

How You Can Grow Like a Pro

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**Technical Service Specialists
Darwin Perennials**

DarwinPerennials®

KieftSeed™

PERENNIALS WITH STAYING POWER™

What does it take to Grow Like a Pro?

Who is it that designates you as a 'Pro'?

- You?
- The kids?
- Customers?
- Uncle Sam?



When do you consider yourself a 'Pro'?

- When you have a greenhouse?
- When you reach a certain number of customers?
- When you reach a certain volume of sales?
- When you kill fewer plants?



#1 Trait of a 'professional' grower:

Collaboration

Collaboration

Collaboration

--Anna Ball

Collaboration is the process of two or more people or organizations working together to complete a task or achieve a goal. *Collaboration* is similar to cooperation.

Topics for Collaboration

- Seed Germination
- Vegetative Rooting
- Media
- Water Management
- Nutrition
- Temperature control
- PGR's
- Variety selection
- Cultural resources
- Lighting
- Scheduling perennial programs
- Overwintering...

Seed!

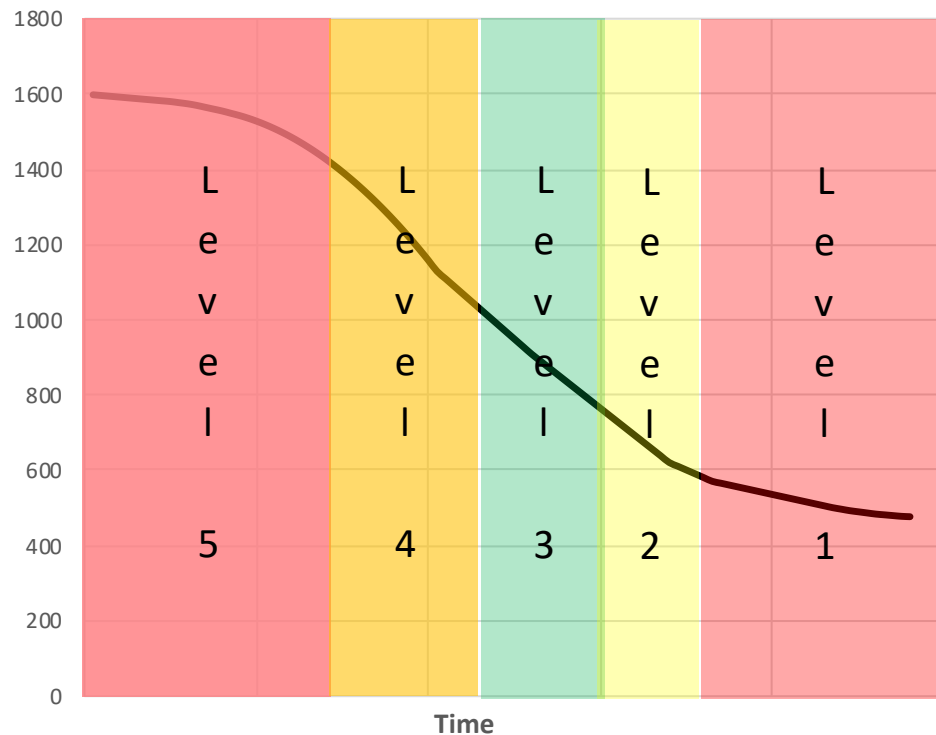
- Lots of opportunity
 - Great genetics!
 - Mechanization
 - Planning/forecasting
 - Inventory in hand
 - Seed is in the bag before the season
 - Fewer mishaps with late changes
 - Reduced disease concerns
 - Plant loss, Importation

Top 4 Germination Factors

1. Water before sowing
2. Water 0-24 hours
3. Water to cotyledon unfolded
4. Temperature



Water Scale (1 to 5) Weights for 288/512



- Sowing to Germination – 4
 - Don't gain or lose weight
- Cotyledons to 1st true leaves – 3½ -4
 - The drying process starts
- True leaves to finished plug – 4 to 2
 - Cycle the water content

URC-Best Practices

Reduce the time: Box to the Bench

Your goal is to maintain the cold chain until the cuttings enter the Manufacturing Process.

Consistent Temperature Control

Make sure the cooler is at the right temperature the day before the cuttings will arrive.

Big swings in temperature will minimize storage life of cuttings and decrease performance after stick.

High humidity

A cold but dry cooler is not a good storage environment

Use fog, wet the floor and maintain humidity above 85%.

Sanitation!

