

Grower Summary

PO 019a

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

Objective 6: To evaluate a range of plant growth regulators (PGRs) and fungicides either approved in the UK or in other European countries for spray application on Poinsettia.

Annual 2018

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The results and conclusions in this report may be based on an investigation conducted over one year. Therefore, care must be taken with the interpretation of the results.

Use of pesticides

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.

Further information

If you would like a copy of the full report, please email the AHDB Horticulture office (hort.info.@ahdb.org.uk), quoting your AHDB Horticulture number, alternatively contact AHDB Horticulture at the address below.

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AHDB Horticulture is a Division of the Agriculture and Horticulture Development Board.

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

Objective 6: To evaluate a range of plant growth regulators (PGRs) and fungicides either approved in the UK or in other European countries for spray application on Poinsettia.

Project number: PO 019a

Project leader: Dr Jill England, ADAS Boxworth

Report: Annual report, 31 March 2018

Previous report: None

Key staff: Dr Jill England (ADAS), Senior Horticulture Consultant
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Date project commenced: 1 April 2017

Date project completed 31 March 2019

(or expected completion date):

Grower Summary

Headline

- Terpal + Activator 90 applications, at both dose rates, reduced Poinsettia growth compared with the untreated control and Stablan 750.
- HDC P005 and Regalis Plus caused phytotoxicity and reduced growth compared with the untreated control and Stablan 750, in all treatments; this suggests potential for growth control at lower dose rates.
- Primo Maxx II caused phytotoxicity in all treatments but with insufficient growth control.
- Bumper 250 EC caused minor leaf crinkling and reduced growth, but appeared safe to use for powdery mildew control.

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 6: To evaluate a range of plant growth regulators (PGRs) and fungicides either approved in the UK or in other European countries for spray application on Poinsettia

Summary

The evaluation of new plant growth regulators (PGRs) for use on bedding and pot plants was prompted by label changes to the plant growth regulator Stablan 750 (chlormequat), including a reduced application rate with a maximum of two applications per annum; and the current loss of approval for Systhane 20 EW for the control of powdery mildew in Poinsettia. The PGRs included in this trial have either been trialled in Denmark with promising results on bedding and pot plants, are new to the market or have recently received CRD approval for use on related crops in the UK, however any phytotoxic effects and efficacy of these chemicals on Poinsettia grown under UK conditions are currently unknown.

The active ingredients of the products included in this trial were predominately anti-gibberellins, which prevent production of gibberellin at various points in its biosynthesis. The

three PGR groupings are: 1) Quaternary Ammonium Compounds (QAC) e.g. chlormequat chloride (Stabilan 750) and mepiquat chloride (a component of Terpal) which prevent gibberellin production early in its biosynthesis; 2) triazoles e.g. myclobutanil (Systhane 20 EW), paclobutrazol (Bonzi, Pirouette) and propiconazole (Bumper 250 EC) and 3) a group which prevents gibberellin production late in its biosynthesis: prohexadione calcium (Regalis Plus, trinexapac-ethyl (Primo Maxx II, Moddus and Cutaway) and daminozide (B-nine). The exception is ethephon (a component of Terpal) which breaks down within the plant to produce the plant hormone, ethylene. Of the three groups the triazoles are the most active, although levels of activity varies within this group.

A range of plant growth regulators was trialled on the industry standard Poinsettia variety 'Infinity' (Dummen) on a commercial nursery. Rooted cuttings were potted into 13cm pots (peat and perlite mix; 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 33. The trial was set up on open mesh container benches covered with capillary matting.

Sprays were applied by hand using a backpack and a 1.5 m boom, with three 02f110 nozzles, to achieve a fine spray quality, in a water volume of 300L/ha. Treatments were applied during late afternoon/early evening with shade screens in place over the crop prior to treatment if appropriate.

The trial was divided into two sub-trials. For the main trial, up to five applications of products were made at full and half the label or EAMU rate (**Table 1**) whilst for the observation trial, a single application was made at double the label or EAMU rate (**Table 2**). Treatments were applied from week 39. Products not currently authorised for protected ornamentals as used in this trial were applied under experimental permit.

Table 1. Main trial. PGR products and treatments applied – 2017.

