



# PGRO Final Report

## APHIDS ON COMBINING PEAS

### SLOT TRIALS 2022

Determining the efficacy of two insecticide molecules on the control of aphids in combining peas.

Project title	Determining the efficacy of two insecticide molecules on the control of aphids in combining peas.
Sponsor project reference	
Country / Region / EPPO zone	United Kingdom EPPO Maritime zone
Target crop	Combining peas ( <i>Pisum sativum</i> )
Target pest	Pea aphid ( <i>Acyrtosiphon pisum</i> ), black bean aphid ( <i>Aphis fabae</i> )
GEP	Yes
Report author	Dina Gomez
Date issued	October 2022
Trial year	2022
Trials by	PGRO Research Ltd Great North Road Thornhaugh Cambridgeshire PE8 6HJ United Kingdom
Sponsor	Several

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## 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.



Dina Gomez,  
Technical Officer

## Objectives

To determine,

- The effect of two insecticides on the control of aphids in combining peas.
- How the efficacy of two insecticides compared against the standard treatments Decis Protech, Stealth, Teppeki and Aphox.

## Summary

- All the standard treatments gave a significant control against aphids on combining peas, after the T1 application, compared to the untreated-control.
- From the confidential products tested, only treatment 5 (T1Conf1T2Untreated) gave a consistent control compared to the untreated after the first treatment application.
- All the treatments had significant effect on the aphids after the second application. It is important to mention that the population of aphids registered was very low after T2 application due to the warm and dried weather conditions.

## Test items and treatments

**Table 1.** Test items

Name	Active(s)	Conc.	Formulation	Batch/lot	MAPP
Decis Protech	deltamethrin	15 g/l	WE	n/a	16160
Stealth	lambda-cyhalothrin and 1,2-benzisothiazolin-3-one	100 g/l	SC	n/a	14551
Aphox	pirimicarb	500 g/kg	WG	n/a	18562
Teppeki	flonicamid	500 g/kg	WG	8309-01	12402

**Table 2.** Treatment list

Trt	Description	Rate(s)	Ai(s)	Timing
1	Control, Untreated	n/a	n/a	n/a
2	T1Decis Protech T2Aphox	0.5 l fb 280 g	15 g fb 140 g	T1 + T2
3	T1Stealth T2Aphox	0.075 l fb 280 g	7.5 g fb 140 g	T1 + T2
4	T1Teppeki T2Aphox	140 g fb 280 g	70 g fb 140 g	T1 + T2
5	T1Conf1 T2Conf1	n/a	n/a	T1 + T2
6	T1Conf2T2Conf2	n/a	n/a	T1 + T2
7	T1Conf3T2Conf3	n/a	n/a	T1 + T2

**Table 3.** Description of application timings

Timing	Growth stage or description of timing	BBCH
T1	3 to 4 internodes	33-34
T2	1 to 30 % of flowers open	59-63

## Methods

**Trial design** - Plots measured 18 m<sup>2</sup> (1.8x10 m) and were arranged in a randomised complete block layout with four replications according to EPPO guideline PP1/152(4).

**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. Spray volumes were 200 l/ha.

**Assessments** - Aphids were assessed as number of aphids per plant on a sample of 20 plants per plot (based on EPPO guidelines PP1/229(1)). Assessments were carried out prior to T1 and T2, as well as 3, 7 and 14 days after T1 application, and 3 and 25 days after T2 application. Phytotoxicity was scored 3 days after T1 application and 3 days after T2 application. For the phytotoxicity evaluation, a scale from 0 to 10 was used, where 10 = No phytotoxicity and 0 denoted dead crop according to EPPO guideline PP1/135(4).

**Harvest** – the trial was harvested using a Wintersteiger plot combine harvester on 25<sup>th</sup> July 2022.

**Analysis** – data were analysed using Analysis of Variance in R Studio.

**Met data** – meteorological data were recorded at Stubton throughout the growing season (Appendix)

**Table 4.** Trials diary.

Activity	Timing	BBCH	Date
Applications	T1	33-34	23-May
	T2	59-63	13-Jun
Assessments	A1	25	20-May
	A2	34-35	26-May
	A3 (+ phyto)	34-36	30-May
	A4	51-52	06-Jun
	A5	59-63	13-Jun
	A6 (+phyto)	65-67	16-Jun
	A7	75-79	08-Jul

## Trial site

**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	Combining peas ( <i>Pisum sativum</i> )
Variety	Bluetime
Drill date	17 March 2022
Inputs	Nirvana (4.4 l/ha) pre-emergence (30-Mar), Benta 480 SL 1.8 l/ha + Butoxone 1.8 l/ha post-emergence (26 Apr)



**a**



**b**

**Figure 1.** a. Evaluation plot. b. Aphids: *A. pisum*, *A. fabae* and *Myzus persicae*.

## Results

All the products mixed well in water when preparing the solution for application.