Priority list



Care and Storage of URCs

The difference in turgidity between treatments after 24hrs was drastic

- Humid +Bag



- Humid - Bag



- Cooler + Bag



- Cooler - Bag



Storage and sticking environment



**45400 Humidification Unit
Spray Systems**



Care and Storage of URCs



- Humid +bag

- Humid -bag

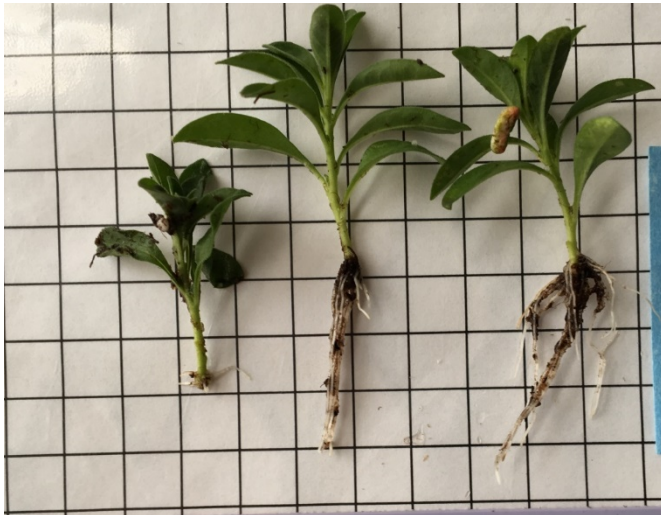
- Cooler +bag

- Cooler -bag

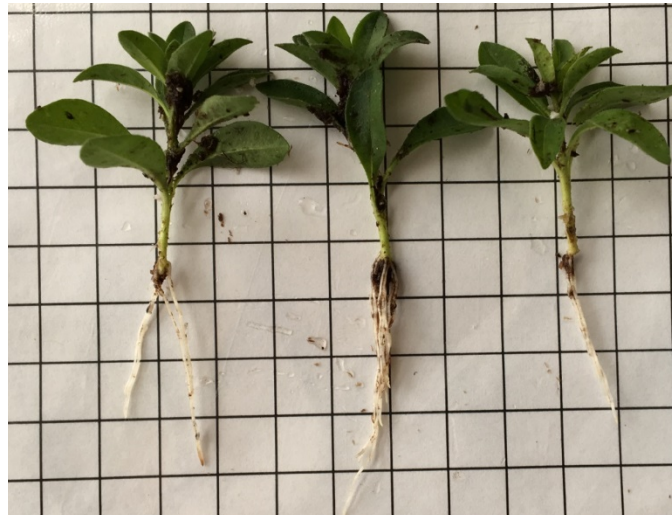
Then get them off the mist!

KIBA 200 ppm “Spray”

Low Volume



Medium Volume



High Volume



Cabaret Deep Blue 9 day after sticking

Found 100 ppm at high volume was just as effective as 200 ppm

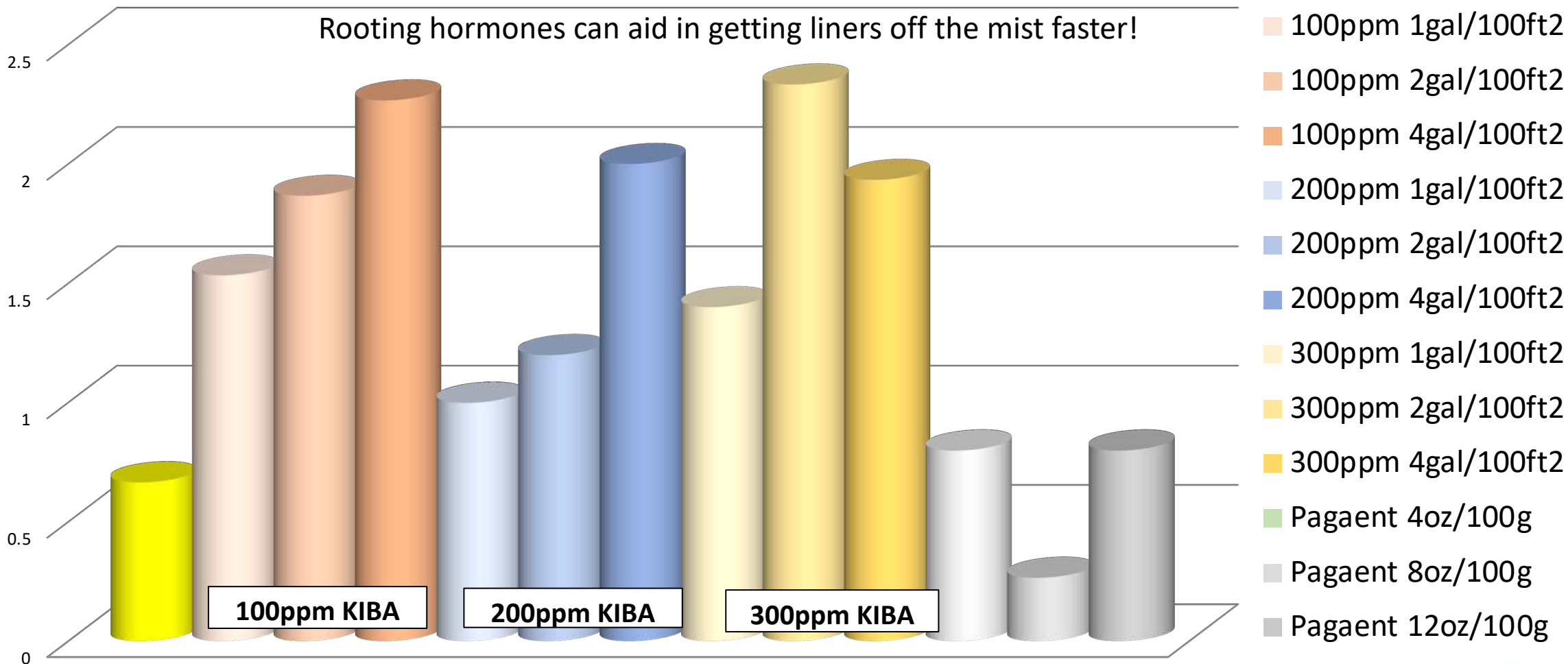
Leaf curl – a few crops really bad

We can often see a benefit from Dip N Grow since it has multiple rooting hormones.

KIBA "Spray"

