confidential 2	0.3	2.7	1.0	0	0	0	0.7
9	Confidential 3	0	0	1.3	0	0	1.3	0
F-value		1	0.59	1.27	2.08	1.24	0.61	1
p-value		0.4613 ns	0.7751 ns	0.3033 1ns	0.0795 ns	0.3217 ns	0.7623 ns	0.4613 ns

*Means with the same letter are not significantly different, ns = not significant

There were no significant differences between treatments in the number of black bindweed plants on 17th May 2022. Treatments 3, 5, 8 and 9 provided significant control of knotgrass (Table 10). Nirvana and treatment 9 gave some control of orache but this was not significant. The presence of all other weeds was at low levels.

Table 10. Mean number of weeds recorded per square metre on the 17th of May 2022 (A6) in spring beans at Stubton.

No	Treatments	Black bindweed	Black grass	Brassica	Chickweed	Fat hen	Field pansy	Groundsel	Knotgrass	Mayweed	Orache	Red dead nettle	Sow thistle	Vol Cereal
1	Control, Untreated	12.7	1.0	5.7	0	0	4.0	4.5	10.3 ab	1.0	4.0 ab	3.0	3.5	1.0
2	Centium 360	21.7	0	3.0	0	2.5	0	2.0	7.5 ab	0	7.0 b	2.7	1.0	2.5
3	Stomp Aqua	23.2	0	3.0	0	1.0	0	2.0	2.5 a	1.0	2.0 ab	1.0	0	3.0
4	Defy	18.5	0	1.3	0	2.0	2.0	0	7.0 ab	0	2.0 ab	0	1.0	0
5	Nirvana	10.7	0	0	0	0	0	0.5	1.0 a	0	0 a	0	0	0
6	Basagran	12.7	0	2.5	1.0	0	1.0	1.0	12.0 ab	0	7.0 b	3.0	1.0	1.5
7	Confidential 1	13.3	0	3.0	0	0	6.0	3.0	14.7 b	0	2.5 ab	2.0	0	1.5
8	Confidential 2	10.0	0	2.0	0	2.0	1.0	2.0	2.0 a	0	7.5 b	2.0	0	1.5
9	Confidential 3	9.5	3.0	3.0	0	1.0	1.0	3.0	3.0 a	0	0 a	2.5	1.0	1.0
F-value		0.69	1.76	0.9	1.8	0.74	0.77	1.06	4.36	1	2.45	1.02	1.36	0.65
p-value		0.6955 ns	0.1351 ns	0.5291 ns	0.1267ns	0.6522 ns	0.6358 ns	0.4249 ns	0.0024	0.4613 ns	0.0428	0.4464ns	0.2618 ns	0.725 ns

Means with the same letter are not significantly different, ns = not significant

Weed Ground Cover

Treatments 3, 5 and 9 reduced ground cover of weeds, although Nirvana was the only product that significantly reduced the percentage weed ground cover compared to the untreated plots (Table 11).

Table 11. Mean percentage weed ground cover in spring beans at Stubton on 15th July 2022 (A7). Percentage control was calculated from the mean of the untreated control.

Treatment	Coverage % area A7 15 July		% Control
1. Control, Untreated	40.6	bc	na
2. Centium 360	26.7	abc	34.2
3. Stomp Aqua	5.5	ab	86.4
4. Defy	22.2	abc	45.2
5. Nirvana	1.3	a	96.7
6. Basagran	44.2	c	-8.9
7. Confidential 1	37.1	abc	8.6
8. Confidential 2	16.0	abc	60.6
9. Confidential 3	5.5	ab	86.4
F value	4.43		
p value	0.0021		

Means with the same letter are not significantly different, ns = not significant

Phytotoxicity

There were statistically significant differences in the level of phytotoxicity recorded between treatments. Treatments 8 and 9 led to low but statistically significant levels of leaf yellowing compared to the untreated plots on the 14th of April and treatment 8 continued to show significant phytotoxic symptoms on 17th of May. Defy, Basagran and Nirvana also showed significant phytotoxicity in at least one assessment, although phytotoxic symptoms were not severe (Table 12).

