

The background of the slide features a dense arrangement of vibrant green leaves, likely from a plant like basil, with visible veins and serrated edges. At the bottom of the image, there are clear, concentric ripples on a light blue-green surface, suggesting water. A semi-transparent white rounded rectangle is centered over the image, containing the title text.

REGULATORI RASTENJA BILJAKA

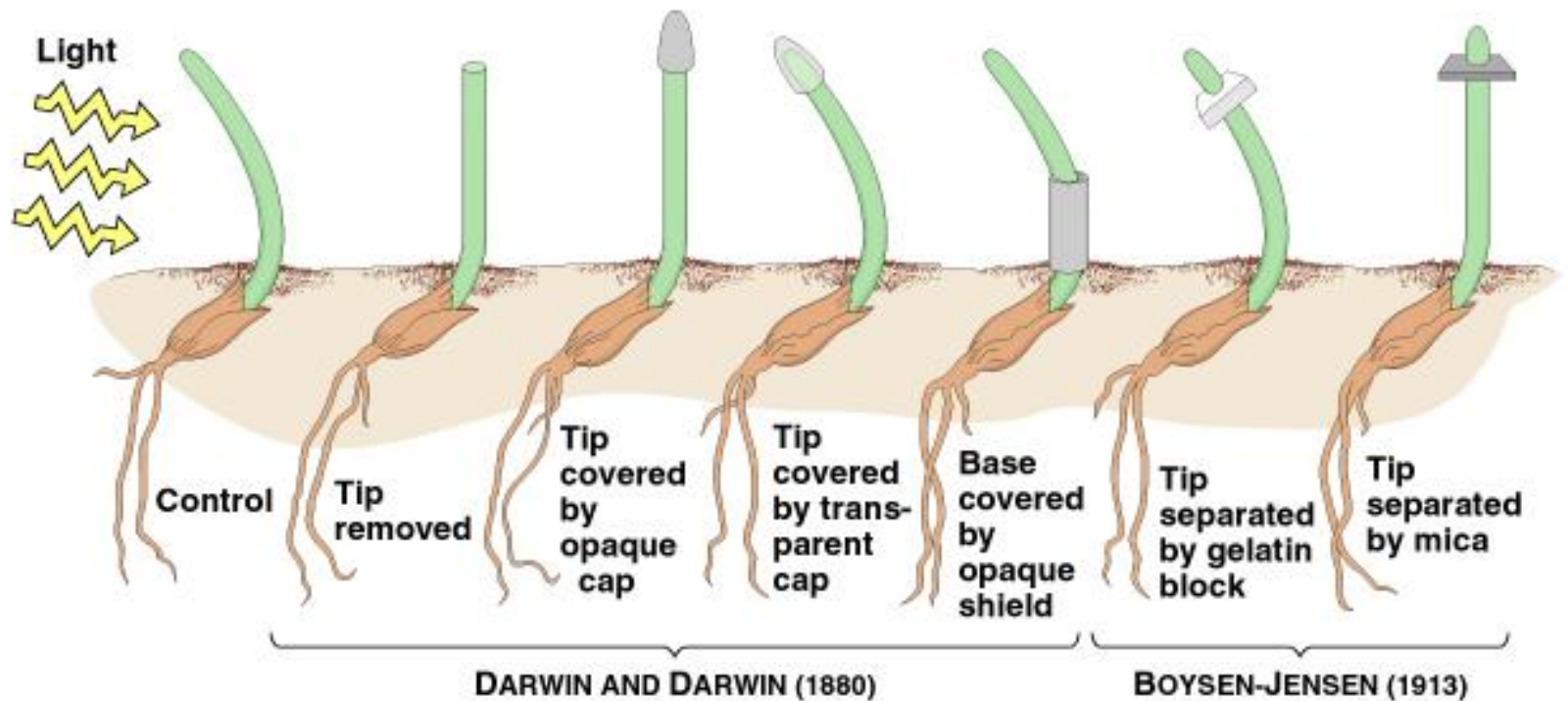
BILJNI HORMONI

**Regulatori rasta biljaka kontrolišu: rasteenje,
razviće i pokrete biljaka**

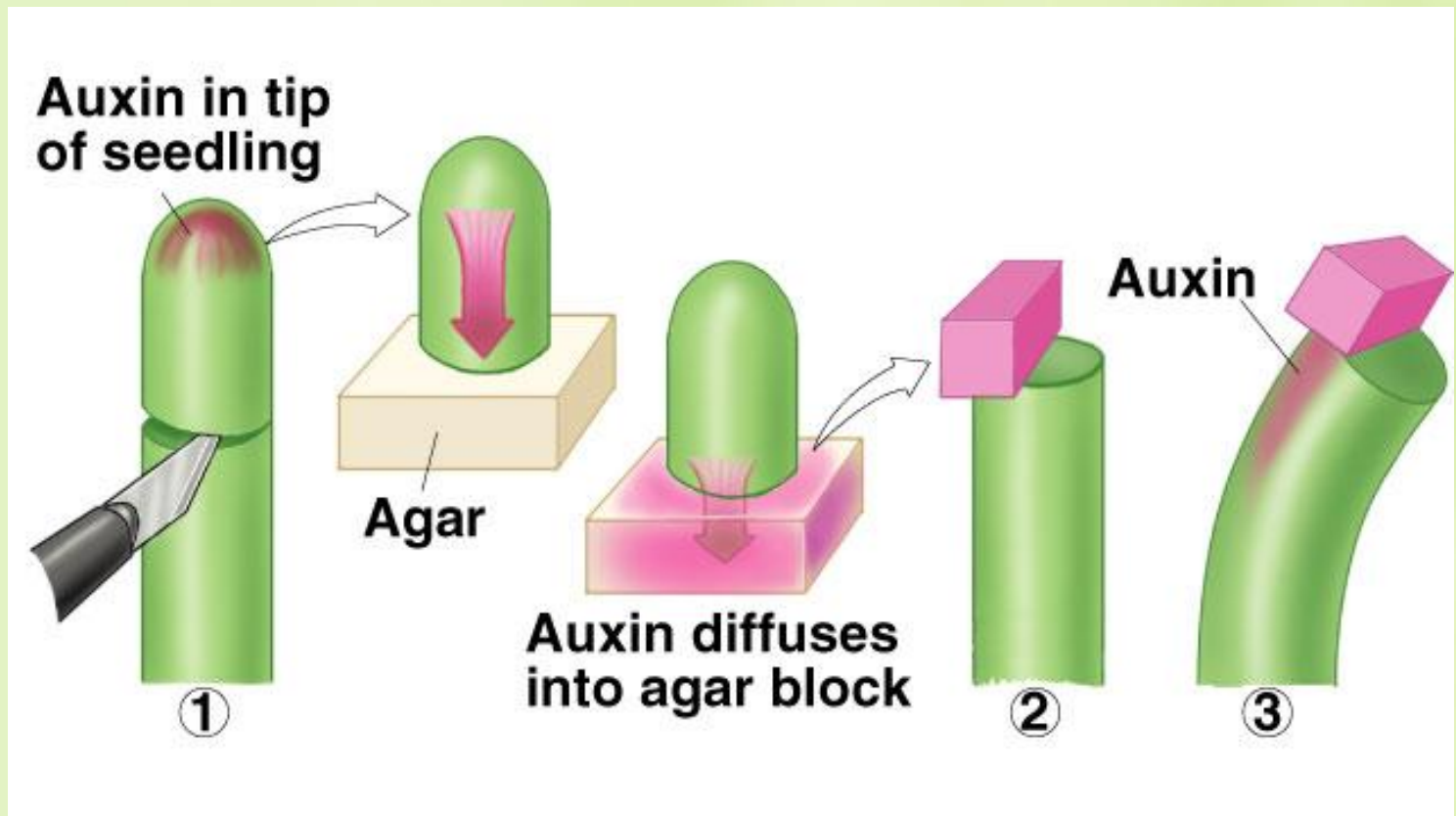
BILJNI HORMONI

- **Auxini**
- **Giberelini**
- **Citokinini**
- **Abcisinska kiselina**
- **Etilen**

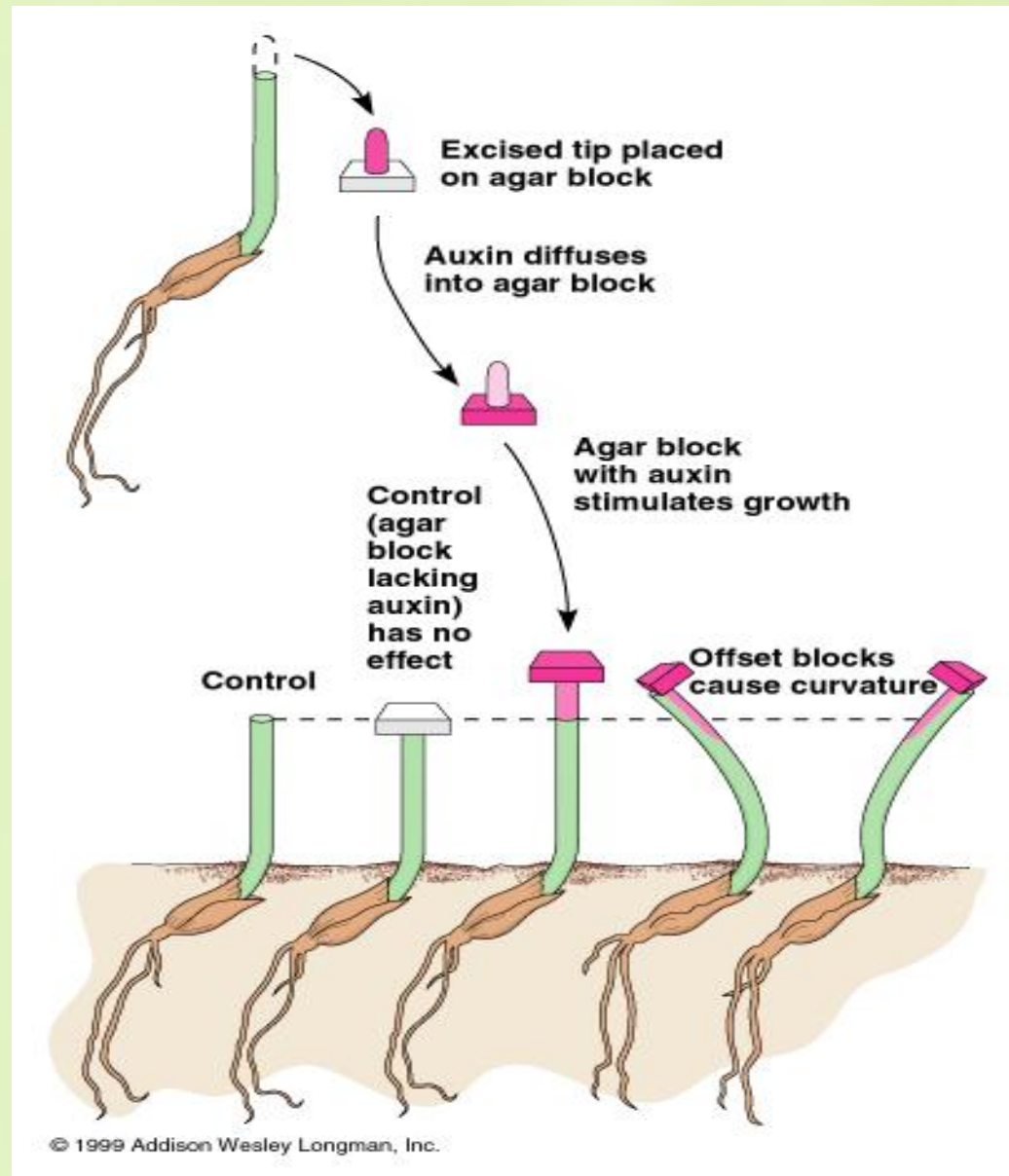
Početna istraživanja fototropskih reakcija koleoptila



