PGR University

How Anti-GA PGRs Work

Brian Whipker, NCSU

PGR University

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11:30 to 11:55 Eastern

HOW ANTI-GA PGRs WORK:

KNOWING THE TOOLS AND HOW TO USE THEM

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NC STATE UNIVERSITY

GOAL WITH PGRS:

KNOWING THE TOOLS & HOW TO USE THEM EFFECTIVELY

1 INTRODUCTION

PGRs Knowing and Using

- Growth Controllers
  - Ancymidol
  - Chlormequat
  - Daminozide
  - Flurprimidol
  - Paclobutrazol
  - Uniconazole
- Structural Enhancers
  - Augeo
  - Configure
  - Ethephon
  - GA/BA

Joyce Latimer will cover in next presentation

Expanding PGR Toolbox

Type	Chemical	Products
Anti-GA	Ancymidol	Abide, A-Rest
	Chlormequat chloride	Citadel, Cycocel
	Daminozide	B-Nine, Dazide
	Fluprimidol	Topflor
	Paclobutrazol	Bonzi, Paczol, Piccolo, Piccolo 10XC, Downsize (*drenches only*)
	Uniconazole	Concise, Sumagic
Structural	BA	Configure
	GA	Florgib, ProGibb T&O
	BA+GA	Fascination, Fresco
	Dikegulac sodium	Augeo
	Ethephon	Collate, Florel

2 GROWTH CONTROLLERS

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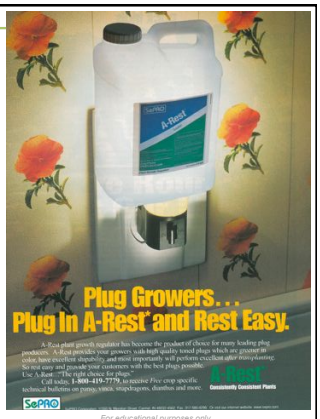
Ancymidol

- Abide (Fine Americas) and A-Rest (SePRO)
  - 0.0264% Solution
- A softer anti-GA PGR.
  - Excellent niche is plugs
    - Daminozide does not have substrate activity
    - Does not have yellowing (phyto) like Chlormequat

Old SePRO Ad
(2000)

- Avoiding over-regulation a plus for plugs



For educational purposes only.

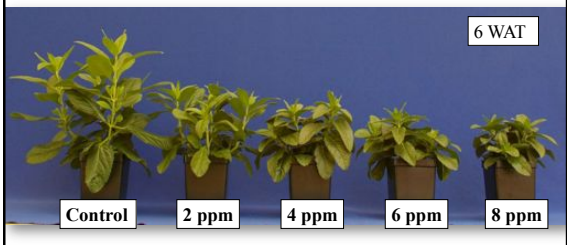
Ancymidol

- Applications
  - BP Plugs: Sprench at 2 to 10 ppm
  - Sprays: 7 to 50 ppm
  - Drench: 25 to 50 ppm
  - Liner Soaks: 15 to 25 ppm

Tips

- Allow the solution to dry slowly over 4 hours to enhance uptake.
- Other uses
  - Fall pansies at 15 ppm
  - Easter lilies at 50 ppm or 1 ppm drench
    - Uniconazole is being used by most growers
  - Other bulb crops.

Abide Drenches on *Veronica* 'Icicle'



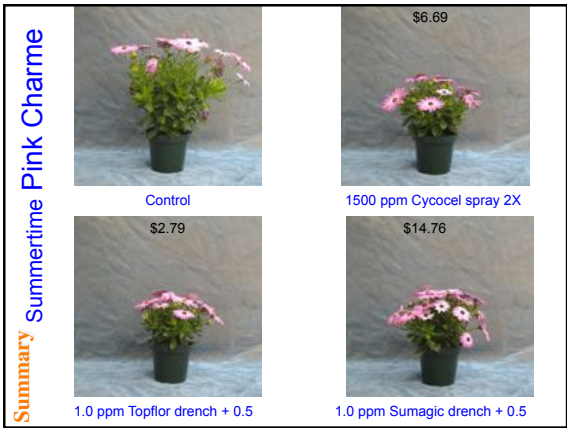
- Drenches at 2 fl.oz. per quart pot
- Plant ht: Control 23.7 cm vs. 8 ppm drench 8.9 cm