Table 12. Phytotoxicity (mean) Assessments A3, A5 and A6. Scale 10 = no phytotoxicity, 0 = dead crop.

Treatment	A3 14 April		A5 4th May		A6 17th May	
1. Untreated	10	a	9.3	a	10	a
2. Centium 360	9.3	ab	9	ab	9	ab
3. Stomp Aqua	9.3	ab	9	ab	9.3	ab
4. Defy	9	abc	8.8	ab	8.7	b
5. Nirvana	9	abc	8	b	9	ab
6. Basagran	10	a	9	ab	8.8	b
7. Confidential 1	9.8	a	9	ab	9.3	ab
8. Confidential 2	8.3	bc	8.5	ab	8.5	b
9. Confidential 3	8	c	8.3	ab	9	ab
F value	10.8		3.34		2.9	
p value	0		0.0104		0.0205	

Means with the same letter are not significantly different, ns = not significant

Plant Counts (crop)

There were no significant differences between treatments in the number of bean plants recorded at early emergence (Table 13).

Table 13. Mean number of spring bean plants per square metre on the 20th of April 2022.

Treatment	A4 20 April
1. Control, Untreated	46
2. Centium 360	46
3. Stomp Aqua	42.7
4. Defy	44
5. Nirvana	50.3
6. Basagran	44.7
7. Confidential 1	45.0
8. Confidential 2	40.4
9. Confidential 3	47.3
F value	0.48
p value	0.8581 ns

Means with the same letter are not significantly different, ns = not significant

Discussion

Beans were drilled on the 14th of March 2022.

Weed pressure was relatively low for the first month following drilling with low numbers and variation of species recorded at A1 and A2. More weed species were recorded at A3 on the April 14th, mostly in low numbers and black bindweed at a higher population. The post-emergence applications were applied on 9th May 2022.

Nirvana provided best overall weed control.

