



# Role of auxins and gibberellins



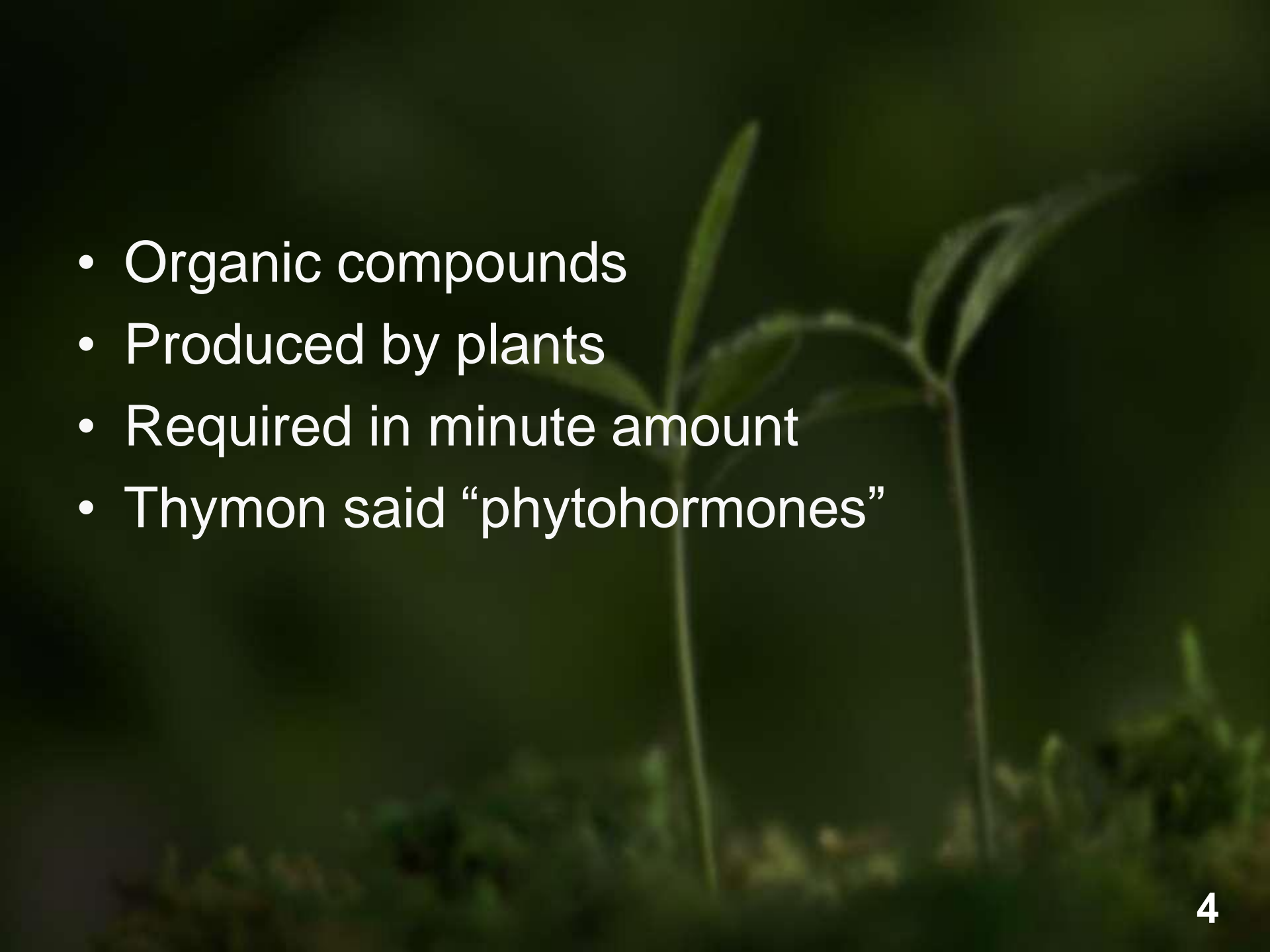
# **C**ONTENT:

- Plant growth regulators
- Introduction
- Mechanism of action
- Auxin
- Gibberellins

# Plant Growth Regulators;

- A **plant growth regulator** is an organic compound, either natural or synthetic, that modifies or controls one or more specific physiological processes within a plant.



- 
- Organic compounds
  - Produced by plants
  - Required in minute amount
  - Thymon said “phytohormones”

# 3 TERMINOLOGIES

- Hormones => animals
- Phytohormones => plants
- Plant growth regulators=> synthetically produced i.e.  
IAA (naturally)  
IBA (synthetically)



❖ Also called as Phytohormones ,  
These are the physiochemical intercellular  
messengers that regulates ;

- Germination
- Rooting
- Growth
- Flowering
- Fruit ripening
- Foliage and death
- Bud dormancy etc

