



# Poinsettia shelf life performance, R&D round up and cultural issues from 2019 Neame Lea Nurseries

15 January 2020





#### **Event Programme**

Time	Presentation	Speaker			
9.30	Registration, coffee/tea refreshments				
10.00	Event welcome, Neame Lea Nurseries	Andrew Fuller, Neame Lea Nurseries			
10.10	Grower thoughts on the 2019 poinsettia season	Rory Paton, Pinetops Nurseries and all			
10.30	Bemisia tabaci and poinsettia crops	Derek MacCann, Principal Inspector, PHSI			
11.00	Coffee/tea refreshments				
11.15	Results from the poinsettia residue testing work	Neil Bragg, Substrate Associates			
11.30	The concept and application of GreenGuard	Thomas Bousart, Dummen Orange			
12.15	<ul> <li>R&amp;D update from 2019:</li> <li>Water deficit trial and irrigation variability</li> <li>PGR trial</li> <li>Poinsettia variety assessment</li> </ul>	Mark Else, NIAB EMR Paul Alexander, Bulrush Jill England, ADAS Harry Kitchener, Consultant			
13.00	Lunch				
14.00	Visit to the shelf life room - water deficit and variety trials (split into two groups)	Mark Else, NIAB, EMR Harry Kitchener, Consultant Hilary Papworth, NIAB			
15.00	Take home messages and summary	Graeme Edwards, BPOA Poinsettia Group Chairperson			
15.30	Coffee/tea refreshments and depart				



## Poinsettia shelf life performance, R&D AHDB round up and cultural issues from 2019





#### Poinsettia and Bemisia tabaci

Derek McCann
APHA Plant Health Surveillance and Action
15th January 2020

#### Aims



- Why we think *Bemisia tabaci* is still important
- What you can expect from APHA/PHSI and collaborative working
- Clarify how action is taken on findings of Bemisia tabaci

#### **UK Protected Zone status**



- The UK is Protected Zone (PZ) for Bemisia tabaci
- PZ is a zone:
  - where a pest established elsewhere in the EU is not established despite favourable conditions
  - where official surveys are carried out
  - where official measures are taken against outbreaks
  - where such measures are effective within 2 years
- Only four finding of B. tabaci on salad crop between 1998 and 2018
- Although there are only specific requirements for certain hosts in legislation, action would be taken on any plant infested with *B. tabaci* 
  - Article 32 (2) Regulation (EU) 2016/2031: A protected zone quarantine
    pest shall not be introduced into, moved within, or held, multiplied or
    released in the respective protected zone.

## Why is Protected Zone status important to the UK?



- Potential impact on the edible sector, benefits are 'avoided impacts'
- Interceptions have confirmed the presence of harmful viruses
- B. tabaci transmits viruses that are present in Southern Europe
- In Netherlands B. tabaci occurs on some pepper and tomato nurseries
  - Tomato Yellow Leaf Curl Virus found in several tomato crops in the Netherlands
- Extent of potential damage is demonstrated by EFSA 2013
  - "B. tabaci is considered to be one of the most serious threats to crop cultivation worldwide, predominantly because of the large number of viruses it transmits. In regions where B. tabaci is established, viruses transmitted by this insect, especially those affecting tomato and cucurbits, and also beans, pepper and aubergines, are responsible for severe diseases that have a strong negative impact on crop yield"

#### Justification for PZ status



- Cost benefit analyses show a strong benefit-cost ratio in favour of exclusion
- Review in 2010 confirmed support for continued Protected Zone status
- 2015 consultation supported improved protection, which included:
  - requirements for Hibiscus, Mandevilla, Nerium oleander and Dipladenia
  - Plants intended for sale to final consumers were included in the scope
- PZ requirements were further strengthened in 2019 by the addition of specific requirements for *Crossandra* and *Ajuga*
- EU consultation on the new Plant Health Regulations, including PZs, which resulted in the PZs retained under SRSF
- Policy is kept under review, there will be further opportunities for this in 2020
- Welcome feedback/input and are always willing to engage with growers and others on specific aspects of plant health requirements

#### Why do we look?



- To ensure that plant movement regimes are being operated effectively
- To ensure that known quarantine pests and diseases are not spread
- To ensure that we have early warning of any new threat from a previously unknown pest, disease or trade

#### What do we look at?



Plants moving in trade based on risk

 Includes material released into circulation following imports from third countries and EU Member States as well as domestic producers

Inspections contribute to

- EU and National surveys
- Underpinning the evidence base for pest risk analysis in response to new threats

#### Where do we inspect?



- Inspections are carried out at production sites, distribution centres, depots, garden centres and retail units
- Frequency of site inspections are based upon business activity, the hosts traded, the origin of the plants, the volume of trade and the level of distribution i.e. potential to rapidly spread a pest or disease issue
- Material may or may not be already subject to Plant Passporting requirements

#### Responsibility sharing



- Growers should not rely on APHA/PHSI finding *Bemisia tabaci* early enough for the most effective actions
- Rooted cuttings should not arrive with Bemisia tabaci
- Growers need to ensure that plants brought onto their premises are checked and precautionary action taken if appropriate
- Growers need to closely monitor crops for any signs of Bemisia tabaci taking quick action when necessary
- Obligation to report Quarantine pests and diseases

#### Good practice



- Dedicated staff with responsibility for inspecting plants and traps
- Sufficient yellow sticky traps (YST) installed with daily records so that if/when an outbreak occurs they know exactly where 'hotspot' is
- Communications with APHA/PHSI on arrival being open with potential problems
- Precautionary treatments and quick action when problems encountered
- Good training of staff e.g. pest recognition from scale to adult

#### Bad practice



- Inspectors having to offer YST to growers as none installed
- When they are present, often not enough YST and inspectors often asking for more to be put up
- Undated traps, up for 2-3 weeks, often covered in sciarid fly
- Trial plants!!!!!!

## Advisable to make prophylactic treatments



- Best to assume that cuttings arrive with some level of infestation
- Dipping of cuttings recommended e.g. unrooted cuttings can be dipped in a solution of Mycotal (*Lecanicillium musacarium*) = entomopathogenic fungi or Mycotal plus Majestik
- If cuttings are held under fleece, this is an ideal time to make applications with entomopathogenic fungi such as Mycotal, Naturalis or Botanigard WP
- A programme of treatments would also be recommended in the early stages of the crop, and this should be IPM compatible if biological control agents are used

#### Biological control options



- Most effective when used prophylactically when Bt numbers are low /very low rather than for trying to control high pest numbers and so may not be appropriate later in the season
- Temperature dependent
- Canadian growers have found using both Encarsia formosa plus Eretmocerus eremicus plus predators such as Delphastus catalaniae, Amblydromalus limonicus or Amblyseius swirskii to be most effective
- Eretmocerus eremicus is generally preferred over E. formosa
- Delphastus is considered to be very sensitive to pesticide residues and other biological control agents could be affected by treatments applied to cuttings before their arrival
- Macrolophus pygmaeus can also be used

## Factors to consider when choosing insecticdes



- Monitoring to determine infested areas is crucial
- Efficacy
- Mode of action: products with a systemic or translaminar activity are likely to be more effective, especially as the crop grows
- Phytotoxicity: New crop variety insecticide combinations should be tested for phytotoxicity and later in the season more caution is needed
- Using products from different insecticide classes is recommended to reduce the impact of insecticide resistance
- Compatibility with biological control agents
- Newest product is Sequoia (sulfoxaflor). One application at the higher application rate which is suitable for whiteflies can be made per crop