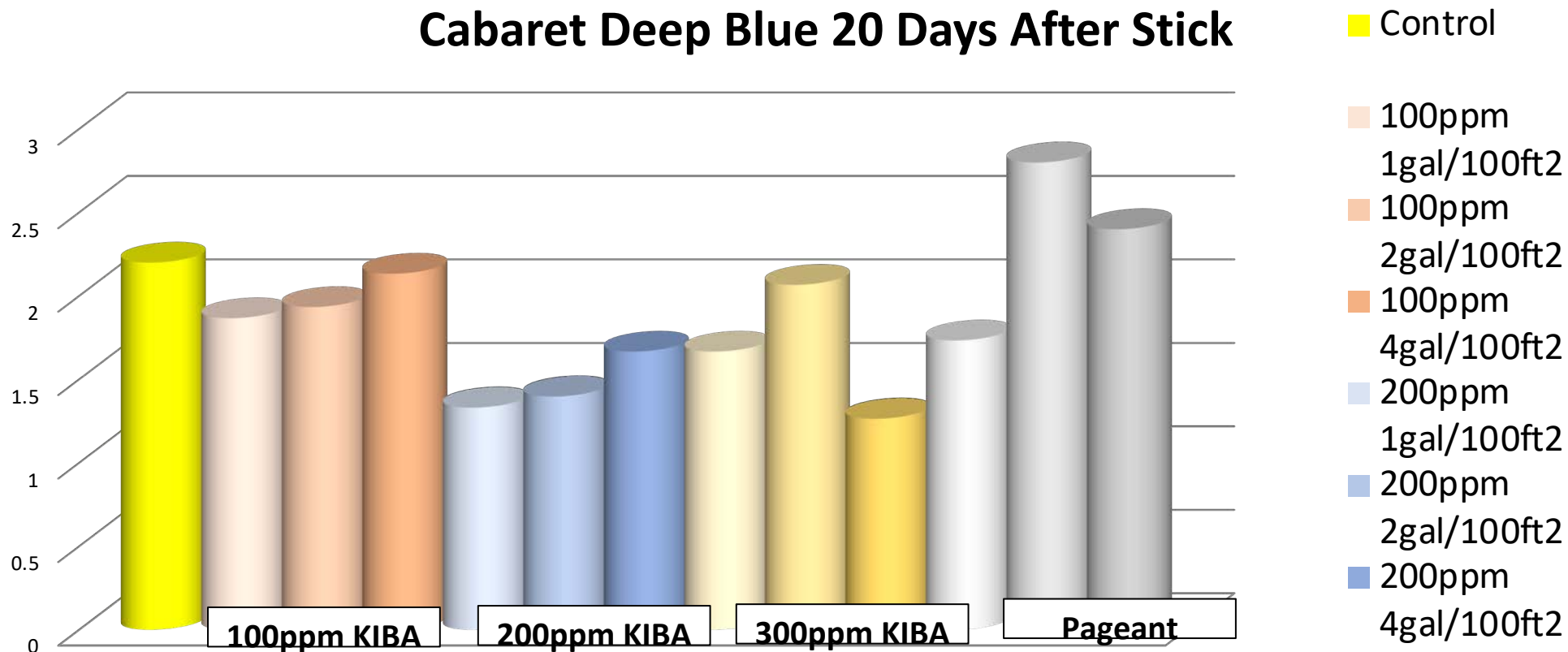
Cabaret Deep Blue 9 Days After Stick

Rooting hormones can aid in getting liners off the mist faster!



KIBA “Spray”

Cabaret Deep Blue 20 Days After Stick



We have found Pageant to be beneficial to rooting success but is evident after rooting hormones!

-Dip N Grow applied at 500ppm, one spray to base of cutting with spray bottle

-KIBA drench applied at 100ppm using showerhead watering can, 4 quick passes over tray

KIBA Drench best for: Achillea, Lavander Hidcote Blue, Thyme Golden Lemon, Thyme Lemon

Dip N Grow best for: Salvia Caradonna, Veronica Royal Candles

KIBA “Spray”

Megan's Findings

Crop	Best Rooting PGR **
Achillea millefolium 'Apricot Delights'	KIBA Drench @ 100 ppm
Lavandula angustifolia 'Super Blue'	
Lavandula angustifolia 'Hidcote'	KIBA Drench @ 100 ppm
Rosemary officianalis 'Tuscan Blue'	KIBA Drench@ 100 ppm
Rosemary officianalis 'Prostratus '	
Salvia nemerosa 'Caradonna'	Dip N Grow @ 500 ppm or KIBA Drench @ 100 ppm
Thyme cit 'Golden Lemon'	KIBA Drench @ 100 ppm
Thyme cit 'Lemon'	KIBA Dip/Drench
Veronica Royal Candles	Dip N Grow @ 500 ppm or Hormodin Powder

Water Management-URC

Water media to a '4'

High Humidity/No mist

Armeria
Buddleia
Hedera helix
Lavender
Lithodora
Rosemary

No mist, media moisture 2.5 - 3

Sedum
Sempervivum

Moderate Mist

Asters
Coreopsis hybrid
Eupatorium
Gaura
Helenium
Lavender*
Leucanthemum
Lithodora*
Lysmachia
Monarda
Nepeta
Salvia
Veronica

Low Mist

Achillea
Alyssum
Agastache
Armeria*
Artemesia
Buddleia*
Caryopteris
Coreopsis verticillata
Dianthus hybrid
Erysimum

Low Mist

Euphorbia
Heliopsis
Iberis
Penstemon
Perovskia
Phlox paniculata
Phlox subulata
Polemonium
Thymus
Sagina

Water Management

Moisture Scale

1-5

5=Saturated. Media is wet and drains freely. Water is easily displaced with a light touch.

4=Medium Wet. Media is dark and glistening but water is not draining freely. Water is displaced slightly with a squeeze.

3=Medium Dry. Media is not dark black and glistening. On the verge to changing to light brown. No water is easily displaced when squeezed but moisture can be felt.

2=Dry. Media has changed to light brown. No moisture can be felt.

1=Very Dry. Media is light brown and may be pulling away from the sides of the container. Plant is wilting.

Water Management

Watering is the #1 activity we do that kills our crops.
*But sometimes we don't put our most valuable time
and resources into watering...*

➤ It's not always the most highly skilled or trained person on the end of the hose.

➤ The “weekend waterer”

➤ “The Intern”

➤ Seasonal help

Color coded flags
corresponding to
the moisture scale

“When in
doubt, flood
it out”--JG

Media

What is the best media for growing perennials?

Peat Moss



Perlite



Rice Hulls



Bark



Wood Fiber



Coconut fiber

Media

Home

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A compact, handheld pH meter with a blue and white body. The digital display shows a pH reading of 7.0. The device has several buttons at the top, including 'MODE', 'ON', 'OFF', and 'CAL'. The brand name 'HORIBA' and the model 'LAQUAtwin' are visible on the device.

HORIBA LAQUAtwin pH-11

Compact pH Meter

\$119.95

Shipping calculated at checkout.