Aphid data from A4 (14 days after T1) were excluded from analysis due to problems with data collection on this date.

Data from A7 were analysed using three replicates due to inconsistencies in data from replicate 1.

Three species of aphid were recorded in this trial, pea aphid (*Acyrtosiphon pisum*), black bean aphid (*Aphis fabae*) and peach potato aphid (*Myzus persicae*). The most commonly occurring aphid was the pea aphid, and only in the last assessment at A7, were the other two species observed.

The mean number of aphids per plant recorded in untreated plots, prior to T1 application was 3.11 (Table 6).

All the treatments, including the standards had a significant control of aphids compared to the untreated plots at A2 or A3 (3 and 7 days after T1) (Figures 2 and 3).

At A5, carried out prior to T2, the number of aphids had decreased and there were no significant differences between treatments (Figure 5).

At A6, 3 days after T2, all treatments provided significant control of aphids as well, the industry standards (Figure 6). Mean aphid numbers in the untreated control plots were relatively low on this date.

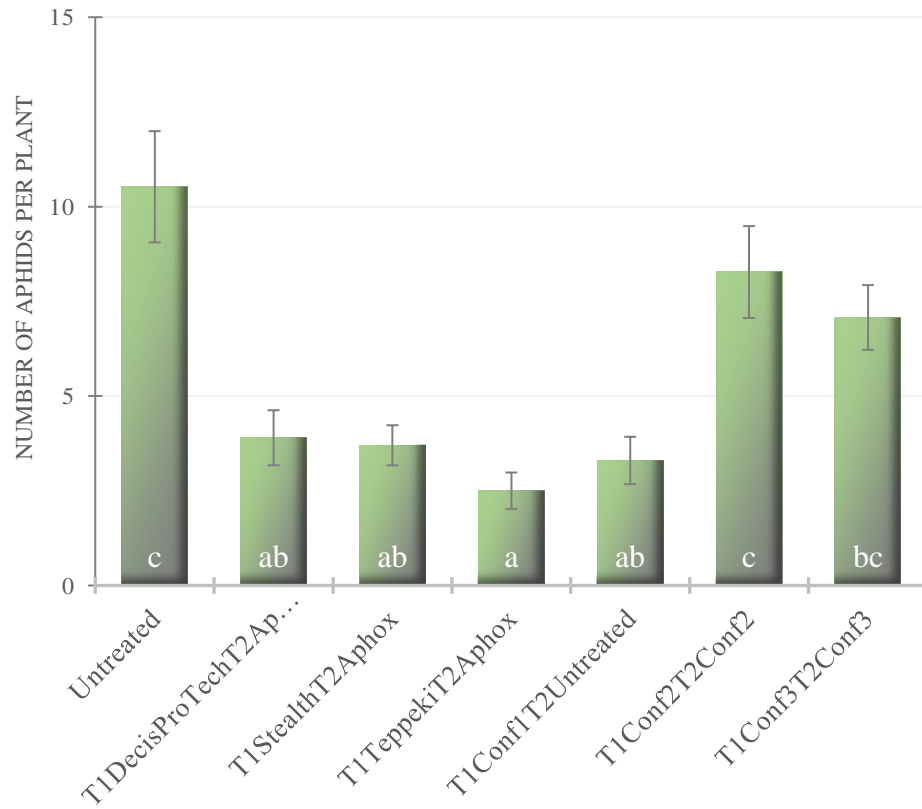
At A7, pea aphid, black bean aphid and peach potato aphid were recorded, but there were no real treatment effects. The standard treatment Decis Protech followed by Aphox showed significantly higher numbers of black bean aphids compared to all other treatments and the untreated control plots (Figure 7). Peach potato aphid (*Myzus persicae*) was found at very low levels. Black bean aphid (*A. fabae*) numbers were skewed by the presence of a few large colonies.

