
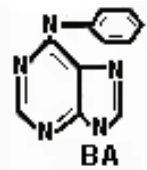
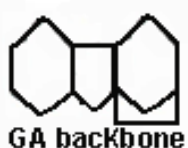
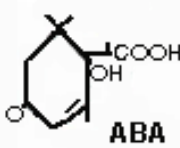


PLANT HORMONES AND GROWTH SUBSTANCES

DEFINITIONS, TYPES AND PROPERTIES

Hormone - an endogenous or naturally-occurring compound that is produced or synthesized in one part of the plant and causes a change in physiology, growth or development in another part of the plant; usually present in very small quantities.

Growth Substance - all naturally-occurring or synthetically produced substances that affect the physiology, growth and development of plants.

Naturally-Occurring Example	Synthetic Example	Structure	Site of Production
Auxin			
<ul style="list-style-type: none"> indoleacetic acid (IAA) 	<ul style="list-style-type: none"> indolebutyric acid (IBA) naphthaleneacetic acid (NAA) 2,4-dichlorophenoxyacetic acid (2,4-D) 		<ul style="list-style-type: none"> shoot tips embryos
Cytokinin			
<ul style="list-style-type: none"> zeatin kinetin (not in plants) 	<ul style="list-style-type: none"> benzyladenine (BA) pyranylbenzyladenine (PBA) 		<ul style="list-style-type: none"> root tips embryos
Gibberellic Acid (GA)			
<ul style="list-style-type: none"> over 90 	<ul style="list-style-type: none"> none 		<ul style="list-style-type: none"> shoot tips root tips embryos
Ethylene			
<ul style="list-style-type: none"> ethylene 	<ul style="list-style-type: none"> ethephon or ethrel (both release ethylene inside plant) 	$H_2C=CH_2$ ethylene	<ul style="list-style-type: none"> ripening fruits aging flowers germinating seeds wounded tissue
Abscisic Acid (ABA)			
<ul style="list-style-type: none"> abscisic acid 	<ul style="list-style-type: none"> none 		<ul style="list-style-type: none"> plastids, especially chloroplast

EFFECTS AND PRACTICAL APPLICATIONS OF HORMONES/GROWTH SUBSTANCES

AUXIN

- 1) **Tropism** - response of plants to environmental or physical stimuli.
 - a) **phototropism** - response to light
 - b) **geotropism** - response to gravity
 - c) **thigmotropism** - response to touch
- 2) **Apical dominance** - determined by apical bud, partly due to auxin produced
- 3) **Fruit set** - low concentrations stimulate
- 4) **Fruit or flower thinning** - high concentrations cause
- 5) **Herbicides** - 2,4-D at high concentrations
- 6) **Adventitious root formation**
 - a) stem and leaf cuttings
 - b) tissue culture

CYTOKININ

- 1) **Leaf aging or abscission** - may delay
- 2) **Seed germination** - may overcome dormancy or stimulate germination
- 3) **Adventitious shoot formation**
 - a) leaf and root cuttings
 - b) tissue culture

page 32

EFFECTS AND PRACTICAL APPLICATIONS OF HORMONES/GROWTH SUBSTANCES - cont.

GIBBERELIC ACID (GA)

- 1) **Rosette or dwarf plants** - lack of endogenous GA often causes
 - **growth retardants** - chemicals that block GA synthesis; are used in greenhouse and bedding plant production to produce compact plants.
- 2) **Flowering** - may cause bolting in biennials
- 3) **Fruit size** - increases size of seedless grapes
- 4) **Bud dormancy** - may overcome and substitute for cold treatment
- 5) **Seed germination** - may increase or speed up
- 6) **Sex expression** - favors staminate flower formation on monoecious plants

ETHYLENE

- 1) **Fruit ripening** - stimulates in many fruits, ex. banana
- 2) **Flowering** - triggers flowering in some bromeliads, ex. pineapple.
- 3) **Flower longevity** - causes senescence (death) of cut flowers
- 4) **Leaf abscission** (leaf drop) - causes in some plants
- 5) **Leaf epinasty** (curling and contortion of leaves) - causes in some plants
- 6) **Sex expression** - favors pistillate flower formation on monoecious plants

ABSCISIC ACID (ABA)

- 1) **Dormancy** - causes bud or seed dormancy
- 2) **Leaf abscission** (leaf drop) - may cause in some plants
- 3) **Stomata** - causes stomata to close (a response to drought stress)

Go to: [Table of Contents](#) | [Introduction](#) | [Anatomy](#) | [Physiology](#) | [Hormones](#) | [Temperature](#) |
| [Light](#) | [Water](#) | [Soil](#) | [Nutrition](#) | [Propagation](#) | [Pruning](#) | [Pests](#) |

Page: [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](#) [27](#) [28](#) [29](#) [30](#) [31](#) [32](#) [33](#) [34](#) [35](#) [36](#) [37](#) [38](#) [39](#) [40](#) [41](#) [42](#) [43](#)
[44](#) [45](#) [46](#) [47](#) [48](#) [49](#) [50](#) [51](#) [52](#) [53](#) [54](#) [55](#) [56](#) [57](#) [58](#) [59](#) [60](#) [61](#) [62](#) [63](#) [64](#) [65](#) [66](#) [67](#) [68](#) [69](#) [70](#) [71](#) [72](#) [73](#) [74](#) [75](#) [76](#) [77](#) [78](#) [79](#) [80](#) [81](#) [82](#) [83](#) [84](#)
[85](#) [86](#) [87](#) [88](#) [89](#) [90](#) [91](#) [92](#) [93](#) [94](#) [95](#) [96](#) [97](#) [98](#) [99](#) [100](#)
