



# **PGRO Biostimulant trials 2018-2021**

## **Background**

Biostimulants are becoming more common place in arable production. The diversity and number of biostimulants products available is vast. Thus, a series of trials set out to determine which biostimulants (from a considered selection) might be beneficial in the production of spring beans, combining peas and vining peas.

## **Summary**

Take-off ST, Phorce and Serenade showed a small consistent benefit to yield over all trials in both peas and beans. Phorce demonstrated significant suppression of downy mildew in beans but not peas.

## **Trial sites**

Trials were completed in spring beans, combining peas and vining peas. Each trial was repeated in 2018, 2019 and 2021. Most trials were established at PGRO's primary trial site near Newark (Stubton) on sandy clay loam. Additional vining pea trials were established at Holbeach Marsh but were all destroyed by either foot rot, damping off or bird damage. Trials were established as replicated (4) plot trials. Various assessments were completed throughout the trials including assessments of emergence, chlorophyll concentration, nodulation success, foot rot severity, foliar disease severity and yield.

The results presented here are an analysis of all data available from all available trials data combined. Results are expressed as a percentage of the average control result over all trials. Z-scores are also presented.

## Treatments

Biostimulant treatments are described in tables 1 and 2. These products are a small selection of currently available products that reflect different styles of applications and “modes of action”. Treatments were applied according to the manufacturer’s instructions or guidance.

**Table 1.** Biostimulant products, method of application.

	<b>Treatment</b>	<b>Application</b>	<b>Supplier</b>
1	Untreated	Soil application	
2	TFP Pro Soil	Soil application	Tricet UK
3	Serenade ASO	Seed treatment	Bayer
4	Radiate	Seed treatment	DeSangosse
5	Start-uP	Seed treatment	Ilex EnviroSciences
6	Take Off ST	Seed treatment	Verdesian
7	MultiMax GPA	Seed treatment	Verdesian
8	KickOff	Foliar application	Fielder Nutrition
9	TFP Pro-Tect	Foliar application	Tricet UK
10	Zynergy + Na 13	Foliar application	Omex
11	Agrihit Foliar Tonic	Foliar application	Agrihit UK
12	Phorce	Foliar application	Verdesian
13	Prestop	Soil + Foliar application	Lallemand

**Table 2.** Rates and timings of biostimulant products.

	<b>Treatment</b>	<b>Rate</b>	<b>T0</b>	<b>T1</b>	<b>T2</b>
1	Untreated	-	-	-	-
2	TFP Pro Soil	1 l/ha	Seedbed	-	-
3	Serenade ASO	8 l/ha	Seedbed	-	-
4	Radiate	2 l/tonne	Seed	-	-
5	Start-uP	2 l/tonne	Seed	-	-
6	Take Off ST	1 l/tonne	Seed	-	-
7	MultiMax GPA	200 ml/tonne	Seed	-	-
8	KickOff	4 l/tonne	Seed	-	-
9	TFP Pro-Tect	1 l/ha	-	4-5 leaf pairs	21 DALA
10	Zynergy + Na 13	1 l/ha + 0.1% v/v	-	Early flower	10-14 DALA
11	Agrihit Foliar Tonic	0.67 l/ha	-	Early flower	10-14 DALA
12	Phorce	1 l/ha	-	2nd node	Pre flowering
13	Prestop	1.5 kg/ha	Seedbed	Flower bud	-