T	Product	Active ingredient	Dose rate	Approval status
1	HDC P005		2.25kg/ha (7.75ml/L)	Not approved on protected ornamentals in UK
2			1.125kg/ha (3.875 ml/L)	
3	Regalis Plus (MAPP 16485)	Prohexadione - calcium	1.25kg/ha (4.17ml/L)	EAMU 0181/15. Three weeks must be allowed between applications
4			0.625kg/ha (2.08ml/L)	
5	Primo Maxx II (MAPP 17509)	Trinexapac-ethyl	2.0L/ha (6.67ml/L)	Not approved on protected ornamentals in UK
6			1.0L/ha (3.34ml/L)	

7	Terpal (MAPP 16463) + Activator 90 (ADJ 0547)	Ethephon + mepiquat chloride	2.0L/ha (6.67ml/L)	EAMU 0151/18 issued 30.01.18
8			1.0L/ha (3.34ml/L)	
		Activator 90	40ml/100L spray solution	Terpal applied with Activator 90 in all treatments
9	Stabilan 750 (reference product)	Chlormequat	1.0L/ha (3.33ml/L)	EAMU 1416/17
10	Bumper 250 EC	Propiconazole	0.4L/ha (1.33ml/L)	EAMU 1274/14
11	Systhane 20 EW	Myclobutanil	0.3L/ha (1.0ml/L)	Not currently approved on ornamentals in the UK
12	Untreated	Water only	-	-

Products and treatments not approved in the UK were applied under experimental permit.

Table 2. Observation trial PGR and fungicide product and treatment list 2017

T	Product	Active ingredient	Dose rate	Approval status
1	HDC P005		4.5kg/ha (15.5ml/L)	Not approved on protected ornamentals in UK
2	Regalis Plus (MAPP 16485)	Prohexadione - calcium	2.5kg/ha (8.34ml/L)	EAMU 0181/15. Three weeks must be allowed between applications
3	Primo Maxx II (MAPP 17509)	Trinexapac-ethyl	4.0L/ha (13.34ml/L)	Not approved on protected ornamentals in UK
4	Terpal (MAPP 16463) + Activator 90 (ADJ 0547)	Ethephon + mepiquat chloride	4.0L/ha (13.34ml/L)	Not approved on protected ornamentals in UK
		Activator 90	40ml/100L spray solution	Terpal applied with Activator 90 in all treatments
5	Bumper 250 EC	Propiconazole	0.8L/ha (2.66ml/L)	EAMU 1274/14
6	Untreated	Water only	-	-

Summary of results

- 2017 was not typical in terms of plant growth due to the ambient weather conditions generally resulting in slow growth and Poinsettias that were generally small. Due to this slow growth treatments were not started until week 39; in a typical year the majority of treatments would be applied in August and September.
- **HDC P005.** The full (2.25kg/ha) and half (1.125kg/ha) rate treatments caused phytotoxicity from early in the trial, developing from marginal scorch to severe bract bleach and 'hard' plants, but with sufficient growth control to suggest that HDC P005 may be effective at a lower dose rate (**Figure 1, Figure 2**).
- **Primo Maxx II.** Treatments resulted in severe phytotoxicity (4.0L/ha, 2.0L/ha, and 1.0L/ha) but was not effective in reducing Poinsettia height and will not be taken forward (**Figure 1, Figure 3**).
- **Regalis Plus.** This product was effective in reducing Poinsettia height when applied at both full (1.125kg/ha) and half (0.625kg/ha) rates, however, bract bleach developed in all treatments. The results suggest it may be possible to achieve growth control at lower dose rates without phytotoxicity if applied early on in production (**Figure 1, Figure 4**).
- **Terpal + Activator 90.** This was the most promising of the plant growth regulators tested, controlling Poinsettia height at both full (2.0kg/ha) and half (1.0kg/ha) rates with minimal phytotoxicity (<5%). The effect on height at both the applied rates was too strong and also resulted in reduced bract size, but provides scope for further trials at lower dose rate (**Figure 1, Figure 5**).
- **Bumper 250 EC.** Application of this fungicide did not cause phytotoxicity at double (0.8L/ha), or full (0.4L/ha) rates. However, the treatments did reduce growth and growers will need to take account of this effect if using this product for powdery mildew control on Poinsettias (**Figure 1, Figure 6**).