Auxini

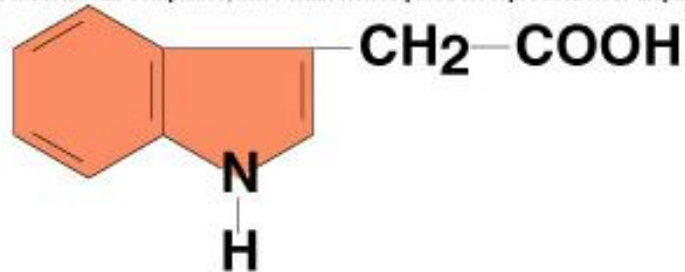


Demonstracija transporta hemijskih signala

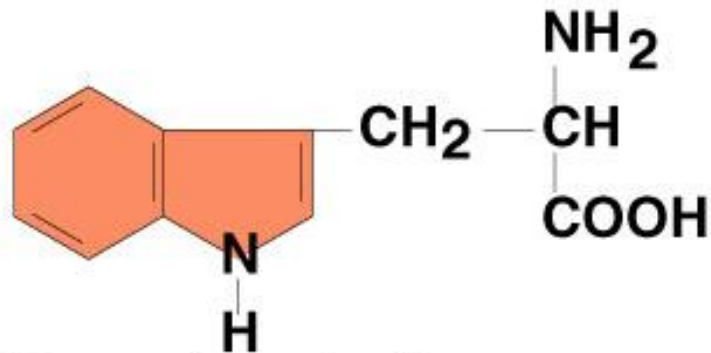


Auxini

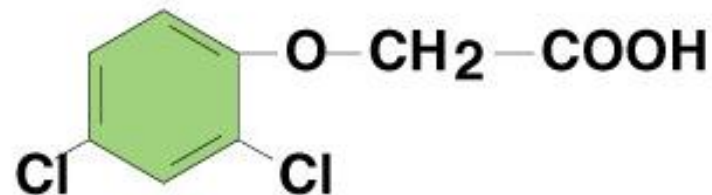
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(a) IAA (Indoleacetic acid)

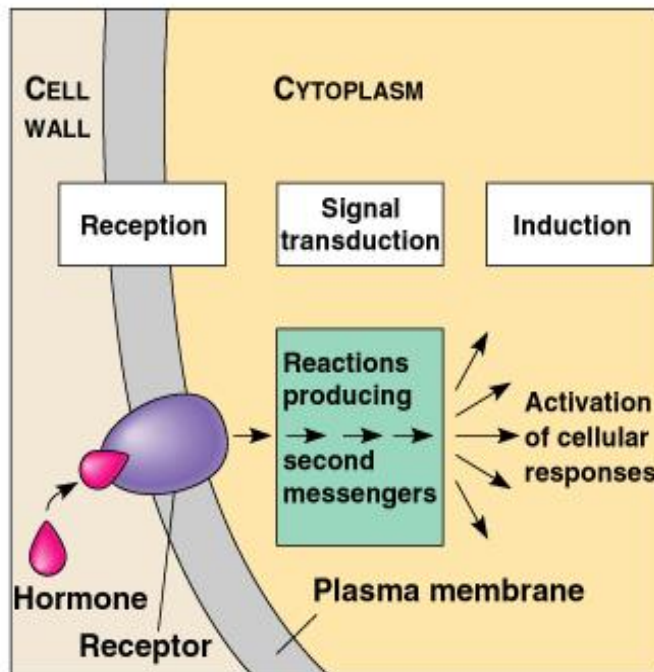


(b) Tryptophan

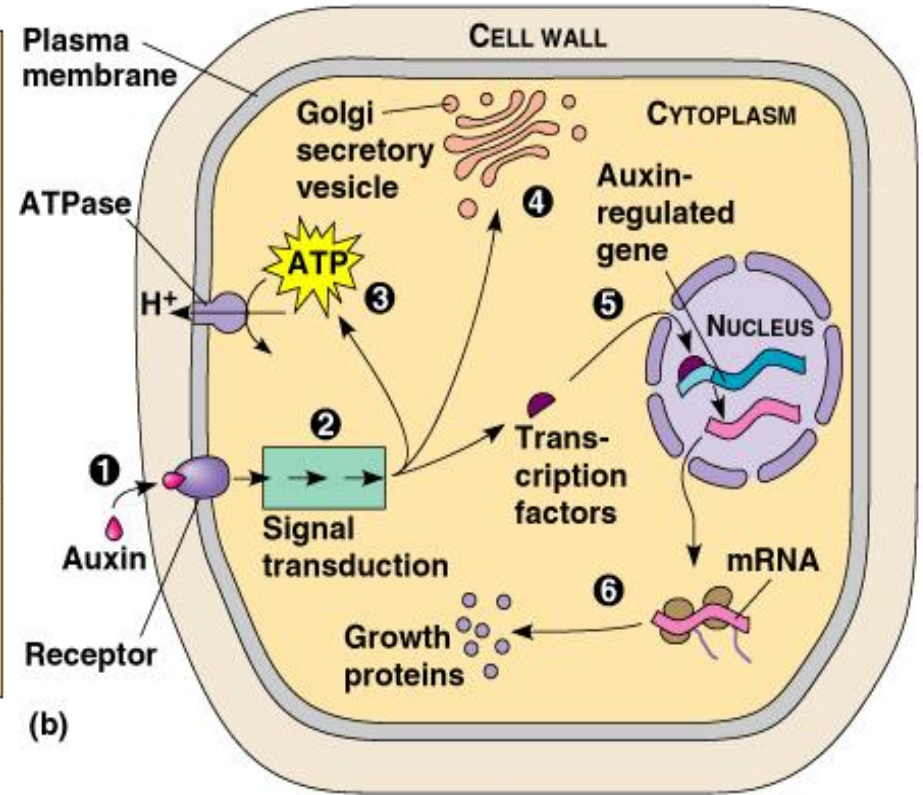


(c) Dichlorophenoxyacetic acid (2,4-D)

Putevi prenosa signala kod biljaka



(a)

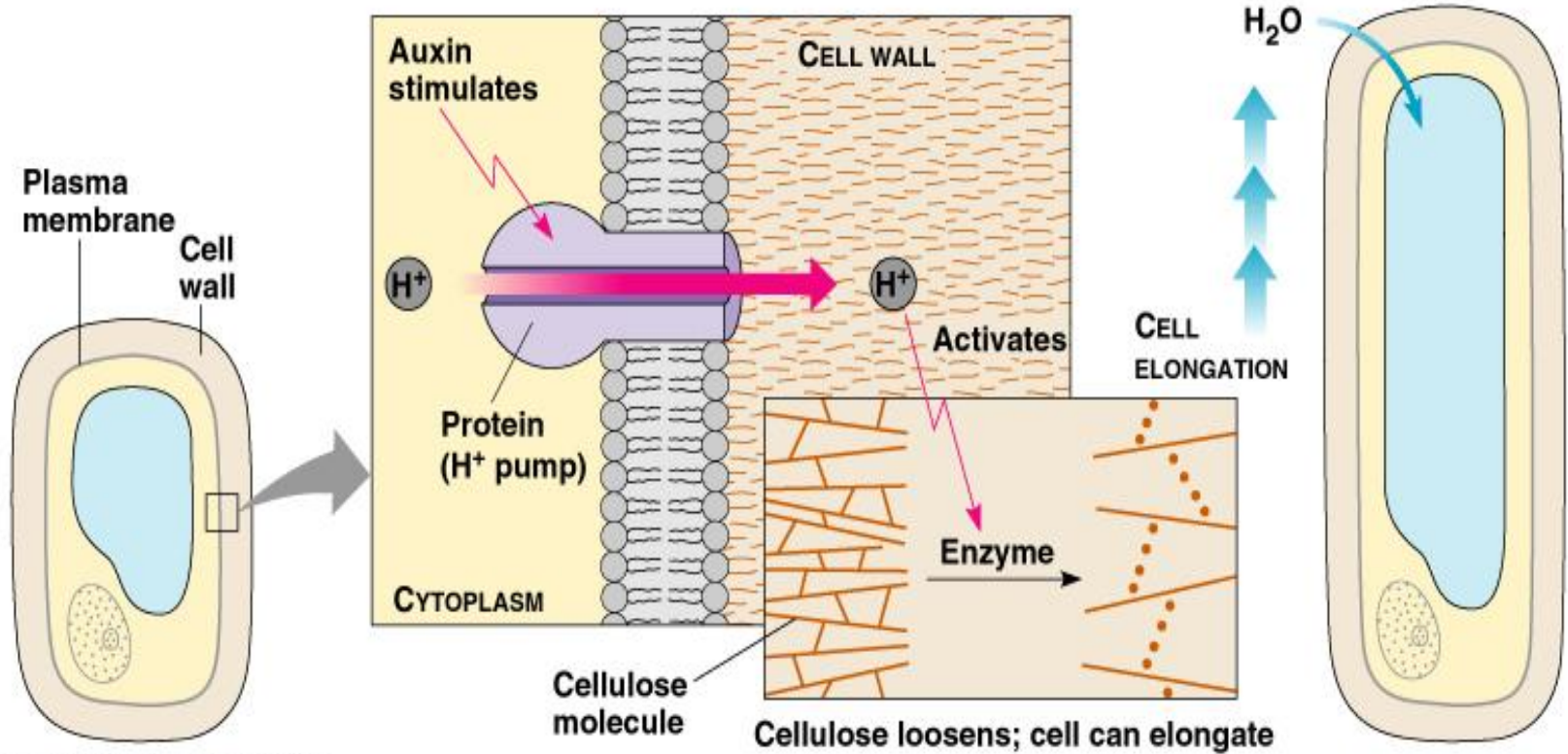


(b)