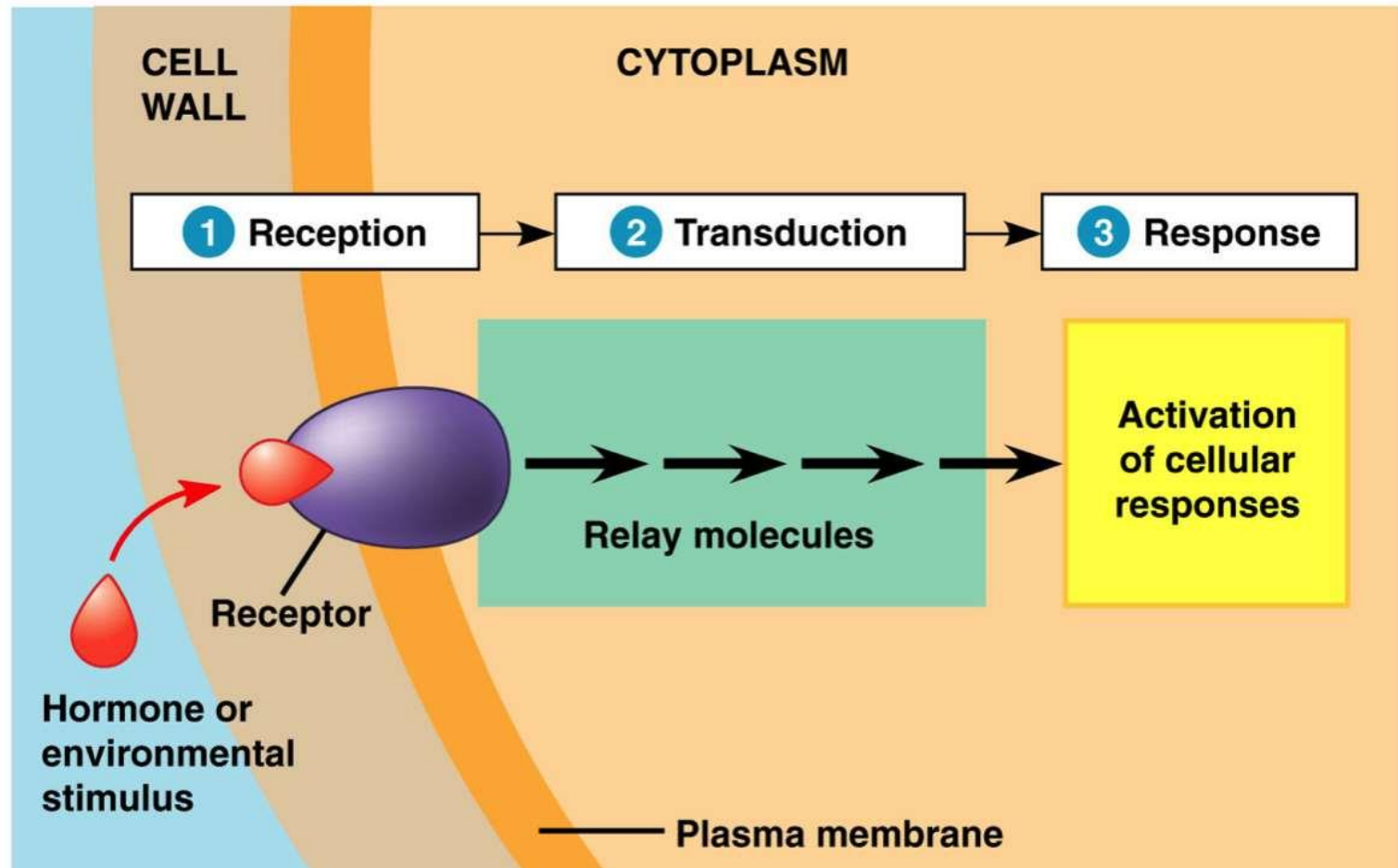


# Types of Plant Growth Regulators

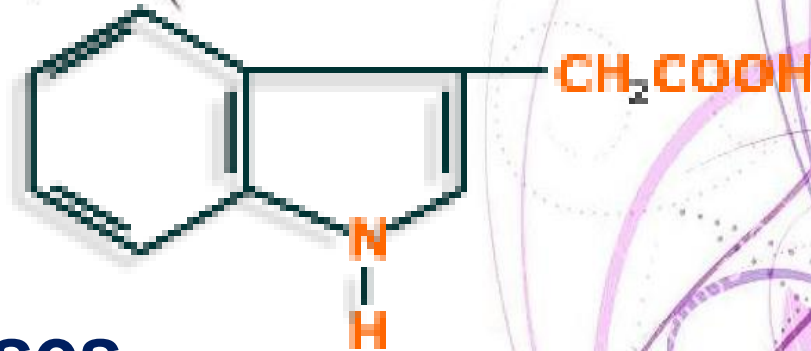
- Auxins
- Gibberellins
- Cytokinins
- Ethylene glycol
- Abscisic acid



# 3 Steps of Signal Transduction:



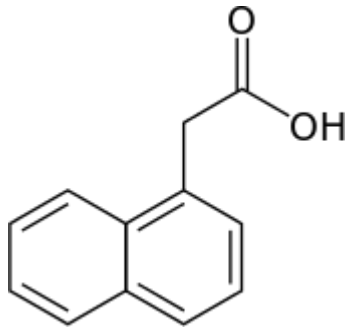
# Auxin



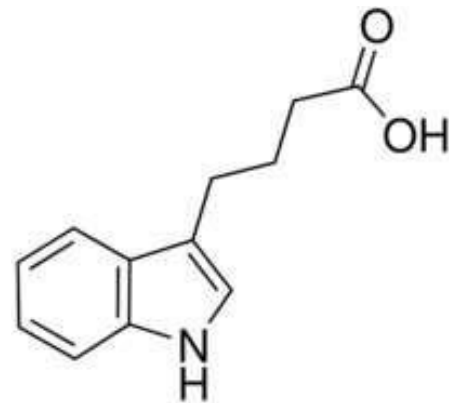
- a plant hormone which causes the elongation of cells in shoots and is involved in regulating plant growth.

# Introduction:

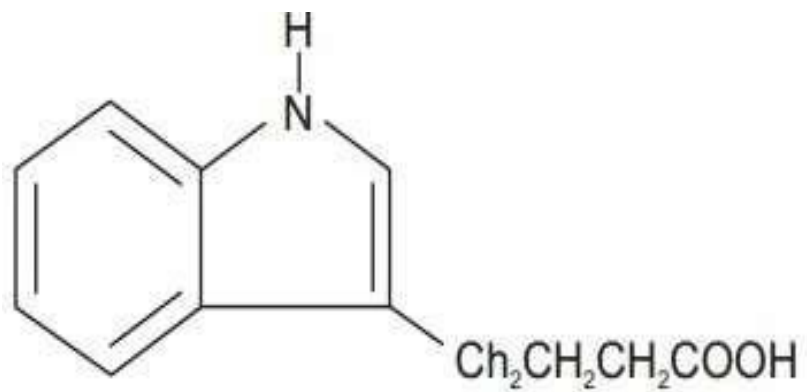
- The term auxin is derived from a greek word *auxein* which means “to grow”
- First growth hormone
- Promotes elongation of young shoots(IAA)
- Promotes fruit growth