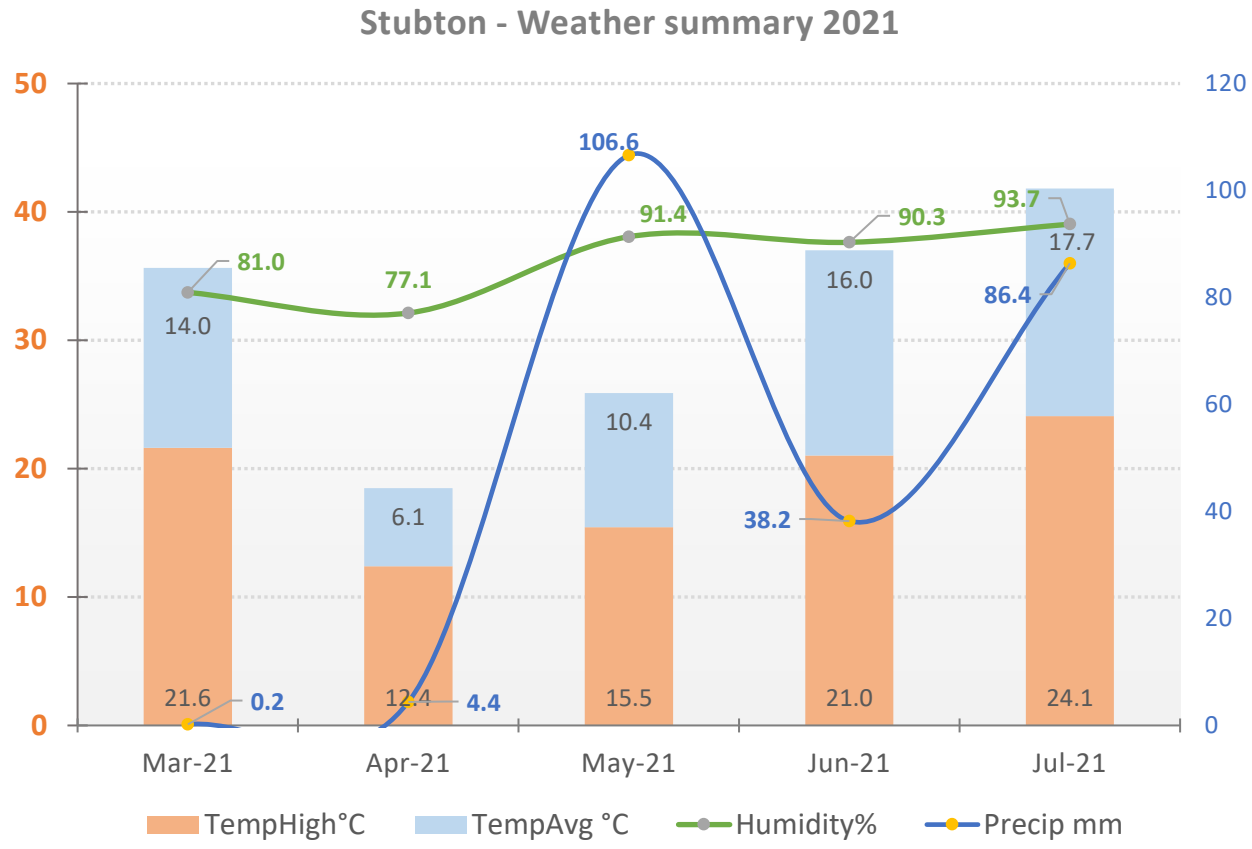
Appendix

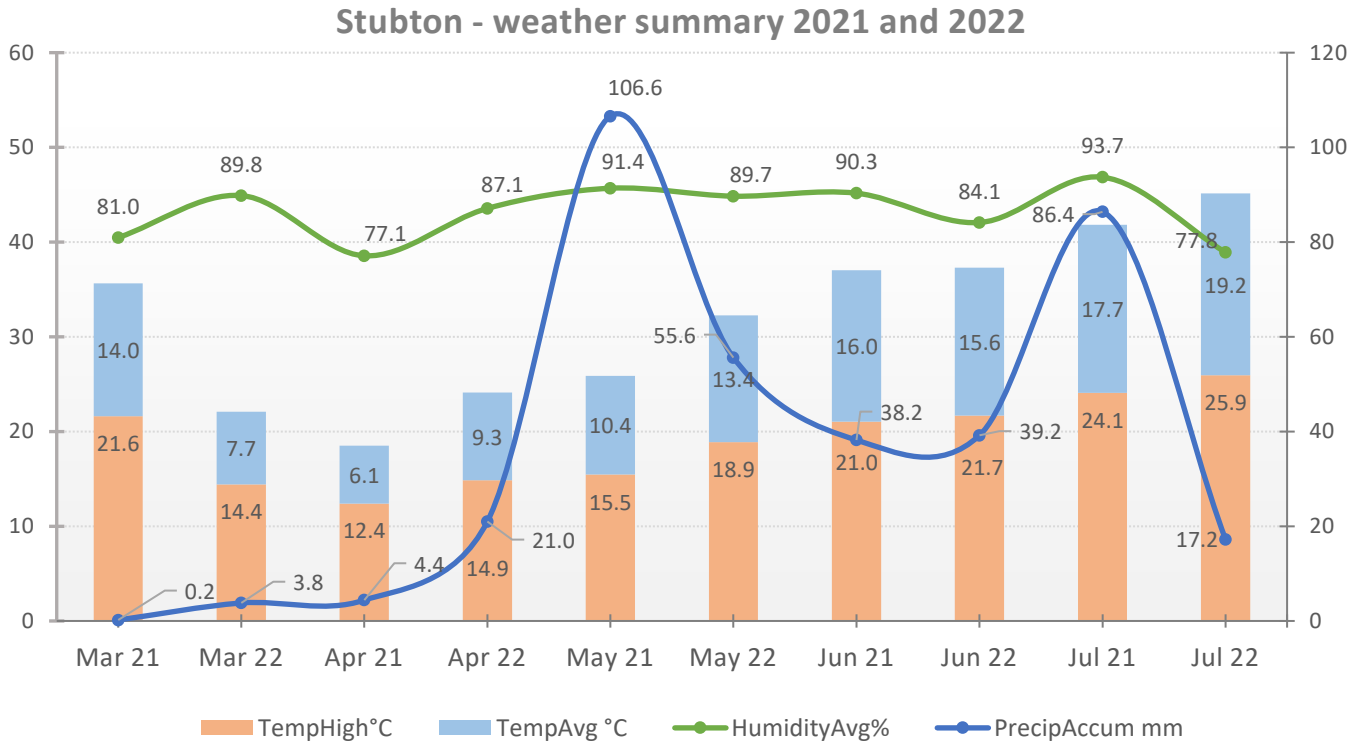
Weather data Stubton 2022					
Date	**Temperature**		**Humidity**	**Wind Speed**	**Precipitation Accum.**
	High °C	**Avg** °C	**Avg** %	**Avg** km/h	**Sum** mm
17-Mar	13.14	7.53	96.42	1.8	0
18-Mar	15.49	7.96	96.74	1	0.2
19-Mar	14.59	8.17	91.49	3	0
20-Mar	10.72	5.68	89.16	1.9	0
21-Mar	13.07	5.61	84.65	0.9	0.2
22-Mar	18.38	11.14	88.22	1.6	0
23-Mar	19.34	10.71	82.52	0.6	0
24-Mar	18.18	10.32	73.45	0.7	0
25-Mar	18.42	9.18	76.7	0.4	0
26-Mar	18.2	8.78	85.13	1	0
27-Mar	14.7	8.04	99.71	1.3	0
28-Mar	16.68	8.97	87.59	0.6	0
29-Mar	10.15	6.16	99.8	1.4	0
30-Mar	8.52	4.56	99.78	1.7	1.6
31-Mar	6.9	2.15	96.05	2.6	1.8
01-Apr	7.75	2.78	99.56	1.7	3.6