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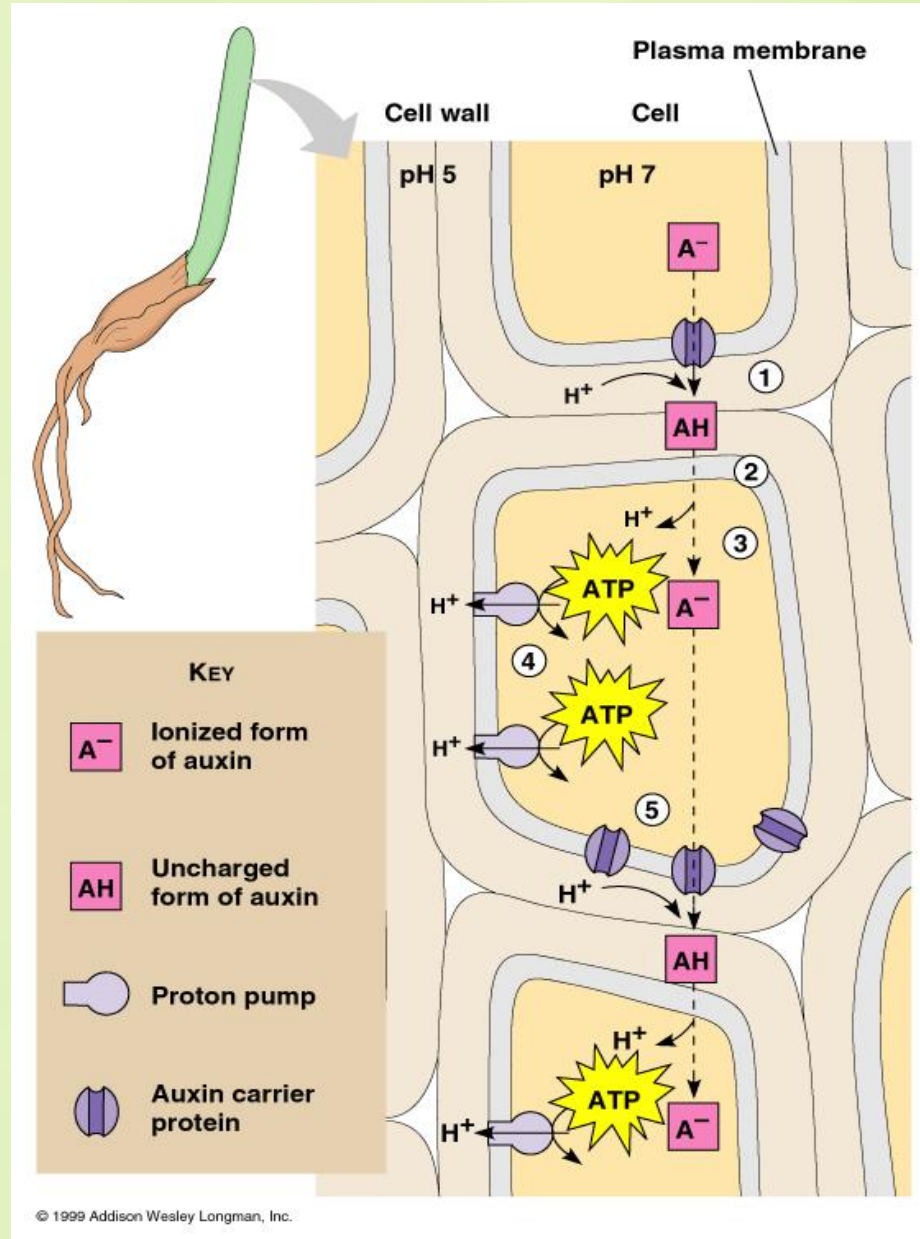
Auxin interacts with calcium ions which in turn calmodulin, a protein, which regulates many processes in plants, animals, and microbes.

Uticaj na ćelijski zid

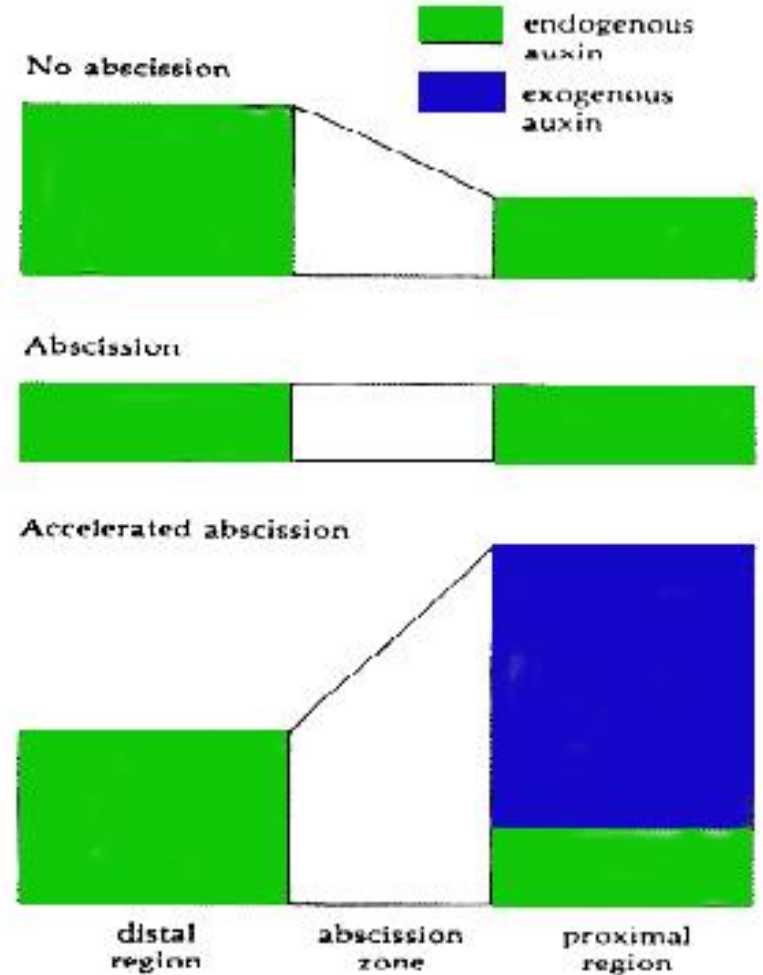
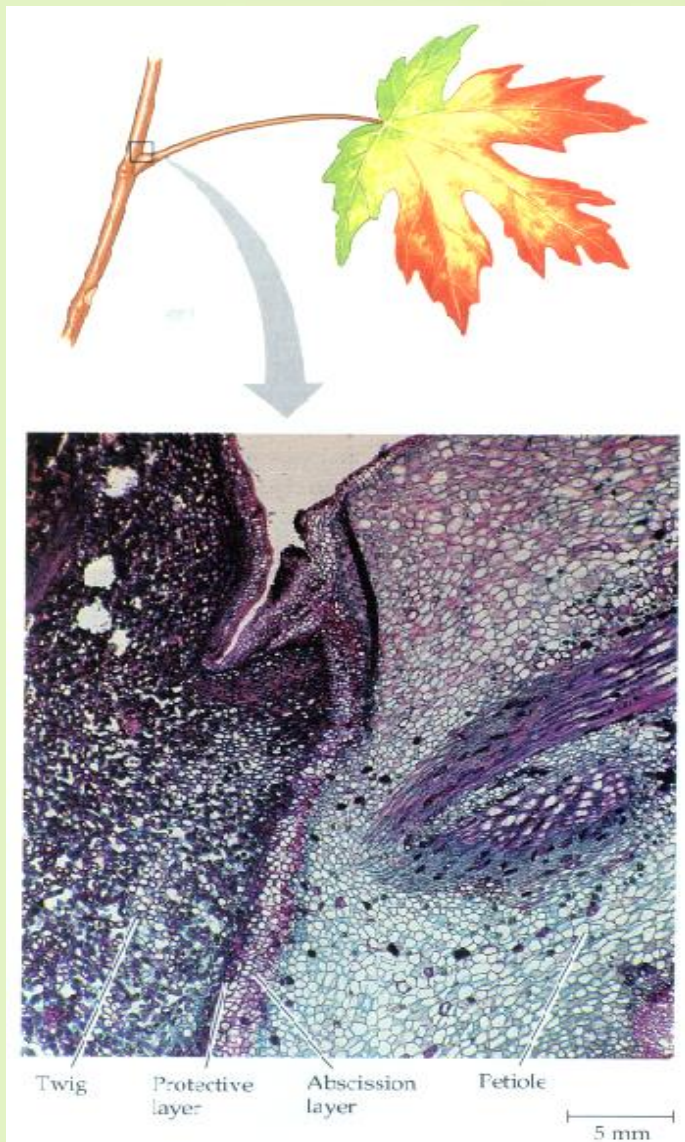