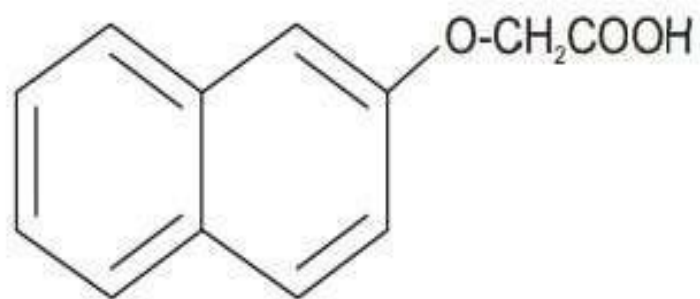
Alpha NAA



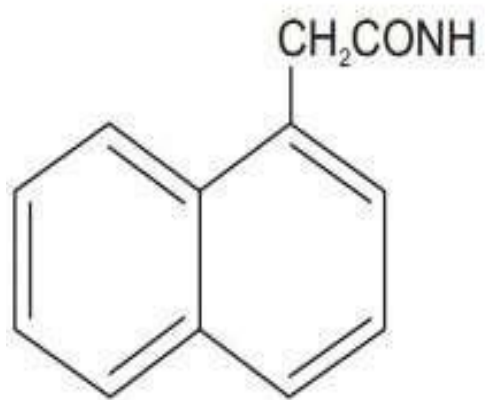
IBA



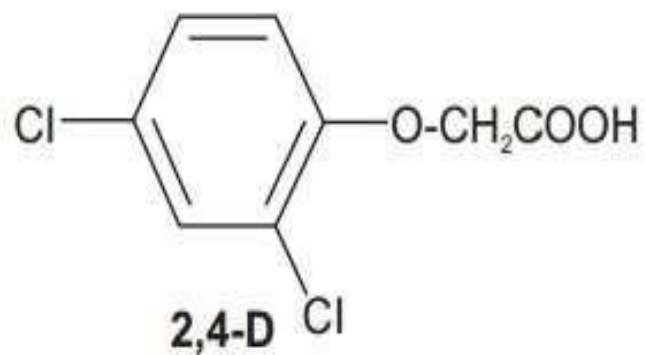
**IBA**



**NOA**



**NAD**

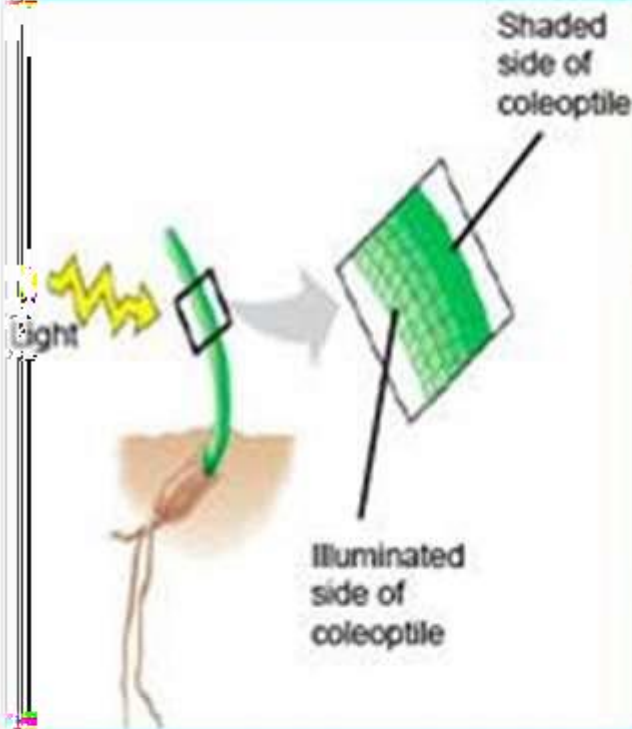


**2,4-D**

# Role of hormones in phototropism...

Measuring phototropism  
Growth toward light

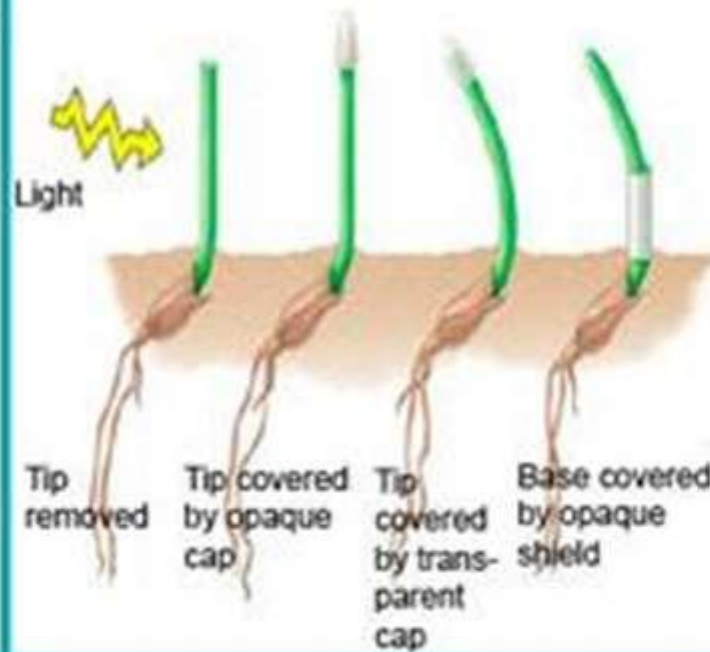
Control



**Conclusion:**  
Tropism toward light

What part of plant perceives signal?

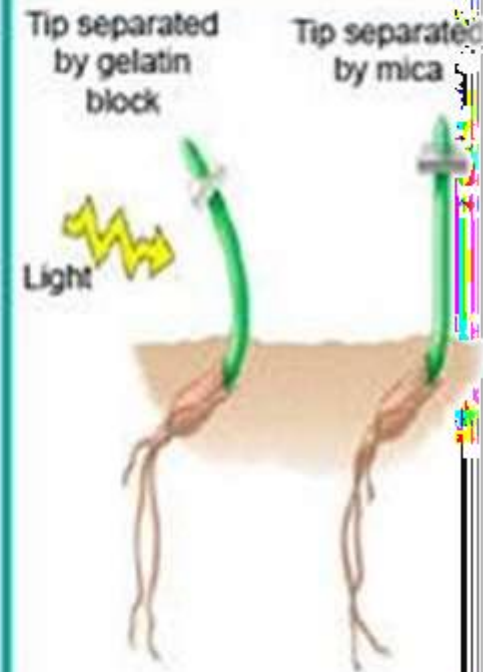
Darwin and Darwin (1880)



**Conclusion:**  
Light signal is perceived by tip

Is the signal mobile?

Boysen-Jensen (1913)



**Conclusion:**  
Signal is a mobile chemical



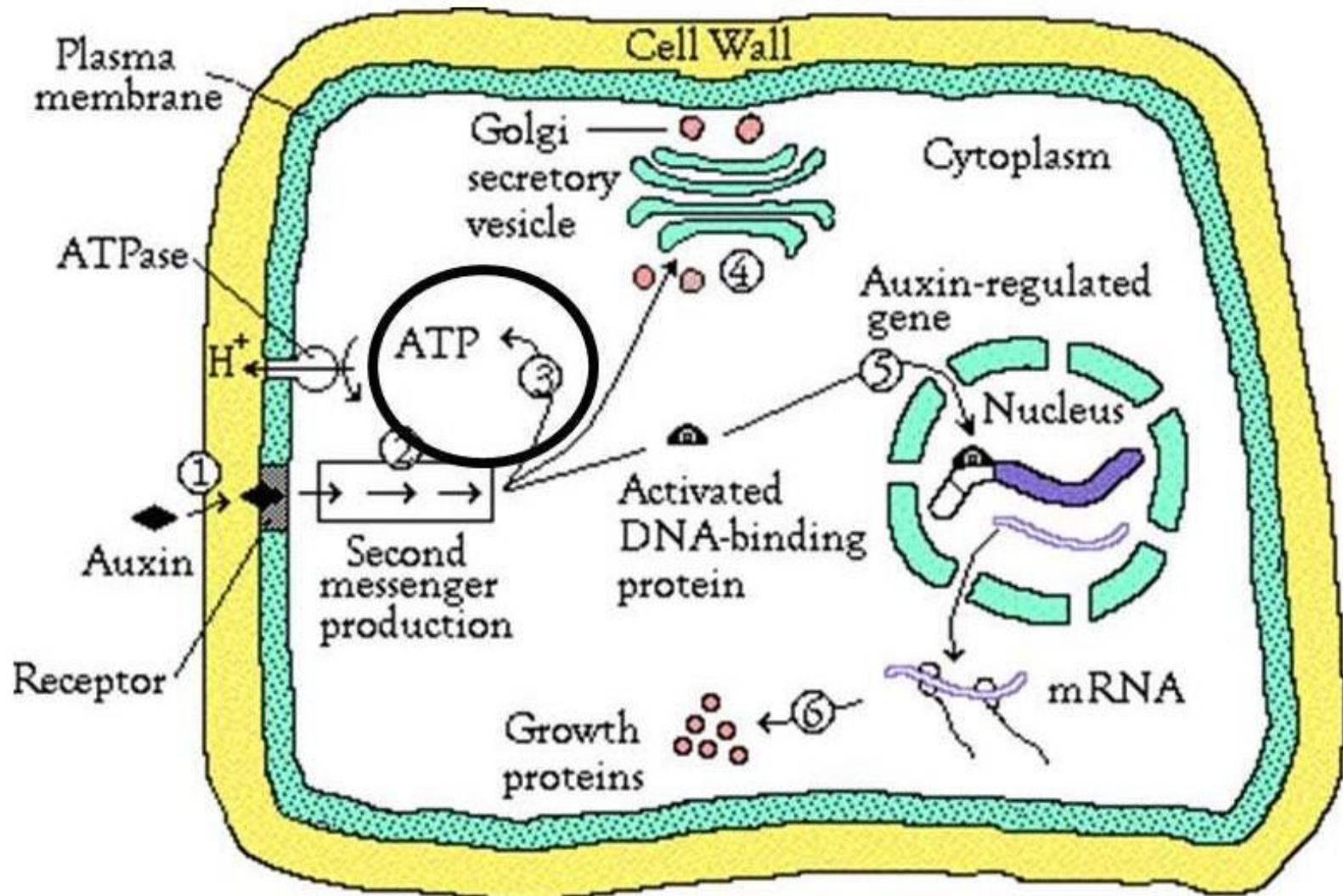
# Production:

- Produced in root cells
- shoot meristematic tissue,
- In young leaves
- Mature root cells
- In the embryo

# **Mechanism of action :**

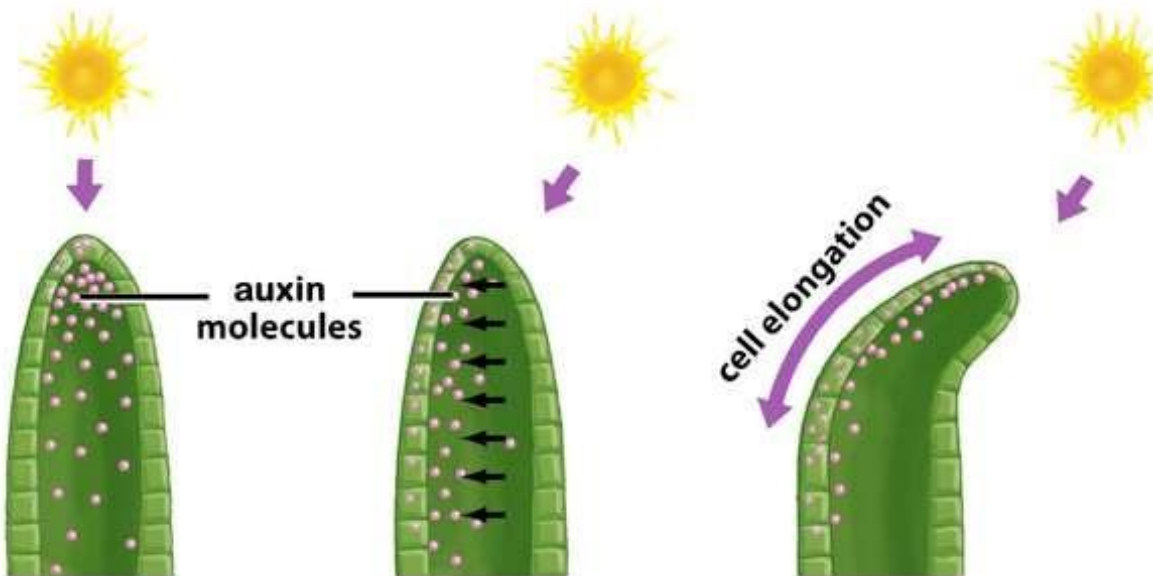
- 1. Binding of hormone**
- 2. Signaling**
- 3. Activation Proton pumps**
- 4. Action of Golgi apparatus**
- 5. Activation of DNA Protiens**
- 6. Production of protiens**

