Plant Reproduction
By Nick Tolosa

Table of Contents
- Introduction- Why Plants? / Evolutionary Fitness
- Asexual Reproduction
- Sexual Reproduction
- Seed Plants
- Seeds
- Fruits
- Gymnosperms
- Angiosperms
- Pollination

Introduction
- Why Plants?
- Evolutionary Fitness?
Asexual Reproduction

1. Any reproductive process that does not involve meiosis or syngamy.

2. Syngamy - is the absence of the fusion of two gametes.

3. Meiosis - the reduction of the number of chromosomes and the production of either gametes or spores.


5. Advantages:
   - Create individuals rapidly and in large numbers.
   - Sexual process is diverted.

6. Disadvantages:
   - Lack genetic diversity.

Types of Asexual Reproduction

1. Fragmentation - Separation of a part of a plant that can become later mature to a new plant.
   - Rhizomes - Horizontal Stem.
   - Potato Tubers - Fleshy Part of Root.
   - Kalanchoe Plants (Leaves).
   - Dandelions & Aspen Trees (Roots).

2. Apomixis - Formation of a sporophyte without fertilization. (F.)

3. Male Apomixis - formation of sporophyte exclusively because of pollen. (S.C.)
Asexual Reproduction: Apomixis

1. Advantages of Apomixis
   - Assured reproduction without pollinators
   - Avoid Male Energy in Producing Pollen

2. Disadvantages
   - Accumulation of Mutations
   - Lack Ability to adapt to changing environments

Sexual Reproduction

1. Reproduction that includes syngamy and meiosis
2. Advantages
   - Genetic Diversity
3. Disadvantages
   - Females capable of gestation
   - Search for mates
   - Chance of syngamy

Sexual Reproduction: Structures

4. Structures involved in sexual reproduction
   - Gametophyte: Structure Containing Haploid Cells formed by spores
   - Gametes: Male and Female Sex Cells
   - Sporophyte: Product of Syngamy
   - Spores: Product of Sporophyte through Meiosis.
Sexual Reproduction: (Life Cycle)

Gametophyte
↓ Mitosis
Gametes (Both Male and Female)
↓ Syngamy
Sporophyte (diploid)
↓ Meiosis
Spores (haploid)
↓ Gametophyte

Asexual Reproduction v.s. Sexual Reproduction

"Sexual reproduction is a mechanism which secures the greatest possibilities or recombination of genetic differences. That is its one primary and universal function. All others derive from it." (Darlington 1937).

"Asexual reproduction, on the other hand, by short-circuiting the twin processes of meiosis and syngamy, eludes their consequences- gene segregation and recombination- and so freezes the flow of variation." (Heslop 1981)

Seed Plants

1. Evolutionary Trend

Nonvascular Plants----→ Seedless Vascular Plants----→ Seed Plants (Spermatophyte)

2. Spermatophyte - Seed Bearing Plants
Seeds

1. Advantages of Seeds
   - Provides food for the sporophyte embryo
   - Provides Protection (Seed Coat)

2. Dormancy of Embryo within Seeds
   - Germinates During favorable Conditions

Seeds: Parts of the Seed

- Cotyledons- Serve as the First Leaves & Absorb Food
- Endosperm- Storage for Food
- Embryo- Earliest Stage of Development
- Seed Coat- Provides Protection
- Epicotyl - Mature Leaves

Seeds: Types of Seeds

1. Monocotyledons (Monocots)- Contains One Cotyledon.
   - Wheat and Corn

2. Dicotyledons (Dicots)-
   Contains Two Cotyledons.
   - Magnolia Flower and Beans
Seeds: Seed Dispersal

1. Movement or Transport of Seeds from Parent Plants

2. Benefits
   - Away from competition and Predators

3. Types of Seed Dispersal
   - Hydrochory
   - Epizoochory
   - Wind

Fruit

- Mature Ovary of Flowering Plant
- Formed to protect seed
- Aid in dispersal

Fruit: Types

1. Simple - Produced by a ripened ovary in a single flower
2. Aggregated - Fruit is a cluster of mature ovaries by a single flower
3. Multiple Fruit - Many ripened ovaries on separate flowers
Fruit: Parts of the Fruit

- **Exocarp**: Tough skin like texture
- **Mesocarp**: Sweet and fleshy texture
- **Endocarp**: Hard and stony and surrounds the seed

Gymnosperms

- **Naked Seeds**
- **Non-Flowering Seed Plants**
- Includes Cedar, Pine, Redwood, Hemlock and Firs
- Usually Large
- Much Secondary Growth (Vascular Cambium)
- Leaves are usually evergreen needles or scales

Gymnosperms: Life Cycle
Angiosperms

- Flowering Plants
- Enclosed Seeds
- Two Categories: Monocots & Dicots
- No Secondary Growth

Angiosperms

4. Differences between dicot and monocot
   - Monocots: Single Cotyledon, Pollen with single furrow or pore, Scattered Vascular Bundles
   - Dicots: Two cotyledons, Pollen with multiple furrows, Vascular bundles in a circle

Angiosperm: Life Cycle
Angiosperm: Parts in Reproduction

1. Stamen (Filament): Male Reproductive Organ
2. Anther: Pollen Bearing Structure
3. Pistil (Carpel): Female Reproductive Organs Stigma, Style, Ovary
4. Stigma: Entrance to ovules for pollen grain
5. Ovary

Pollination

1. Movement of Pollen from Stamen to Stigma
2. Majority of Flowering Plants are hermaphroditic
3. Able to Self Pollinate
4. Pollinating Agents (Abiotic and Biotic)
5. Diversity

References

3. http://www.ucmp.berkeley.edu
5. www.google.com/images