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Polarni transport auksina



Kontrola abscisije

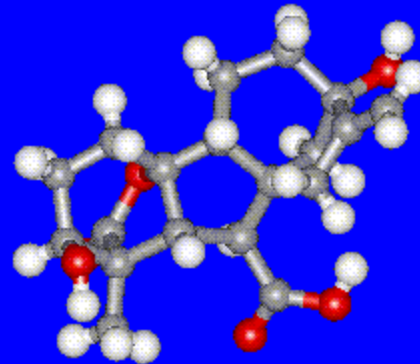
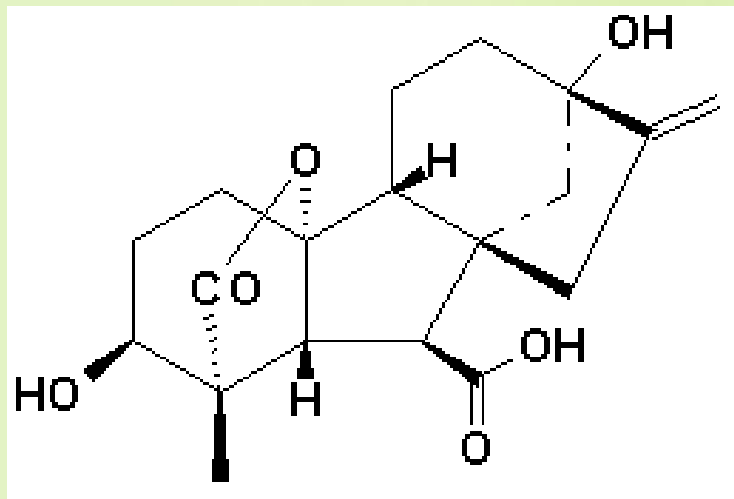


Relationships between auxin gradient across abscission zone and abscission.

Apikalna dominacija



Giberelini



Otkriveni 1930's, kao bolest kod riže koju izaziva fitopatogena gljiva (*Gibberella fujikuroi*)



Giberelini i veličina ploda

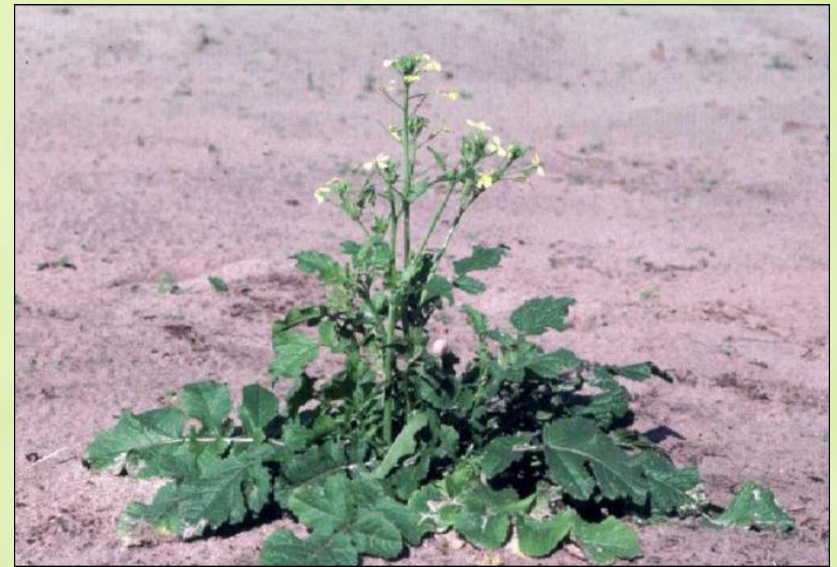


Divlji radić

Cvjetanje – jednogodišnja biljka

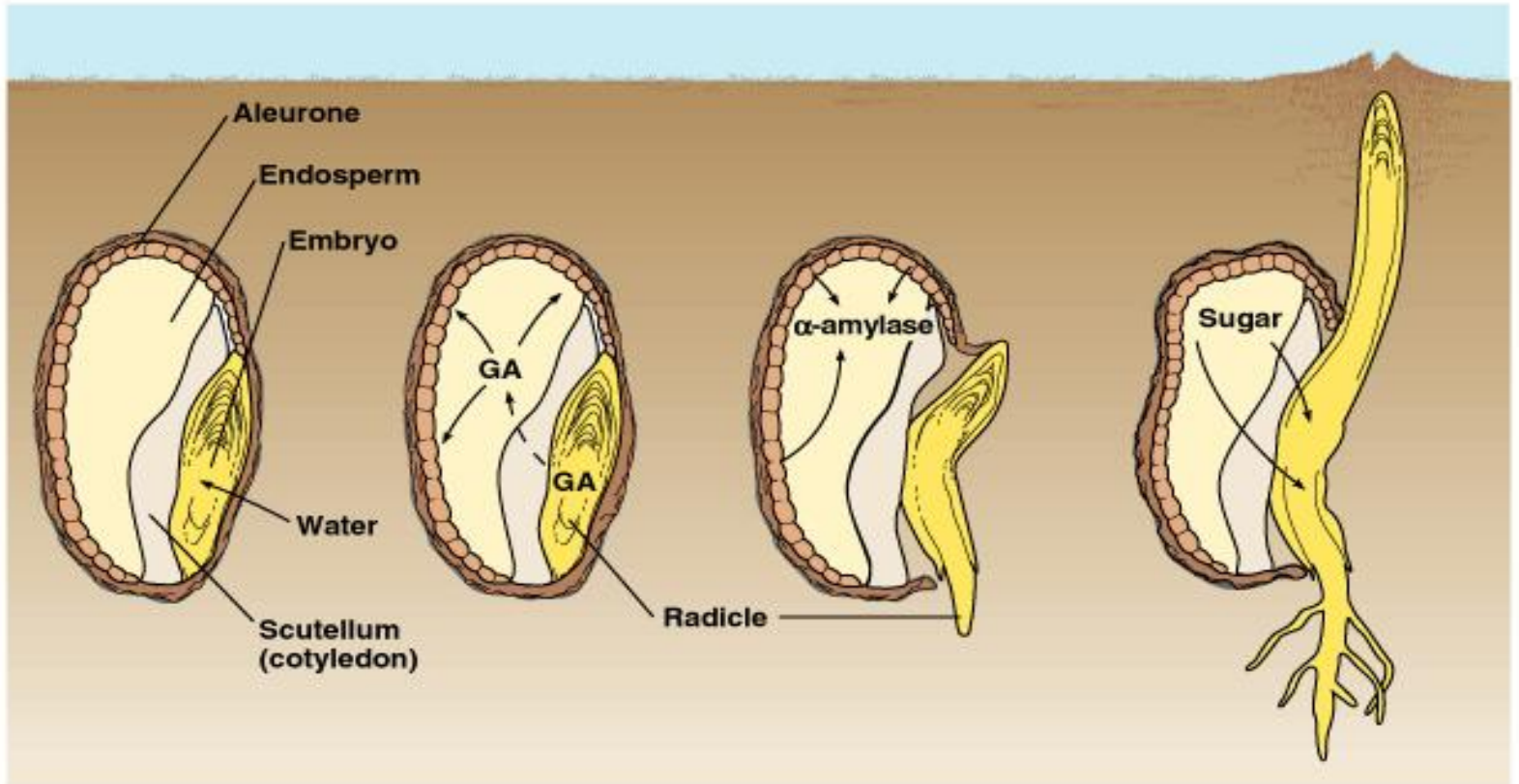


Prva godina

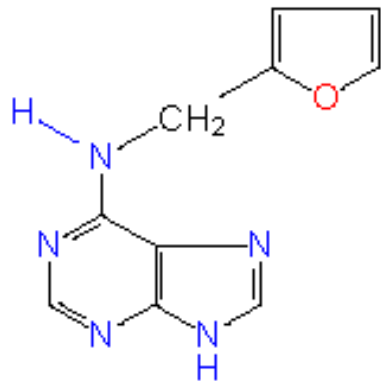


Prva godina

Mobilizacija rezervi

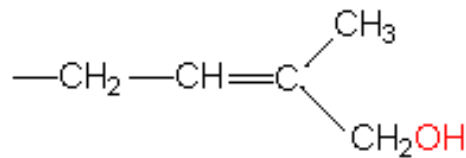
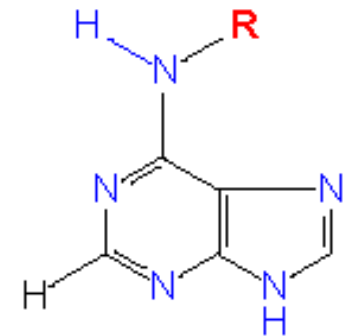


Citokinini



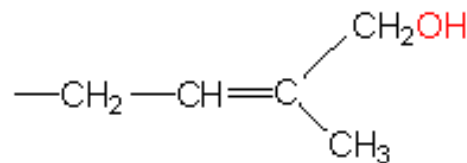
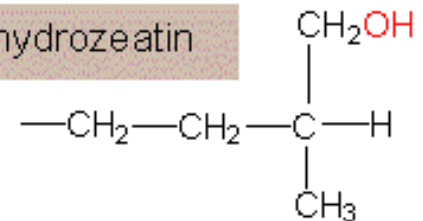
kinetin:
6 - (2 - furfuryl -
7 - amino purine)

cytokinin
(basic structure)

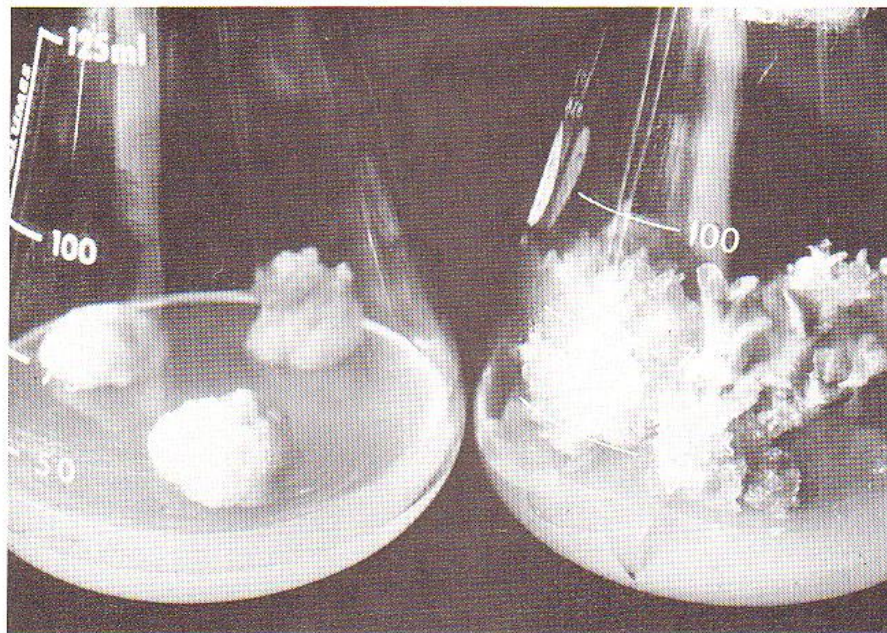


zeatin

dihydrozeatin



Interakcija citokinina i auksina na kalus tkiva duvana (nediferencirane biljne ćelije)