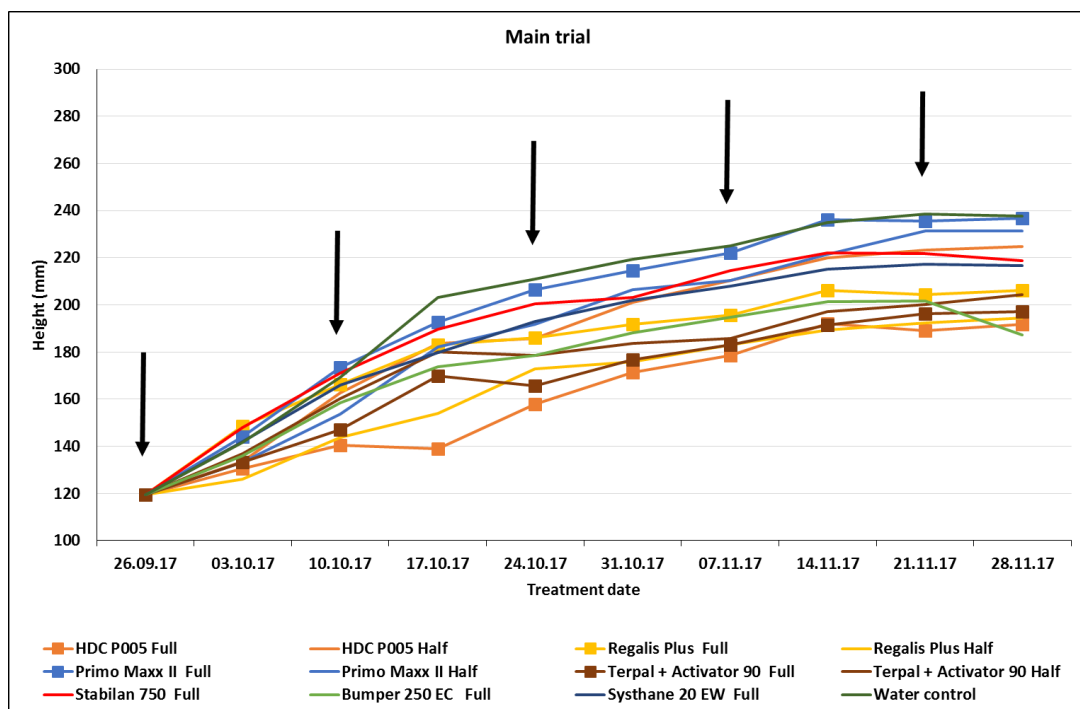


Figure 1. Main trial: Average plant height. Arrows indicate application dates. Treatments applied at full and half label / EAMU rate 26.09.17, week 39. Regalis Plus - three applications only (three weeks required between treatments). Treatments applied in 300L/ha water. Height specification for Poinsettia = 220-280 mm. Apparent decreases in plant height are the effect of using mean heights of multiple plants



Figure 2. HDC P005 at final assessment (28 November 2017). Treatments from left: water only control; Stablan 750 (reference product); double dose rate (single application only); full dose rate (five applications); half dose rate (5 applications).



Figure 3. Primo Maxx II at final assessment (28 November 2017). Treatments from left: water only control; Stabilan 750 (reference product); double dose rate (single application only); full dose rate (5 applications); half dose rate (5 applications).



Figure 4. Regalis Plus at final assessment (28 November 2017). Treatments from left: water only control; Stabilan 750 (reference product); double dose rate (single application only); full dose rate (three applications); half dose rate (three applications).



Figure 5. Terpal + Activator 90 at final assessment (28 November 2017). Treatments from left: water only control; Stabilan 750 (reference product); double dose rate (single application only); full dose rate (5 applications); half dose rate (5 applications).



Figure 6. Bumper 250 EC at final assessment (28 November 2017). Treatments from left: water only control; Systhane 20 EW (reference product); double dose rate (single application only); full dose rate (5 applications).

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), followed by 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 do 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 not only used to control plant height, but to also manipulate plant growth and habit, to provide uniform extension between nodes and a flat top growth to the plants so that the coloured bract heads are all exposed and uniformly displayed. The cost per litre of spray solution to apply the products included in this trial at the specified 'full' rates ranges 0.5p from to 51.3p (**Table 3**).

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

Product	Cost of active ingredient (p/ml)	Cost of one application at the 'full' rate used in this trial (p/L)
HDC P005	XX	XX
Regalis Plus	12.3	51.3
Primo Maxx II	5.0	33.3
Terpal plus Activator 90	2.4	11.6
Terpal*	1.7	11.3
Activator 90*	0.6	0.3
Stabilan 750	0.3	0.5
Bumper 250 EC	1.3	5.7

*Individual cost of adjuvant and PGR. Regalis Plus received three treatments; all other products received five treatments due to label requirements. A cost has not been included for Sythane 20EW as it is 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 rate used (2.0L/ha and 1.0L/ha), although bract size was affected at the application timings used in this trial. There may be a risk of the ethephon used in the formulation promoting unwanted side branches and/or cyathia abortion, although this was not seen in this trial. It must be trialled on a small scale prior to any widespread commercial use.
- Bumper 250 EC can be applied to Poinsettia at the label rate to control outbreaks of powdery mildew. However, growers should take the growth control effects into account when considering making any applications.
- Growers should note that the spray rate used in the trials (300 litres 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.