QUANTITY

-

1

+

Add to Cart

Buy with **PayPal**

The only pocket meter that directly measures pH in 0.1ml sample (or 0.05ml sample with sampling sheet B). Unique sensor allows measurement of viscous liquids, solids, and even powder samples.

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Media

Growing medias are as unique as growers themselves.

Key factors:

- Doesn't dry out too fast
- Doesn't dry out too slow
- Drains well
- Rewets easily
- Minimal algae growth/biofilm
- Enough buffer to stabilize pH
- Low salts/EC. Low in sodium
- Does not absorb nutrients
- Pasturized
- Availability/sustainability
- Price



10 days after transplant

What is the 'best' media for perennials?

The best media is the one you have experience with.

Generalizing Water Quality

- Low alkalinity waters
 - Low Calcium and almost always low Mg
 - Maybe high Fe/Mn
 - Need a “basic” feed
- Moderate Alkalinity
 - Medium Ca and many times low Mg
- High to Very high Alkalinity
 - Adequate Ca and Mg may be unbalanced
 - Na may be an issue as well
 - Need an “acidic” feed
 - May need acid injection
- Watch Na and B as compounding issues



Greenhouse Production Calculators

March 26, 2018



ALKCALC
FERTCALC
PGRCALC

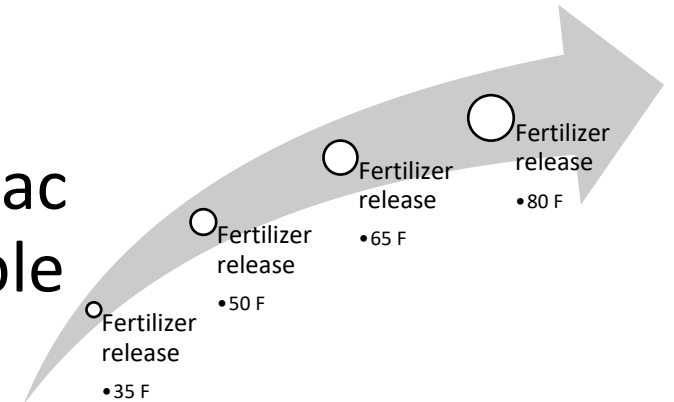
Fertilizers

Liquid

- Fast
- Low cost upfront
- **You have control**
- Water quality is a big factor in selection of formula
- Must have system

CRF

- **One-time application**
 - Varied release curves/durations available
 - Top-dress or incorporate
- Slow
- Expensive upfront
- Turf farmer to Cadillac formulations available



Fertilizers for Perennials

Liquid Feed

- Based upon water quality
- Treating water (acid injection) will increase flexibility
 - Can chose a less aggressive feed

CRF

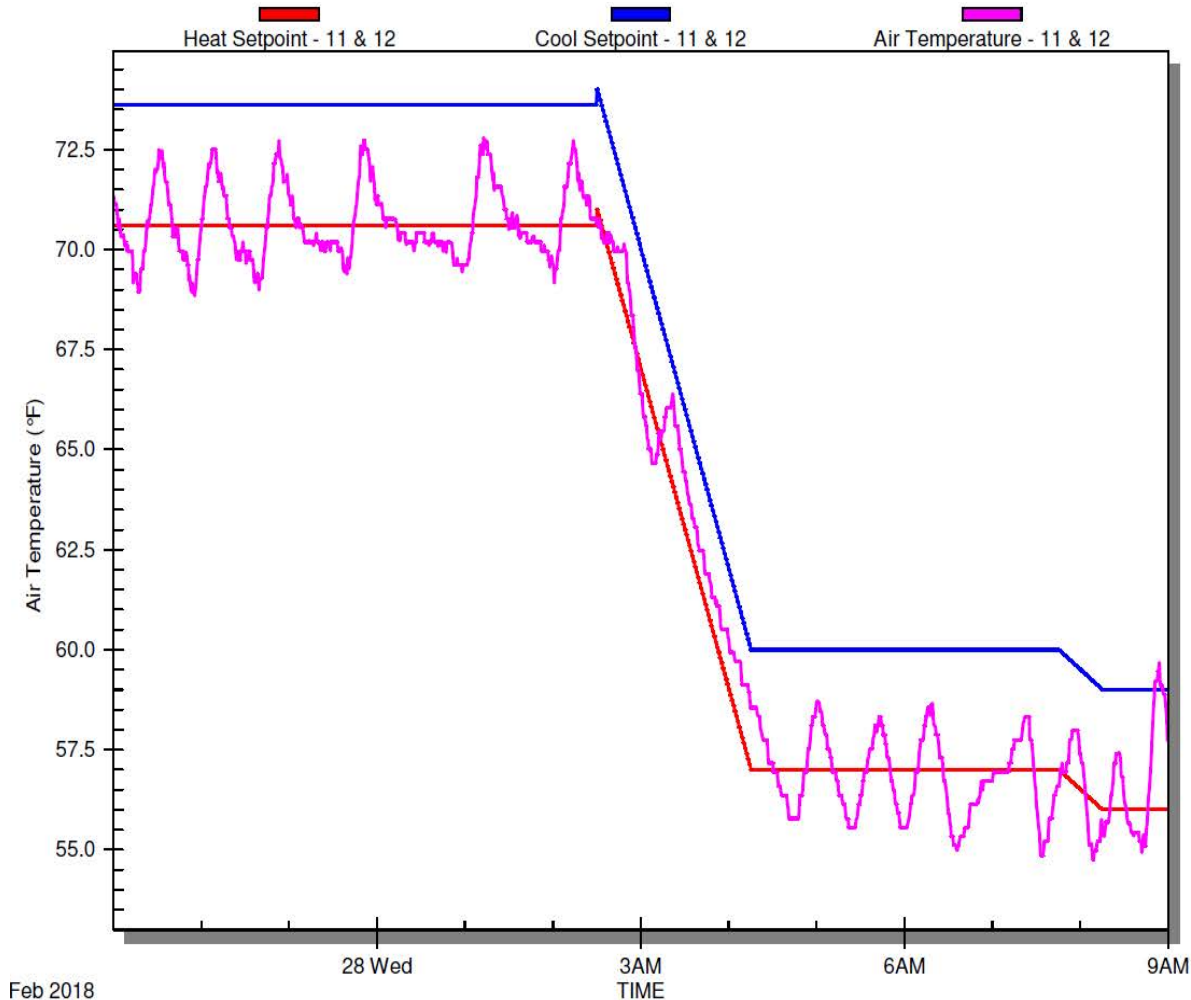
- Choose middle of road to Cadillac formulation
- 2-1-2 nutrient ratio preferred
- Often benefit from micronutrient additive in soil