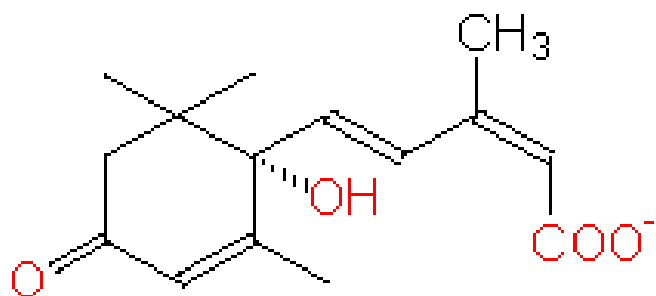


Tissue cultures of tobacco (*Nicotiana tabacum*) callus. By altering cytokinin-to-auxin ratio, tobacco stem pith tissue may be maintained in culture as undifferentiated callus (left) or induced to differentiate and bud into plantlets (right).

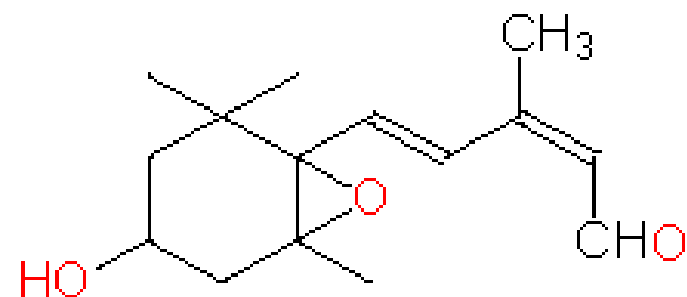
From work of F. Skoog and C.O. Miller. Photo by F.H. Witham.

- ❖ Organogeneza: Citokinini i auksini utiču na organogenezu
- ❖ Visok odnos citokinini/auksini utiče na obrazovanje nadzemnog dijela
- ❖ Nizak odnos citokinini/auksini utiče na obrazovanje korjena

Abscisinska kiselina



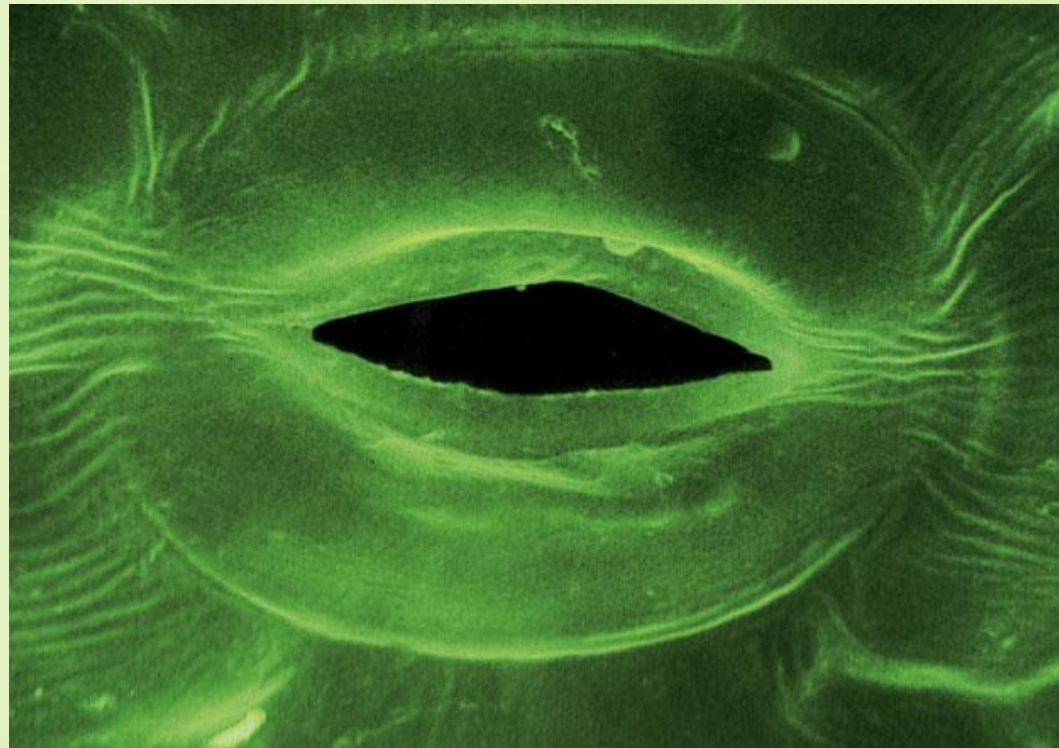
abscisic acid (ABA)



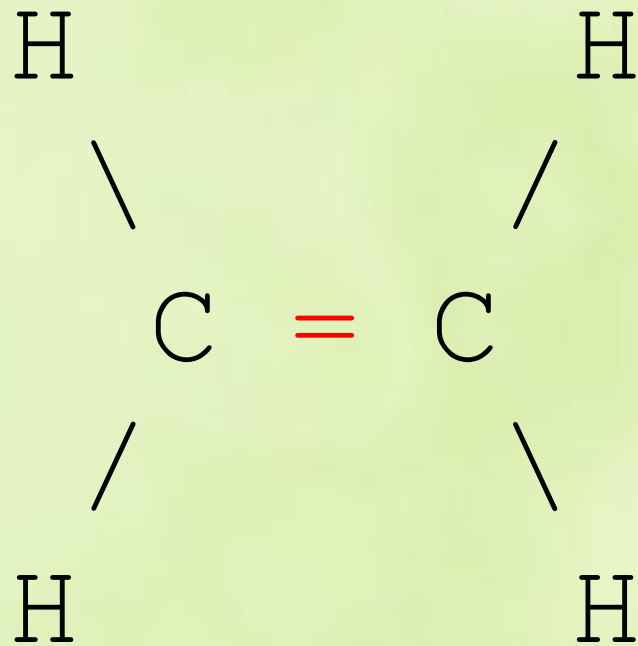
xanthoxine

Abcisinska kiselina

Veoma značajna u kontroli otvaranja i zatvaranja stoma



Etilen



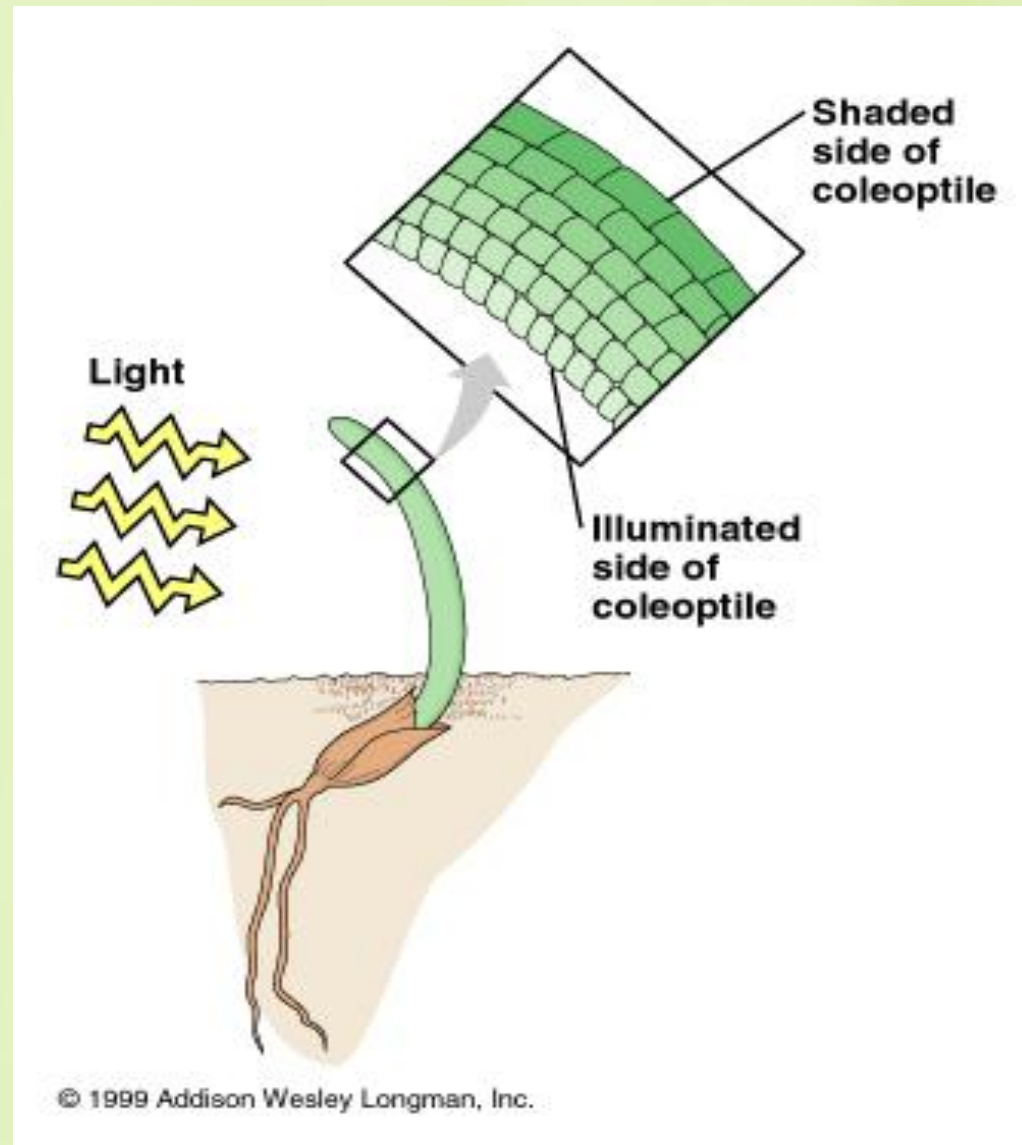
The background of the slide features a dense pattern of vibrant green leaves, likely from a tree, with visible veins and serrated edges. Below the leaves, there are soft, circular ripples in a light blue-green color, suggesting water. The entire scene is framed within a semi-transparent, rounded rectangular area.

