**Seed Germination**

**Seed Germination**

* Seeds initially **germinate** as they absorb \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, bursting the seed coat so the growing plant can energy
* This starts a chain of chemical reactions which will result in the development of a plant embryo

**Steps in Seed Germination**

1. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ is added (most important)
   * Activates enzymes necessary for \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ in the maturing seedling so it can produce the energy needed to grow
2. Seeds are exposed to \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
   * Chemical energy in seed’s starch is converted to glucose during germination
3. Seeds are exposed to \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
   * Chemical energy in seed’s starch is converted to glucose during germination
4. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ is available

**Seed Dormancy**

* **Dormancy** is the block of complete germination of a viable seed under *favourable conditions*
* Advantage: Germination is delayed until conditions are \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ for the survival of both the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and the maturing \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
  + Ex. Even though some conditions are favourable in late November, dormancy occurs due to the onset of winter.
* **Seed banks** are a plant strategy to ensure that not all the seeds of one \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ germinate in a single year. This insurance could save a species during drought, extreme cold, etc.

**Nutrients in Order of Priority**

* CO2 and H2O   
  🡪 needed for \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_!
* N2 (from \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ material)   
  🡪 needed to produce \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, nucleic acids, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and leaf growth
  + NH3 from animal waste
  + NO2 and NO3 from decayed materials
  + Nitrogen fixing bacteria contain N2 gas and convert it to nitrates

|  |  |  |
| --- | --- | --- |
| **Nutrient** | **Function** | **Deficiency Symptoms** |
| K | Water balance, protein synthesis |  |
| P | ATP (energy) syntesis, mitosis, cell division |  |
| Ca | Part of cell walls, membrane permeability |  |
| Mg | Part of chlorophyll and coenzymes for photosynthesis |  |
| S | Part of proteins |  |

|  |  |  |
| --- | --- | --- |
|  | **Natural** | **Synthetic** |
| *Examples* | Manure, compost, sludge, crop rotation | Man-made chemical cocktails that contain ammonia and other nutrients |
| *Advantage* | No harmful chemicals | Get exact nutrients |
| *Disadvantage* | May not always get the correct amount of each nutrient | Costly, prone to leaching and runoff which alters chemical balance in water and soil |

**Fertilizers**

**Case Study: Monsanto**

* <http://www.youtube.com/watch?v=OLzELDt3d2I>
* <http://www.youtube.com/watch?v=LHfI9jltIeA>
* **Punch lines:**
* Monsanto is a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ producing company, most popular product is “\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_” pesticide
* Monsanto also produces \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ seeds, genetically modified to resist its own pesticide (“Roundup-ready” seeds). Farmers who purchase Monsanto’s seeds are guaranteed to not kill their crops when applying Roundup.
* Monsanto has \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ their GMO “\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ seeds” that are only good for one season, so farmers must buy more each season
* Any farmer caught with Monsanto seeds in their field (even from \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ -\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_) is charged and must either:
  + Pay royalties (portion of profits) on all their future revenues
  + Switch to using exclusively Monsanto seeds
* Agent Orange (pesticide used in Vietnam War as weapon)
* <http://www.youtube.com/watch?v=tznQ2Bko5X4>
* <http://www.youtube.com/watch?v=GJxb7CY13uc>

**Key Words: Germination**

* Germinate
* Dormancy
* Seed bank