#### Outbreak – production sites

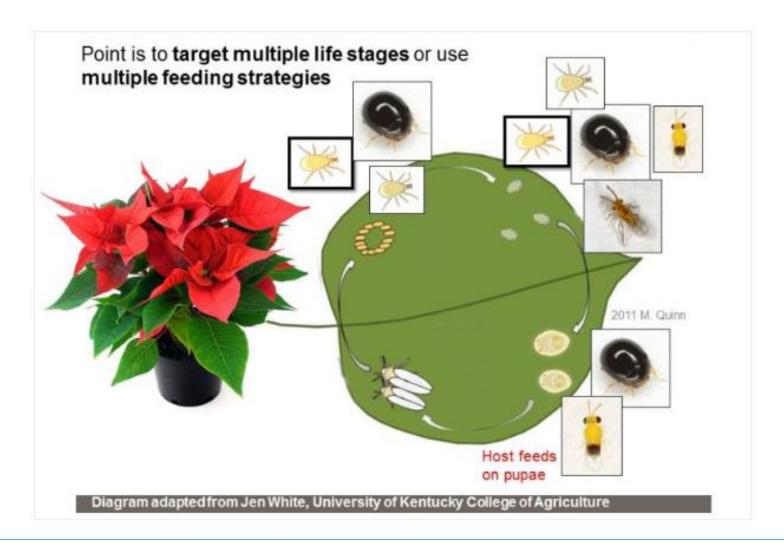


It is policy to require <u>eradication</u> of *Bemisia tabaci* wherever outbreaks or interceptions occur, to prevent movement of the pest

An infested nursery will be required under statutory Notice to carry out an **immediate eradication programme** 

#### Breaking the life cycle





#### Marketing



- Finished pot plants may be marketed provided all visible signs of whitefly are removed prior to marketing, so that no live pest leaves the premises on plants
- This will only be practical at low levels of site infestation and is normally only considered at about 5% or fewer infested plants
- Sorting will be allowed provided the inspector is confident that the required standard can be reached
- Consignments leaving the premises will be inspected by PHSI and the frequency of inspection will be at their discretion

#### Marketing



- At each visit, as a minimum, we will inspect 200 plants from randomly selected batches to check all pest individuals have been removed
- Where all infestation cannot be removed, no marketing will be permitted
- Sorting and subsequent marketing is at the growers own risk and action will be taken if their plants are found at recipient sites with Bemisia tabaci

#### Find in-store - action on initial find



- If a suspect quarantine pest /disease is found in an individual store, stock put on hold locally and an official sample taken for diagnosis
- APHA Plant Health Surveillance and Action team and the PHSI responsible for the multiples HQ office is informed
- The HQ of the multiple is alerted that further details may be required in the event of positive confirmation – at this point we request:
  - total number of plants in the consignment
  - the number/location of stores receiving deliveries
  - any distribution to devolved administrations (Northern Ireland, Scotland, Channel Islands,) or other countries
  - the volume of remaining stock on sale
  - supplier delivery notes including plant passport details

## Find in-store - action on positive confirmation



- PHSI responsible for the HQ will serve a national enforcement notice on the head office requiring action against all material identified to that consignment
- A consignment stands or falls upon the diagnosis of a sample taken from a single store. This is deemed to be representative of the batch / barcode
- No further follow up inspections will be made to additional stores to inspect other material
- HQ office initiates a national recall via its stock system / internal system requiring all material to be removed from sale / destroyed
- Destruction procedure may vary according to the pest / disease present
- APHA notifies the EU Commission of the interception and liaises with the NPPO of the exporting country to obtain details of other UK deliveries made by the same supplier for trace forward

#### Compounding factors



#### Mixing stock of different varieties on a single barcode

e.g. different varieties or colours of the same genus but only one may be infested. If it is not possible to separate and account for the volume of only the infested variety the whole consignment is destroyed

#### Mixing stock originating from several suppliers onto one barcode

e.g. different genera within a novelty packaging line. This causes increased losses but also traceability difficulties for APHA in notifying the exporting country and trace back by the NPPO to the affected supplier



## Poinsettia shelf life performance, R&D AHDB round up and cultural issues from 2019





# Leaf active ingredient residue testing and the need for further work

Presented by Neil Bragg

## Example of beginning and end of season results - 2019

11eaf12them	ical@esidues@on@poinsettia@cutt	tings@eceived@uly-Au	ug 🕸 🛮 etested 🖪 s 🗗 inished	@plants@Nov@2019
Jul-19		mg/kg	Nov-19 mg/kg	
Supplier	Detected themical	level₫ound	Detected themical	level⊡found
Α	Fenamidone	0.67	Boscalid	0.24
	Lambda©yhalothin	0.06	Cyprodinil	0.06
	Propiconazole	0.03	Fludioxonil	0.24
	Carbendazim	4.3	Propamocarb	0.02
	Cryomazine	0.03	Pyraclostrobin	0.04
	Flonicamid	0.02	Thiacloprid	0.05
	Fluazinam	0.7		
	Spinetoram	0.03		
	Teflubenzuron	0.11		
	Thiophanate Methyl	9		

# Possible effects on an IPM programme - courtesy of Fargro

Leaf chemical residues on poinsettia cuttings received July-August 2019 **UK Example** Comments Supplic Detected chemical level fou mg/kg Fenamidone Α 0.67 Fenomenal (with fosetyl) 0.06 Lambda Cyhalothin Hallmark Propiconazole 0.03 Bumper Carbendazim 4.3 Bavistin (Not UK) Cryomazine 0.03 (not UK) **Flonicamid** 0.02 Mainman Fluazinam 0.7 ????? Shirlan Spinetoram 0.03 (not UK) Teflubenzuron 0.11 Nemolt (not UK) Cercobin Thiophanate Methyl 9

#### Take home messages

- Liaise with suppliers or undertake a one-off leaf residue analysis at delivery to identify the range of pesticides applied to cuttings prior to delivery.
- Work with consultants, IPM agent providers etc. to identify those pesticides that may negatively impact biologicals used for bio-control on poinsettias.
- If persistent insecticides such as pyrethroids, organophosphates etc. have been used extensively on mother stock and/or cuttings then a delay in the commencement of macro-biological agent introduction may be necessary for days or even weeks, depending upon date of application.
- In terms of plant residues prior to marketing, fungicides tend to predominate, so consider early application of fungicides for root rot and powdery mildew control to allow time for residues to dissipate.

#### Future work

- Monitoring of all cutting supplies or supply of information from source?
- Assessment of impact on IPM programmes?
- Data needed on residue levels and specific maximum residue limits (MRL's) in relation to biologicals?
- Work on timing of applications in relation to residue disappearance?



## Poinsettia shelf life performance, R&D AHDB round up and cultural issues from 2019







#### **AGENDA**



- Short introduction
- Dümmen Orange at a glance
- What's playing in our industry?
- Our Vision
- Greenguard information
- Reasons to believe



#### SHORT INTRODUCTION



#### **Thomas Bousart**

• 2014 - 2020 Dümmen Orange

Managing Director Dümmen Orange

Germany

Head of Potplants Global

2001 - 2013 Syngenta Flowers
 Business Manager North Europe















#### **DÜMMEN ORANGE AT A GLANCE**

**7,300** Employees

190 R&D PROFESSIONALS

3,300+

20
PRODUCTION LOCATIONS

330+

HEKTAR
PRODUCTION

2Bn+
CUTTINGS
PER YEAR

11,000+

#### WHAT'S PLAYING IN OUR INDUSTRY?





### **BIG CHALLENGES...**

We should stop with "greenwashing" and start being serious about our individual CSR efforts!

- Plastic waste prevention
- Reduction of toxic load in plants
- Reduction of carbon footprint
- Safe and fair working conditions within entire supply chain



Without compromising on quality, availability and preferrably at the same price!



### **OUR VISION**



- Dümmen Orange wants to produce Cuttings with the lowest residue level possible to contribute to better plant quality and safer working conditions for our colleagues
- Due to stricter protocols and increasing international regulations, concepts like Greenguard will be a license to operate in future
- Greenguard should set a new standard for producing high quality starting material to allow maximum flexibility for our customers and worry free production from sticking to finished plants

### A LONG JOURNEY...



### 2013 - 2017

Intensive research, trialing and lauch preparation in close cooperation with Koppert for one single crop

### 2018

Launch of Greenguard for Chrysanthemum on IPM

### 2019

Launch of Greenguard for Poinsettia at IPM

### 2020

Retail campaigns, More products to follow...