Know your water quality – Test your soil pH and EC

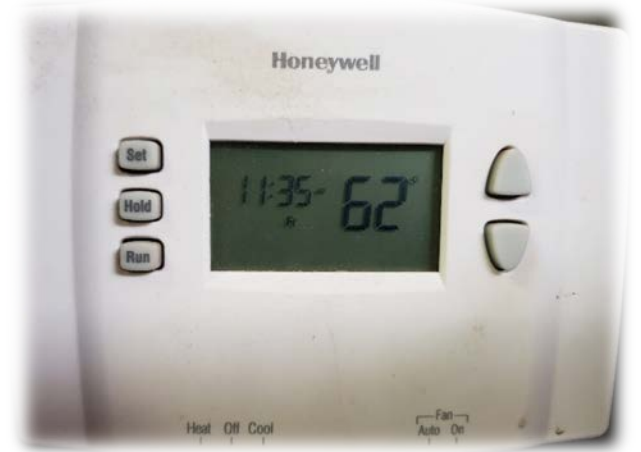
Liquid feed

Formulation	Acid/ Base/ Neutral	Potential Acid / Basic	Water Quality (Alkalinity- CaCO ₃)
17-5-24	A / N	125	50 – 100 ppm
17-5-17	N	69	50 – 100 ppm
20-9-20	A	510	75 - 150 ppm
20-18-18	A	710	75 - 150 ppm
15-0-15	B	418	0-75 ppm
13-2-13	B	342	0-75 ppm

Growth Control with Temperature



- **DIF—dropping temperature 2 hours before until 2 hours after sunrise**
- **Many perennials stay more compact with negative DIF**
- **Begin week 3 and gradually increase**



Temperature Control

Forcing

Old
School

“They’re perennials!” Grow them cold. They’ll flower when they want to.



