

# Grower Summary

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## **PO 019a**

The Bedding and Pot Plant Centre – new product opportunities for bedding and pot plant growers.

*Objective 4. To evaluate efficacy and phytotoxicity of a range of plant growth regulators (PGRs) and HDC P006 on Poinsettia, and their effect on marketability*

Final Report 2019

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

Read the label before use: use pesticides safely.

## **Further information**

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**Project title:** The Bedding and Pot Plant Centre – new product opportunities for bedding and pot plant growers.  
*Objective 4. To evaluate efficacy and phytotoxicity of a range of plant growth regulators (PGRs) and HDC P006 on Poinsettia, and their effect on marketability.*

**Project number:** PO 019a

**Project leader:** Dr Jill England, ADAS Boxworth

**Report:** Final Report 31 March 2019

**Previous report:** Annual report, 31 March 2018

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**Industry Representative:** Caroline Shove, Bryants Nurseries Ltd, Water Lane, Bovingdon, Hemel Hempstead, Hertfordshire, HP3 0NA

**Date project commenced:** 1 April 2017

**Date project completed (or expected completion date):** 31 March 2019

## Grower Summary

### Headline

- Recommended for use on Poinsettia:
  - Bonzi: Good efficacy, no phytotoxicity up to week 44 (0.25 ml/L), good shelf life performance, cost effective.
  - Terpal: Recommend use at 1.67 ml/L (0.5 L/ha) dose rate or lower. Good efficacy, no phytotoxicity, good shelf life performance, cost effective.
  - Consider a programme using Terpal during the growth phase and Bonzi nearer marketing to exploit the relative characteristics of each growth regulator.
  - Adjuvant HDC P006: Effectively halved the dose rate required of Stabilan 750 and Terpal.
- Not recommended for use on Poinsettia:
  - HDC P005 and Primo Maxx II: Due to severe induced phytotoxicity.

### Background

The Bedding and Pot Plant Centre (BPPC) has been established to address the needs of the industry via a programme of work to trial and demonstrate new product opportunities and practical solutions to problems encountered on nurseries. Knowledge transfer events including trial open days and study tours are also included in the programme.

The work programme is guided by a grower-led Management Group that includes members of the BPOA Technical Committee, and representatives from Baginton Nurseries, Coventry the host nursery for the BPPC, and growers representing both the bedding and pot plant sectors.

*This is the Bedding and Pot Plant Centre report for:*

**Objective 4:** *To evaluate the efficacy and phytotoxicity of a range of plant growth regulators (PGRs) (either approved in the UK or in other European Countries), and HDC P006 (adjuvant) on Poinsettia, and their effect on marketability.*

### Summary

A range of plant growth regulators (**Table 1**) were trialled on the Poinsettia variety 'Vega Red' (Syngenta) at Newey Roundstone Nurseries, Chichester. Rooted cuttings were potted into 13 cm pots (peat and perlite mix; liquid feed using Peters Excel Grower 15:5:15 + 7 CAO + 3 MgO + TE + calcium nitrate applied to an EC of 2.0) in week 31 and pinched in week 32. The trial was set out on 14 open-mesh benches covered with capillary matting and mypex prior to the first treatment. Plants were spaced in week 38. All treatments were applied during late afternoon / early evening with shade screens placed over the crop prior to

treatment when appropriate. Products not currently authorised for use on protected ornamentals as used in this trial were applied under experimental permit. Sprays were applied in a water volume of 300 L/ha.

Up to five applications were made of products (**Table 2**) from week 37, followed by an overspray of Bonzi (0.35 ml/L) to all plots except for the water only control in week 42. Graphical tracking was used to manage the plants, as used in commercial practice. Not all plants received the same number of treatments (**Table 2**). Application number was determined by label restrictions, e.g. for Regalis Plus three weeks must be allowed between treatments. The decision whether to apply products was based on the graphical tracking, aiming to keep plant height within the limits of the product specification throughout the season. Where a product caused too strong an effect with insufficient plant growth, applications were halted until sufficient growth had been made e.g. Terpal (0.25 L/ha) and Stabilan 750 (0.15 L/ha). Plant height was measured from the top of the pot to the tallest growing tip. Plant height graphs with graphical tracking are presented in **Appendix 2**.