Chlormequat

- Citadel (Fine Americas) and Cycocel (OHP)
  - 11.8% Solution
- Introduced in 1962 by BASF.
  - Key crops: geranium, poinsettia, hibiscus, osteospermum
  - Activity lasts 2-3 weeks (crop dependent)
  - Spray rates: 750-1500 ppm
  - Apply early in the crop cycle

Chlormequat

- Absorption
  - Leaf
  - Substrate drench (root uptake)
    - Used extensively in Europe (higher % a.i. formula)
    - Effective rates 2,000 to 3,000 ppm
    - Increases the substrate EC.
- Tank mix with Dazide
  - 2,500 ppm Dazide + 1,000 ppm Chlormequat (~3:1)



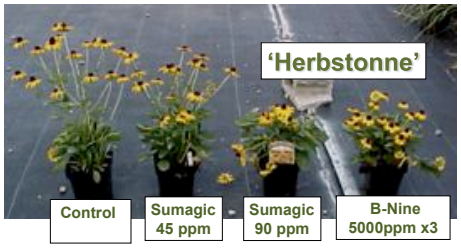
Chlormequat

- Leaf Yellowing (phytoxicity)
  - Occurs with > 1,500 ppm
  - Occurs on expanding leaves

Daminozide

- **B-Nine WSG** (OHP)
- **Dazide** (Fine Americas)
- Short term (2-3 wk) control
  - multiple applications generally required
- Relatively safe, no soil activity
- Uptake by leaves; good coverage required; absorbed slowly; apply under long drying conditions; avoid early overhead irrigation
- Rapid translocation after absorbed
- Effective on a wide range of crops

Rudbeckia



- Sumagic: >45 ppm
- B-Nine: good control, 5000 ppm x3

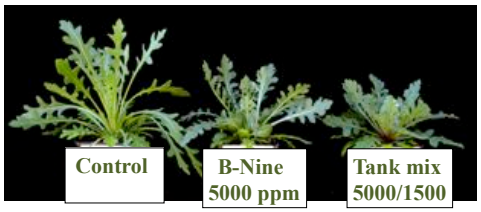
Daminozide/Chlormequat Tank Mix

- Increased activity of both products as tank mix
- Synergistic effect – block different sites in GA pathway
- Easy to apply, little soil activity
- Can have very high activity (5000:1500 ppm)
- Safer than triazoles on sensitive plants
- Effective on many annuals and perennials

Daminozide/Chlormequat Tank Mix Activity

Activity	Daminozide (ppm)	Chlormequat Cl (ppm)
Very high	5000	1500
High	2500	1250
Medium	1250	1250
Low	800	1000
Very low	800	800

Gaillardia x *grandiflora* 'Burgundy'



- B-Nine/Cycocel Tank mix: 30-35% reductions at 3 WAT, NS at 5 WAT
- Multiple applications may be required

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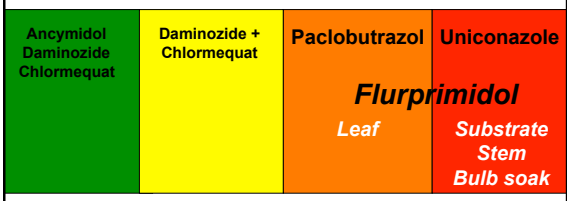
Flurprimidol

- Topflor (SePRO) 0.38% solution
- Can be used on a wide assortment of plants
- Applications
  - Sprays: 5 to 50 ppm
  - Drenches: 0.25 to 2 ppm
  - Liner Soaks: 1.25 to 10 ppm
- Because of its greater efficacy in root uptake, it is a very cost effective PGR drench.

PGR Relative Activity



Less → More

Tips

- Has leaf, stem and root activity.
- Allow the solution to dry slowly over 4 hours to enhance uptake.