# Signaling pathways due to Auxin

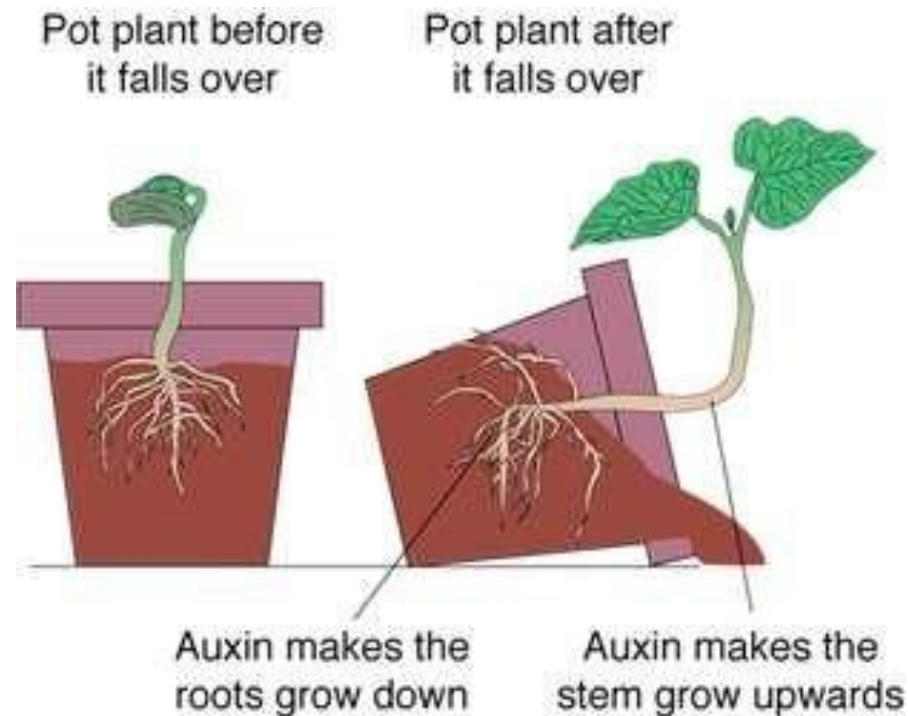


# Functions of Auxin;

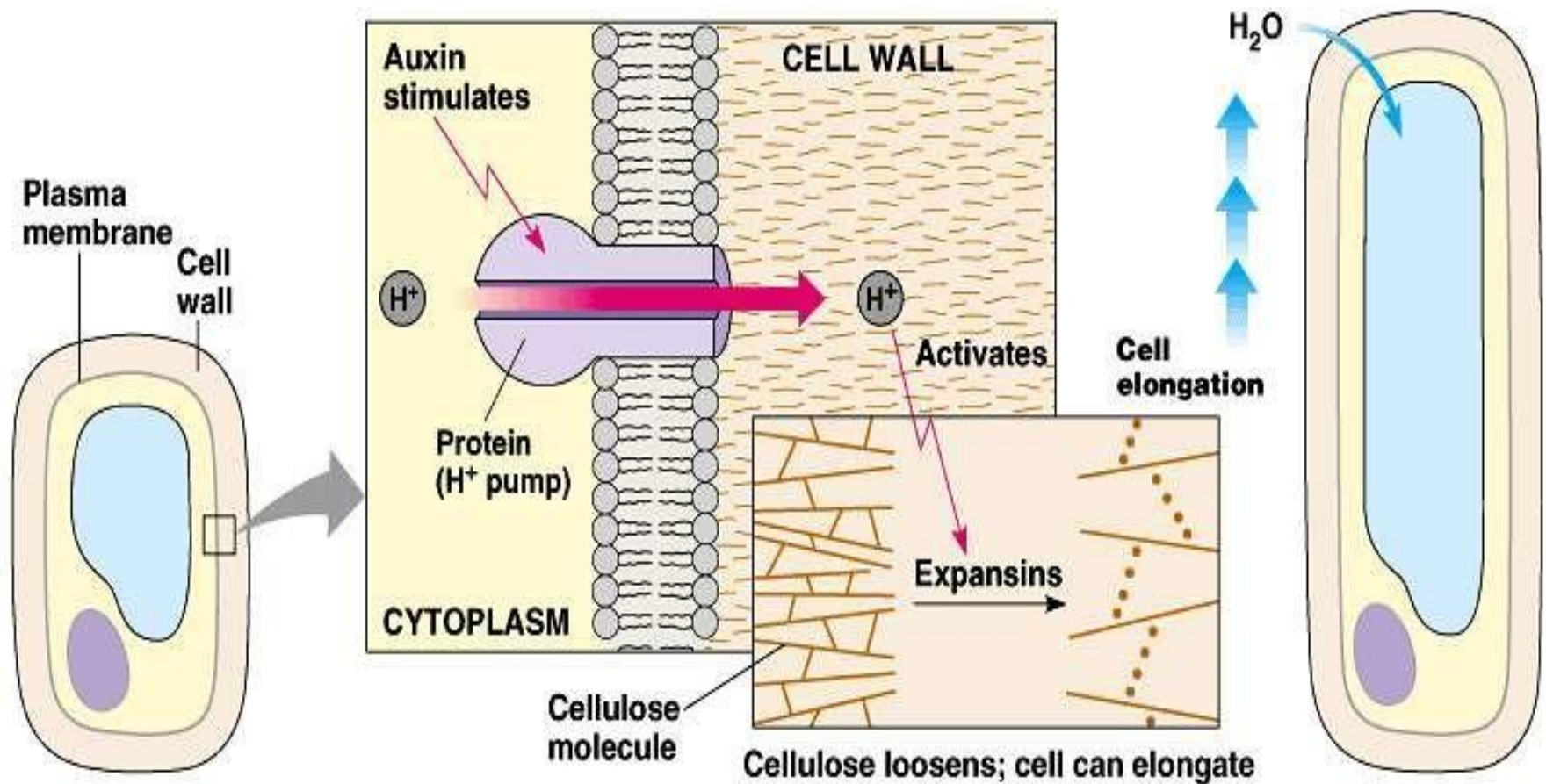
- Auxin promotes cell growth
- Help in phototropism
- Suppresses lateral growth



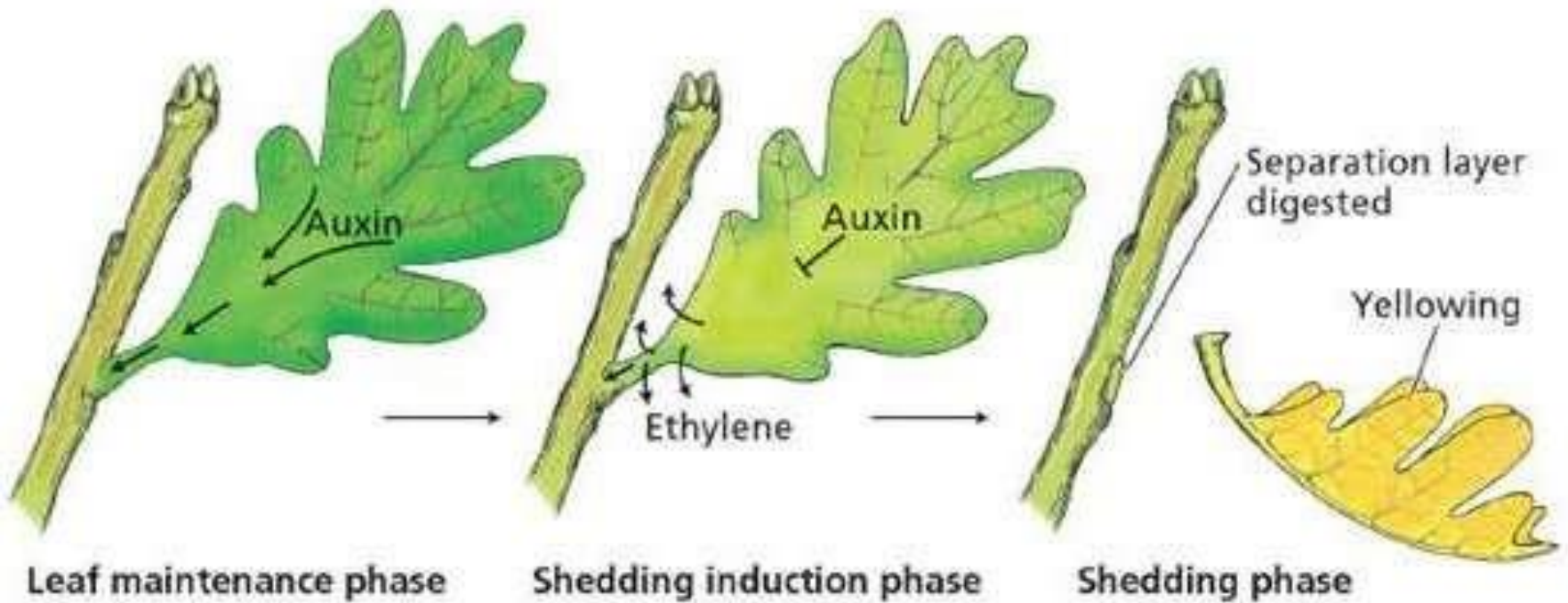
- Auxin is required for fruit growth
- Rooting elongation.
- Tropistic response of bending



- Elongation of the plant,
- Increases the plasticity of the cell wall

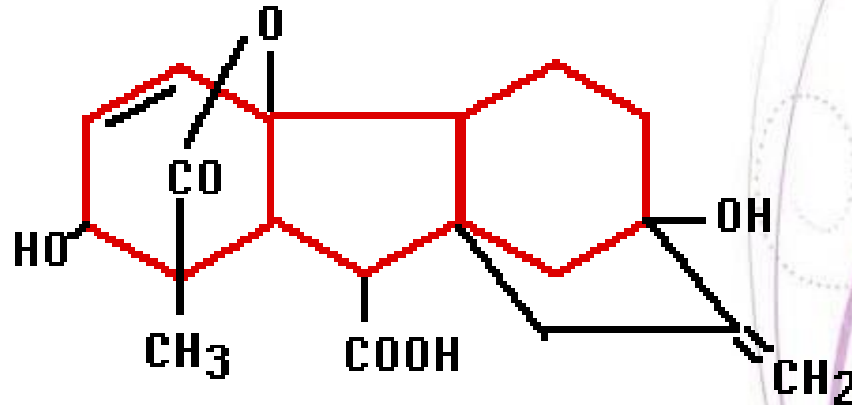


- Leaf and fruit abscission



# GIBBERELLINS

•A class of diterpene plant growth hormones that regulate growth and various developmental processes.