## WHAT EXACTLY IS GREENGUARD?



- Integrated pest Management (IPM)
- Ecosystem-based strategy
- Focus on long-term prevention via special scouting and monitoring activities
- Focus on biological control, ideal climate, hygiene and irrigation (Greencare is a pre-requisite)
- Tailor-made growing methodology per farm and crop
- To prevent resistance

### INTEGRATED PEST MANAGEMENT



Fungicides

IPM friendly chemicals

#### NON-CHEMICAL CONTROL

Mass trapping, thrips/white fly net, beneficial insects, biological products

### **MONITORING**

Scouting of sticky traps and crop checks, threshold values

### **PREVENTION**

Phytosanitary protocols

Optimal nutrition and climate

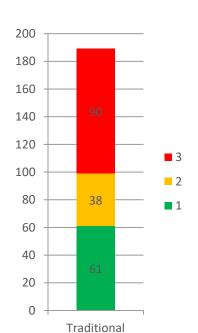
### **GREENGUARD INFO**



### **Traditional production**

### **Basic philosophy**

Prevent risks for cutting production by <a href="mailto:chemical">chemical</a> treatment



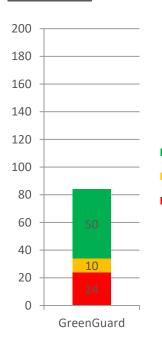
Analysis of traditional production:

- **3.** Heavier toxic chemicals used as basic preventive spray treatment
- 2. Medium toxic chemicals used as basic preventive spray treatment
- **1.** Experimenting with soft chemicals

### **GreenGuard production**

### **Basic philosophy**

Prevent risks for cutting production by combination of beneficial, biological and soft chemicals



Analysis of traditional production:

- **1.** Soft chemicals are used as basic preventive spray treatment
- 2. Medium chemicals used only asscouting teams finds spots
  - **3.** First weeks, in non harvesting weeks when beneficials are less effective, heavier chemicals applied

chemical calculation = application x chemical rate\*

<sup>\*</sup> = chemical rate based on MPS norm for Uganda





### WHICH POSSIBILITIES EXISTS?



- 1. Predatory mites: Leaf-dwelling and soil-dwelling
- 2. Parasitic wasps
- 3. Predatory bugs
- 4. Predatory gall midges
- 5. Entomopathogenic nematodes
- 6. Entomopathogenic fungi
- 7. Neem
- 8. Bacillus Thuringiensis
- 9. Bio-fungicides







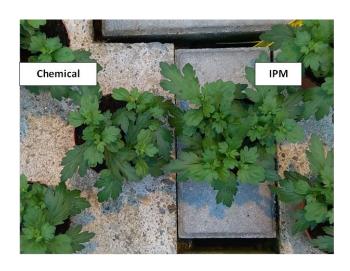




### PROOF POINT CHRYSANTEMUM



- During season 2018 and 2019 we received very positive feedback from almost every EU customer
- Growers are receiving good quality cuttings, very vital and healthy
- We also see better results in Uganda (less stress, better growth and higher production coefficients, etc.)





**Greenguard** treatment

Conventional treatment

### PROOF POINT POINSETTIA



- After the difficult Poinsettia season 2018 we can conclude that Greenguard is a reliable strategy to prevent from a WF infestation
- No single issue in season 2019 with WF both in EU and NA (Proof of concept)
- Poinsettia Cuttings in general show better quality and vitality, less stress and better health





### OTHER REASONS TO BELIEVE



- Greenguard awarded with the "Plantum Duurzaamheidsprijs" in September 2019
- Greenguard has made it to the short list of TASPO Awards 2019 in Berlin in the category best cooperation in the industry (Koppert/Dümmen Orange)
- Increasing interest from retail during events like IPM, Flower Trials, etc.







# RETAIL-TRADE

Perfect for customers who are looking for sustainably produced products.

Green Guard makes
Chrysanthemums and
Poinsettias attractive to the
trade

Rising demand from consumers

More products will follow







for you

THOMAS BOUSART

MANAGING SALES DIRECTOR



# Poinsettia shelf life performance, R&D AHDB round up and cultural issues from 2019











PO 022: Developing precision and deficit irrigation techniques to reduce reliance on PGRs and to optimise plant quality, uniformity and shelf life potential in commercial protected pot and bedding plant production





HK Consultancy









Substrate Associates Ltd









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WP 3: Using Regulated Deficit Irrigation as a non-chemical means of growth regulation



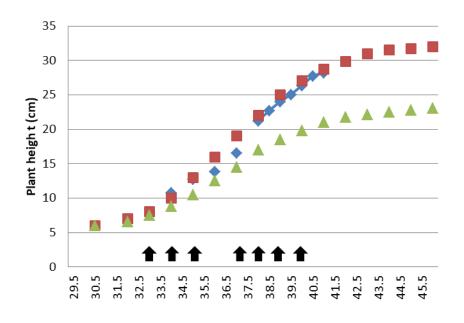


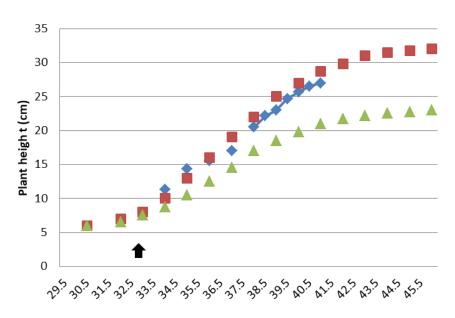






### Summary of Staplehurst PI RDI work...





- 'Hera Red', potted Week 29, into short days on 12 September 2019
- Commercial crop sprayed x 7 times to date
- PI RDI crop sprayed once







### CC and PI RDI plants from Staplehurst at dispatch





Which plants are the PI RDI ones?







## Shelf life tests at NIAB EMR ('end lab.')







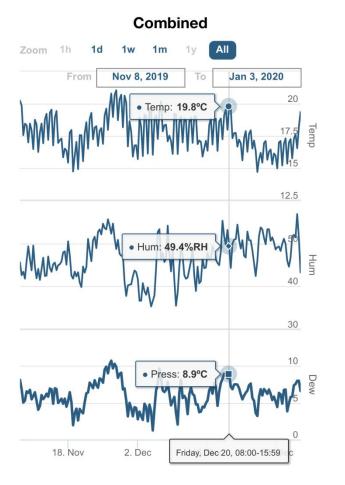


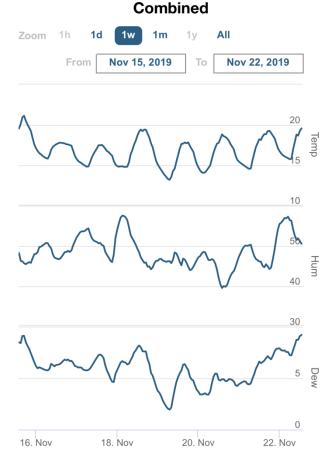




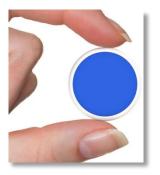


### Conditions during 'shelf life'







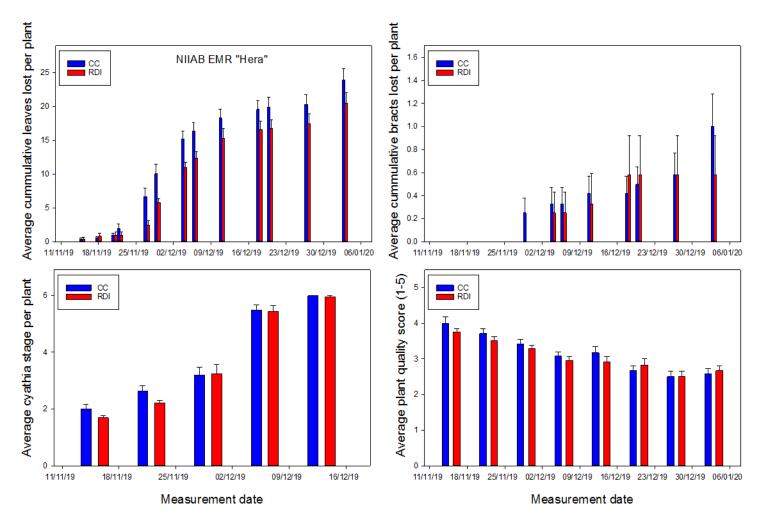








### **Preliminary results**









### **Next steps (WP 3)**

- Complete collection of data (15 Nov 2019 10 Jan 2020)
- Send leaf and substrate samples for mineral analysis
- Carry out statistical analyses
- Compare effects of CC and RDI treatments on:
  - Leaf chlorophyll content
  - Bract colour (Hue angle)
  - Evapo-transpiration rate
  - Deterioration in overall plant quality
  - Rates of leaf and bract drop
  - Rate of cyathia development