Cold
and
Wet



New
School

**Heat them
up!**

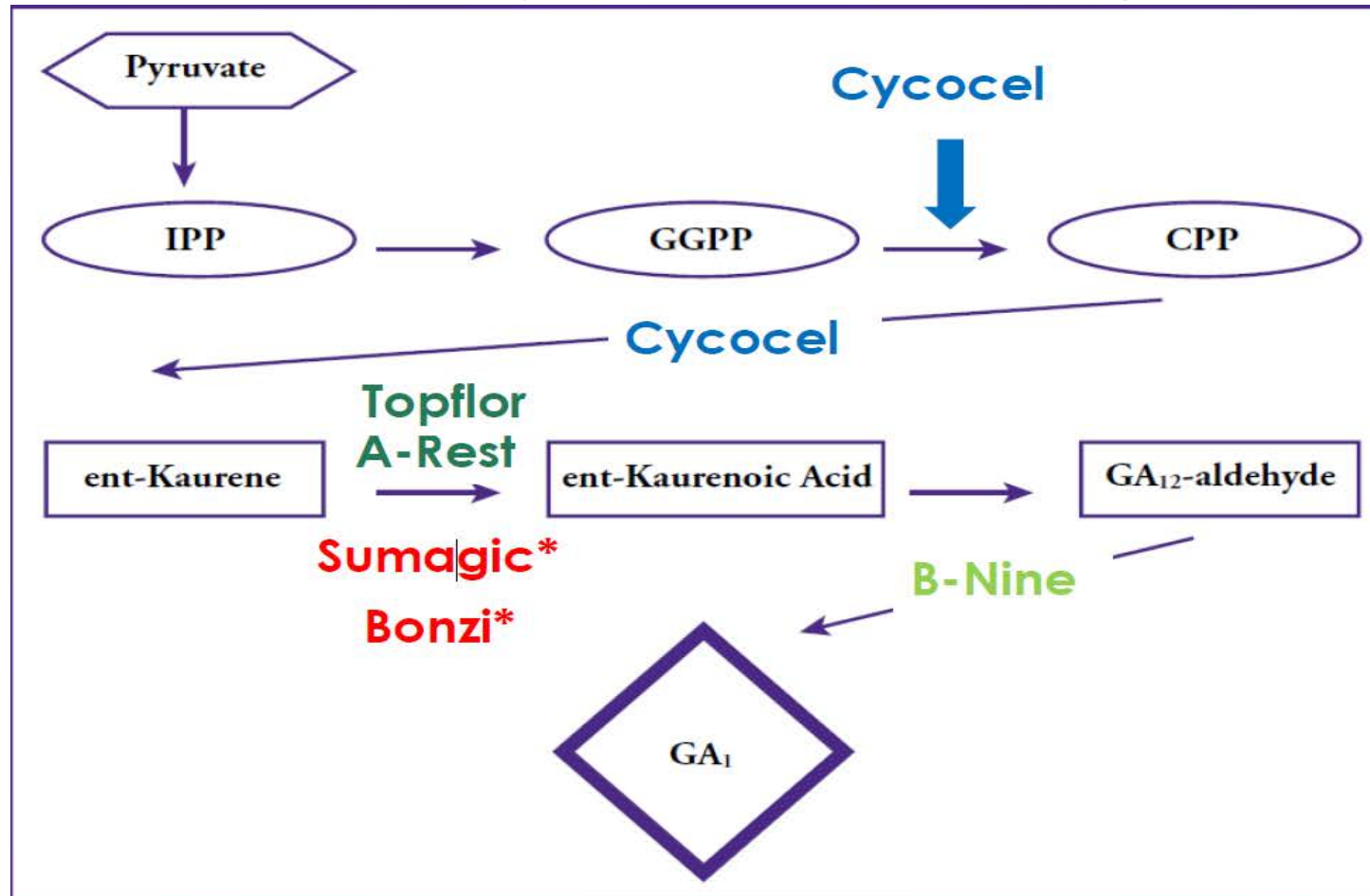


70F+ day
and night

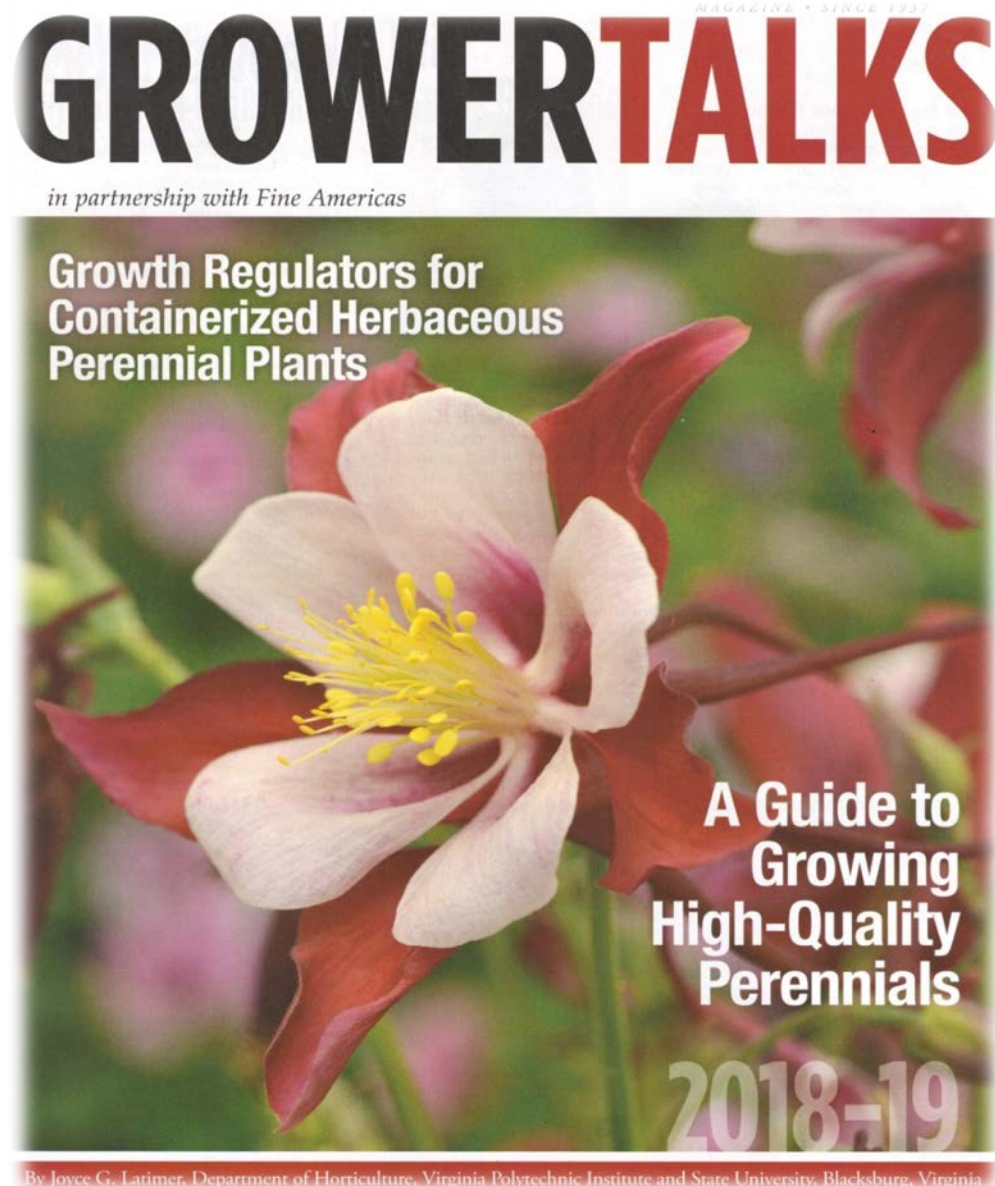


Wise PGR Usage: GA inhibitors

For when water, feed, and temperature aren't enough to control stretch.



PGR Like a Pro



- Excellent resource
- Good starting point
- Covers many varieties and multiple PGR's

- Can make PGR's sound complicated

Simplifying PGR's

My experience with GA inhibitors in liners...

- Sumagic is the most effective on perennials, but can be easily overused and lead to problems.
 - Young plants are more sensitive
 - Stunting
 - Delayed flowering
 - Carryover into finished
- B-nine/Cycocel combination is a safer option.
- GA inhibitors will control stretch, but do not promote branching.

Simplifying PGR's

Uniconazole (sumagic, concise)

- Strongest of the PGR's
- Easy to apply as a spray
- Volume dependent
- 5-10 ppm*
- Can re-apply as needed



B-nine + Cycocel

- Benign combination
- Not effective on many perennials
- Best on varieties where uniconazole stunts
- Can green up nearly any plant

Simplifying PGR's

For many crops, apply PGR after flower bud initiation and just as they are beginning to stretch.



Delphinium

Achillea



Aquilegia

Dianthus barbatus



Simplifying PGR's for Perennials

Key Points:

- PGR's are used to slow and tone growth, with minimal delay in flowering.
- Begin PGR early.
- Leave a control! Observe the response.
- Use B9/CCC combination when possible (humidity, light).
- Sumagic-begin with lower rates. Can be applied weekly if necessary.
- Increase rates as season progresses, temperatures rise, days get longer.