**Table 6.** Mean number of aphids per plant at all assessment timings at Stubton in 2022.

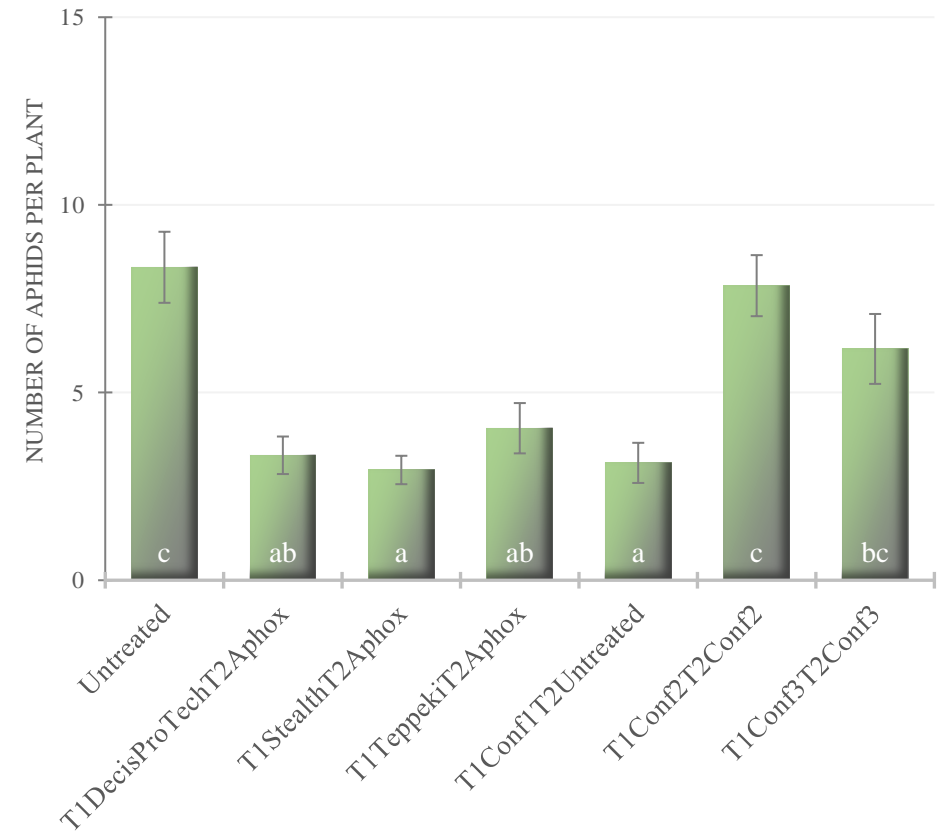
No.	Treatment	<i>Acyrtosiphon pisum</i> (pea aphid)						<i>Aphis fabae</i> (Black bean aphid)	<i>Myzus persicae</i> (Peach potatoe aphid)
		20-May A1	26-May A2	30-May A3	13-Jun A5	16-Jun A6	08-Jul A7	08-Jul A7	08-Jul A7
1	Control, Untreated	3.11	10.53 c	8.34 c	1.36	2.49 b	0.07	0.0 a	0.00
2	T1Decis ProTech T2Aphox		3.90 ab	3.33 ab	1.83	0.90 a	0.38	3.4 b	0.00
3	T1Stealth T2Aphox		3.70 ab	2.94 a	0.70	0.40 a	0.03	0.0 a	0.05
4	T1Teppeki T2Aphox		2.50 a	4.05 ab	1.03	0.14 a	0.17	0.0 a	0.00
5	T1Conf1T2Untreated		3.30 ab	3.13 a	0.64	0.25 a	0.67	0.6 a	0.03
6	T1Conf2T2Conf2		8.28 c	7.85 c	1.30	0.26 a	0.08	0.1 a	0.02
7	T1Conf3T2Conf3		7.08 bc	6.16 bc	1.55	0.38 a	0.48	0.3 a	0.00
	f-value		11.09	10.47	1.99	15.15	0.977	4.41	1.04
	p-value (ns) not significant		0 (<0.001) ***	0 (<0.001) ***	0.066 ns	0 (<0.001) ***	0.44 ns	0.000247 ***	0.398 ns