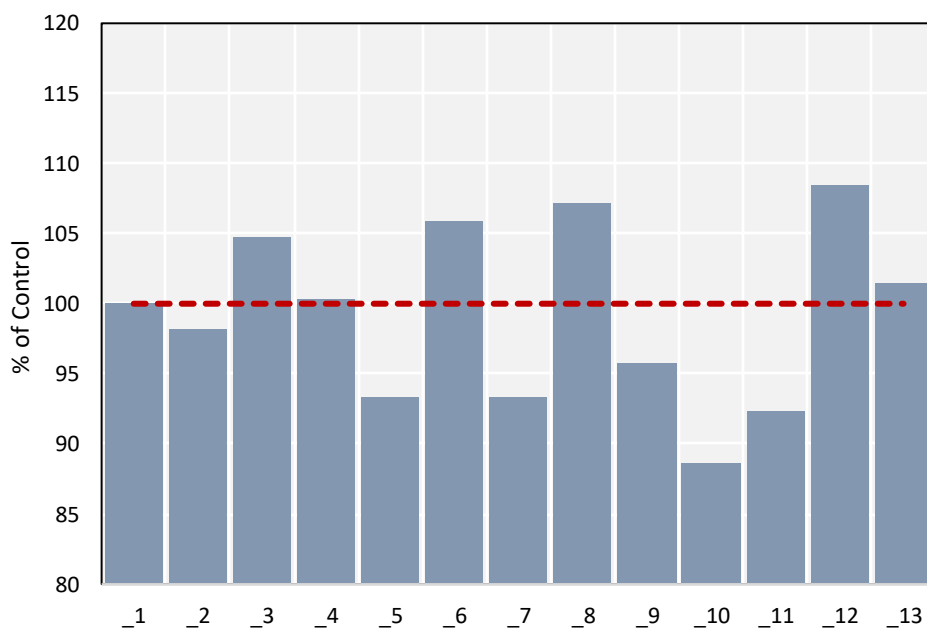
## Results - Vining peas

6 trials established, at Holbeach or Stubton. Holbeach trials were destroyed by foot rot/birds/pythium. Only 2 trials in total made it to yield.

With regards to yield in vining peas, treatments 3, 6, 8 and 12 performed best.

**Table 3.** Vining pea yield compared to control. N=2.

		<b>% of control</b>	<b>z-score</b>
1	Untreated	100.00	-0.01
2	TFP Pro Soil	98.16	-0.25
3	Serenade ASO	104.70	0.45
4	Radiate	100.29	0.17
5	Start-uP	93.36	-0.53
6	Take Off ST	105.85	1.18
7	Multimax GPA	93.31	-0.59
8	KickOff	107.13	0.59
9	TFP Pro-Tect	95.84	-0.70
10	Zynergy + NA13	88.69	-0.68
11	Agrihit Foliar Tonic	92.33	-0.85
12	Phorce	108.47	1.17
13	Prestop	101.54	0.01



**Figure 1.** Mean yield of vining peas as percentage of control.

Downy mildew in vining peas was reduced by treatment 8.

**Table 4.** Vining pea downy mildew infection compared to control. N=2.

		<b>% of control</b>	<b>z-score</b>
1	Untreated	100	-0.53
2	TFP Pro Soil	139.73	0.84
3	Serenade ASO	125.68	0.38
4	Radiate	95.42	-0.68
5	Start-uP	100.27	-0.57
6	Take Off ST	111.65	-0.07
7	Multimax GPA	96.97	-0.62
8	KickOff	67.48	-1.65
9	TFP Pro-Tect	167.73	1.85
10	Zynergy + NA13	129.56	0.48
11	Agrihit Foliar Tonic	125.68	0.41
12	Phorce	133.42	0.65
13	Prestop	99.66	-0.53

No strong responses in foot rot infection were observed.

**Table 5.** Vining pea foot rot infection compared to control. N=2.

		<b>% of control</b>	<b>z-score</b>
1	Untreated	100.00	0.74
2	TFP Pro Soil	92.00	-0.78
3	Serenade ASO	100.64	0.89
4	Radiate	94.40	-0.07
5	Start-uP	93.03	-0.52
6	Take Off ST	99.52	0.36
7	Multimax GPA	94.26	-0.15
8	KickOff	96.10	0.01
9	TFP Pro-Tect	97.02	0.49
10	Zynergy + NA13	93.83	-0.06
11	Agrihit Foliar Tonic	90.97	-1.04
12	Phorce	102.81	0.63
13	Prestop	95.92	-0.48

