

# Seed Ecology

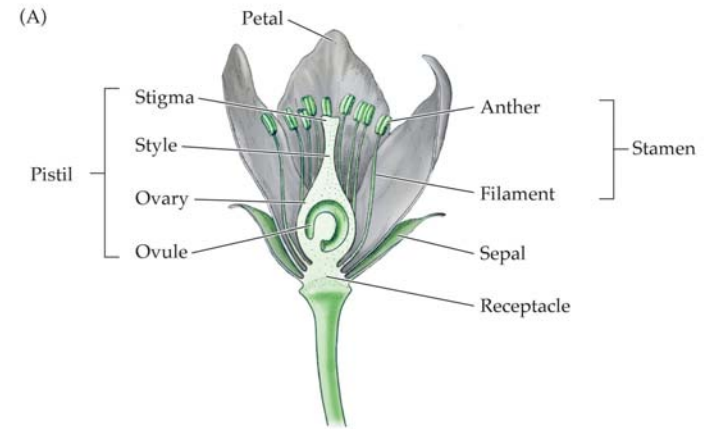
- Review life cycles
- Factors determining seed/fruit set
- Seed/ Fruit dispersal mechanisms



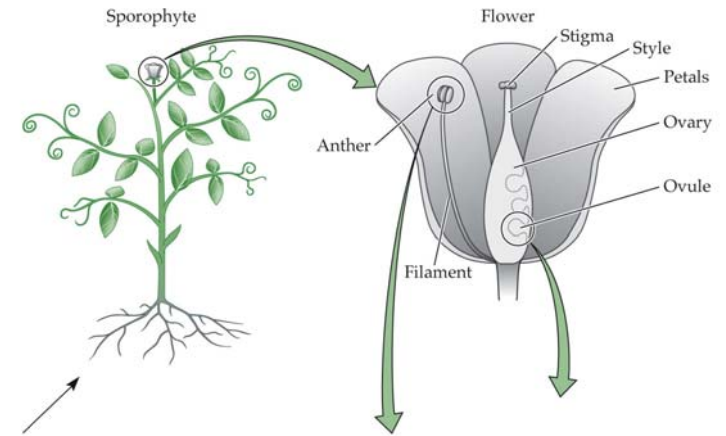
*Amorphophallus titanum*  
Voodoo lily

# Life cycles

- Seed plants
- Gymnosperm
- Single fertilization
- Angiosperm



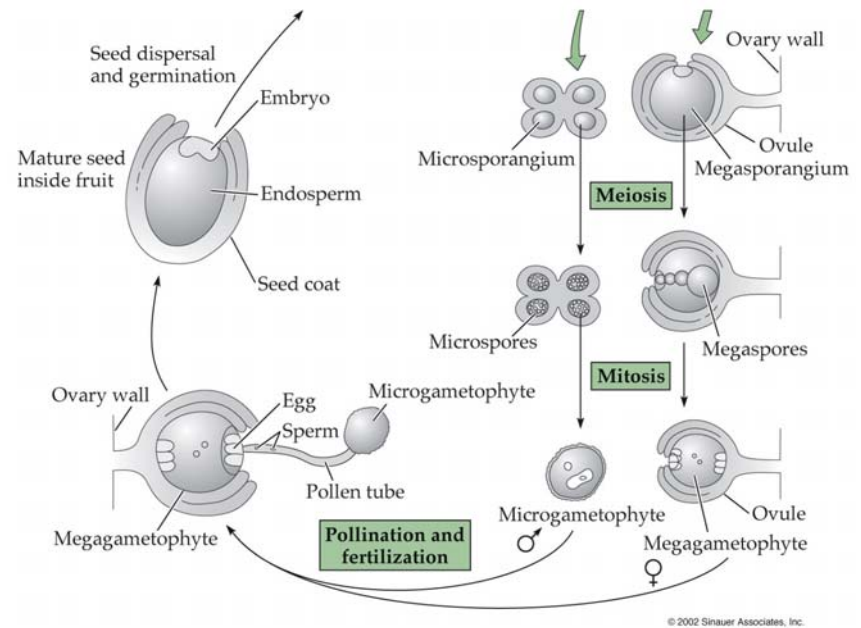
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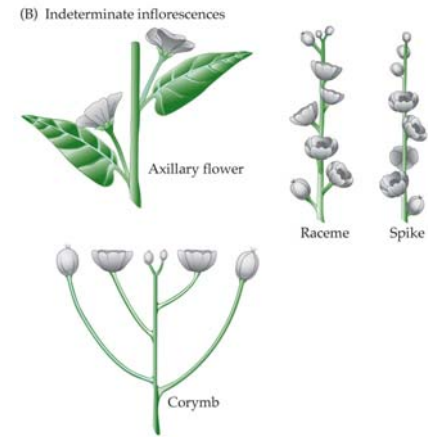
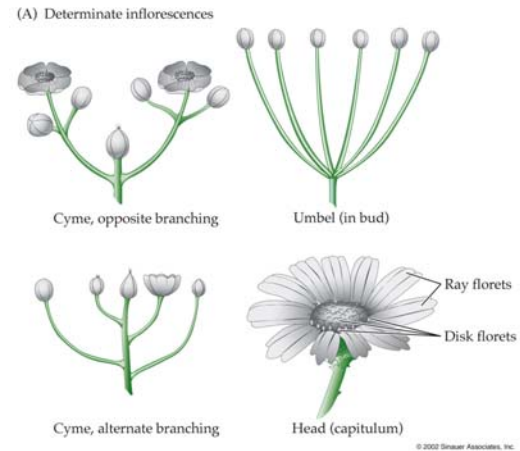
# Life cycle

