

Grower Summary

FV 394a

Vegetable crops: Development of a screening programme for plant growth enhancement products.

Final 2013

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Only officially approved pesticides may be used in the UK. Approvals are normally granted only in relation to individual products and for specified uses. It is an offence to use non-approved products or to use approved products in a manner that does not comply with the statutory conditions of use, except where the crop or situation is the subject of an off-label extension of use.

Before using all pesticides check the approval status and conditions of use.

Read the label before use: use pesticides safely.

PLEASE NOTE: The HDC, whilst reporting the results of this independent work, does not advocate or promote the use of the products reviewed in this study for crop protection. It is important to note that:

- a) The trials reported in this study are not specifically designed regulatory trials to support a product claim and they have not been through any regulatory scrutiny to assess consistency, level of control, and appropriate dose of the products.
- b) It is important for growers to remember that before using any product for plant protection purposes always check whether the product is currently approved for the intended use and situation.

HDC is a division of the Agriculture and Horticulture Development Board.

Project Number:	FV 394a
Project Title:	Vegetable crops: Development of a screening programme for plant growth enhancement products.
Project Leader:	Pat Croft
Contractor:	STC Research Foundation
Industry Representative:	Martin Evans, Fresh Growers Ltd
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Previous report/(s):	None
Start Date:	01 April 2012
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Project Cost:	£28,200

Headlines

- A wide selection of speciality crop nutrition products were applied to lettuce, carrots and peas, and their effects on yield, and pest and disease damage, were assessed during the 2012 season.
- As in the first year of the trial in 2011, the most significant, beneficial effects were particularly seen in lettuce.

Background

Vegetable growers are faced with increased demand for UK-grown produce in an arena of reduced pesticide availability, increased fertiliser costs, pressure to reduce greenhouse emissions, and demands to improve productivity and quality, whilst protecting the environment and improving biodiversity. High yields require the management and optimisation of all resources, including nitrogen (N), phosphorus (P), potassium (K) and micronutrient availability.

This project is a repeated trial of project FV 394, which was conducted in 2011, and focuses on screening plant growth enhancers (non-NPK macro and micronutrient products). The aim of the project is to provide a service to the UK horticultural sector that uses recent science, known expertise and grower consultations to better inform vegetable growers on the options available for crop improvement using plant enhancers.

Summary of the results and main conclusions

- Tables 1–3 below summarise the recorded effects of the different treatments for each of the three crops (lettuce, carrots and peas) and compares the findings to the previous year (2011).
- The tables provide a simple comparison of the treatments against the control (NPK only), indicating where the treatments gave a better performance than the control (>) or not (x). The tables also indicate where these differences are significant after statistical analysis ($p < 0.05$) (+).
- As previously recorded in the 2011 trials, significant treatment effects were recorded on lettuce for fresh weight. Weights (dry and fresh) were recorded at harvest; Omex Biomex Plus, TTL Plus and Phos-Star produced statistically significant increases in yield (Table 1a). Due to the wet climate in 2012, downy mildew appeared quickly throughout the lettuce crop; therefore assessment on percentage of leaves affected

was recorded. *Botrytis cinerea*, *Sclerotinia sclerotiorum* and tip-burn were not recorded in 2012.

- In the pea crop some treatments did improve measurements marginally in comparison to the control plots (Table 2a), but there were no statistically valid improvements. Root nodules were very poor in 2012 and it is possible this is because the peas had been flooded due to the wettest year on record. Generally the pea crop was poor due to this heavy rainfall and made comparisons of treatments difficult.

Table 1a: Lettuce (Frisco) 2012

	Treatments	Means per plot (20 plants per plot)		
		Fresh Weight (g)	Dry weight (g)	Disease (Downy mildew)
1	Commercial NPK	*	*	*
2	InCa	>	X	>
3	Wormcast	X	X	X
4	Omex Biomex Starter	>	X	>
5	Omex Biomex Plus	+	+	>
6	PHC Colonise AG	X	X	+
7	PHC Complete Plus	>	X	X
8	TTL Plus	+	X	X
9	Serenade	>	X	X
10	Bactolife DP104	X	X	X
11	Bactolife A10	>	X	X
12	Phos-Star	+	X	>