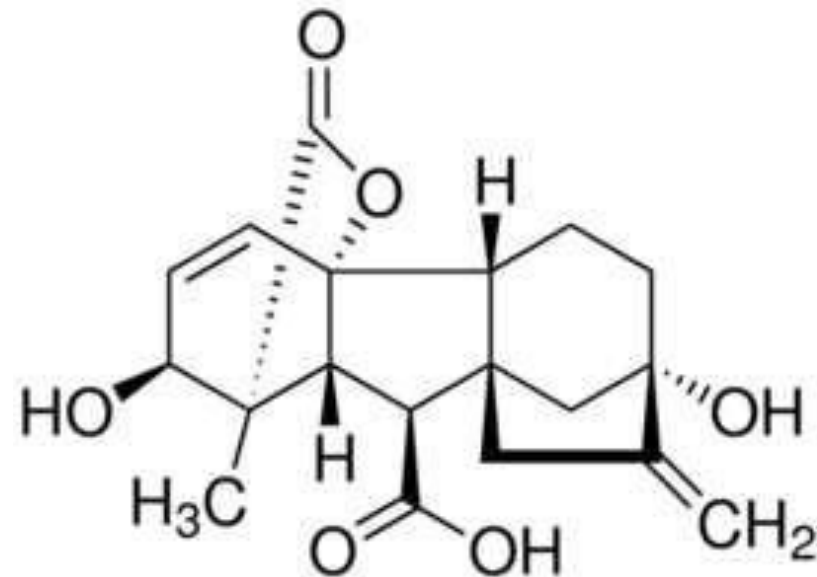


**Gibberellic acid (GA3)**

# INTRODUCTION:

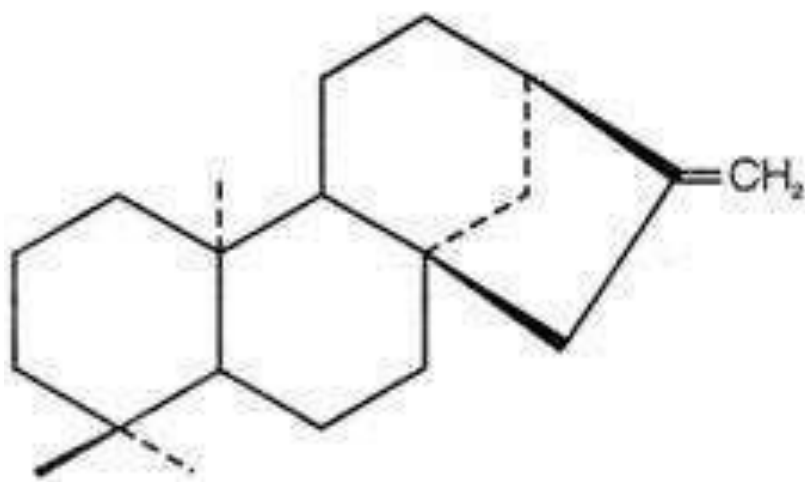
- First Gibberellin to be structurally found as GA<sub>3</sub>
- About 136 GAs identified
- Diterpenoid acids
- Weakly acidic compound
- of rice seedlings.

Gibberellic Acid

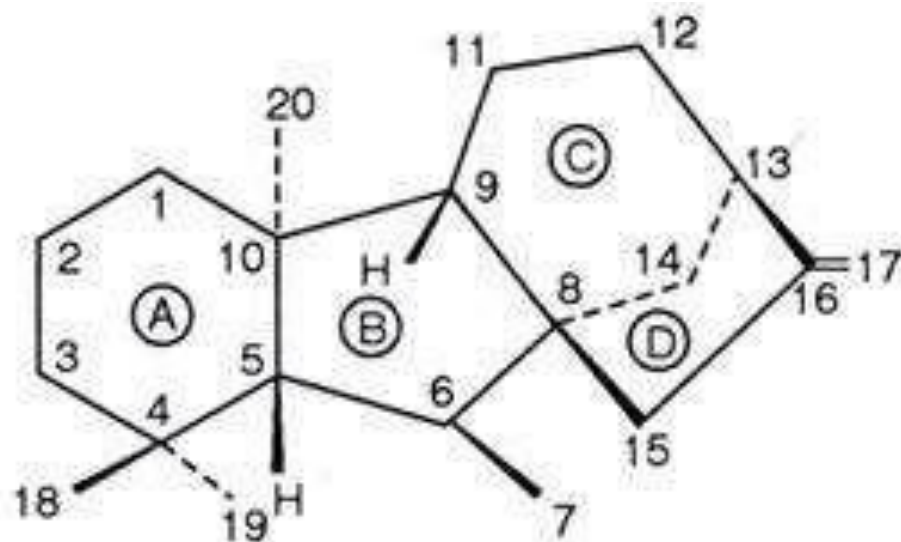


# Chemical Structure

- tetracyclic diterpene acids which have a common entgibberellane skeleton.
- Gibbane ring



ent- kaurene



ent- gibberellane

# Discovery:

- Japanese scientist Kurosawa
- Bakanae (foolish seedlings)
- “Gibberella fujikuroi”
- 1926 Filtered Extract of fungus
- In 1934, Yabuta discovered compound Fusaric Acid, known as Gibberellins.

