

THE ELEMENTS FOR SUCCESS

Unraveling the mystery of PGRs, Growth Products and Stimulants

Today's indoor gardening and greenhouse market offers many different products which claim to enhance or alter plant growth and/or development in some fashion. Designations like plant growth regulator (PGR), plant stimulant, growth stimulant, biostimulant, plant enhancer, growth enhancer, plant fortifier, and bio-catalyst can be found on a multitude of products. Which one should you choose?

To answer this question, first decide what benefits or plant responses you want. Do you want more flowers, lusher green leaves, a stronger root system, help in naturally fighting off disease pathogens and insects...maybe all of these responses? Next, you need an understanding of what all those ingredients listed on the various labels or product flyers can really do for your plants.

There are a number of natural and synthetic compounds listed as ingredients – various plant hormones, enzymes and amino acids – which positively affect plant metabolic functions and thereby growth or development. We offer the following information to expand your understanding of PGRs, growth products and stimulants.

Auxins, plant hormones widespread in stem, bud and root-tip tissues, influence developmental processes such as shoot and stem elongation, adventitious roots initiation and stimulation of fruit development. In general, auxins promote cell elongation and overall development. Synthetic auxins such as indole-3-butyric acid (IBA) and naphthaleneacetic acid (NAA) are sold as "rooting hormones" and used extensively in asexual propagation. NAA and other auxins are also used commercially to prevent preharvest fruit drop.

Cytokinins, are plant hormones associated with cell division. There are more than 200 identified natural and synthetic forms. Cytokinins concentrate in the roots, young leaves, developing fruit and seeds and interact with auxins in a number of metabolic functions. Cytokinins can also induce systemic resistance to pathogens and insects, and are known to help reduce environmental and transplant stress.

Betaines, a sub-class of plant hormones, have been implicated in stress tolerance and stimulation of immune systems. Betaines are especially helpful in alleviating environmental stresses such as high temperature or excessive temperature swings, water stress or undesirable humidity.

Ethylene, reluctantly classified as a plant hormone due to its gaseous nature, regulates fruit ripening, flower opening, and can break dormancy. Ethylene also promotes flowering, especially female flowers for seed production. Ethylene, like cytokinins, also interacts with auxins to regulate growth activities.

Gibberellins (Gibberellic acid or GA), is another plant hormone of which over 125 forms have been identified. GAs have a variety of activities including promotion of germination in dormant seeds and induction of flowering. Gibberellins can also increase fruit size or change fruit shape.

Other plant hormones - Abscisic Acid, Brassinosteroids, Jasmonates, Salicylates - are present in various quantities in your plants, but are not readily available as retail or commercial growth products.

Amino acids are the building block of proteins and provide an alternate form of organic (biological) nitrogen. When applied during critical stages of growth, amino acids can help relieve environmental stress and enhance photosynthesis. Amino Acids are precursors or activators of phytohormones and growth substances.

Plant active proteins, such as the harpin proteins, are little self-contained genetic programs made up of chains of amino acids. These genetic programs, if recognized and accepted, can trigger events in the plant leading to defense and growth responses. Enzymes are complex proteins produced in cells that promote an assortment of bio-chemical reactions and regulate all living processes. Researchers are still unraveling the mystery of enzymes and proteins.

Hormones, natural and synthetic, can be useful tools in indoor gardening and greenhouses because of the beneficial effects they elicit in your plants. Remember, decide what responses or benefits you want from a growth promoting product; then choose a product that contains ingredients that will elicit those responses. For a broad-spectrum of responses, choose products with a mixture of hormones, amino acids and enzymes.

Still not sure which product to choose? Call the manufacturers, ask questions. Ask for samples and try different products in your garden or greenhouse and compare responses for yourself. Always follow manufacturer's use recommendation for application timing and rates. Plant growth products work at very small use rates and during specific times during plant development. It should be noted that no product is a "cure-all, miracle potion" and growth promoting products, in particular, must be used as part of a complete management program with a solid strategy. Good Luck and Have Fun.

Stay tuned for more information on this subject in future "Elements for Success." Or for more in-depth information now, try these informative resources:

Green Air Products, Inc. www.greenair.com

Outline for a Comprehensive Theory of Plant Hormones.

www.planthormones.info/

Plant Hormones. www.plant-hormones.info/

Plant Hormones, Nutrition and Transport.

www.emc.maricopa.edu/faculty/farabee/BIOBK/BioBookPLANTHORM.html

"THE ELEMENTS FOR SUCCESS" are brought to you by Green Air Products Inc.
Redefining Excellence in Hydroponic and Indoor Gardening for over 20 years

BIO-GENESIS SYNERGY ORGANIC PLANT STIMULANT

An OMRI-Listed proprietary blend of fermented plant & seaweed extracts that provides natural hormones, humates, complex carbohydrates, enzymes, amino acids, and a multifaceted blend of metabolic precursors. Synergy™ offers high biological activity at much lower use rates compared to other bio-stimulants.

Synergy™ will empower your plant to achieve it's full genetic potential!

AN ORGANIC SUPPLEMENT COMPRISED OF FERMENTED SEAWEED AND PLANT EXTRACTS TO ENHANCE NUTRIENT UPTAKE & PLANT VIGOR

- Induces rapid cell division
- Enhances cell differentiation
- Stimulates bud break (flower & fruit initiation)
- Improves vascular development
- Accelerates photosynthesis
- Increases flavor, smell, quantity of flowers & fruit

DIRECTIONS FOR USE

SYNERGY is not a plant food and should be used in conjunction with a complete fertilizer program.

SHAKE BOTTLE WELL BEFORE USING PRODUCT

STAGE OF DEVELOPMENT	USE RATE per GALLON of WATER
SEEDS	½-1 teaspoon
CUTTINGS & VEGETATIVE STAGE	1 teaspoon
TRANSPLANT, AT PLANTING, PREPLANT	1½ teaspoons
FOLIAR SPRAYS	1 teaspoon
TRANSITION or STRESSED PLANTS	2 teaspoons
FLOWERING	1-1½ teaspoons

WANT OPTIMUM RESULTS?

Make sure hydroponic reservoirs have plenty of oxygen and stay well agitated. Always adjust pH to 6.5 or below prior to adding SYNERGY and add it last to your nutrient solution. Keep well mixed and oxygenated until and during use.

HANDLING AND STORAGE REQUIREMENTS

Keep lid tightly closed. Store in a dry area, above freezing, below 105°F, and not in direct sunlight. Keep out of reach of children.

CONVERSION FACTORS

1 Teaspoon = 5 mL	1 Cup = 237 mL
1 Quart = 0.95 L	1 Gallon = 3.8 L

INGREDIENTS

NON-PLANT FOOD INGREDIENTS

Humic acids derived from seaweed	0.8%
Seaweed extract (<i>ascophyllum nodosum</i>)	1.7%
Plant extracts	60.0%

QUESTIONS? CONTACT US...

Green Air Products, Inc.
P.O. Box 1318, Gresham, OR 97030 USA
(800) 669-2113 • www.greenair.com

Available in Pints (473 mL), Quarts (946 mL) & Gallons (3.8 L)

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