PGR's for promoting branching

Configure

- Increased lateral branching, but not a pinching agent
- Much potential on many varieties
- Stressful and causes phyto in some species
- Use lower rates and 2 applications
 - 200 ppm 2X two weeks apart
 - 300 ppm 1X
- Commonly used on Echinacea for basal branching
- Only apply on well rooted liners or plugs, 6-8 weeks old
- Do not apply within 14 days of transplant



Augeo – Not recommended

Simplifying PGR's-When to trim



Not every crop can be managed with a reasonable amount of growth regulator.

Know Your Varieties



Why are we offering this?

Know Your Varieties

When we can
offer this!



Know Your Varieties

DarwinPerennials®

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[Return to Heliopsis helianthoides List](#)



Heliopsis helianthoides Sunstruck

Plant Info

Culture

More

Propagation Guide

Media EC/pH:

EC 0.75-0.80 mmhos/pH 5.8-6.2

Soil Temperature:

70-72°F (21-22°C)

Rooting Hormone:

1,000 ppm IBA

Mist:

Low

Fertilization:

50-75 ppm N when roots become visible

Pinching:

Recommended after roots are established. Leave 4-5 active internodes.

Transplanting:

35-42 days after sticking

Comments:

Comments:

Use low mist settings; do not oversaturate rooting media. Root zone temperatures of 70°F (21°C). Remove flowers in propagation. **Long day obligate plant.** Must provide long days in propagation.



- Technical Guides
- University Technical Information
<http://www.flor.hrt.msu.edu/perennials/>
- Perennial Solutions – Paul Pilon
- Your Supplier



Avoid
unforced
errors!

KieftSeed™

Photoperiod

Flowering and Dormancy

- Natural Photoperiod
 - March 21, 2016 = 12 hours of daylight and dark
 - Increasing day length until June 21
 - Long days until the Fall
 - September 21, 2016 = 12 hours of daylight and dark
 - Decreasing days until December 21
 - Short days until the spring
- It's really about the length of darkness

Helping Long Day Plants Flower

- For obligate long day plants there is a “critical” photoperiod
 - For simplification we commonly just assume it is 12 hours but some plants may be 14-16.
- Can use day length extension
 - Simple incandescent will work
 - Specialty lamps now available – LEDs, Fluorescents, special wave lengths
 - HID lights work well (HPS over MH)
 - Only need a few (10) footcandles
- Night interruption considered most effective in general
 - Provide 4 hours of light during the middle of the night



Helping Short Day Plants Flower

- For obligate short day plants there is a “critical” photoperiod
 - Assume it is 11 hours or shorter.
- Black Cloth
 - Extend the night
 - Generally best to do this in the morning when temperatures are cooler.
- Need 2-3 weeks to induce!
- Planting date and natural day length should be considered
 - Response Time
 - Exposure time and time to flower from start of the inducing photoperiod



Helianthus
Autumn Gold
9/25/16

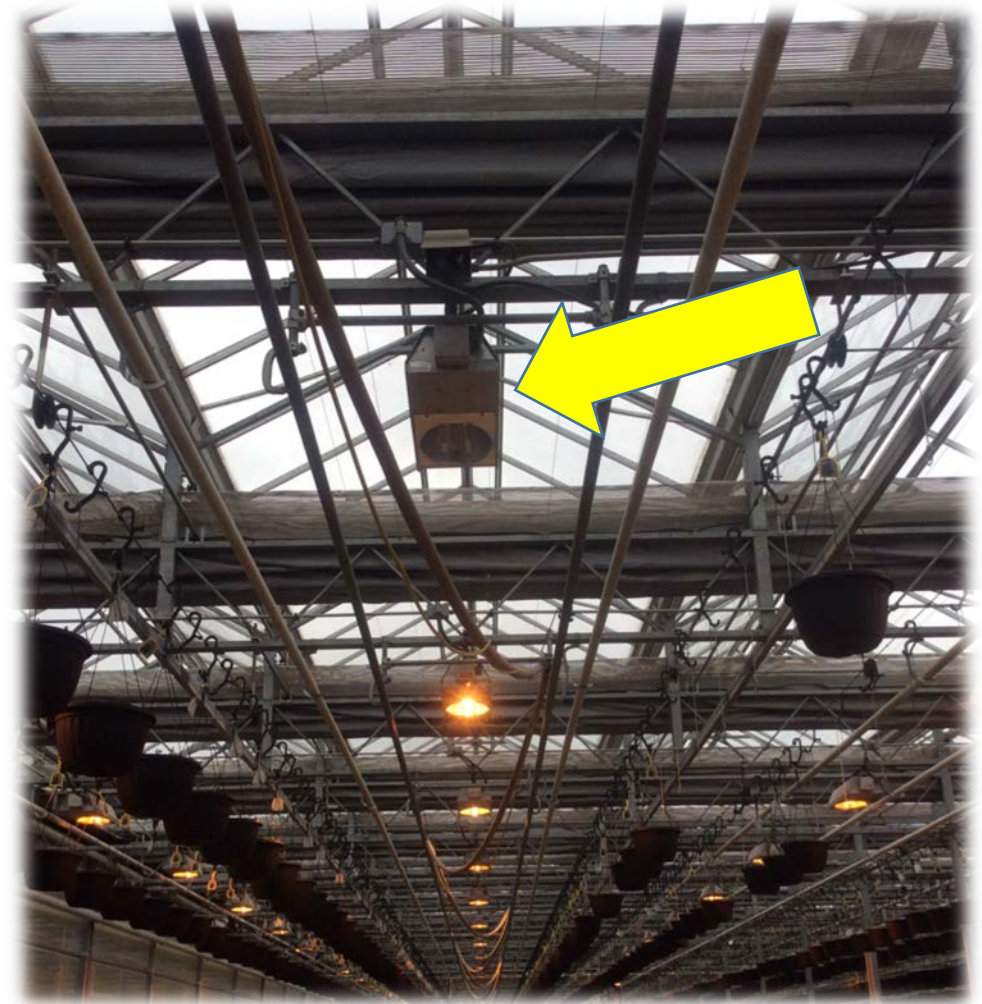
Always a problem child... Echinacea

- Double Induction
 - Needs 2 different photoperiods to flower
 - Echinacea requires short days for several weeks before being exposed to long days



High Intensity Discharge Lighting

- HID Lights improve growth
 - High Pressure Sodium
 - Promote Flowering (orange – reds)
 - Newer generation
 - E-ballast, double ended
 - Compact growth (?)
 - New, clean, burned-out?