Table 1b: Lettuce (Frisco) 2011

	Treatments	Means per plot (20 plants per plot)			
		Weight (g)	No. with <i>Botrytis</i>	No. with <i>Sclerotinia</i>	No. with tip burn
1	Control (NPK only)	*	*	*	*
2	InCA	>	+	>	>
3	Wormcast Pro	>	+	X	>
4	Omex Biomex Starter	>	>	>	>
5	Omex Biomex Plus	>	+	>	>
6	PLC Colonize AG	X	+	>	>
7	PHC Complete Plus	X	>	>	X
8	TTL Plus	X	+	>	X
9	Serenade	+	+	>	>
10	HYT b	>	+	>	>
11	HYTb + a + c	>	+	>	>
12	Phos-Star	+	+	>	>

Table 2a: Peas 2012

Treatments		Means per sample		
		Numbers of pods	Stem length	Pod weights
1	Control (NPK only)	*	*	*
2	InCa	X	X	X
3	Wormcast	X	X	X
4	Omex Biomex Starter	>	>	>
5	Omex Biomex Plus	>	>	>
6	PHC Colonise AG	X	X	X
7	PHC Complete Plus	X	>	X
8	TTL Plus	X	>	X
9	Serenade	X	>	X
10	Bactolife DP104	>	X	>
11	Bactolife A10	>	X	X
12	Phos-Star	X	>	X

Table 2b: Peas 2011

Treatments		Means per sample (2 x 0.5 m)			
		Numbers of pods	Stem length	Pod weights	Nodule score
1	Control (NPK only)	*	*	*	*
2	InCa	>	>	>	>
3	Wormcast	>	>	X	X
4	Omex Biomex Starter	>	X	>	>
5	Omex Biomex Plus	>	>	>	>
6	PHC Colonise AG	>	X	>	X
7	PHC Complete Plus	X	>	X	X
8	TTL Plus	>	X	>	X
9	Serenade	>	X	>	X
10	HYTb	X	x	>	X
11	HYT abc	>	>	>	>
12	Phos-Star	>	>	>	X

- 2012 demonstrated that some treatments did improve marketable yield in carrots compared to the control plots (PHC Complete plus, TTL plus, Serenade and Wormcast), but results were not statistically significant. Cavity spot and carrot root fly levels were low as in the previous year.

Table 3a: Carrots 2012

	Treatments	Means per m ²			
		Cavity spot score	No. of carrots with carrot root per m ²	Weight per m ²	Marketable weight per m ²
1	Control (NPK only)	*	*	*	*
2	InCa	>	X	>	X
3	Wormcast	X	X	>	>
4	Omex Biomex Starter	X	X	>	X
5	Omex Biomex Plus	X	>	X	X
6	PHC Colonise AG	>	X	X	X
7	PHC Complete Plus	>	>	>	>
8	TTL Plus	>	>	>	>
9	Serenade	X	>	>	>
10	Bactolife DP104	>	>	>	X
11	Bactolife A10	X	X	>	X
12	Phos-Star	>	X	X	X

Table 3b: Carrots 2011

	Treatments	Means per sample (60 carrots)			
		Cavity spot score	Carrot root fly score	Diameter	Length
1	Control (NPK only)	*	*	*	*
2	InCa	>	X	X	X
3	Wormcast	X	X	X	X
4	Omex Biomex Starter	X	>	X	X
5	Omex Biomex Plus	>	X	>	>
6	PHC Colonise AG	>	>	X	X
7	PHC Complete Plus	>	X	X	X
8	TTL Plus	>	X	X	X
9	Serenade	>	X	X	X
10	HYTb	X	>	>	>
11	HYT abc	X	>	X	X
12	Phos-Star	X	X	X	X

- The second year data have showed some marginal improvements in yield for carrots and lettuce with some products. The results from two years of trials do not as yet provide clear indications of the efficacy of these plant growth enhancing products. However weather conditions for the two years were very different, with the 2012 being the wettest year on record.
- Additional data would provide a clearer effect of the products on yield and disease. It has been also suggested that introducing an additional control treatment with no NPK application would be useful, as scientific evidence suggests that the addition of NPK

may counteract the potential benefits that some of the products are trying to achieve in their promotion of beneficial microbes within the soil.

Research is needed to address the complex interactions of micronutrients and their role in sustainable crop production before recommendations can be made to growers.

Financial benefits

It is possible that micronutrient treatments may provide sustainable methods of maintaining, or even increasing, yield and quality. It is important for the horticultural industry to begin to understand the evidence on micronutrient nutrition and whether these plant growth-enhancing products are useful tools in crop production.

Action points for growers

- Growers can use the results of this project to make more informed decisions on the nutritional products applied to their crops

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