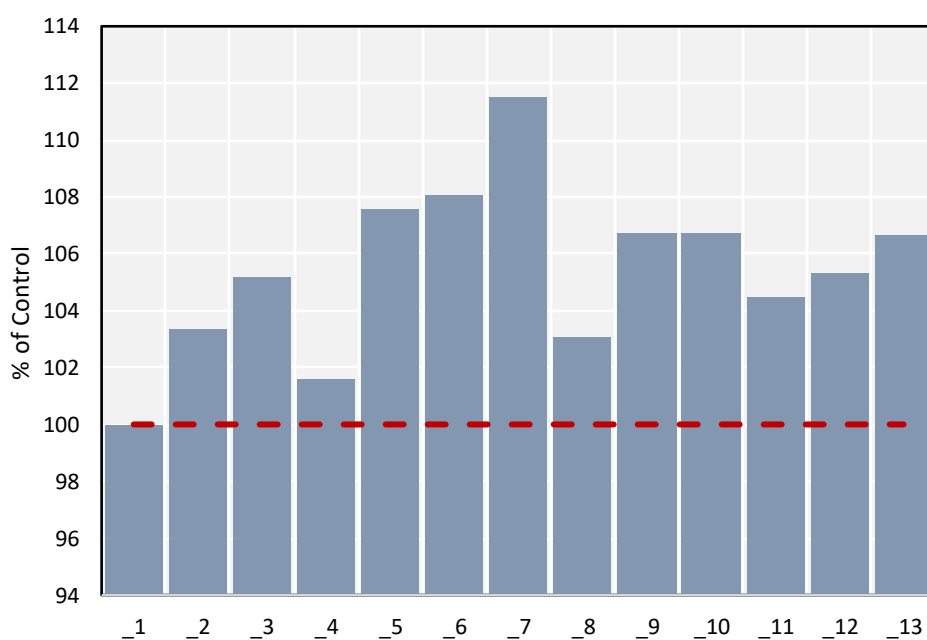
## Results - Combining peas

3 trials were established at Stubton.

All treatments generally resulted in improved yield in comparison to the control over the years. Other metrics were measured (chlorophyll and emergence) but there were no treatment effects.

**Table 6.** Combining pea yield compared to control. N=3.

		<b>% of control</b>	<b>z-score</b>
1	Untreated	100.00	-0.98
2	TFP Pro Soil	103.37	-0.33
3	Serenade ASO	105.18	0.06
4	Radiate	101.63	-0.56
5	Start-uP	107.56	0.82
6	Take Off ST	108.05	0.20
7	Multimax GPA	111.48	0.48
8	KickOff	103.08	-0.85
9	TFP Pro-Tect	106.75	0.03
10	Zynergy + NA13	106.74	0.59
11	Agrihit Foliar Tonic	104.46	0.02
12	Phorce	105.30	0.14
13	Prestop	106.65	0.45