**Table 1.** PGR product and treatment list, 2018

T	Product	Active ingredient	Dose rate (kg/L per ha)	Dose rate (ml or g/L)	Approval status
1	HDC P005*	-	0.563 kg/ha	1.88 g/L	EAMU application underway
2	Regalis Plus (MAPP 16485)	Prohexadione	0.313 kg/ha	1.04 g/L	EAMU 0181/15. 3 weeks must be allowed between applications
3	Primo Maxx II (MAPP 17509)	Trinexapac-ethyl	0.5 L/ha	1.67 ml/L	EAMU 0621/18
4	Terpal* (MAPP 16463)	Ethephon and mepiquat (as chloride)	1.0 L/ha	3.33 ml/L	EAMU 0151/18
5			0.5 L/ha	1.67 ml/L	
6			0.25 L/ha	0.83 ml/L	
7	Bonzi (MAPP 17095)	Paclobutrazol	0.045 L/ha	0.15 ml/L	Label approval
8			0.075 L/ha	0.25 ml/L	
9			0.105 L/ha	0.35 ml/L	
10	Terpal* (MAPP 16463) + HDC P006*	Ethephon and mepiquat (as chloride) + /	0.5 L/ha + 0.75 L/ha	1.67 ml/L + 2.5 ml/L	EAMU 0151/18 + EAMU application underway
11	Regalis Plus (MAPP 16485) + HDC P006*	Prohexadione + /	0.313 kg/ha + 0.75 L/ha	1.04 g/L + 2.5 ml/L	EAMU 0181/15 + EAMU application underway
12	Stabilan 750 (MAPP 09303) + HDC P006*	Chlormequat + /	0.075 L/ha + 0.75 L/ha	0.25 ml/L + 2.5 ml/L	EAMU 0910/17 + EAMU application underway

13	Stabilan 750 (MAPP 09303)	Chlormequat	0.15 L/ha	0.5 ml/L	EAMU 0910/17
14	Untreated control	Water only	n/a		

Foliar sprays applied in 300 L water/ha. \*Treatments applied under experimental permit.

**Table 2.** PGR product application summary, 2018

Trt	Product	Wk 37	Wk 38	Wk 39	Wk 40	Wk 41
1	HDC P005 1.88 g/L	✓	✓	✓	✓	✓
2	Regalis Plus 1.04 g/L	✓			✓	
3	Primo Maxx II 1.67 ml/L	✓	✓	✓	✓	✓
4	Terpal 3.33 ml/L	✓	✓	✓		
5	Terpal 1.67 ml/L	✓	✓	✓	✓	✓
6	Terpal 0.83 ml/L	✓	✓	✓	✓	✓
7	Bonzi 0.15 ml/L	✓	✓	✓	✓	✓
8	Bonzi 0.25 ml/L	✓	✓	✓	✓	✓
9	Bonzi 0.35 ml/L	✓	✓	✓	✓	✓
10	Terpal + HDC P006 1.67 ml/L + 2.5 ml/L	✓	✓	✓		
11	Regalis Plus + HDC P006 1.04 g/L + 2.5 ml/L	✓			✓	
12	Stabilan 750 + HDC P006 0.25 ml/L + 2.5 ml/L	✓	✓	✓		✓
13	Stabilan 750 (reference) 0.5 ml/L	✓	✓	✓		✓
14	Water only	✓	✓	✓	✓	✓

### *Shelf life trial*

Following the final assessment in week 47, six plants from each of the promising treatments, along with the untreated control, were sleeved, placed in cardboard boxes which were open at the top, and transferred to ADAS Boxworth, where they were then entered into the shelf life room (20°C, 12 hours light/dark) where they remained, boxed, for three days (no light). After three days, three plants from each treatment were removed from the boxes and placed onto the benches in a randomised trial design, with a saucer beneath each pot. Plants were irrigated by hand as and when required. The sleeves were removed after a further seven days. Plants remained in the shelf life room until 7 January 2019 (week 2).

### **Summary of results**

The variety 'Vega Red' is relatively vigorous and the trial was sited in a glasshouse where the temperature was maintained to achieve a specific customer height specification, and this increased the challenge to the treatments applied in this trial. Whilst none of the treatments had a significant adverse effect on the number of heads per plant or cyathia quality, there

were noticeable phytotoxic effects from HDC P005 and Primo Maxx II, even though the rates had been reduced from the 2017-18 trial.