# WP 5: Capillary matting and drip irrigation



Substrate Associates Ltd







## Summary

- Explore variability in on-floor (Volmary) and on-bench (Hill Bros) capillary matting
- Bluelab Pulse Meter
- Several data sets collected at different times before / after watering
- Sampling (protocols)
  - Different areas/benches sampled
  - Split into sections along area/bench, 6 plants per section, 54 per bench
  - No edge plants sampled, took from two 'rows' and not adjacent plants
- What are we looking for?
  - Wet areas/dry areas
  - Is variability the same when wet or dry?
- I haven't 'cleansed' the data

## On-bench: ~72hrs since watering

46	46	44	37	35	35	42	40	37	44	39	34	42	33	1	36	33
48	47	43	44	40	37	41	46	43	42	35	30	43	41		27	37
50	43	42	44	45	44	41	46	42	33	35	25	43	39		37	35
48	38	43	47	39	39	43	42	42	42	30	36	49	51		47	47
40	46	49	49	39	43	43	39	39	42	45	37	46	43		40	41
44	39	47	47	43	41	38	41	41	36	39	29	49	43		37	44
43	43	46	46	43	41	38	46	40	43	43	42	48	47		42	47
47	45	43	47	42	43	43	42	43	35	42	37	52	49		44	45
47	40	48	41	35	42	47	40	43	42	35	42	47	57		46	45
45	41	50	50	41	38	49	49	44	41	50	41	50	53		47	60
44	45	51	44	45	43	50	46	40	42	45	48	47	47		47	44
45	44	40	46	44	45	48	44	44	40	44	37	50	54		44	46
45	47	50	53	41	45	47	51	44	50	50	39	51	43		47	64
48	43	51	45	41	46	49	45	42	46	45	41	46	51		47	47
50	44	46	45	44	40	40	43	45	45	36	44	59	54		37	38
45	47	46	47	42	39	50	43	41	44	46	50	50	48		42	44
45	45	45	50	41	46	44	45	40	42	37	44	42	46		46	49
48	44	52	48	43	41	39	45	42	47	42	39	52	47		46	42
41	47	48	52	43	44	41	36	39	48	43	49	51	59		39	43
47	41	51	45	44	44	44	47	53	39	51	42	50	49		38	45
45	45	40	43	43	52	43	40	47	46	45	39	47	46		31	35
41	36	49	51	45	46	46	48	43	33	47	43	45	42		35	40
44	41	50	45	46	47	49	46	45	43	47	47	45	43		39	45
47	47	48	47	40	45	43	45	44	47	41	42	48	50		40	44
47	40	44	41	45	46	43	45	39	42	42	42	42	47		45	47
45	43	44	38	47	48	39	38	39	41	35	40	50	48		47	49
46	42	39	31	47	50	38	43	47	40	41	41	46	49		48	48
Irrigatio	n	Irrigatio	on		Irrigatio	n										

## On-bench: ~72hrs since watering

n=432	mean	sd	max	min
ALL (not incl back samples)	43.85	5.38	64	25
n=54	mean	sd	max	min
Bay 1 LHS	44.44	2.98	50	36
Bay 1 RHS	45.96	4.24	53	31
Bay 2 LHS	42.78	3.49	52	35
Bay 2 RHS	43.69	3.65	51	36
Bay 3 LHS	42.28	3.75	53	33
Bay 3 RHS	40.93	5.61	51	25
Bay 4 LHS	47.76	4.73	59	33
Bay 4 RHS	43.00	6.32	64	27

## On-bench: recently watered (~2 hrs)

						1										
59	50	46	43	44	39		45	45	41	41	47	43	45	40	57	52
41	55	46	41	42	45		43	48	43	44	38	40	43	41	54	54
49	50	39	41	45	47		48	48	41	41	35	38	49	49	51	49
55	59	54	54	50	51		47	54	42	40	40	42	48	52	52	52
58	53	56	51	57	53		45	49	47	41	40	44	54	47	48	47
54	53	54	54	56	48		46	44	47	49	45	47	55	54	40	41
55	58	59	64	53	50		54	48	57	51	42	42	59	44	52	50
54	51	63	50	53	52		54	51	47	48	50	48	51	49	49	53
57	53	54	65	51	47		49	49	51	53	52	45	56	47	55	59
48	46	57	54	49	52		51	53	50	52	43	51	50	52	56	53
54	56	53	60	58	52		52	59	56	52	52	49	51	59	54	53
54	54	57	56	54	56		55	60	53	50	48	60	62	59	50	57
59	55	51	53	53	48		56	55	48	56	53	42	54	53	59	46
56	57	56	58	58	56		55	56	54	49	53	50	57	52	60	62
59	54	55	55	58	55		58	57	52	56	45	49	59	51	61	51
57	53	54	57	53	52		55	53	52	49	45	46	58	55	49	53
52	60	56	53	53	57		50	54	54	57	50	47	56	55	49	49
48	53	57	52	58	59		51	51	54	55	45	42	54	52	45	58
52	44	62	53	53	56		49	45	55	55	49	48	57	49	46	49
45	52	60	58	53	56		51	47	47	48	55	46	59	53	42	44
52	48	60	52	56	61		55	57	56	55	52	55	55	51	39	41
51	55	46	58	53	56		52	55	49	47	46	50	51	54	43	47
58	52	54	57	62	59		57	58	55	48	46	44	58	51	46	43
48	48	52	49	52	62		62	56	55	50	52	47	47	57	49	53
55	46	52	41	50	50		47	47	42	45	38	48	47	51	49	44
50	55	47	49	55	50		47	44	46	45	54	46	54	57	50	54
42	50	42	45	47	50		47	44	41	52	49	51	54	52	43	53
										-02						
Irrigatio	n	Irrigatio	n	Irrigati	on		Irrigatio	n	Irrigatio	n	Irrigatio	n	Irrigatio	on .	Irrigatio	วท
igatio		I Butio		ii i bati	<b>U.</b> 1			•••	.i i i butic				ar i gatic	,		,

## On-bench: recently watered (~2hrs)

n=432	mean	sd	max	min
ALL	51.04	5.47	65	35
n=54	mean	sd	max	min
Bay 1 LHS	52.63	4.47	60	41
Bay 1 RHS	53.06	6.12	65	39
Bay 2 LHS	52.69	4.88	62	39
Bay 2 RHS	51.20	4.74	62	43
Bay 3 LHS	49.33	5.11	57	40
Bay 3 RHS	46.74	5.02	60	35
Bay 4 LHS	52.39	4.82	62	40
Bay 4 RHS	50.28	5.58	62	39

## On-floor: ~48hrs since watering

B1 RHS		B2 RHS			B3 RHS		B4 RHS	
Irrigation		Irrigation			Irrigation		Irrigation	
27	35	24	10		26	17	18	10
37	39	32	39		36	40	35	39
36	32	18	31		31	33	36	29
33	35	31	26		33	28	28	24
42	34	17	13		29	24	23	30
38	35	25	12		27	35	33	22
32	36	11	10		27	32	26	32
37	39	11	10		29	22	31	22
31	40	16	9		27	30	34	16
30	31	9	9		26	34	35	11
34	27	11	13		28	25	32	17
35	30	16	10		26	25	9	22
27	32	19	15		28	24	22	13
21	28	17	21		34	23	8	20
23	26	21	15		22	30	12	10
26	32	16	13		24	21	10	10
21	24	14	10		24	28	15	13
20	28	12	11		15	21	10	9
29	18	14	11		23	21	11	11
19	32	10	10		22	22	8	11
17	19	11	11		24	22	12	10
15	28	9	10		21	13	14	11
21	15	12	23		23	20	11	10
18	22	13	23		21	20	9	12
17	13	22	23		21	13	13	11
19	17	9	12		23	18	14	16
15	14	22	16		15	32	24	15
		CENTRAL	PATH OF H	OUSE				

