# Seed Biology

Martha Rosemeyer Farm to Table 14 April 2005

### Self test

- 1. What is the function of a seed?
- 2. How are seeds dispersed?
- 3. What is first to emerge from a germinating seed– the shoot or the root?
- 4. What does a seed need in order to germinate?
- 5. Where are the oldest tissues of a plant– the lower or upper leaves/branches?
- 6. Where is the oldest tissue of a leaf– the tip or the base?

# Flowering plants with enclosed seeds= angiosperms

- Seeds borne in closed fruits
- Almost all plants that provide food

- Vs Gymnosperms- naked seeds
- What is an example of a gymnosperm seed that we eat?

# Monocots vs. Dicots

Monocots- more recent evolutionary development Families include:

• Poaceae, old Graminae- Grasses like corn, wheat rice and other non-legume grains and many grassy weeds like Johnson grass),

– Where is the growing part of the plant?

- Amaryllis (onions and garlic),
- Palms,
- Orchids

# Dicots- older group evolutionarily

Many more plant families including:

- Fabaceae- legumes like beans and peas (with weeds like Scotch broom),
- Brassicaceae- cole crops– cabbage, kale, cauliflower etc. (with some winter weeds like black mustard),
- Solanaceae- tomato, potato, eggplant, tobacco (with weeds like nightshade and jimsonweed);
- Asteraceae- Sunflower/composite family with crops like lettuce, Jerusalem artichoke (with weeds like Galinsoga, thistles, dandelions)

## Dicot, example bean



#### leaves

#### embryo – root or radical

With the seed coat and one cotyledon removed from a bean seed, the embryo is seen pressed against the other cotyledon. Complete with a pair of tiny leaves, a short stem and root, the miniature plant awaits the moment of germination.



Germination begins with the embryo's rapidly growing root bursting through the seed coat.

Cotyledon provides storage tissue for germinating seed



While the seedling's stem pushes its way toward the light, the root system branches in several directions from the plant's base. At the soil surface, the hooked stem pulls the cotyledons and, between them, the stem tip out of the soil. When the cotyledons are free of the soil, the bean's stem straightens and the embryo leaves, present in the seed, begin to expand and turn green.



After food supplies used up, cotyledons shrivel

#### Monocot, example corn



Has **one cotyledon** but also **endosperm**, another storage tissue inside the seed

White soft pulp in fresh corn is endosperm.

# Factors that affect seed germination (weed or crop)

- Type of seed coat, some need scarificationmechanical abrasion, e.g. okra
  - use sandpaper in tumbler
- Temperature, moisture
  - Bottom heat in winter, depending on plant
- Oxygen, CO<sub>2</sub>
- Light
  - Certain wavelengths stimulate germination, e.g. red and lettuce so need to be close to the surface of the soil.
    Larger seeds can be deeper but not more than 3 times the diameter of the seed
  - Rainforest light gaps
  - Tillage exposes seeds and germinates them

# Other requirements

- Presence of chemical inhibitors in seed coat
  may need to leach out
- Pretreatment with cold or heat
  - Apple (cold)
  - Desert wildflowers (heat)
- Scarification with fire
  - Pine trees in chaparral
- Good resources: Seed Starters Handbook

# Seed dissemination

- Wind
- Surface (stream). irrigation water or ocean currents
- Birds, gophers, ants, other animals
- Farm equipment in the case of weed seeds
- Compost and animal manures









# Weed seed dissemination

- Wind
- Irrigation water, if surface
- Farm equipment
- Compost and animal manures
- Birds, gophers, ants, other animals
- Impure seed
- How does this affect control?







#### Exercise

- 1) Dissect bean and corn seeds and look for parts, draw them and put them in your portfolio.
- 2) Start a "germination test" bag. Take seeds, use corn and bean or pea, put in moist paper towel in plastic bag and observe over one week. Make a drawing every few days and include in your portfolio.
- 3) Retake quiz!

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