02-Apr	8.67	2.21	93.96	0.7	1.2
03-Apr	11.35	4.09	82.85	1.2	0.2
04-Apr	13.55	9.98	99.01	2.9	5.8
05-Apr	13.69	11.45	95.52	2.5	0
06-Apr	14.32	10.69	95.75	3.5	1.2
07-Apr	10.79	6.85	99.67	3.4	5.6
08-Apr	11.46	5.26	85.62	1.3	0.2
09-Apr	11.45	4.75	80.73	1.4	0.2
10-Apr	13.09	6.53	75.65	0.8	0
11-Apr	16.06	10.42	70.18	3	0
12-Apr	19.94	12.61	94.91	1.2	1.2
13-Apr	17.6	12.39	98.09	1.5	1.6
14-Apr	17.29	10.48	93.77	0.6	0.2
15-Apr	20.87	14.3	86.15	1.1	0
16-Apr	20.58	13.6	85.56	2	0
17-Apr	19.65	12.88	74.89	1.8	0
18-Apr	16.88	11.92	80.06	1.1	0
19-Apr	16.82	10.42	94.26	1.4	0
20-Apr	16.7	10.55	76.72	2.3	0
21-Apr	17.92	10.29	80.72	2.6	0
22-Apr	16.4	10.87	81.2	4	0
23-Apr	15.83	10.75	93.03	4.3	0
24-Apr	16.1	10.81	81.84	3.8	0
25-Apr	13.79	8.38	91.35	1.8	0