## On-floor: ~48hrs since watering

n=54	mean	sd	max	min
Bay 1	27.43	7.99	42	13
Bay 2	15.48	6.90	39	9
Bay 3	25.15	5.85	36	13
Bay 4	18.33	9.15	39	8

## On-floor: recently watered (~24hrs)

Irrigation		Irrigation			Irrigation		Irrigation	
40	56	35	38		46	42	11	21
51	56	55	58		50	47	47	47
55	60	37	50		57	49	51	51
58	44	51	44		49	48	46	46
54	58	48	39		45	50	53	44
53	59	46	39		55	49	59	60
54	55	55	47		55	52	47	54
49	48	44	43		49	46	47	55
57	49	45	34		46	36	47	46
54	51	36	33		44	51	55	50
52	39	35	34		48	40	42	41
43	47	37	34		45	45	47	44
52	50	38	39		50	47	44	41
38	43	35	36		36	49	39	38
44	39	36	29		44	41	37	36
43	42	36	29		40	40	38	49
21	47	35	31		39	37	34	37
40	41	34	31		46	40	41	41
43	43	34	33		33	36	32	31
40	40	38	34		44	41	40	38
39	46	38	36		39	36	40	39
35	32	41	39		33	37	36	32
37	38	42	35		34	39	34	35
43	38	33	42		41	27	38	32
40	36	36	37		35	42	36	30
34	37	38	42		34	36	36	37
32	37	23	25		33	38	39	42
		CENTRAL	PATH OF H	OLISE				

## On-floor: recently watered (~24hrs)

n=54	mean	sd	max	min
Bay 1	45.04	8.40	60	21
Bay 2	38.30	7.09	58	23
Bay 3	42.80	6.60	57	27
Bay 4	41.35	8.84	60	11

### Considerations

- Capillary matting construction
- Glasshouse 'layout'/ construction
- Is using moisture sensors too pot dependent?
  - Too dry too wet? Sensor dependence?
  - VPD? ETP?
- What is acceptable variation?
  - On a bench?
  - In a house?
- What's the trigger point to actually restrict growth?
- How big a difference is there between growth restriction and actual damage to plant?



# WP 6: Plant quality and shelf life potential







#### Quality assessment and shelf life testing

Aim to establish criteria to objectively assess quality at dispatch, after distribution and during shelf-life

Industry agreement required on what constitutes relevant measure of quality

Development of draft protocol and guide to shelf life assessment

Protocol checked for robustness during assessment of RDI trial

Review and refinement of method once data analysed

Feedback from industry

Output - a standardised method for use by industry and researchers for shelf life assessment



#### Quality assessment and shelf life protocols

- Preliminary scoring of quality 'at dispatch'
- Watered to achieve a weight between 500g and 550g
- Plants into sleeves and packed six per box
- Transportation with data recording
- Arrival at testing facility and unpacked into the shelf life room
- Removal of sleeves after 7 days
- 2<sup>nd</sup> quality scoring 24 h after sleeve removal
- Plants randomised, spaced and placed in saucers
- Watered to c. 500-550g (approx. once per week)
- Weekly scoring for 6 weeks, last measurement date 9 January 2020



#### Shelf life room at Neame Lea

#### Target specification:

- Consistent and even conditions to be achieved throughout the area
- No windows or North-facing windows

	Value
Temperature	20 °C
Photoperiod	12 h
Light level	1000 Lux
RH	60%



#### Issues

- Low RH during early stages <40% but increased as more plants added</li>
- Gradient in light intensity meant that darker areas had to be avoided



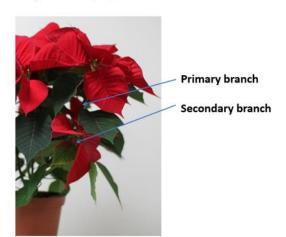
### **Quality assessment criteria**

Characteristic	observation	scoring type	description/method	description of range
	frequency			
Plant height	on nursery and at final assessment	measure	Assessment made from pot top to tallest part of plant, but does not include stray bracts	n/a
Shoot loss	once only 24 h after sleeves removed	count	Loss of primary shoots on removal of sleeves	n/a
	not on nursery but then at each observation	count	observed as sleeve removed and then weekly count of drop with a final assessment of overall loss as a proportion of the total number of leaves	final score with 1 to 5 scale with 1 = all fallen off, to 5 = all present
Bract drop	not on nursery but then at each observation	count	observed as sleeve removed and then weekly count of drop with a final assessment of overall loss as a proportion of total number of bracts	final score with 1 to 5 scale with 1= all fallen off, to 5= all present
Bract head difference in height	once only 24 h after sleeves removed	measure	measure the distance between the highest and lowest of the 4 main bract heads, using the cyathia as the point of measurement	pass/fail
Bract head diameter	once only 24 h after sleeves removed	measure	Measure width across broadest part of the head	n/a
Bract edge blackening	weekly during home- life testing	absent/present	observed once sleeve removed and home-life testing underway	n/a
Cyathia quality	at each observation	1 to 5	single overall score which takes stage of development including pollen production and abscission into consideration	1= closed bud; 6=presence of cyathia abscission scars
Plant quality	at each observation	1 to 5	single overall score which takes into consideration all scored aspects as well as plant habit/shape, bract position, bract colour (how it is maintained over time), cyathia colour, leaf colour.	1= unacceptable in one or more aspects 2= 2nd quality, not to retail standard 3= acceptable in all aspects 4= less than excellent in one aspect 5 = excellent quality in all areas
524			A .	



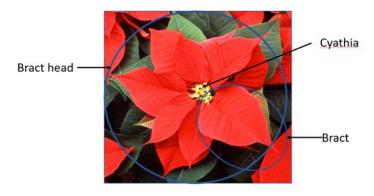
#### Standard nomenclature

- Agreed with industry
- User friendly
- Primary branch a stem which terminates in a bract head that can be seen from a top view of the plant
- Secondary branch a stem which terminates in a bract head that is obscured from view
  when looking from the top by other bract heads

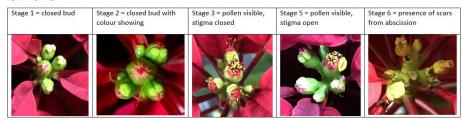


For the purposes of this protocol the following terminology applies:

- Bract a single coloured leaf-like structure
- Bract head a collection of coloured leaf like structures and true flowers (cyathia) which
  together make up the floral part of the plant



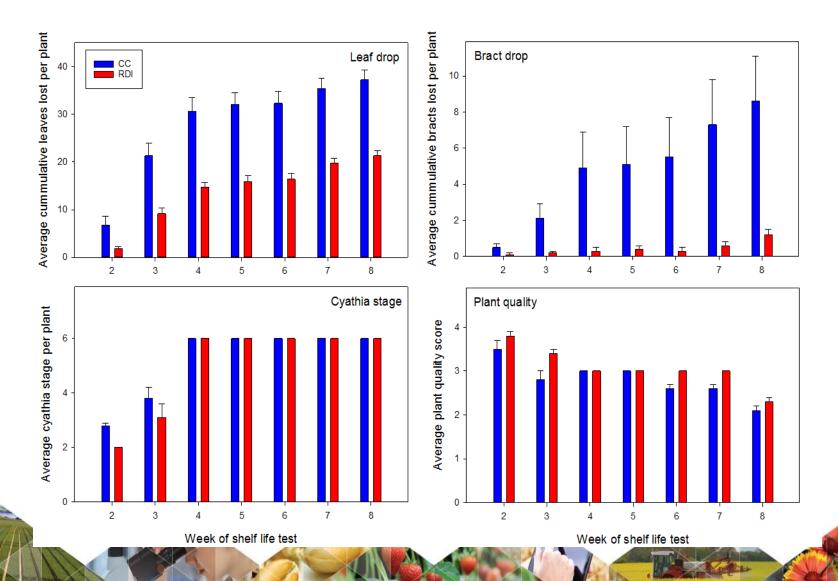
#### Cyathia quality







#### Shelf life results...



#### Plant Science into Practice





#### Thanks to:

Marcel, Martyn, Simon, John, Geoff and Steve Vasile and Viktorija Hilary, Tara and Harry Mike, Fernando, Lucia, Matteo, Victor, Pablo





Consultancy









**Substrate Associates Ltd** 













# Poinsettia shelf life performance, R&D AHDB round up and cultural issues from 2019







### Evaluation of PGRs on poinsettia

The Bedding and Pot Plant Centre (PO 019b)

New product opportunities for bedding and pot plant growers

Dr Jill England, Chloe Whiteside, David Talbot, Chris Need and Harry Kitchener



www.adas.uk







# Evaluation of PGRs, fungicides and nutrients on poinsettia 2019

**Aim:** To evaluate the efficacy and phytotoxicity of a range of plant growth regulators (PGRs), fungicides and nutrients for use on poinsettia.