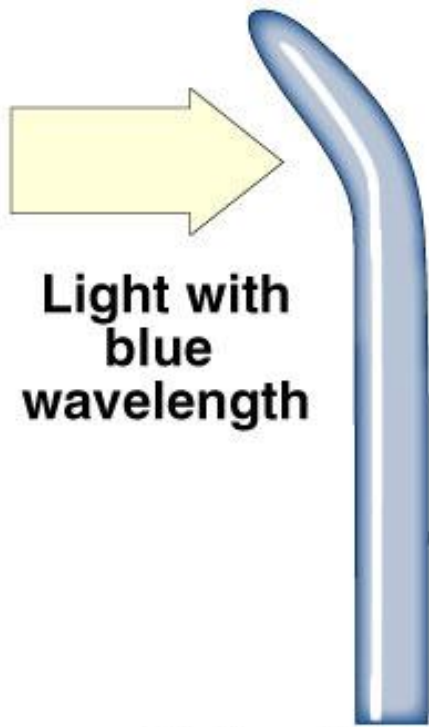
POKRETI BILJAKA

Fototropizmi



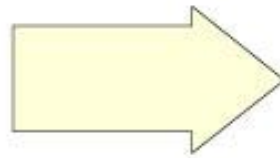
Pokreti u toku rastenja



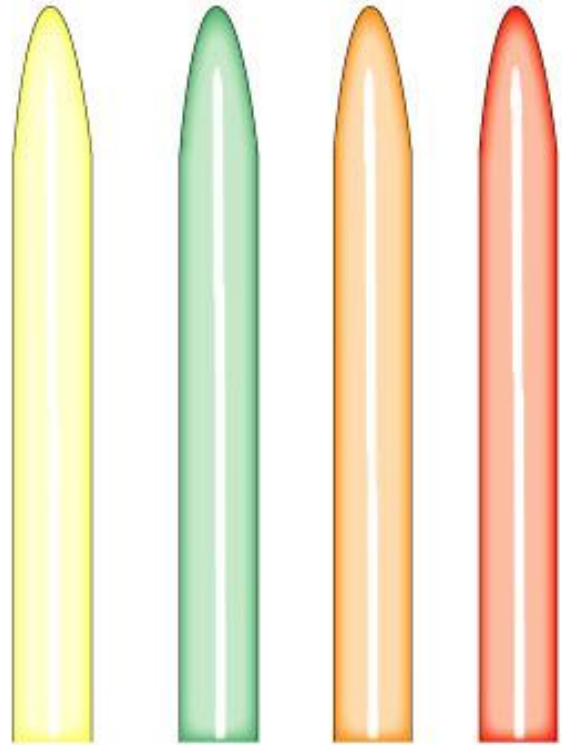


**Light with
blue
wavelength**

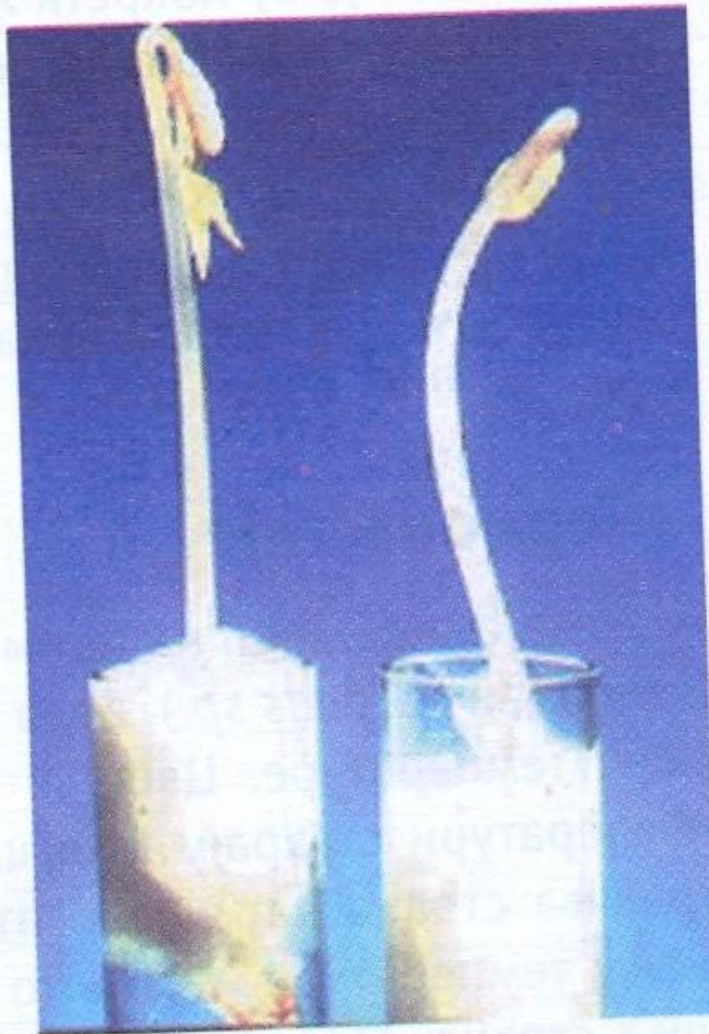
**Coleoptile bends
towards light with
blue wavelength.**



**Light without
blue
wavelength**

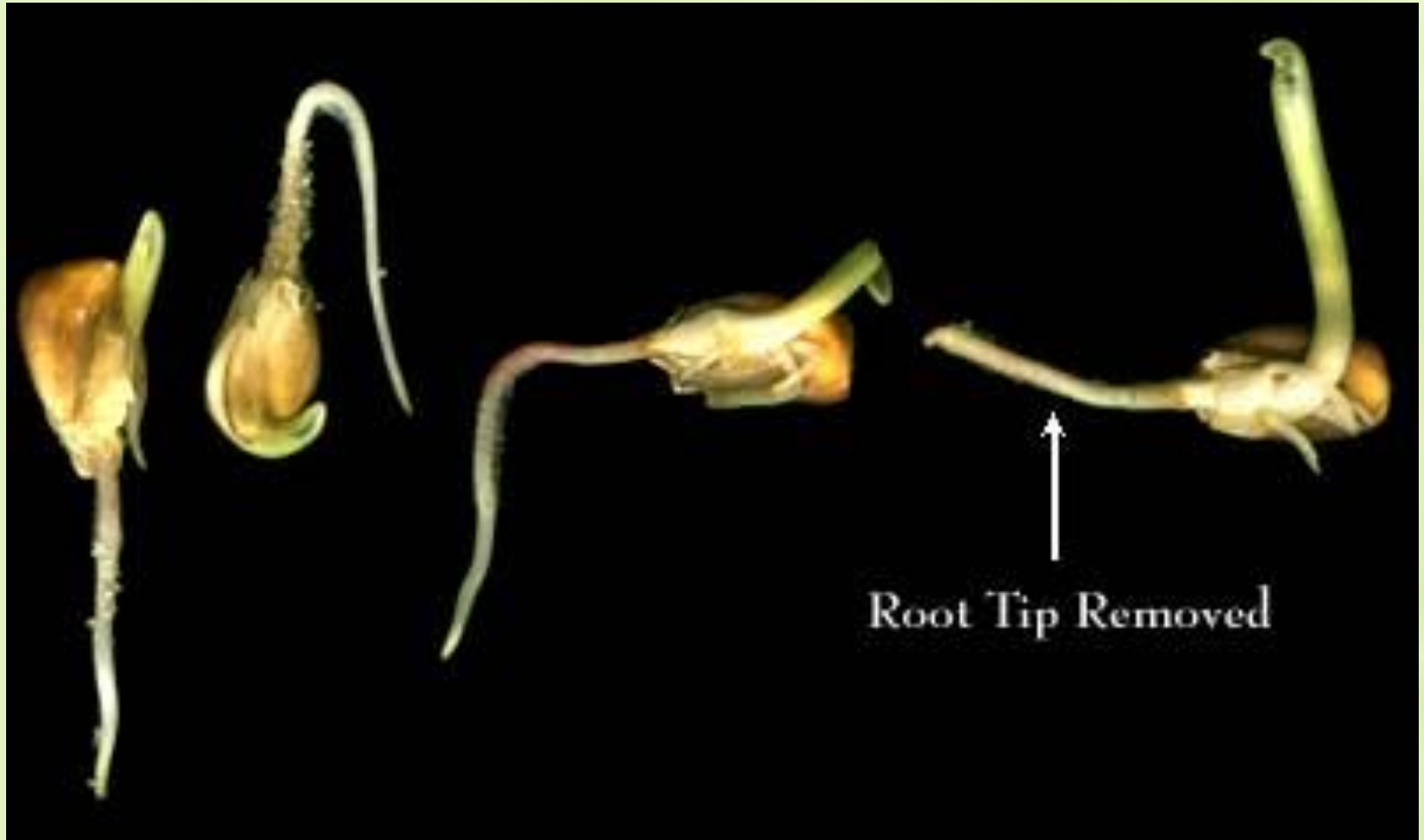


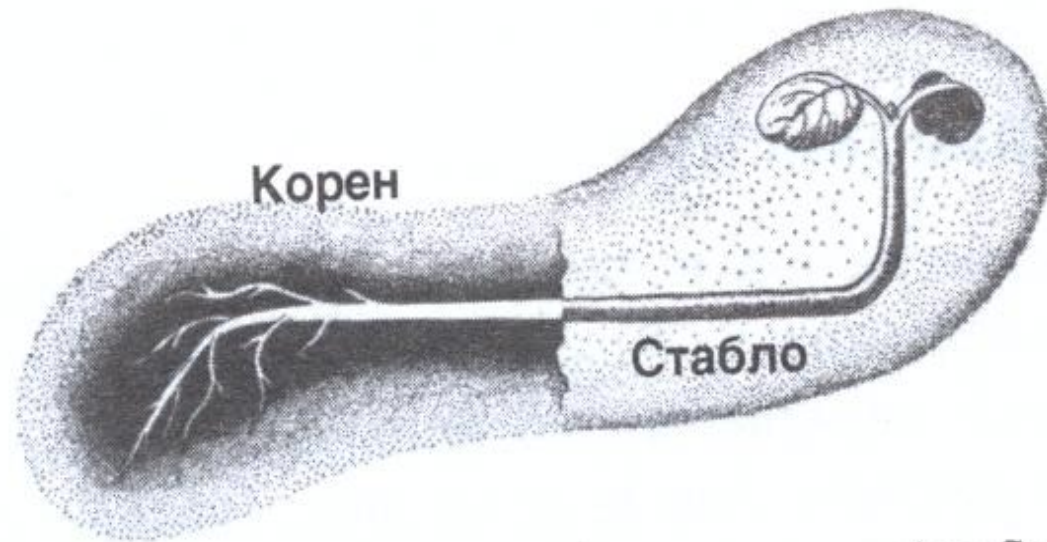
**Coleoptile does not
bend when blue light
is removed.**