Weather data Stubton 2022					
Date	**Temperature**		**Humidity**	**Wind Speed**	**Precipitation Accum.**
	High °C	**Avg** °C	**Avg** %	**Avg** km/h	**Sum** mm
26-Apr	14.98	8.13	87.62	1.4	0
27-Apr	10.6	7.63	81.99	1.4	0
28-Apr	9.96	8.08	99.49	1.6	0
29-Apr	13.11	8.54	79.98	1.1	0
30-Apr	18.38	10.02	73.31	0.6	0
01-May	14.06	11.52	99.87	0.6	0
02-May	16.72	12.41	93.68	0.7	0.4
03-May	13.62	10.57	99.85	0.8	2.6
04-May	17.44	11.77	99.82	1.1	3.6
05-May	20.85	13.17	85.32	0.5	0
06-May	19.16	13.41	93.24	1.1	3.2
07-May	17.74	12.99	99.66	1.5	1
08-May	17.89	11.96	86.21	1.2	0
09-May	20.42	14.58	78.16	2	0
10-May	20.7	16.26	74.25	2.2	0
11-May	16.25	12.31	96.35	1.7	8.6
12-May	17.08	11.89	82.03	1.5	0
13-May	20.17	14.49	80.05	2.1	0
14-May	22.9	15.66	76.83	0.8	0
15-May	21.44	14.96	95.82	2.2	0.6
16-May	23.22	16.23	95.11	1.7	4.6
17-May	24.12	17.79	84.64	1.7	0.6
18-May	21.25	15.86	85.05	1.4	9.8
19-May	20.53	14.91	87.24	0.6	0
20-May	18.11	13.81	94.81	1.2	0.4
21-May	19.19	13.7	88.91	1.1	0
22-May	22.02	15.61	87.39	1.2	0
23-May	18.69	14.49	91.24	0.6	4.6
24-May	18.29	12.78	87.42	1	2
25-May	19.39	13.44	91.9	1.8	0
26-May	19.89	13.92	99.28	1.7	2
27-May	17.99	13.09	74.85	1.6	0.2
28-May	17.65	11.22	83.58	1	0
29-May	16.39	10.19	89.68	1.3	0
30-May	15.8	9.84	98.41	0.9	3.2
31-May	16.14	10.51	99.78	0.6	8.2
01-Jun	18.8	11.3	96.95	0.5	2.4
02-Jun	19.84	13.08	81.5	0.7	0.2
03-Jun	19.78	13.82	93.09	2	0
04-Jun	15.25	12.19	99.88	2.8	0
05-Jun	11.34	10.43	99.73	1.6	19.8
06-Jun	14.35	11.6	99.77	0.6	3.4
07-Jun	21.68	14.23	90.08	0.7	0

Weather data Stubton 2022					
Date	**Temperature**		**Humidity**	**Wind Speed**	**Precipitation Accum.**
	High °C	**Avg** °C	**Avg** %	**Avg** km/h	**Sum** mm
08-Jun	21.4	16.18	94.46	1.2	3.4
09-Jun	19.89	14.81	91.62	1.5	0.2
10-Jun	22.35	17.02	80.46	1.9	0
11-Jun	21.92	15.99	82.81	2	0.6
12-Jun	21.2	14.98	75.84	1.3	0
13-Jun	18.66	14.36	85.74	0.7	0
14-Jun	23.94	16.34	80.27	0.5	0
15-Jun	27.51	17.45	80.3	0.3	0
16-Jun	26.98	19.11	74.95	0.4	0
17-Jun	31.03	23.18	69.44	1.4	0
18-Jun	16.93	13.86	99.78	0.4	7
19-Jun	19.91	13.19	90.82	0.7	0.2
20-Jun	21.73	14.76	81.55	0.7	0
21-Jun	25.51	17.98	69.48	0.5	0
22-Jun	27.96	19.67	75.51	0.3	0
23-Jun	24.98	19.08	76.24	0.6	0
24-Jun	23.17	17.26	90.87	1.3	0
25-Jun	22.45	16.86	71.49	2.4	0
26-Jun	22.74	16.36	69.55	2.6	0
27-Jun	21.45	14.68	81.93	1.5	0.6
28-Jun	22.6	15.8	73.84	2.1	0
29-Jun	23.8	17.42	80.39	1.6	1.4
30-Jun	21.15	15.73	85.73	0.7	0
01-Jul	22.03	15.25	85.93	1.1	0
02-Jul	19.8	14.61	99.06	1.8	2.8
03-Jul	22.21	14.96	88.95	0.8	0
04-Jul	21.95	14.89	79.25	1.1	0
05-Jul	22.47	15.61	78.28	0.9	0
06-Jul	23.06	17.26	93.19	1.3	0
07-Jul	26.42	19.05	79.04	0.9	0
08-Jul	28.64	19.87	74.75	0.8	0
09-Jul	26.93	19.55	73.32	0.7	0
10-Jul	30.07	20.43	68.86	0.6	0
11-Jul	31.68	22.39	67.24	0.4	0
12-Jul	27.7	22.71	72.19	0.5	0
13-Jul	26.95	19.98	67.87	0.6	0
14-Jul	22.88	15.77	78.77	0.6	0.2
15-Jul	24.78	16.71	79.16	1	0
16-Jul	27.79	18.46	70.65	0.3	0
17-Jul	31.1	22.48	60.14	1	0
18-Jul	36.67	27.07	41.27	0.7	0
19-Jul	40.78	29.32	42.76	1.2	0
20-Jul	28.21	23.09	74.16	1.3	0

