PI-102

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IFAS Extension

Plant Growth Regulators[1]

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This document discusses the meaning of the term "plant growth regulator," patterns of use and provides a listing of plant growth regulators registered for use in Florida.

Introduction: what are plant growth regulators?

Simply put, plant growth regulators (also known as growth regulators or plant hormones) are chemicals used to alter the growth of a plant or plant part. Hormones are substances naturally produced by plants; they control normal plant functions, such as root growth, fruit set and drop, growth and other development processes. Legally, they are regulated as pesticides under the Florida Department of Agriculture and Consumer Services (FDACS) and must be registered for use as would any pesticide within the state.

FDACS Definition of "Plant Regulator"

> Any substance or mixture of substances intended, through physiological action, for accelerating or retarding the rate of growth or maturation, or for otherwise altering the behavior, of ornamental or crop plants or the produce thereof; but does not include substances intended as plant nutrients, trace elements, nutritional chemicals, plant inoculants, or soil amendments.

The use of plant growth regulators in agricultural production within the United States began during the 1930s. The first discovery and use was with acetylene and ethylene, which enhanced flower production in pineapple. Subsequently, their use has grown exponentially and they are major components of agricultural commodity production. Although not true plant growth regulators, certain herbicides and insecticides cause some plant growth-regulating effects. For example, the widely used insecticide, carbaryl is used to thin apple fruit from trees and to aid in encouraging annual bearing. There are six major classes of plant growth regulators according to the American Society for Horticultural Science. Table 1 lists these classes with the development function(s) and examples of practical uses which they are associated with. Table 2 provides more Florida-specific information regarding plant growth regulators registered in this state. Major commodities associated with their use, their primary function(s) and examples of trade names are included in the table.

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Additional Information

American Society for Horticultural Science: http://www.ashs.org/

Table 1. Plant growth regulator class, associated function(s) and practical uses.

Class	Function(s)	Practical uses
Auxins	Shoot elongation	Thin tree fruit, increase rooting and flower formation
Gibberellins	Stimulate cell division and elongation	Increase stalk length, increase flower and fruit size
Cytokinins	Stimulate cell division	Prolonging storage life of flowers and vegetables, bud initiation and root growth
Ethylene generators	Ripening	Induce uniform ripening in fruit and vegetables
Growth inhibitors	Stops growth	Promote flower production by shortening internodes
Growth retardants	Slows growth	Retard tobacco sucker growth

Table 2. Plant growth regulators registered for use in Florida.

Active ingredient	Registered crops and functions	Trade names*
Ancymidol	Ornamental plants – growth inhibitor	A-Rest®
Butralin	Tobacco – shoot inhibitor	Butralin®
C8 – C10 fatty alcohols	Tobacco – shoot inhibitor	Fair®, Royaltac®, Sucker-Plucker®, Off-Shoot®, Contact-85®
Chlormequat chloride	Ornamental flowers – shoot inhibitor	Cycocel®
Daminozide	Ornamental plants – growth inhibitor	B-Nine®
Ethephon	Turfgrass – reduces mowing frequency Various fruits, vegetables, and nuts – hastens ripening and maturity, enhance fruit color and floral stimulant Cucurbits – increases flowering Ground covers – inhibits flowering Ornamental trees – inhibits fruiting Tobacco and cotton – hastens maturity Cereal grains and grasses grown for seed – reduces lodging	Proxy®, Ethrel®, Florel®, Mature®, Prep®, Cerone®
Fluprimidol	Ornamental woody plants and ground covers – reduces pruning Turfgrass – reduces mowing frequentcy	Cutless®
Gibberellic acid	Small fruits, cucurbits – increase fruit set Citrus – promote rind/peel integrity, prevent fruit drop Rice, cotton – growth enhancer	GibGro®
Gibberellin mixtures	Cut flowers – plant preservative Tree fruit – increase fruit size, hasten maturity, shoot stimulant Evergreen trees – floral stimulant, stimulate germination	BVB®, Fascination®, Procone®
Maleic hydrazide	Tobacco – shoot inhibitor Stored bulbs – sprout inhibitor	Sucker Stuff®, Royal®, Fair®
Mefluidide	Ground covers, shrubs, ornamental trees – reduces pruning Turfgrass – reduces mowing frequency	Embark®
Mepiquat chloride	Cotton - growth inhibitor, enhance uniform fruit maturity	Pix®
Mepiquat pentaborate	Cotton – growth inhibitor, enhance uniform fruit maturity	Pentia®
NAD	Woody ornamental cuttings – rooting stimulant	Rootone®
Naphthalene-acetic acid (NAA)	Ornamental plants – stimulates rooting, increase vegetative growth	Dipn Grow®, Hi-Yield®
n-Decanol	Tobacco – shoot inhibitor	Antac®, FST-7®, Royaltac®
Paclobutrazol	Ornamental plants – reduces internodal length Ornamental trees – growth inhibitor Turfgrass – increased plant thickness, growth inhibitor	Bonzi®, Cambistat®, Profile®, Piccolo®
Prohexadione calcium	Peanut – reduce excessive vine growth Tree fruit – reduce tree canopy volume Turfgrass grown for seed – increase seed set	Apogee®
Trinexapac-ethyl	Turfgrass – reduces mowing frequency	Primo®

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Active ingredient	Registered crops and functions	Trade names*
Uniconazole	Ornamental plants – growth inhibitor	Sumagic®

*Consult individual labels for specific sites and commodities approved for use.