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

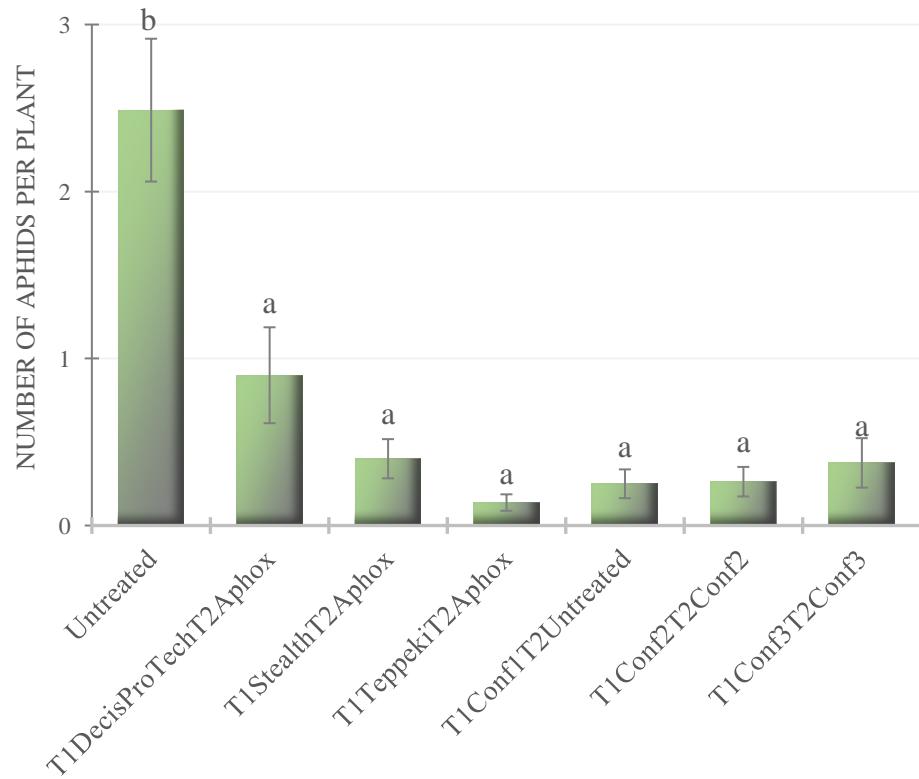




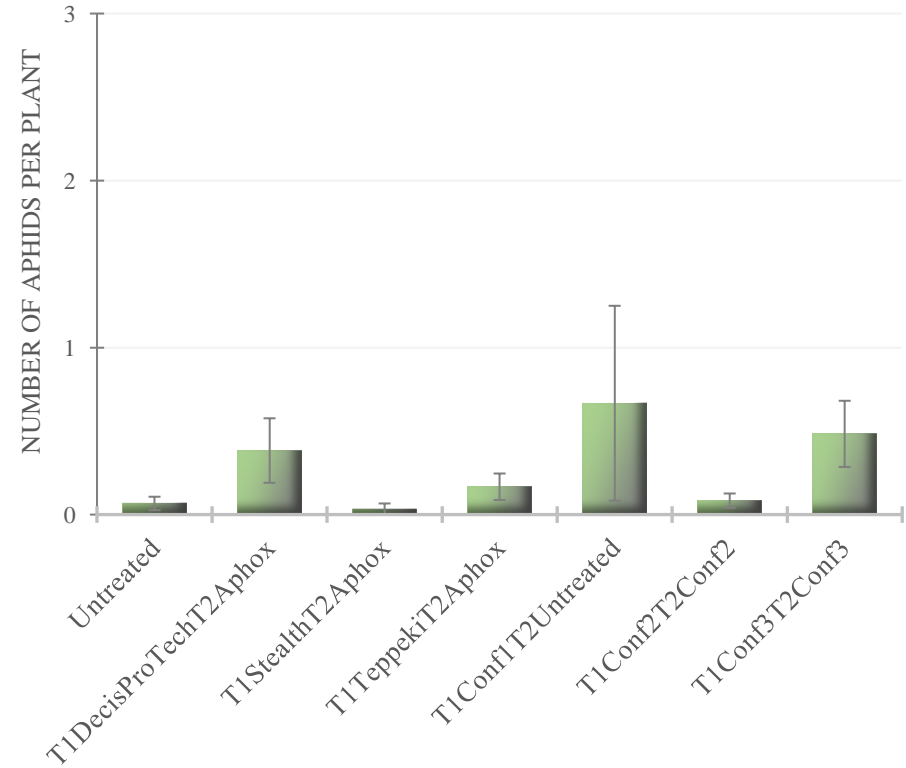
**Figure 2.** Mean number of *A. pisum* per plant at A2 on 26<sup>th</sup> May 2022.