**Poinsettia Infinity (Dummen)** 



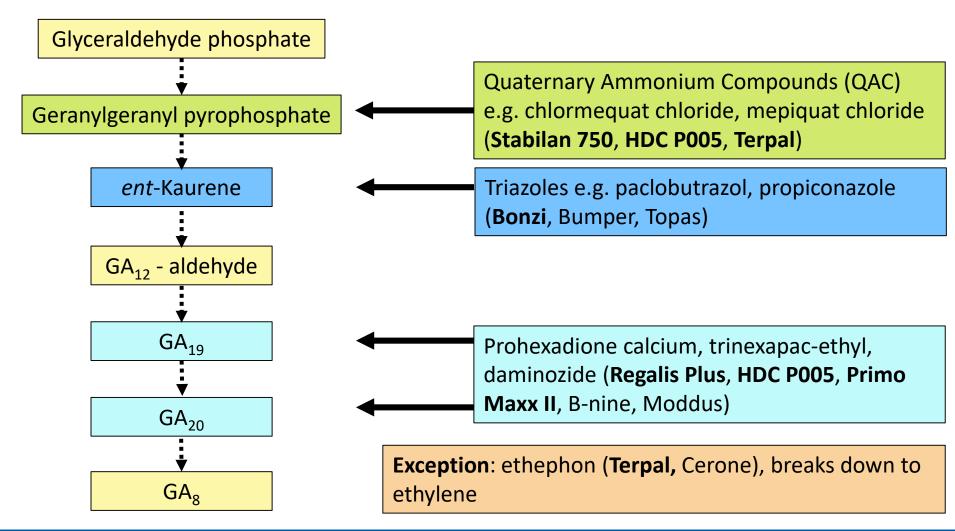
### Product approvals

	Product	Active ingredient / formulation	Approval status
1	Terpal (PGR)	Ethephon (155 g/L) + mepiquat chloride (305 g/L)	EAMU 0151/18
2	Stabilan 750 (PGR)	Chlormequat (750 g/L)	EAMU 0910/17
3	Bonzi (PGR)	Paclobutrazol (4.0 g/L)	Label approval
4	Stena (adjuvant)	Polyglycerol based adjuvant	EAMU being issued
5	Topas (fungicide)	Penconazole (100 g/L)	EAMU 0169/19
6	Control (nutrient)	Seaweed based nutrients	n/a

Applied in 300 L/ha water except for \*Bonzi (T10) applied in 600 L/ha water.

### Modes of action

#### Gibberellin biosynthesis pathway



### Evaluation of PGRs - 2018

- Terpal: Good efficacy. No phytotoxicity.
   Recommend rate 1.67 ml/L (0.5 L/ha) or lower (300 L/ha water).
- **Bonzi**: Good efficacy at higher rates, no phytotoxicity. Useful during later stages.
- Regalis Plus: Limited efficacy and restricted use; most expensive.
- Stena (HDC P006): Once approved, use with Terpal and Stabilan 750 to permit reduced dose rates.
- HDC P005 and Primo Maxx II: Phytotoxicity. Use not recommended.





### Evaluation of PGRs & fungicides - 2019

#### Culture

- Variety: 'Infinity' (Dummen)
- 13 cm pots
- Potted: week 30
- Pinched: week 33

#### **Treatments**

- Weekly applications, week 39-43 (five applications)
- Holding spray of Bonzi week 44



### Standard dose rates - 2019

Treatment	Product	Dose rates (L/ha)	Dose rate (ml/L)
1	Terpal	0.5 L/ha	1.67 ml/L
2	Stabilan 750	0.15 L/ha	0.5 ml/L
3	Bonzi	0.105 L/ha	0.35 ml/L
4	Stena	0.75 L/ha	2.5 ml/L
5	Topas	0.5 L/ha	1.67 ml/L
6	Control	1.5 L/ha	5.0 ml/L

### Treatments - 2019

Trt	Spray 1	Spray 2	Spray 3	Spray 4	Spray 5	
1	Water	Water	Water	Water	Water	Water
2	Stabilan 750	Stabilan 750	Bonzi	Bonzi	Bonzi	
3	Stabilan 750 + Stena	Stabilan 750 + Stena	Bonzi	Bonzi	Bonzi	<b>.</b>
4	Terpal	Terpal	Terpal	Terpal	Terpal	nen
5	Terpal + Stena	Terpal + Stena	Terpal + Stena	Terpal + Stena	Terpal + Stena	holding treatment
6	Stabilan 750	Stabilan 750	Terpal	Terpal	Terpal	lding
7	Stabilan 750 + Stena	Stabilan 750 + Stena	Terpal + Stena	Terpal + Stena	Terpal + Stena	Bonzi ho
8	Bonzi 0.35	Bonzi 0.35	Bonzi 0.35	Bonzi 0.35	Bonzi 0.35	Ğ
9	Bonzi 0.5	Bonzi 0.5	Bonzi 0.5	Bonzi 0.5	Bonzi 0.5	
10*	Bonzi 0.35	Bonzi 0.35	Bonzi 0.35	Bonzi 0.35	Bonzi 0.35	

Applied in 300 L/ha water except for T10 applied in 600 L/ha water

### Treatments - 2019

Trt	Spray 1	Spray 2	Spray 3	Spray 4	Spray 5	
11	Terpal	Terpal	Terpal	Stabilan 750	Stabilan 750	i ng ent
12	Topas x 1	Topas x 1	Topas x 1	Topas x 1	Topas x 1	Bonzi holding reatment
13	Topas x 0.5	Topas x 0.5	Topas x 0.5	Topas x 0.5	Topas x 0.5	hc trea
Obs 1	Topas x 2	-	-	-	-	
Obs 2	Control	Control	Control	Control	Control	Control
Obs 3	Control x 2	-	-	-	-	