Weather data Stubton 2022					
Date	**Temperature**		**Humidity**	**Wind Speed**	**Precipitation Accum.**
	High °C	**Avg** °C	**Avg** %	**Avg** km/h	**Sum** mm
21-Jul	21.24	18.74	84.11	1	0
22-Jul	21.05	16.81	91.45	1.1	0.6
23-Jul	25.8	20.22	78.92	1.7	0
24-Jul	28.11	21.94	84.77	3.1	0.4
25-Jul	23.65	18.66	89.04	1.8	0.4
26-Jul	21.78	16.06	84.08	0.6	0.2
27-Jul	22.82	17.48	77.2	1.2	0.4
28-Jul	24.42	17.66	74.5	1.1	3.2
29-Jul	24.72	18.46	77.73	0.9	0
30-Jul	25.39	19.75	96	1	0.4
31-Jul	23.28	19.34	99.48	1.1	8.6
01-Aug	26.27	19.73	69.45	0.7	0
02-Aug	28.12	22.49	91.09	2.5	1
03-Aug	27.87	21.76	80.57	1.6	0
04-Aug	24.68	17.26	72.92	0.8	0
05-Aug	22.55	15.05	72.41	0.8	0
06-Aug	24.1	15.71	72.28	0.6	0
07-Aug	26.24	17.87	74.91	0.7	0
08-Aug	28.64	19.22	77.12	0.5	0
09-Aug	28.43	20.59	69.79	0.5	0
10-Aug	29.45	21.01	64.03	0.9	0
11-Aug	32.02	22.42	64.81	0.7	0
12-Aug	31.16	21.68	69.43	1.3	0
13-Aug	32.26	21.71	69.07	1.3	0
14-Aug	32.39	22.53	62.61	1	0
15-Aug	30.96	22.28	69.04	0.6	0


Stubton - Weather summary 2021
50
40
30
20
10
0
120
100
80
60
40
20
0
106.6
91.4
90.3
93.7
81.0
77.1
86.4
38.2
14.0
6.1
10.4
16.0
17.7
21.6
0.2
12.4
4.4
15.5
21.0
24.1
Mar-21
Apr-21
May-21
Jun-21
Jul-21
TempHigh°C
TempAvg °C
Humidity%
Precip mm


Stubton - weather summary 2021 and 2022
60
50
40
30
20
10
0
120
100
80
60
40
20
0
106.6
91.4
89.8
87.1
90.3
89.7
84.1
93.7
81.0
77.1
86.4
77.8
55.6
38.2
39.2
21.0
0.2
3.8
4.4
14.0
7.7
6.1
9.3
10.4
13.4
16.0
15.6
17.7
19.2
21.6
14.4
12.4
14.9
15.5
18.9
21.0
21.7
24.1
25.9
17.2
Mar 21
Mar 22
Apr 21
Apr 22
May 21
May 22
Jun 21
Jun 22
Jul 21
Jul 22
TempHigh°C
TempAvg °C
HumidityAvg%
PrecipAccum mm

Certificate of

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

This certifies that

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Date of issue: 9 January 2018
Effective date: 1 January 2018
Expiry date: 31 December 2022

Signature *Authorised signatory*

Certification Number
ORETO 384

HSE
Chemicals Regulation Division

Department of Agriculture and Rural Development