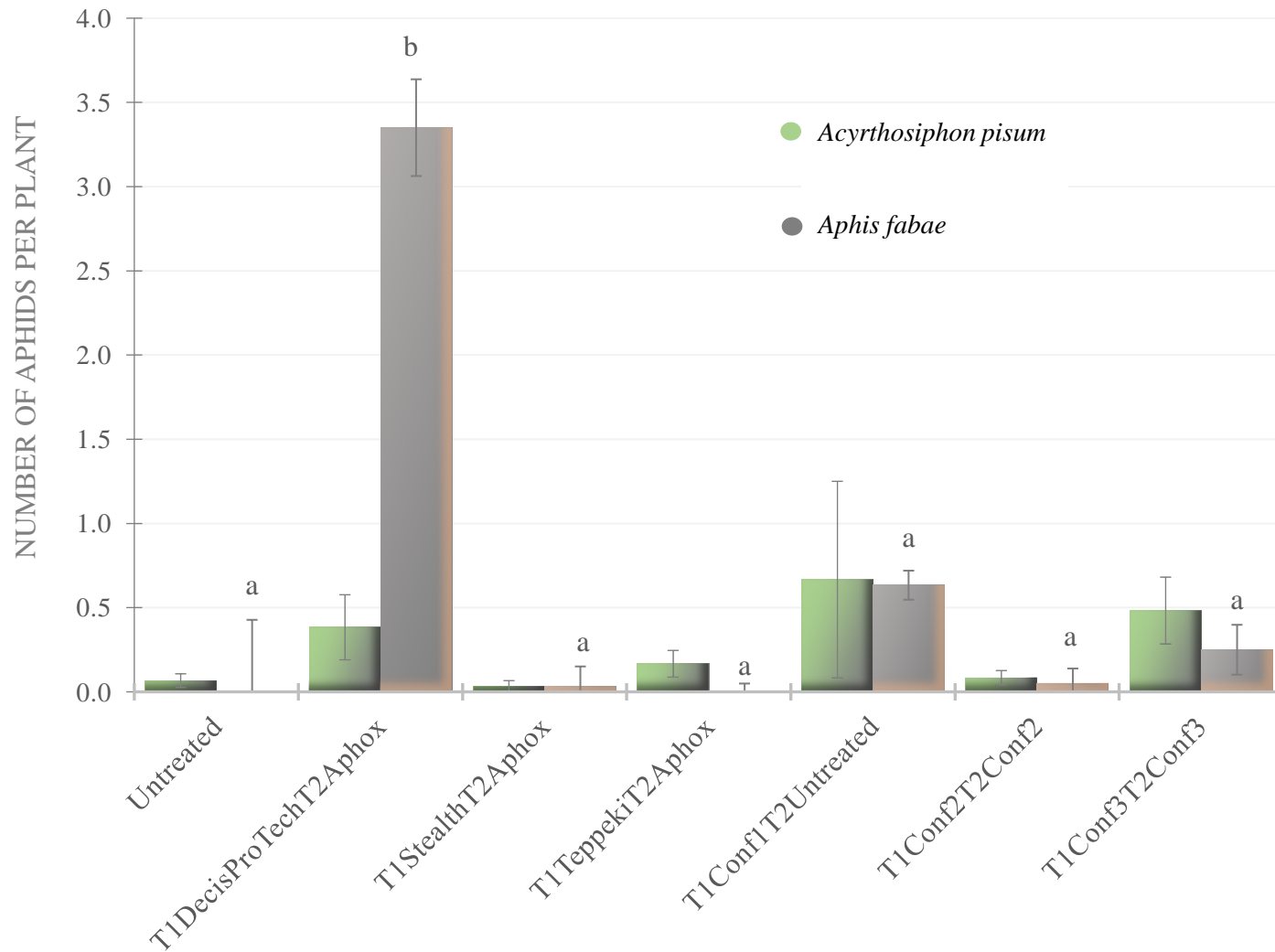
**Figure 3.** Mean number of *A. pisum* per plant at A3 on 30<sup>th</sup> May 2022



