

# Overview of Plant Growth Regulators (PGRs) for Greenhouse Production

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Chemical	Trade name	Active Ingredient (A.I. %)	Application type	Application target	Growth Response					Water quality	Spreader sticker	Phytotoxicity potential	Substrate reduce efficacy	Restricted entry interval (REI, hrs.)	Notes		
					Suppress	Extend/Promote	Branching	Flower bud abscission	Reduce leaf chlorosis								
Ancymidol	Abide®	0.0264%	Spray Dip Drench	Leaves Stems Roots	X					pH: 5.5 - 6.5	No	Yes	Pine bark: Yes	12	<ul style="list-style-type: none"> <li>Can be applied to plugs.</li> <li>Solution should be agitated to continuously for uniform distribution.</li> <li>Do not reuse containers.</li> <li>Reduced efficacy may occur at increased temperatures.</li> <li>At higher application rates, phytotoxicity can occur as necrotic (brown, dead) spots.</li> <li>Vigorous plants may require increased ancymidol concentration rates or multiple low ancymidol concentration applications.</li> </ul>		
	A-Rest®		Spray Dip Drench	Leaves Stems Roots	X												
Benzyladenine (BA)	Configure®	2.0%	Spray Drench	Leaves	X		X			---	Yes	---	---	12	<ul style="list-style-type: none"> <li>Complete coverage required.</li> </ul>		
Chlormequat chloride	Citadel®	11.8%	Spray Dip Drench	Leaves Stems Roots	X					pH: 3.0 - 7.0	No	Yes	---	12	<ul style="list-style-type: none"> <li>Can be applied to plugs.</li> <li>Greatest affect at the beginning of rapid stem elongation/ extension.</li> </ul>		
	Cycocel®		Spray Dip Drench	Leaves Stems Roots	X												
Daminozide	B-Nine®	85.0%	Spray	Leaves	X					pH: 5.0 - 9.0	No	Yes	---	24	<ul style="list-style-type: none"> <li>Can be applied to plugs and cuttings.</li> <li>Do not apply to lilies.</li> <li>Highly effective in cool climates.</li> </ul>		
	Dazide®		Spray	Leaves	X											12	
Dikegulac sodium	Atrimmec®	18.5%	Spray Drench	Leaves	X					---	No	Yes	---	4	<ul style="list-style-type: none"> <li>Solution should be agitated to continuously for uniform distribution.</li> </ul>		
	Augeo®		Spray Drench	Leaves	X					---	No	Yes	---	4			
Ethephon	Collate®	21.7%	Spray	Leaves	X		X	X	X	pH: 4.0 - 5.0 CaCO <sub>3</sub> : <300 ppm	Yes	Yes	---	48	<ul style="list-style-type: none"> <li>Can be applied to plugs.</li> <li>REI in areas with avg. rainfall &lt;25"/ year: 72 hrs.</li> </ul>		
	Flore!®	3.9%	Spray		X		X	X	X					48			
Flurprimidol	Topflor®	0.38%	Bulb soak Spray Dip Drench	Leaves Stems Roots	X					---	No	Yes	Pine bark: Yes Wood fiber: No	12	<ul style="list-style-type: none"> <li>Can be applied to plugs.</li> <li>Solution should be agitated to continuously for uniform distribution.</li> <li>Do not reuse containers.</li> <li>No recommended for use on fibrous begonia (<i>Begonia × semperflorens-cultorum</i>).</li> <li>Vinca (<i>Catharanthus roesus</i>) may develop black leaf spotting as a result of foliar spray application with a high concentration of flurprimidol and at high temperatures.</li> </ul>		
			Gibberellin (GA3)	Florgib® ProGibb T&O®	4.0%	Spray Spray	Leaves Stems		X								
Paclobutrazol	Bonzi®	0.4%	Bulb soak Spray Dip Drench	Leaves Stems Roots	X					pH: 4.0 - 9.0	No	Yes	---	12	<ul style="list-style-type: none"> <li>Can be applied to plugs.</li> <li>Solution should be agitated to continuously for uniform distribution.</li> <li>Do not reuse containers.</li> <li>Foliar spray applications should be applied heavy enough to contact the stem of the plant.</li> <li>Substrate drenches can be applied at a single high concentration or as multiple low concentration applications.</li> <li>Chemical is highly effective at low concentrations and persists longer than most PGRs.</li> </ul>		
	Downsize®		Drench		X											---	12
	Paczol®		Bulb soak Spray Dip Drench		X											---	12
	Piccolo®		Bulb soak Spray Dip Drench		X											Pine bark: Yes Wood fiber: No Wood chips: No	12
	Piccolo 10XC®		4.0%		Bulb soak Spray Dip Drench	X											---
Uniconazole	Concise®	0.055%	Bulb soak Spray Dip Drench	Leaves Stems Roots	X					pH: 5.5 - 6.5	No	Yes	Pine bark: Yes	12	<ul style="list-style-type: none"> <li>Can be applied to plugs.</li> <li>Widely used on herbaceous perennials.</li> </ul>		
	Sumagic®		Bulb soak Spray Dip Drench	Leaves Stems Roots	X											12	
BA+GA4+7 Combinations	Fascination®	1.8%+1.8%	Spray	Leaves				X		---	No	---	---	4	<ul style="list-style-type: none"> <li>Apply to lilies to avoid of reduce lower leaf chlorosis and leaf drop and can prolong flower life.</li> <li>Apply to geranium cuttings after stick to reduce lower leaf chlorosis.</li> <li>Apply to poinsettias to promote or increase bract expansion.</li> </ul>		
	Fresco®		Spray					X								4	

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**References**

B.E. Whipker. 2019. Plant Growth Regulators for Annuals. GrowerTalks.  
 J. Latimer. 2018. Growth Regulators for Containerized Herbaceous Perennial Plants. GrowerTalks.  
 W.G. Owen. 2018. PGR drenches and commercially available wood fiber substrates.  
 W.G. Owen, B.E. Jackson, B.E. Whipker, and W.C. Fonteno. 2016. Paclobutrazol drench activity not affected in sphagnum peat-based substrates amended with pine wood chip aggregates. HortTechnology 26(2):156-163.