### Stabilan 750 treatments

#### 5 apps (2 apps of Stabilan):

- T9. Bonzi
- T2. Stabilan / Bonzi
- T3. Stabilan + Stena / Bonzi

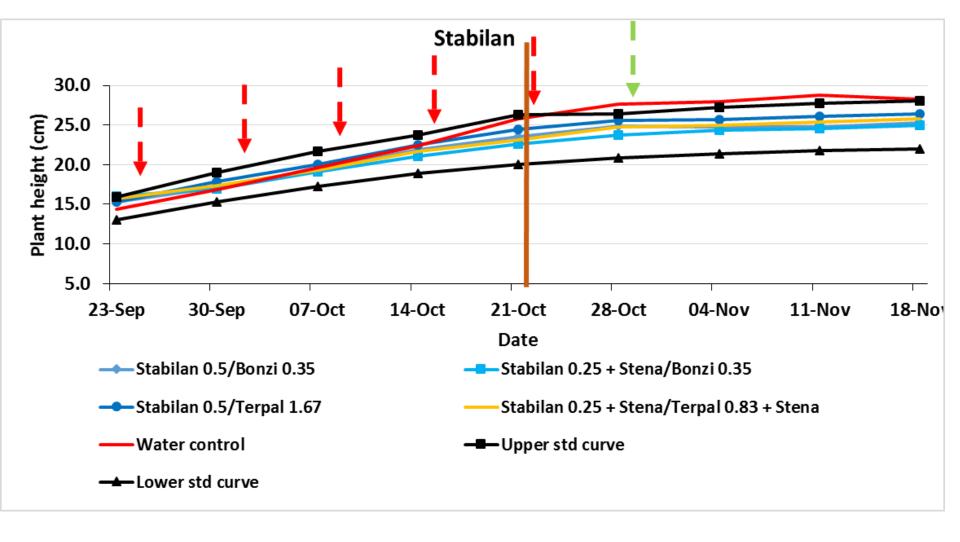
#### **Bonzi overspray:**

(0.50 ml/L) week 44



	Water	Т9	T2	Т3
Phyto score / Cyathia score	5/1	5/1	5/1	5/1
Marketing height (cm)	28.3	25.0	25.3	25.0
Quality score / No heads	4.7 / 4.1	3 .7 / 4.0	3.3 / 3.8	4.0 / 3.7

### Stabilan treatments



### Terpal treatments

#### 5 apps:

- T4. Terpal
- T5. Terpal + Stena

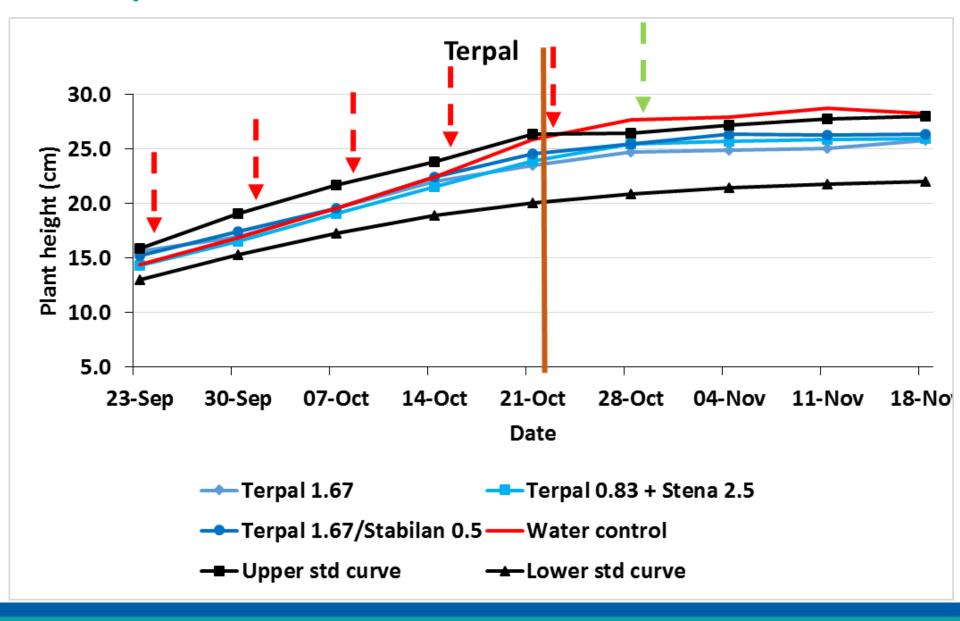
#### **Bonzi overspray:**

(0.50 ml/L) week 44



	Water	T4	T5
Phyto score / Cyathia score	5/1	5/1	5/1
Marketing height (cm)	28.3	25.8	25.9
Quality score / No heads	4.7 / 4.1	3.3 / 4.1	4.0 / 4.1

### Terpal treatments



### Stabilan vs Terpal vs Stena

Water only



#### 5 apps (2 apps of Stabilan):

- T4. Terpal
- T6. Stabilan / Terpal
- T7. Stabilan + Stena /
   Terpal + Stena
- T11. Terpal / Stabilan

#### **Bonzi overspray:**

(0.50 ml/L) week 44



	Water	T4	Т6	Т7	T11
Phyto score / Cyathia score	5/1	5/1	5/1	5/1	5/1
Marketing height (cm)	28.3	25.8	26.4	25.8	26.3
Quality score / No heads	4.7 / 4.1	3.3 / 4.1	3.7 / 3.7	4.0 / 3.9	3.3 / 4.3

### **Bonzi treatments**

#### 5 apps:

T8. Bonzi 0.35 ml/L T9. Bonzi 0.50 ml/L T10. Bonzi 0.35 ml/L

#### Water volume:

T8 & T9 - 300 L/ha T10 - 600 L/ha

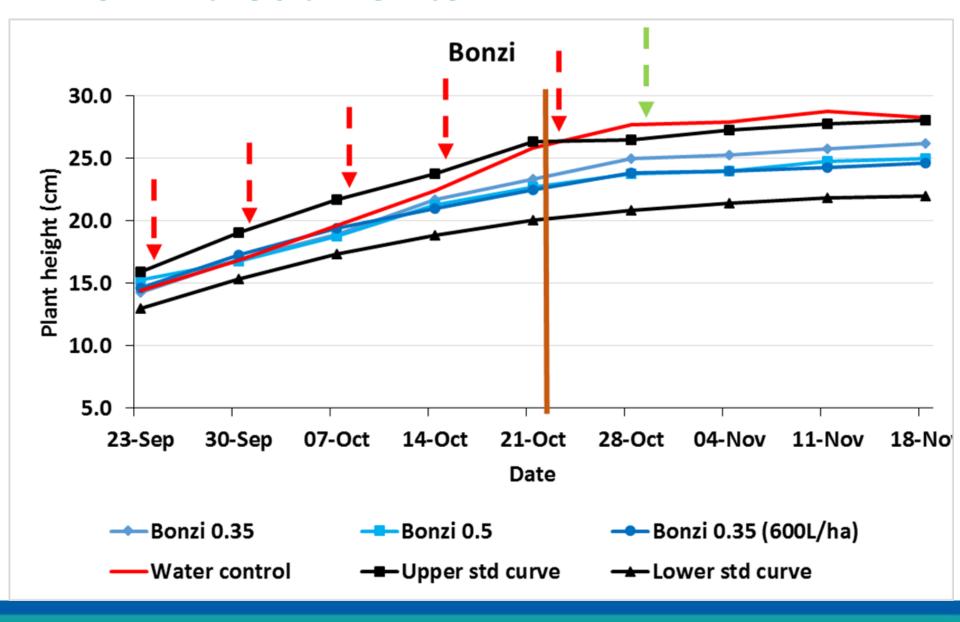
#### **Bonzi overspray:**

(0.50 ml/L) week 44



	Water	18	19	T10
Phyto score / Cyathia score	5/1	5/1	5/1	5/1
Marketing height (cm)	28.3	26.2	25.0	24.6
Quality score / No heads	4.7 / 4.1	4.3 / 3.7	3.7 / 4.0	4.0 / 3.7