**Figure 4.** Mean number of *A. pisum* per plant at A5 on 13<sup>th</sup> June 2022



**Figure 5.** Mean number of *A. pisum* per plant at A6 on 16<sup>th</sup> June 2022



**Figure 6.** Mean number of *A. pisum* and *A. fabae* per plant at A7 on 8<sup>th</sup> July 2022

**Phytotoxicity:**

Only a very low level of phytotoxicity (as slight leaf yellowing) was observed in treatment 6 on 26<sup>th</sup> May 2022 (Table 7), although this was transient and was not recorded on 16<sup>th</sup> June.

**Table 7.** Mean phytotoxicity after T1 and T2 applications. 10 = no phytotoxicity 0 = dead plant

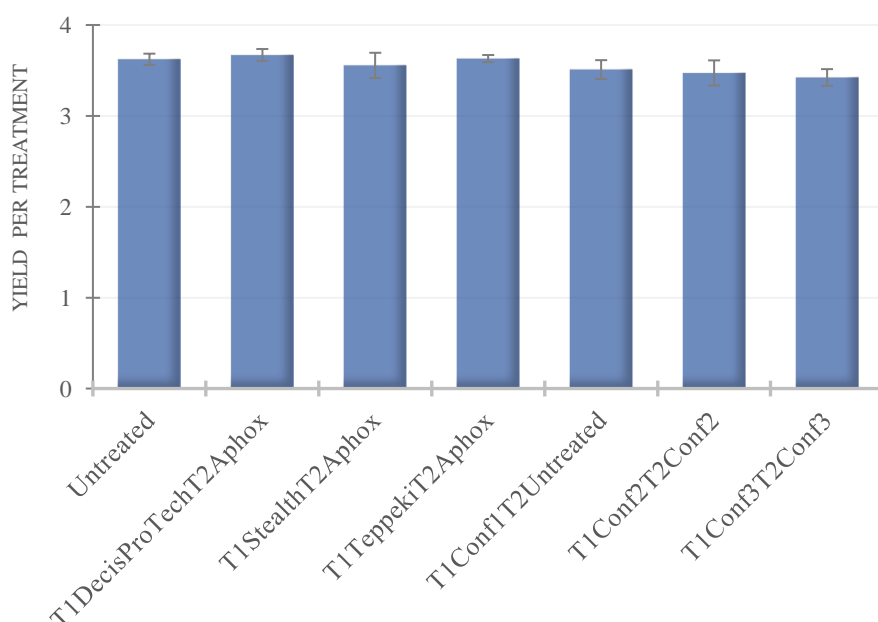
Treatment	26-May	16-Jun
1. Control, Untreated	10.0	10.0
2. T1Decis Protech T2Aphox	10.0	10.0
3. T1Stealth T2Aphox	10.0	10.0
4. T1Teppeki T2Aphox	10.0	10.0
5. T1Conf1 T2Conf1	10.0	10.0
6. T1Conf2T2Conf2	9.5	10.0
7. T1Conf3T2Conf3	10.0	10.0

**Yield:**

There were no significant differences in yield, (t/ha) at 15% moisture content between any of the treatments (Table 8).

**Table 8.** Mean yield (t/ha) at 15% moisture content.

Treatment	Yield (t/ha at 15% moisture content)
1. Control, Untreated	3.62
2. T1Decis Protech T2Aphox	3.67
3. T1Stealth T2Aphox	3.56
4. T1Teppeki T2Aphox	3.63
5. T1Conf1 T2Conf1	3.51
6. T1Conf2T2Conf2	3.47
7. T1Conf3T2Conf3	3.42
f-value	0.866
p-value	0.536 (ns)

**Figure 7.** Mean yield (t/ha) at 15% moisture content.

## Discussion

This trial was performed in combining peas, variety Bluetime, selected as one of the standard blue varieties (PGRO descriptive list 2022), to evaluate the efficacy of Sirius on the control of aphids.