Фототропска реакција
хипокотила кинеског пасуља

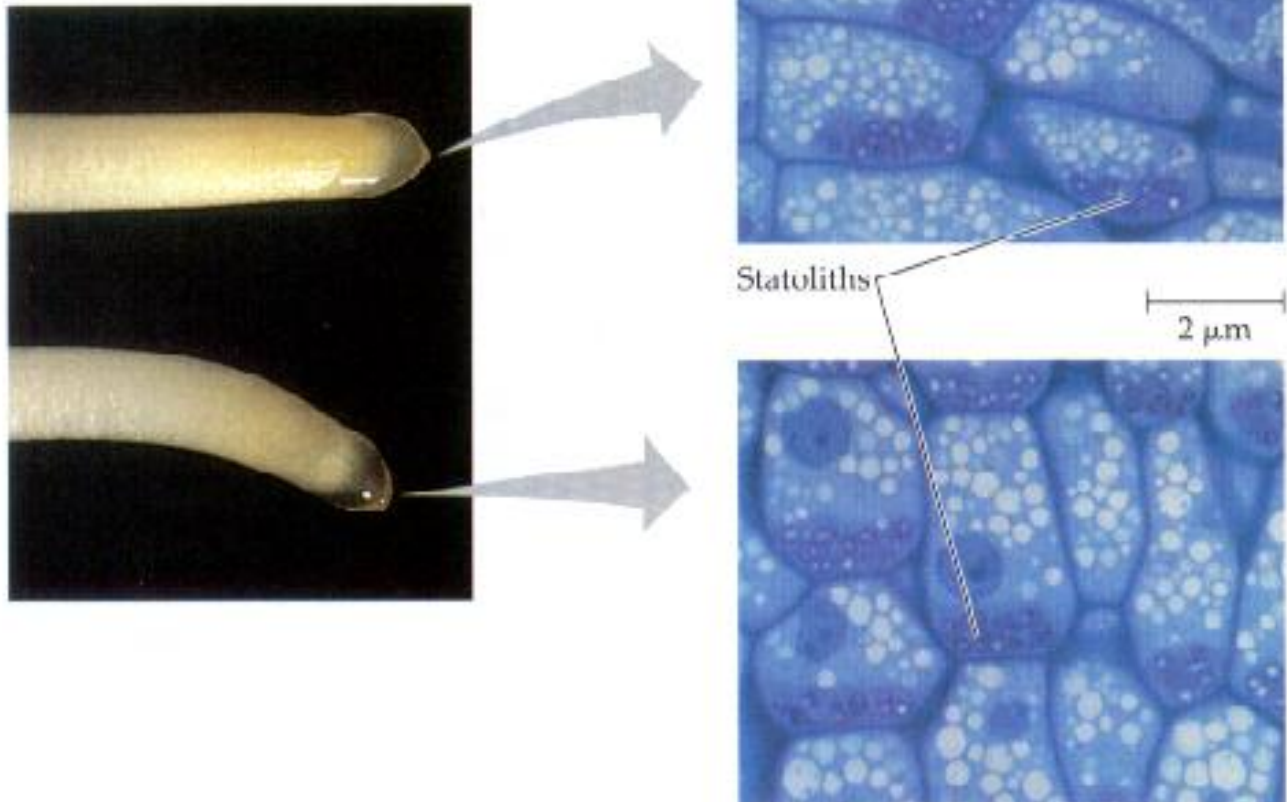
Gravitropizam = Geotropizam





Приказ позитивне (корен) и негативне (стабло)
гравитропске реакције

Statoliti



Odgovor biljaka na dodir

- **Tigmotropizam**



Tigmotropizam



SEIZMONASTIJE

Mimosa pudica L. (osjetljiva biljka)





(a)

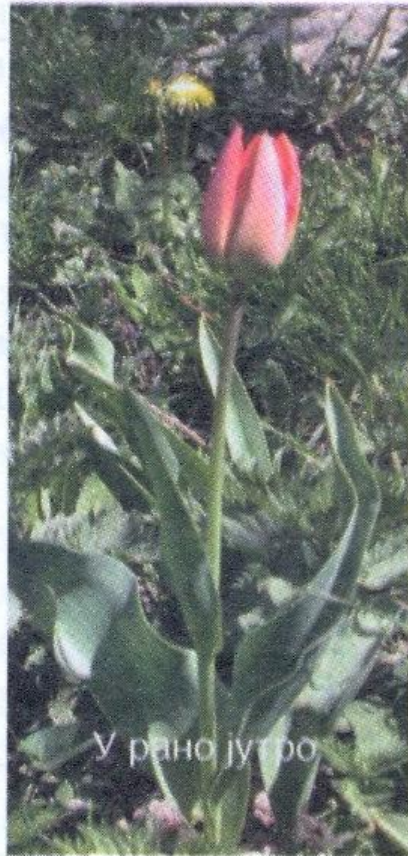


(b)



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Термонастије



У рано јутро



У подне

Термонастија лале. У јутарњим сатима температура је нижа и зато је цвет затворен. Са порастом температуре у току дана цвет се отвара.

Fotonastije



Отворени цветови киселице у току дана (А) и затворени у смирај дана (Б)

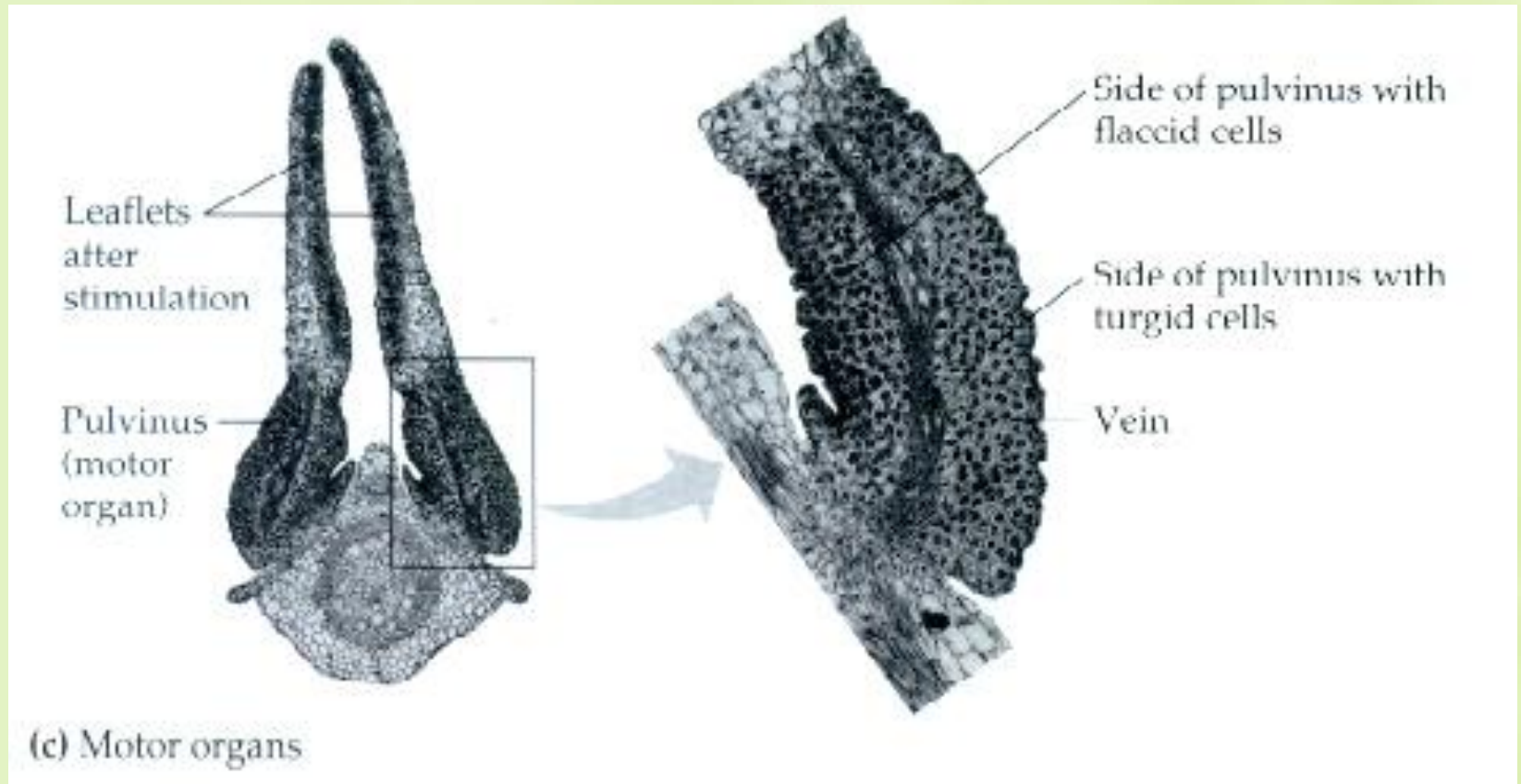
Niknastije

***Molitva biljka- spuštteni listovi
u toku dana a podignuti u toku
noći**

***Djetelina**



Pulvinus of *Mimosa pudica*



Odgovor biljaka na svjetlost

- **Fotomorfogeneza**

- svjetlost izaziva promjene u rastu i razvoju biljaka
 - Crvena svjetlost mijenja oblik fitohroma i izaziva fotomorfogenezu
 - Nadzemni dio (stablo) prelazi od etioliranog (u mraku Pfr) do neetioloranog (na svjetlosti Pr).