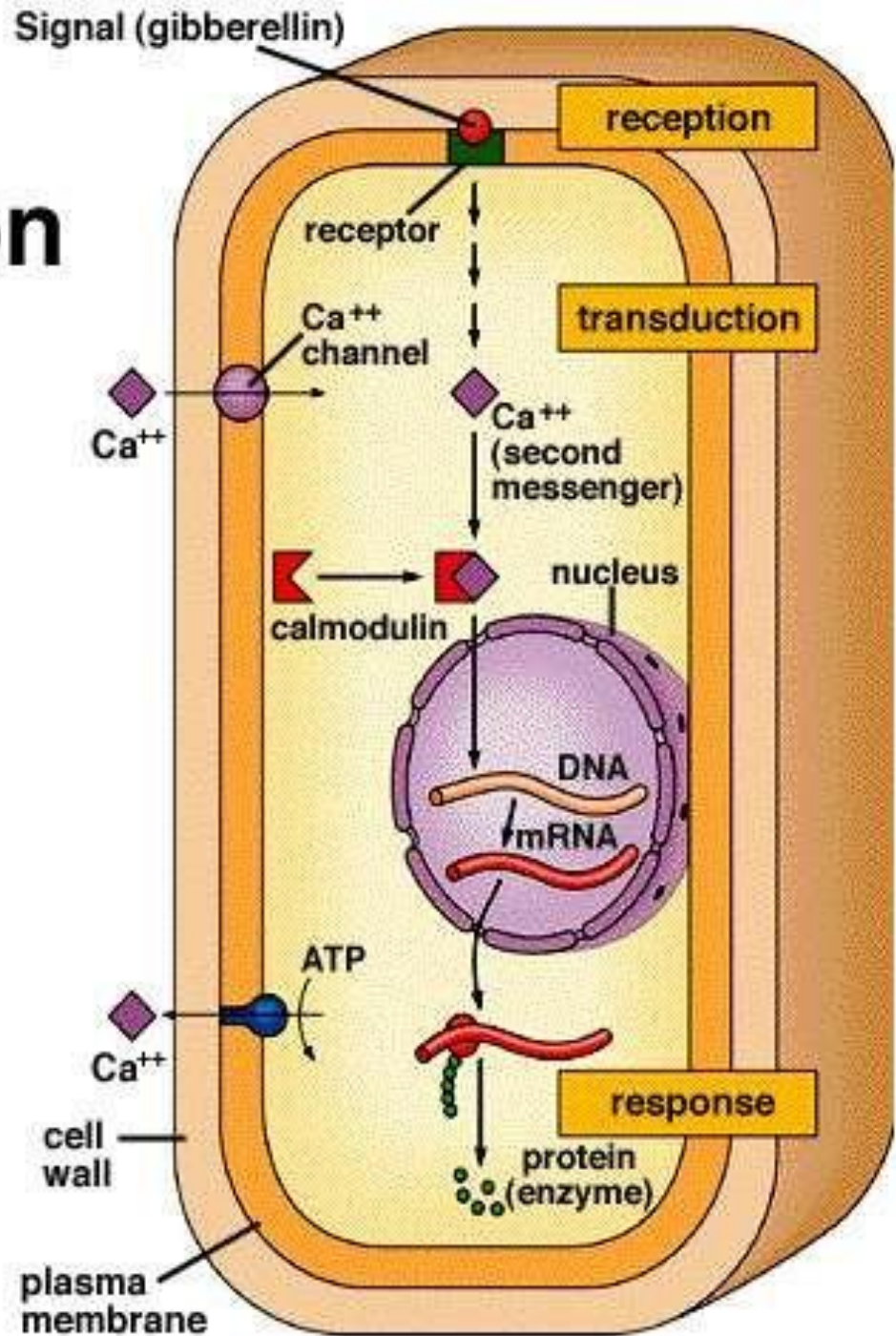


# Production:

These are found in the;

- Young tissues of Roots ,
- Germinating seeds,
- Developing shoot tissues,
- Embroy,
- Production increases in the dark.
- **SYNTHESIS;**
- From acetyl CoA

# Gibberellin mode of action



# Differences Between

## AUXIN

- Found in higher plants
- Double or single unsaturated ring structure
- Apical dominance
- Does not cause bolting

## GIBBERELLINS

- Found in fungi mostly
- Tetracyclic gibbane structure, less unsaturation
- Does not affect
- Causes bolting

- Essential for callus formation
- Effect on root growth
- Does not produce Hydrolyzing enzyme
- No effect on flowering in long day plants

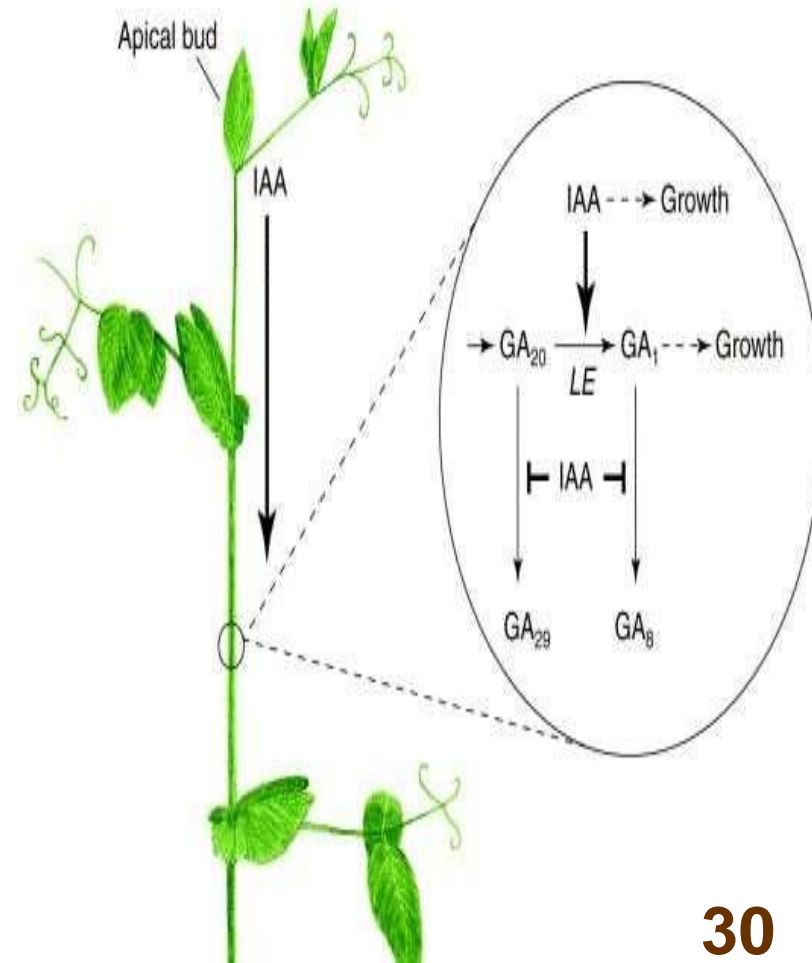
- Does not influence callus formation
- No effect of root growth
- Produce Hydrolyzing enzyme.
- Replace the requirements of long photoperiods