The weather in 2022 led to moderate levels of aphids; 2022 had dry May and July months compared to 2021 and higher temperatures (average °C) from April onwards in 2022 contrasted with the 2021 season (Appendix graphs).

There was significant control of aphids following the application T1 with treatment 4 (T1Teppeki) compared to the untreated plots in this trial, and similar control with the standard treatments.

After the T2 application all treatments provided significant control of aphids, but the population of the aphids was less than 2.49 aphids per plant.

Very little phytotoxicity was recorded in this trial. All products appeared to be crop safe.

There were issues with data collection at A4 and A7. A4 data were excluded from the analyses and data from A7 was analysed using only 3 replicates to provide balanced data. It was felt that this was appropriate and still provided sufficient degrees of freedom to allow for robust data analysis.

There were no significant differences in yield between any of the treatments, possibly due to the moderate levels of aphids observed in this trial and the short life cycle of the crop this season. The conditions in July were a combination of high mean maximum temperature at 25.9 °C, low mean accumulated precipitation of 17.2 mm and low mean relative humidity of 77.8%, that prompted very rapid crop senescence. Meteorological data were recorded and can be found in the Appendix.

## Appendix

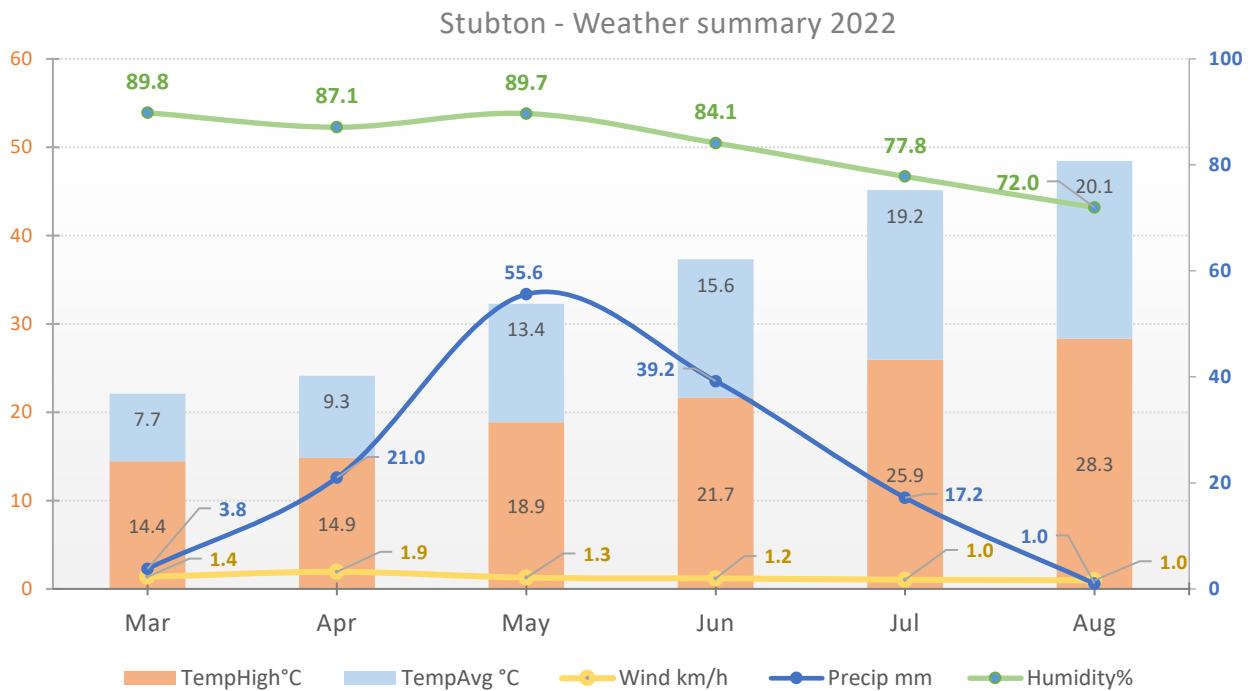
Weather data Stubton 2022					
Date	Temperature		Humidity	Wind Speed	Precipitation Accum.
	High °C	Avg °C	Avg %	Avg km/h	Sum mm
17-Mar	13.14	7.53	96.42	1.8	0
18-Mar	15.49	7.96	96.74	1	0.2
19-Mar	14.59	8.17	91.49	3	0
20-Mar	10.72	5.68	89.16	1.9	0
21-Mar	13.07	5.61	84.65	0.9	0.2
22-Mar	18.38	11.14	88.22	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
26-Apr	14.98	8.13	87.62	1.4	0

