**Gravitropism & Thigmotropism**

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**Tropisms**
- Directional Plant growth responses
- Are permanent
- Plants can exhibit wide range of Tropisms:
  - Traumatropism - Wound
  - Hydrotropism - Water
  - Geomagnetotropism - Magnetic Fields
  - **Gravitropism**
  - **Thigmotropism**

**Overview**

**Plants Response to Gravity**
- Auxins play primary role
- Four steps:
  - Gravity perceived by cell
  - Signal formation
  - Signal transduced intra- and intercellularly
  - Differential cell elongation

**Gravitropism**
- Also referred as Geotropism
- A plant’s growth response to gravity.
- It can be positive gravitropism or negative gravitropism.
- The concentration of the plant hormone Auxin is key to the direction of growth as well.

**Positive Gravitropism VS Negative Gravitropism**

*Positive*: Grows with the directional force of gravity.

*Negative*: Grows away from the force of gravity.

Typically roots grow into the ground (positive gravitropism) Stems and leaves grow up above the ground (negative gravitropism).
In leaves, elongated growth is promoted where higher concentrations of Auxin are present. Auxin is located on the lower surface of the leaf causing the leaf to curve. In roots, a higher concentration of Auxin will inhibit elongational growth. Auxin in roots is uniformly distributed causing the root to grow evenly and straight down.

**Root response to Gravity**

- **Without Root Tip, No Gravitropism**
  - [Image showing a root with and without the tip]

**Root response to Gravity - Sensing**

- **Starch filled Amyloplastic organelles that are pulled to the lowest part of the cell by gravity**

**Thigmotropism**

- Contact with a solid object changes the direction of plant growth
- Involves TOUC reproductive growth
- Results in unequal growth rates on opposite sides of the shoot
Plants have a sense of touch?

- Some plants are much more sensitive to touch than humans
  - Some are 10 times more sensitive

Thigmomony = Rapid plant movement, short term stimuli causes the plant to respond rapidly, but does **NOT** change the directional growth of the plant like thigmotropism.

What parts of the plant respond to touch?

- Clearest example is the coiling that occurs in some tendrils.

- General touch response in roots are negative.
  - When a root “feels” an object, the root grows away from the it. Allowing growth with the least amount of resistance.

- Most tendrils grow toward the touch stimulus.
  - Allows for the tendril to wrap around the object it is in contact with

How do Tendrils Actually Curve?

- Able to curve by employing a process known as “Differential Growth”.
- This process involves the stimulation of growth in particular regions of the tendril.

References

- http://users.rcn.com/jkimball.ma.ultranet/BiologyPages/A/Auxin.html