**Figure 2.** Mean yield of combining peas as percentage of control.

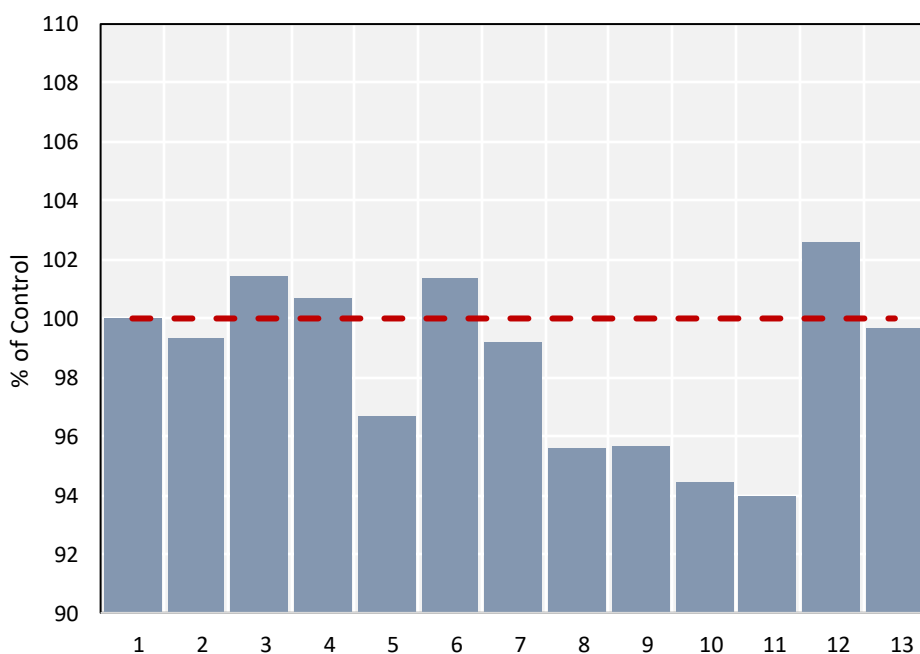
## Results - Spring beans

3 trials were established at Stubton and Thistleton.

Positive treatment effects on yield may have resulted from treatments 3, 6 and 12. Emergence and chlorophyll were measured but there were no consistent effects. Bean rust and foot rot pressure were significant in 2021 thus assessed. Both pathogens appeared to be slightly suppressed by the use of treatment 6 in 2021.

**Table 7.** Spring bean yield compared to the control. N=3.

		<b>% of control</b>	<b>z-score</b>
1	Untreated	100.00	0.41
2	TFP Pro Soil	99.32	0.10
3	Serenade ASO	101.46	0.85
4	Radiate	100.69	0.52
5	Start-uP	96.69	-0.49
6	Take Off ST	101.34	0.78
7	Multimax GPA	99.19	0.10
8	KickOff	95.61	-0.73
9	TFP Pro-Tect	95.66	-0.64
10	Zynergy + NA13	94.46	-0.93
11	Agrihit Foliar Tonic	93.94	-1.05
12	Phorce	102.61	0.85
13	Prestop	99.66	0.23



**Figure 3.** Mean yield of spring beans as percentage of control.

Downy mildew infection in spring beans was significantly reduced by the use of treatment 12.

Table 8. Downy mildew infection compared to the control. N=2.

		<b>% of control</b>	<b>z-score</b>
1	Untreated	100.00	0.93
2	TFP Pro Soil	102.75	0.89
3	Serenade ASO	102.60	1.02
4	Radiate	96.56	0.62
5	Start-uP	85.75	-0.31
6	Take Off ST	89.46	0.05
7	Multimax GPA	82.61	-0.31
8	KickOff	89.39	0.25
9	TFP Pro-Tect	87.55	-0.13
10	Zynergy + NA13	92.68	0.17
11	Agrihit Foliar Tonic	83.33	-0.28
12	Phorce	41.59	-2.75
13	Prestop	83.89	-0.15