- **Fitohrom sistem**

- Prisustvo Pr inhibira klijanje, dok konverzija u Pfr na crvenoj svjetlosti indukuje klijanje

Crvena svjetlost====> klijanje

Daleka – crvena svjetlost====> nema klijanja

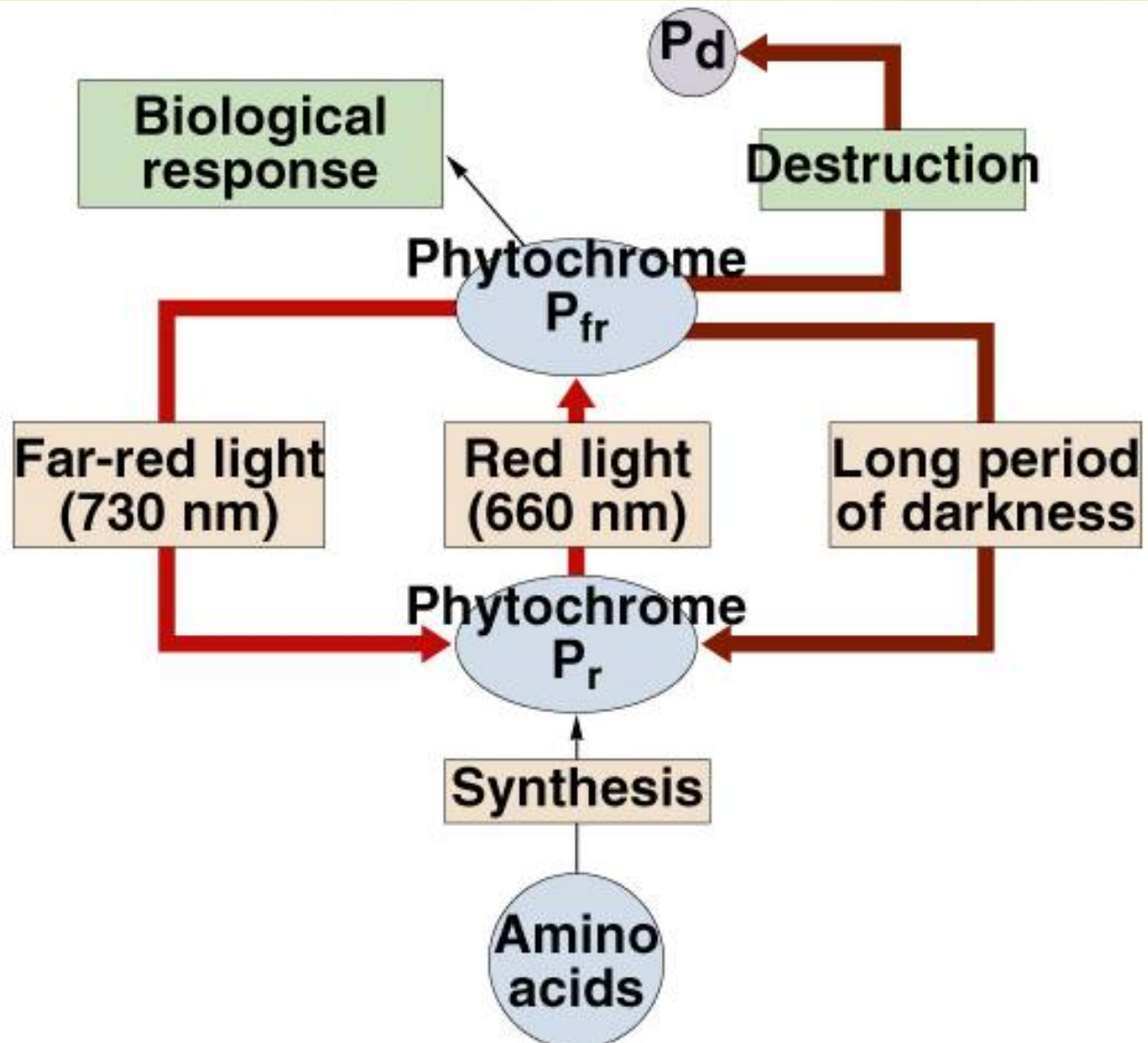
Crvena ====> daleka - crvena====> crvena ====> klijanje

Crvena====> daleka - crvena====> crvena====> daleka crvena====> nema klijanja

Sjemeni koja nisu duboko posijana budu izložena crvenoj svjetlosti i to je signal za klijanje!

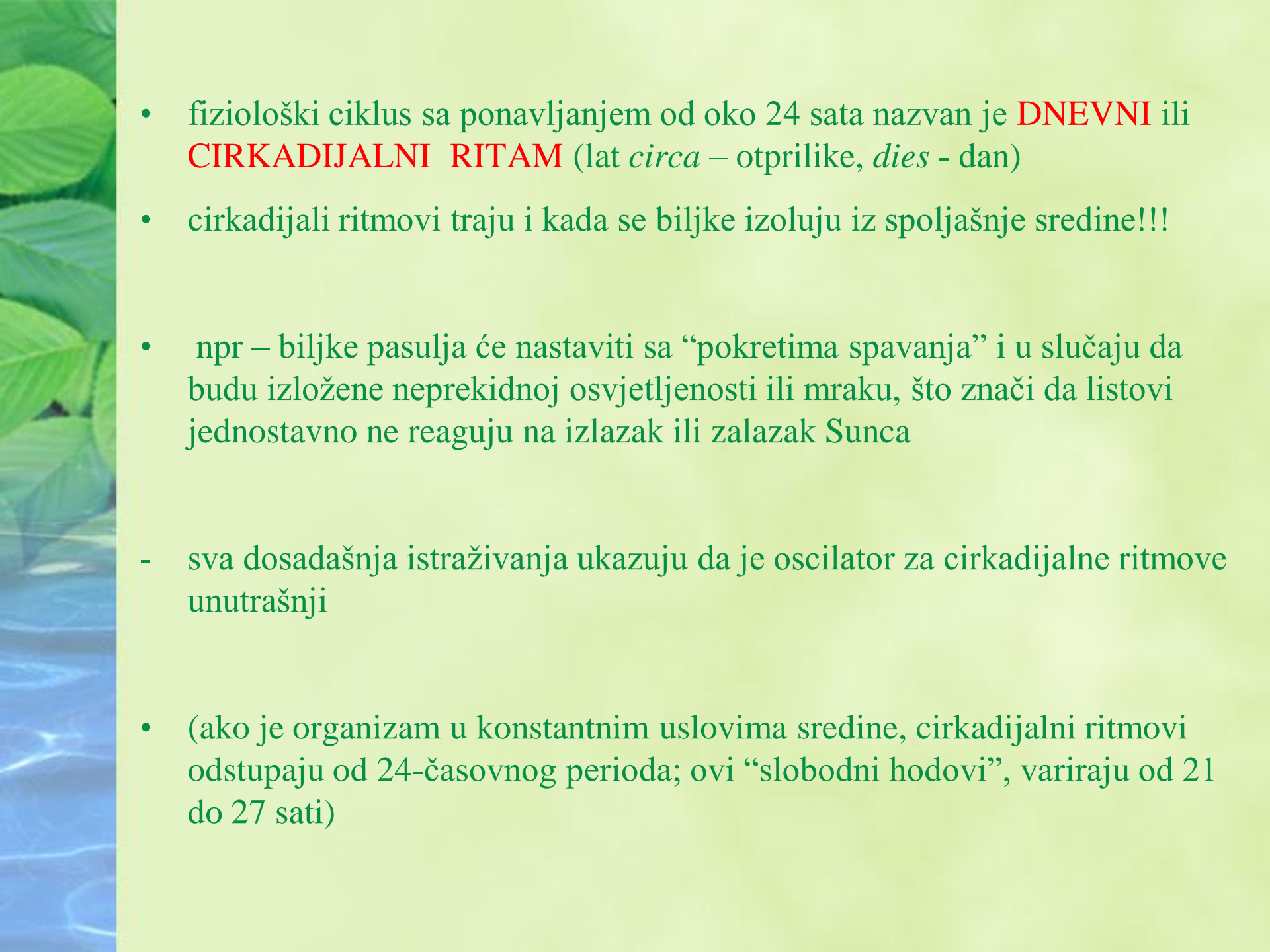
- Regulišu cvjetanje biljaka, bilo u proljeće ili kraj ljeta i jesen!

Kako fitohrom radi



Cirkadijalna ritmika

- biljke pokazuju ritmičko ponašanje
- najuočljiviji primjeri su dnevno-noćni pokreti listova kod leguminoza, ili otvaranje i zatvaranje stoma
- ovi fenomeni su kontrolisani biološkim časovnicima, tj unutrašnjim oscilatorima, koji održavaju tačno vrijeme
- Ovi ritmovi potiču iz unutrašnjosti organizma i ne zavise od promjena spoljašnje sredine, nazivaju se endogeni ritmovi

- 
- fiziološki ciklus sa ponavljanjem od oko 24 sata nazvan je **DNEVNI** ili **CIRKADIJALNI RITAM** (lat *circa* – otprilike, *dies* - dan)
 - cirkadijalni ritmovi traju i kada se biljke izoluju iz spoljašnje sredine!!!
 - npr – biljke pasulja će nastaviti sa “pokretima spavanja” i u slučaju da budu izložene neprekidnoj osvjetljenosti ili mraku, što znači da listovi jednostavno ne reaguju na izlazak ili zalazak Sunca
 - sva dosadašnja istraživanja ukazuju da je oscilator za cirkadijalne ritmove unutrašnji
 - (ako je organizam u konstantnim uslovima sredine, cirkadijalni ritmovi odstupaju od 24-časovnog perioda; ovi “slobodni hodovi”, variraju od 21 do 27 sati)