# Functions of Gibberellins:

- Stimulate elongation
- Flowering in the binel plants
- Break seed dormancy

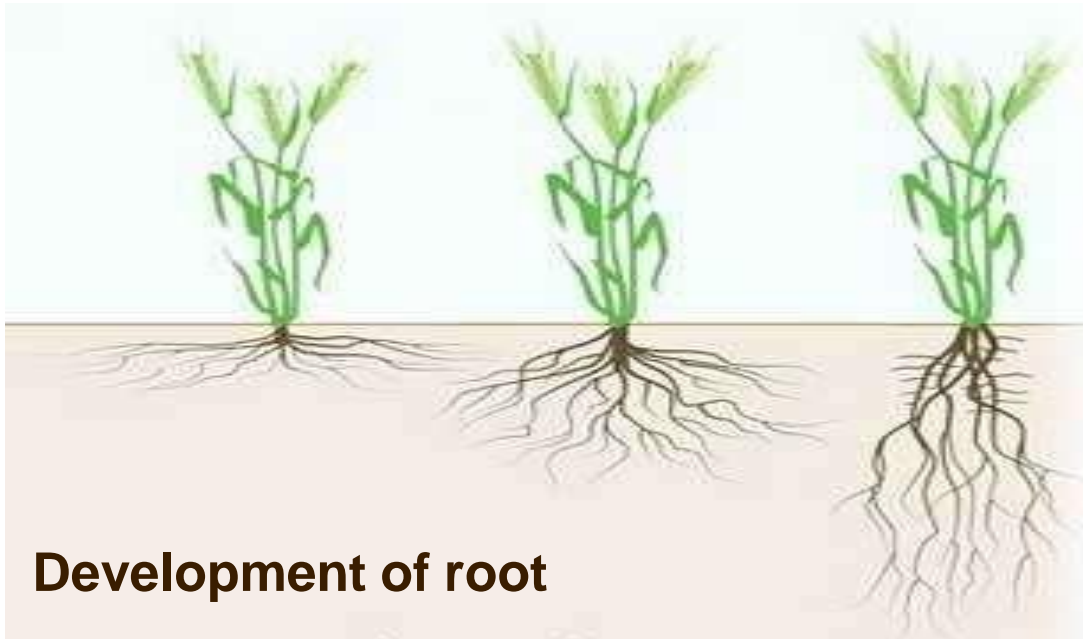


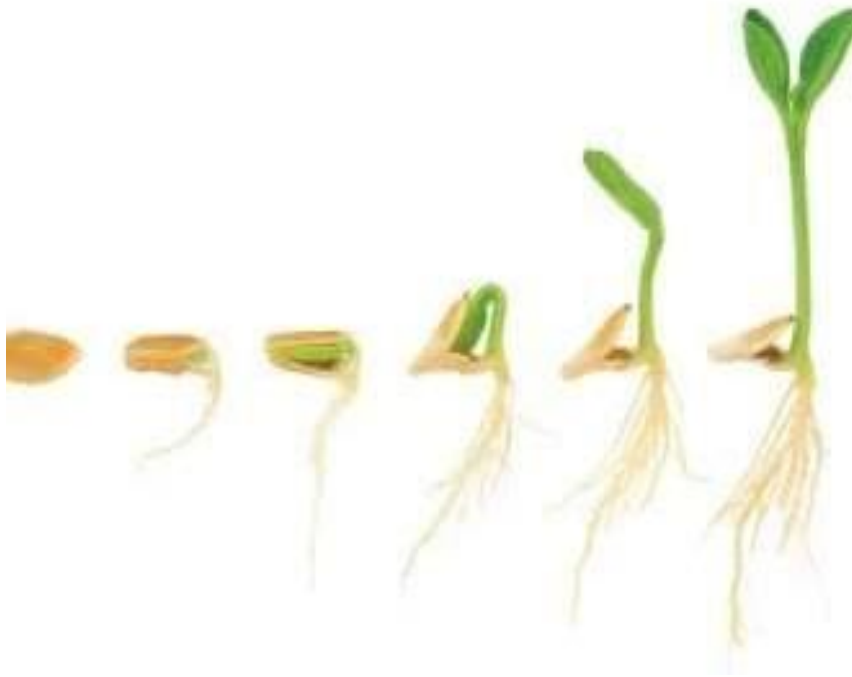
• Foolish Seedlings of rice



Internodal stem development •

- Parthenocarpic plants fruit development
- Induces sex expression
- Stimulates germination of pollen
- Stimulate root growth



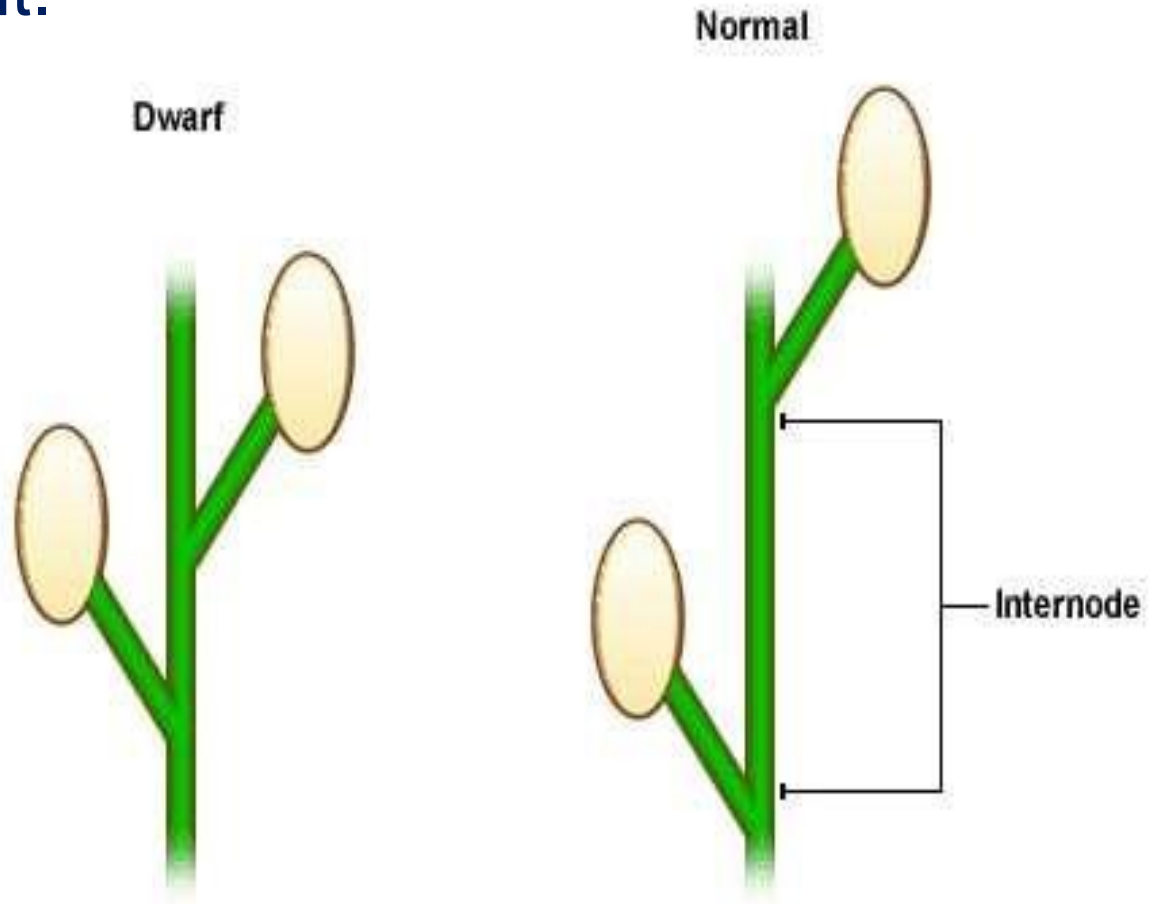


Breaks seed  
dormancy



Delay senescence

- Stimulates  $\alpha$ -amylase production in germinating seeds.
- Stimulate internodal development.





**THANK YOU!**