### **Bonzi treatments**



### Topas treatments

#### 5 apps:

T12. Topas 1.67 ml/L T13. Topas 0.83 ml/L

Single plot. 1 app.
OBS. Topas 5.0 ml/L

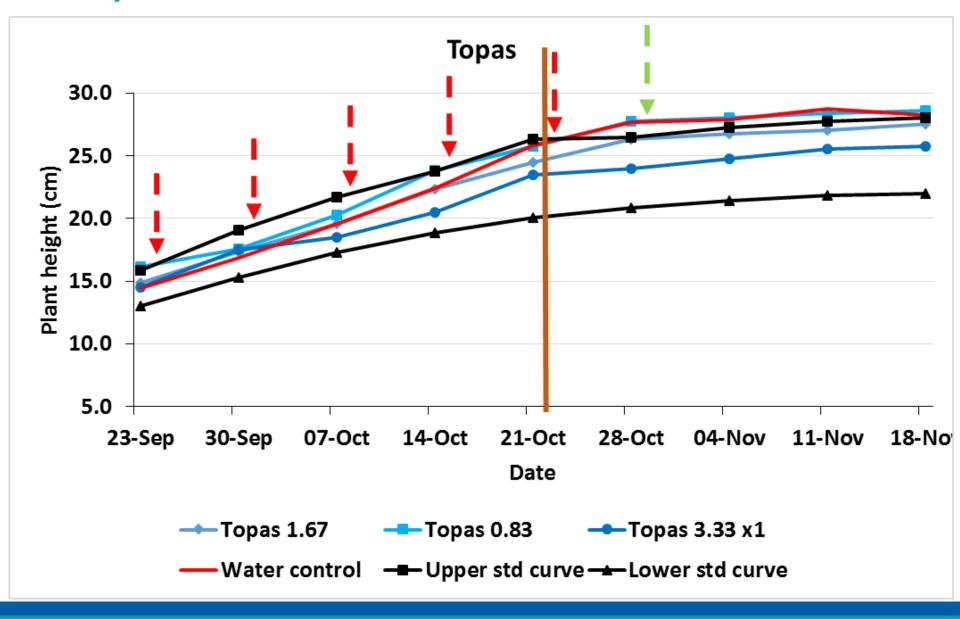
#### **Bonzi overspray:**

0.50 ml/L, week 44 (T12 & T13 only)



	Water	T12	T13	OBS 1
Phyto score / Cyathia score	5/1	5/1	5/1	5/1
Marketing height (cm)	28.3	27.5	28.6	25.8
Quality score / No heads	4.7 / 4.1	4.7 / 4.3	4.7 / 4.3	5 / 4.6

### Topas treatments



### **Control treatments**

All single plots

6 apps:

OBS2. Control 5.0 ml/L

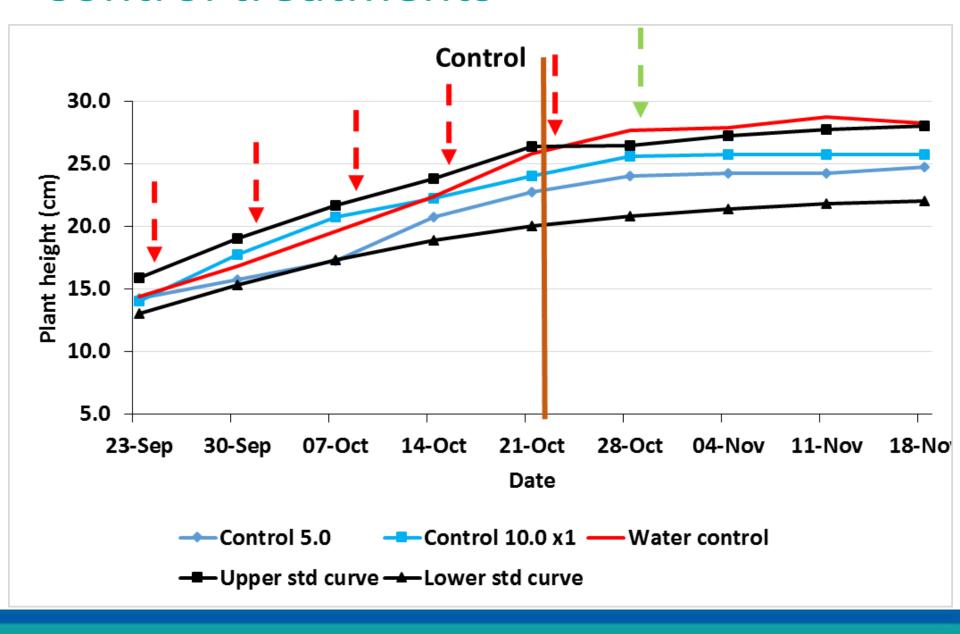
1 app:

OBS3. Control 10.0 ml/L



	Water	OBS2	OBS3
Phyto score / Cyathia score	5/1	5/1	5/1
Marketing height (cm)	28.3	24.8	25.8
Quality score / No heads	4.7 / 4.1	4 / 4.2	4 / 3.6

### Control treatments



Date	Action
Wk 47 – 19.11.19	Plants sleeved, boxed and transferred to ADAS Boxworth. Placed in shelf life room in the dark.
Wk 47 – 22.11.19	Plants removed from boxes, sleeves left on, lights set.
Wk 48 – 29.11.19	Sleeves removed. Assessment completed.
Wk 49 – 05.12.19	Assessment completed.
Wk 50 – 12.12.19	Assessment completed.
Wk 51 – 19.12.19	Assessment completed.
Wk 01 – 02.01.20	Assessment completed.
	- Long-

Shelf life room set to 12hr light/dark, 20°C



Wk 48 – sleeves removed



Water; Stabilan 750 / Bonzi



Water; Stabilan 750 + Stena / Bonzi

Wk 01 2020



Water; Stabilan 750 / Bonzi



Water; Stabilan 750 + Stena / Bonzi

Wk 48 – sleeves removed



Water; Terpal



Water; Terpal + Stena

#### Wk 01 2020



Water; Terpal



Water; Terpal + Stena

Wk 48 – sleeves removed



Water; Stabilan 750 / Terpal



Water; Stabilan 750 + Stena / Terpal + Stena

Wk 01 2020



Water; Stabilan 750 / Terpal



Water; Stabilan 750 + Stena / Terpal + Stena

Wk 48 – sleeves removed



Water; Bonzi 0.35



Water; Bonzi 0.50

Wk 01 2020



Water; Bonzi 0.35



Water; Bonzi 0.50

Wk 48 – sleeves removed



Water; Bonzi 0.35 (600 L/ha)



Water; Terpal / Stabilan 750

Wk 01 2020



Water; Bonzi 0.35 (600 L/ha)



Water; Terpal / Stabilan 750

Wk 48 – sleeves removed



Water; Topas x1



Water; Topas x0.5

Wk 01 2020



Water; Topas x1



Water; Topas x0.5

### Shelf life – quality week 1 2020

Trt	Product	Quality
1	Water only	2.3
2	Stabilan / Bonzi	2.0
3	Stabilan + Stena / Bonzi	3.0
4	Terpal	2.7
5	Terpal + Stena	2.0
6	Stabilan / Terpal	2.0
7	Stabilan + Stena / Terpal + Stena	2.7
8	Bonzi 0.35 ml/L in 300 L/ha water	3.0
9	Bonzi 0.50 ml/L in 300 L/ha water	2.7
10	Bonzi 0.35 ml/L in 600 L/ha water	2.7
11	Terpal / Stabilan	3.0
12	Topas 1.67 ml/L	3.3
13	Topas 0.83 ml/L	2.7

\*scored on a scale of 0-4



### **PGR** costs

Product	Cost of active* (p)	Cost /L of spray (p)	
Terpal (1.67 ml/L)	1.7 /ml	2.8	
Bonzi (0.35 ml/L)	9.5 /ml	3.3	
Stabilan 750 (0.5 ml/L)	0.3 /ml	0.2	
Stena (2.5 ml/L)	tbc	tbc	
Control (5.0 ml/L)	2.7 /ml	13.4	
*Non-discounted, excluding VAT			



### Summary

- Plants from all treatments were within height specification and marketable.
- No phytotoxicity in any treatments.
- The higher dose rate of Control can promote growth (lower dose rate controls growth).
- Application in higher water volumes increases growth control effect.
- Topas only affected growth at double the EAMU dose rate.



### Growth regulation of poinsettia

#### Recommendations

- Use Terpal, Bonzi and Stabilan 750 all effective to control growth.
- Use Stena with Stabilan 750 or Terpal and halve the rate of active.
- Use Control at label rate to control growth.
- Use Topas to control powdery mildew without risk of stunting (label rate).

Always test new products or treatments on a few plants prior to widespread use



### **Further information**

Twitter: <a>@ahdbbppc</a>

Report: March 2020

**AHDB Horticulture News articles** 



### Thank you

- Stuart Whiteman, Nick Nolan and the team at Newey
- Peter Seymour and Megan-Rose Beard, ADAS
- BASF
- Syngenta
- Nufarm
- GrowDesign
- AHDB









# Poinsettia shelf life performance, R&D AHDB round up and cultural issues from 2019