LED Lighting

- Very efficient
- Longer life
- Less maintenance
- Can fine tune to plant needs
- ROI gap is “closed”
 - 20 year comparison
- Substantial DLI (Daily Light Integral) =
plants growing better & faster!

LED and HID Horticultural Luminaire Testing Report

Prepared for
Lighting Energy Alliance Members
and
Natural Resources Canada




by
Leora C. Radetsky
Lighting Research Center, Rensselaer Polytechnic Institute
21 Union Street
Troy, NY 12180
Final Report: May 3, 2018

Scheduling for Flowering-Darwin


<u>Coreopsis UpTick from URC</u>				<u>Colors:</u>	
Early spring thru fall programs				Bronze and Gold	Cream and Red
No vernalization needed to flower				Yellow and Red	Cream Yellow
North: grown outdoor flowering window weeks 23-36					
South: grown outdoor flowering window weeks 18-40					
<u>Spring-early summer programs</u>				<u>Late summer - fall programs</u>	
Week color desire	18			Week color desired	40
URC Stick Week	3			URC Stick Week	27
Liner ready week	8			Liner ready week	32
Transplant Week	9			Transplant Week	33
				*Plantings after week 25 finish faster	
<u>Propagation guidelines</u>					
Soil	Well drained				
	EC 0.8 to 1.00 mmhos				
	pH 5.8 to 6.2				
Temperature	70F. To 72F. Until roots are visible				
Hormone	Basal dip 1000ppm				
Liner	72-cell / 30mm elle				
Mist	Moderate to high first 24-48 hours to rehydrate cuttings				
	Reduce mist level to low once turgid				
Feed	Fert 50-75ppm N 10 days after stick				
Water	During root development moderate moisture				
	Do not saturate soil				
	Coreopsis will root slowly if too wet				
Pinching	Pinch once in tray when roots are well developed				

Use the Scheduling Tool!
Use the right genetics!
Fill the gaps!


<https://www.darwinperennials.com/Culture/ProductionGuides/>


DarwinPerennials. 

Scheduling Tools & Production Guides





Propagation Guide

 Download





Finishing Guide

 Download





Finishing Guide for Fall Flowering

 Download





Culture Essentials

 Download




Tissue Culture Echinacea - Best Practices for Success

 Download



Tissue Culture Heuchera - Best Practices for Success

 Download

		Lavender Scheduling Tool-Pacific Midwest and Northeast Region																																																	
		Weeks	<div><div>Sow</div><div>Propagation</div><div>TP</div><div>Growing on</div><div>Sales and market ready</div></div>																																																
			30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
Sow period	Weeks 45-52	<div><div>Bandera Annual</div><div>Ellagance OW</div><div>Avignon Early Blue Annual</div><div>Ellagance Annual</div><div>Blue Spear Annual</div><div>Lavance OW</div><div>Lavance Annual</div></div>																																																	
plug production	7 weeks																																																		
TP period	Weeks 51-6																																																		
Finish time from TP	12-14 weeks																																																		
Sales period	Weeks 12-17																																																		
Sow period	Weeks 28-32																																																		
plug production	7 weeks																																																		
TP period	Weeks 34-38																																																		
Finish time from TP	31-34 weeks																																																		
Sales period	Weeks 15-19																																																		
Sow period	Weeks 5-14																																																		
plug production	7 weeks																																																		
TP period	Weeks 09-20																																																		
Finish time from TP	9-11 weeks																																																		
Sales period	Weeks 20-29																																																		
Sow period	Weeks 5-14																																																		
plug production	7 weeks																																																		
TP period	Weeks 11-20																																																		
Finish time from TP	9-12 weeks																																																		
Sales period	Weeks 22-29																																																		
Sow period	Weeks 5-14																																																		
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TP period	Weeks 11-20																																																		
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Sow period	Weeks 28-32																																																		
plug production	7 weeks																																																		
TP period	Weeks 34-38																																																		
Finish time from TP	36-38 weeks																																																		
Sales period	Weeks 18-23																																																		
Sow period	Weeks 5-19																																																		
plug production	7 weeks																																																		
TP period	Weeks 12-25																																																		
Finish time from TP	10-14 weeks																																																		
Sales period	Weeks 25-34																																																		

First Year Flowering Perennials

Annual



Bandera Purple

Vs.

- Why the distinction?
- Many perennials can be grown like annuals
- Can be accurately scheduled for flowering
- Can add texture that many annuals cannot

Perennial



Blue Spear

FYF Perennials from Seed

A few of my favorites

- (Aquilegia Early Bird)*
- Armeria Ballerina – 8 weeks
- Bellis Habanera
- Coreopsis Double the Sun, Sunkiss
- Dianthus Rockin' Red
- Echinacea Pow Wow, Cheyenne Spirit, (Lakota)
- Gaillardia Mesa
- Lavender Blue Spear, Ellagance, Avignon Early Blue, Bandera
- Leucanthemum Madonna, (Early White)
- Salvia New Dimension, Salvatore Blue



FYF Perennials from Cutting or Liner

A few of my favorites



- Achillea New Vintage, Milly Rock
- Coreopsis Uptick, Superstar
- Digitalis Arctic Fox Rose
- Echinacea Sombrero
- Heuchera Carnival
- Iberis Summer Snowdrift
- Lavender Superblue
- Perovskia Crazy Blue
- Phlox Ka-Pow, Cherry Cream
- Salvia Blue By You, Marvel
- Veronica Moody Blues

How You Can Grow Like a Pro

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**Thank
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