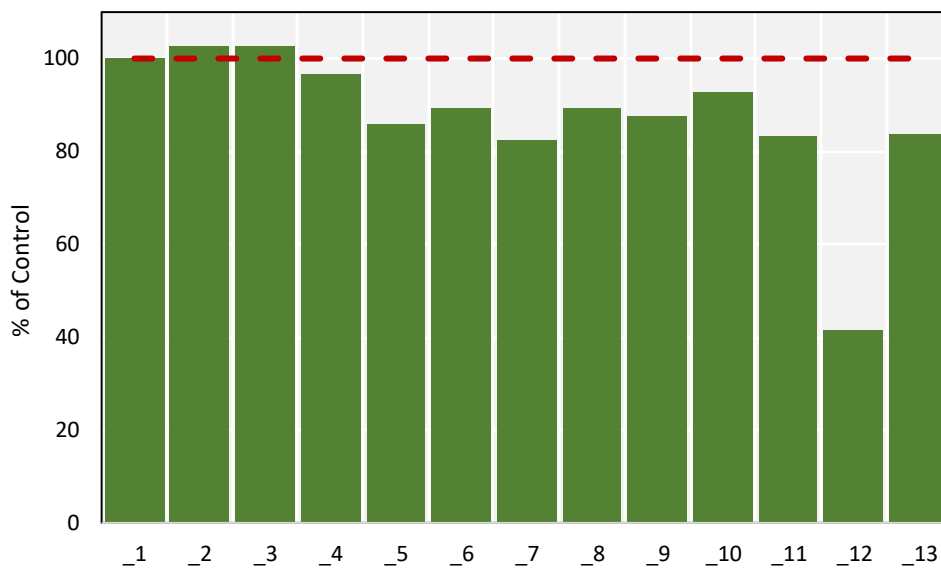


Figure 4. Mean downy mildew leaf area infection as percentage of control.

## Combined results

Treatments 3, 6, 12 (Serenade ASO, Take-Off ST and Phorce, respectively) demonstrated the most positive yield responses across vining peas, combining peas and spring beans.

Table 9. Yield, all crops. N=8.

		% of control	z-score
1	Untreated	100.00	-0.21
2	TFP Pro Soil	100.55	-0.15
3	Serenade ASO	103.66	0.45
4	Radiate	100.94	0.03
5	Start-uP	99.93	-0.01
6	Take Off ST	104.99	0.66
7	Multimax GPA	102.33	0.07
8	KickOff	101.29	-0.45
9	TFP Pro-Tect	99.87	-0.41
10	Zynergy + NA13	97.62	-0.30
11	Agrihit Foliar Tonic	97.49	-0.60
12	Phorce	105.08	0.66
13	Prestop	102.75	0.26

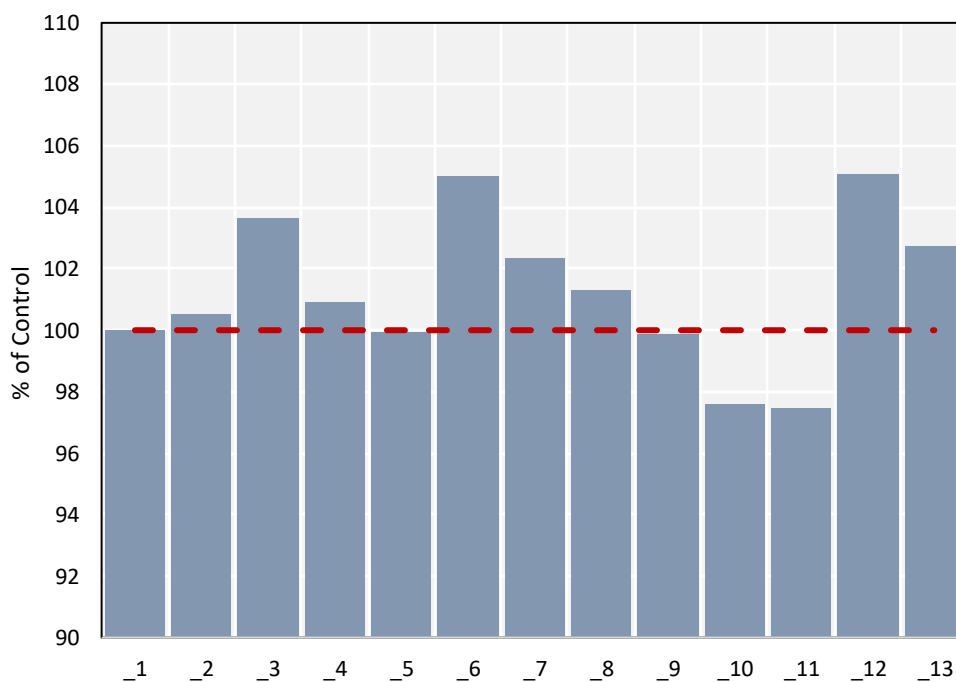


Figure 5. Mean yield of all trials as percentage of control.