Weather data Stubton 2022					
Date	Temperature		Humidity	Wind Speed	Precipitation Accum.
	High °C	Avg °C	Avg %	Avg km/h	Sum mm
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
08-Jun	21.4	16.18	94.46	1.2	3.4

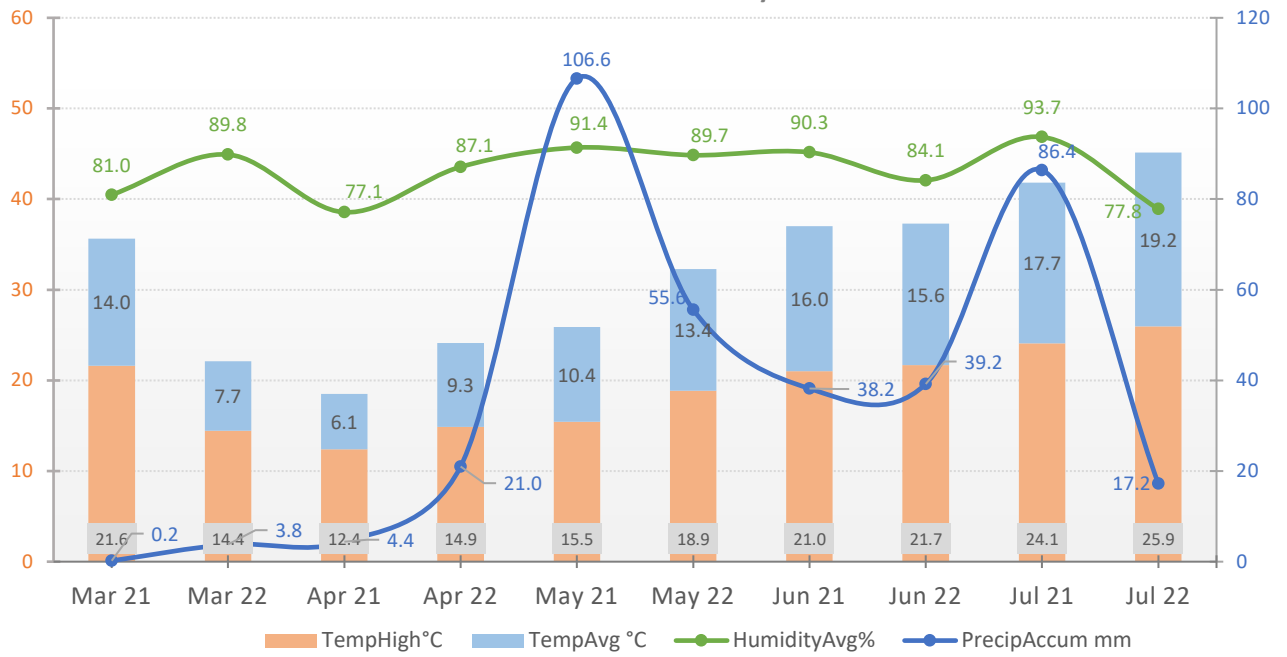
Weather data Stubton 2022					
Date	Temperature		Humidity	Wind Speed	Precipitation Accum.
	High °C	Avg °C	Avg %	Avg km/h	Sum mm
09-Jun	19.89	14.81	91.62	1.5	0.2
10-Jun	22.35	17.02	80.46	1.9	0
11-Jun	21.92	15.99	82.81	2	0.6
12-Jun	21.2	14.98	75.84	1.3	0
13-Jun	18.66	14.36	85.74	0.7	0
14-Jun	23.94	16.34	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
21-Jul	21.24	18.74	84.11	1	0



Weather data Stubton 2022					
Date	Temperature		Humidity	Wind Speed	Precipitation Accum.
	High °C	Avg °C	Avg %	Avg km/h	Sum mm
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



Stubton - weather summary 2021 and 2022





# Certificate of

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

*This certifies that*

**PGRO Research 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**

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

Signature

*Authorised signatory*

Certification Number

ORETO 384



Chemicals Regulation Division



Department of  
Agriculture and  
Rural Development