Dusty Miller 1203's

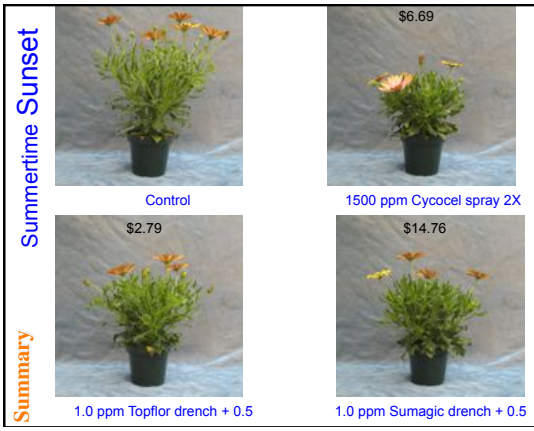
Topflor at 20 ppm is about equal to 35 ppm Bonzi or 10 ppm Sumagic

0 T-20 T-30

0 T-20 T-30 B-35 S-10

Pot Mum: Duluth

Control **25 (1x)** **25 (2x)**



Flurprimidol – Keys to Use

- A cost effective method of controlling growth as a substrate drench.
- Similar efficacy as the Paclos when it comes to foliar sprays.
- Has limited flower delay even at high rates.

Paclobutrazol

- Piccolo (Fine Americas), Bonzi (Syngenta), Paczol (OHP), and Downsize (drenches only, Greenleaf)
  - 0.4% Solution
- Piccolo 10XC (Fine Americas)
  - 4.0% Solution

Paclobutrazol

- Triazole growth regulator activity discovered during fungicide activity screening program for conazole.
- ICI Plant Protection Division paclobutrazol discovered in 1980.
- Bonzi EPA Registration occurred in 1985
  - Uniroyal Chemical lead in introducing Bonzi to the greenhouse industry.

Paclobutrazol

- Excellent stem and *root* uptake.
- Key crops: poinsettia, bedding plants, perennials, nursery, etc.
- Late drenches will not disrupt blooms/bracts
- Low use rates:
  - Foliar sprays: 5 to 30 ppm
  - Drenches:
    - 0.1 ppm (Ultra-low drench)
    - 0 .5 to 5 ppm (plugs have low use rates)

Piccolo Drenches (mg a.i.)

(Percent of control provided in blue)

Untreated	1 mg	2 mg
100%	61.1%	56.8%
a	b	c

Plant height significant by concentration ($P<0.0001$), $R^2=0.96$

Piccolo Foliar Sprays (mg/L)

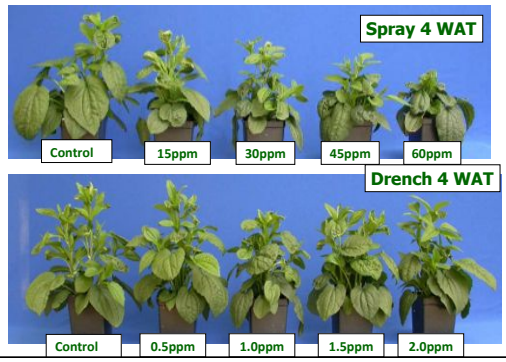
(Percent of control provided in blue) *(LSDs in red)*

Untreated	25	50
100%	81.6%	72.8%
a	b	b

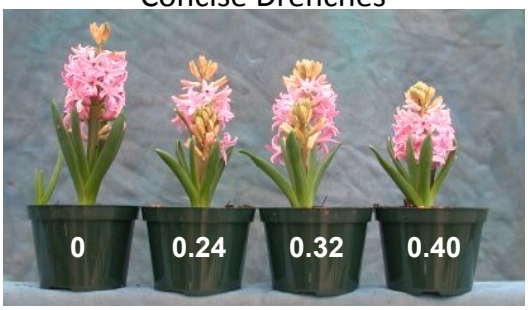
Uniconazoles

- **Sumagic** (Valent USA)
- **Concise** (Fine Americas, Inc.)
- Very high activity (10x paclobutrazols)
- Primary uptake by stems and roots
- Soil ACTIVE (not labeled for chemigation)
- Typically very linear rate response, especially with perennials

Concise on *Rudbeckia* 'Goldsturm'



Concise Drenches



mg active ingredient per pot

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Structural	BA	Configure
	GA	Florgib, ProGibb T&O
	BA+GA	Fascination, Fresco
	Dikegulac sodium	Augeo
	Ethephon	Collate, Florel