- **Terpal.** This was the most promising product of the plant growth regulators tested, producing Poinsettia plants within the height specification of 220 – 280 mm at a rate of 1.0 L/ha, with no phytotoxicity. However, the effect on height was slightly strong at this rate, and resulted in slightly reduced bract size compared with other treatments. Height was controlled by Terpal at the lower rate of 0.5 L/ha compared with other treatments and the untreated control. Plants treated at 1.0 L/ha performed less well in shelf life than those treated at the lower dose rates, with yellowing to the lower foliage and significant leaf drop. The lower rates (0.5 L/ha and 0.25 L/ha) may prove to be of greatest value to growers as they had no effect on bract size, and provide the opportunity for a little and often approach to growth control using PGRs.
- **Bonzi.** As expected, Bonzi did achieve growth control and did not cause phytotoxicity. This product gave the greatest control at the highest rate (0.105 L/ha), but growth was less than the untreated control for all rates of Bonzi applied. The plants performed well in shelf life at all rates tested, although the foliage became paler at the 0.075 L/ha rate. As for Terpal, there is flexibility in the rate that growers may choose to use and a little and often approach may be most appropriate.
- **Regalis Plus.** The application rate had been reduced for this trial, as phytotoxicity had occurred in the 2017-18 trial. However, the product had a limited effect on Poinsettia height when applied at this lower rate. Plants treated with Regalis Plus plants performed well in shelf life, maintaining their colour, although the plants that were also treated with HDC P006 suffered from leaf drop, and yellowing of the lower foliage.
- **HDC P005 and Primo Maxx II.** Applications caused severe phytotoxicity from early in the trial, but without sufficient growth control to suggest that this product may be effective at a lower dose rate. Plants treated with these products were not submitted to the shelf life trial. HDC P005 and Primo Maxx II are not recommended for use on Poinsettia.
- **HDC P006.** When applied in combination with Stablan 750 or Terpal, the adjuvant HDC P006 effectively halved the dose rate required. However, little effect was recorded when used with Regalis Plus.

### **Financial benefits**

The evaluation of plant growth regulators (PGRs) either approved in the UK or in other European Countries for use on Poinsettia (spray application), with appropriate AHDB EAMU applications and authorisation by CRD/HSE will expand the range of active ingredients in the growers' armoury for controlling plant growth.

Whilst growers use cultural methods (e.g. DIF/DROP, controlling irrigation and nutrient supply) to control plant growth where possible, lack of cost effective PGRs approved for use on protected ornamentals would reduce the range of products that can be produced profitably within challenging customer specifications. PGRs are particularly useful, in conjunction with techniques such as graphical tracking, to deliver plants to meet multiple retailer specifications during a period of the year where environmental factors, such as temperature, are difficult to manipulate to achieve height control.

Water deficit irrigation has been employed on a semi-commercial basis as part of AHDB-funded work, but growers will require further information to provide confidence for the technique to be used on a fully commercial basis throughout industry. In the interim period, PGRs continue to offer growers the means to control plant height. Without PGRs a high percentage of the five million plants produced in 2018 would not have been within the height specification demanded by retailers.

The cost per litre of spray solution to apply the products included in this trial at the specified rates ranges 0.1p from to 12.8p (**Table 3**).

**Table 3.** PGR costs (non-discounted, excluding VAT and labour costs for application)

<b>Product</b>	<b>Cost of active* (p)</b>	<b>Cost /L of spray (p)</b>
HDC P005 (1.88 g/L)	2.23 /g	4.2
Regalis Plus (1.04 g/L)	12.3 /g	12.8
Primo Maxx II (1.67 ml/L)	5.0 /ml	8.3
Terpal (3.33, 1.67; 0.83 ml/L)	1.7 /ml	5.7; 2.8; 1.4
Bonzi (0.35; 0.25; 0.15 ml/L)	9.5 /ml	3.3; 2.4;1.4
Stabilan 750 (0.5; 0.25 ml/L)	0.3 /ml	0.2; 0.1
HDC P006** (2.5 ml/L)	tbc	tbc
*Non-discounted, excluding VAT		
**Awaiting approval, not currently marketed in the UK.		

### Action points

- Terpal is now approved for use as a plant growth regulator in ornamental plant production (EAMU 0151/18). It has potential for use as a PGR with low risk of phytotoxicity on Poinsettia at the rates used (1.0, 0.5 and 0.25 L/ha). Growers should



explore its use, either alone or within a programme, over a batch of plants to gain experience of the product. (There may be a risk of the ethephon used in the formulation promoting unwanted side branches and/or cyathia abortion, but this was not seen in the two trials completed in the 2017/18 and 2018/19 seasons).

- The rates of Bonzi used in this trial (0.35, 0.25 and 0.15 ml/L) did not cause excessive growth control under the growing conditions experienced in the 2018-19 Poinsettia season, and consideration should be given to use of the product as part of a little and often approach, or at the higher rate if fewer applications are required.
- The adjuvant HDC P006 is not yet approved for use in the UK, approval is expected during 2019. In combination with Terpal or Stabilan 750 at the recommended rate (2.5 ml/L) this product will enable growers to reduce PGR dose rate.
- Growers should note that that the spray rate used in the trials (300 litres water per hectare) may be lower than the rate they currently use and as such application rates or volumes may need to be adjusted to maintain the same application rate of active ingredient. **Test new or unfamiliar products on a small number of plants before large scale use.**
- Growers should familiarise themselves with and adhere to product labels, approvals and Extensions of Approval for Minor Use (EAMUs) prior to use. Note that a number of the treatments included in this trial were carried out under experimental permit and are not currently authorised for nursery use.