- Development of pollen and ovules
- Pollination
- Double fertilization
- Development of seed
- Structure of seed
- Embryo
- Endosperm
- Seed coat



# Factors determining seed/fruit set

- Pollination
  - Selfing
  - Out crossing
  - Genetic factors
- Self-incompatibility
  - Inbreeding depression
  - Out crossing depression



# Determining seed/fruit set

- Resources
  - Fruit abortion
  - Seed size
  - Seed number
  - Flower number/size
- Selective abortion
- Predation/parasitism
  - Pre-dispersal predation
  - Predator satiation
  - Post-dispersal predation
  - Chemical defenses of fruits

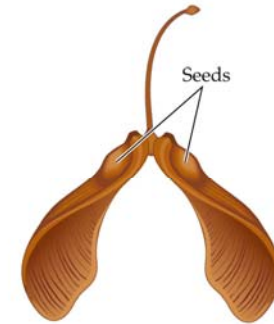
# Seed Dispersal mechanisms

- Benefits
- Hydrochory
- Anemochory
- Zoochory

(A) Dandelion seed (*Taraxacum*)

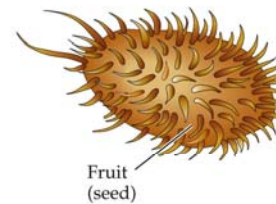


(B) Maple fruit (*Acer saccharum*)

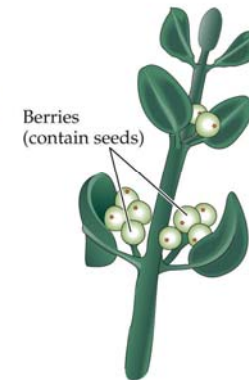


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(C) Cocklebur fruit (*Xanthium strumarium*)



(D) Mistletoe berries (*Phoradendron leucarpum*)



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# Benefits

Table 7-4 Advantages to seed dissemination, from the perspective of parental fitness

Hypothesis	Advantage	Expected Attributes
Colonization	Occupy vacant sites	Small, often minute seeds; seed dormancy; rapid growth in sun; shade intolerant
Escape	Avoid density-dependent seed or seedling death near parent	Medium or large seeds; shade tolerant
Directed dispersal	Occupy specific micro-sites critical for establishment	Small, often ant-dispersed seeds; special germination or seedling requirements

# Seed fall

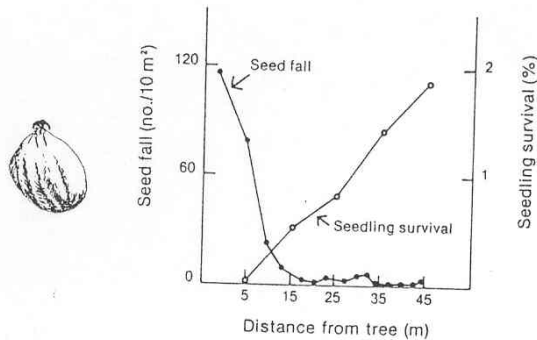


Fig. 7-16 Actual patterns of seed fall and seed and seedling survival three months after fruit drop in the toucan dispersed tree, *Virola surinamensis*, in Panama. Seed and seedling mortality due to *Conotrachelus* weevil infestations are so heavy under the crown that the seed fall and seedling survival curves cross at the crown edge, 10–15 m from the tree base. Not surprisingly, adults of this species are clumped, with an average nearest neighbor distance of 18 m. Overall, there is a 40-fold advantage to seed dispersal only 45 m from fruiting *Virola* trees. Data from Howe et al. (1985).

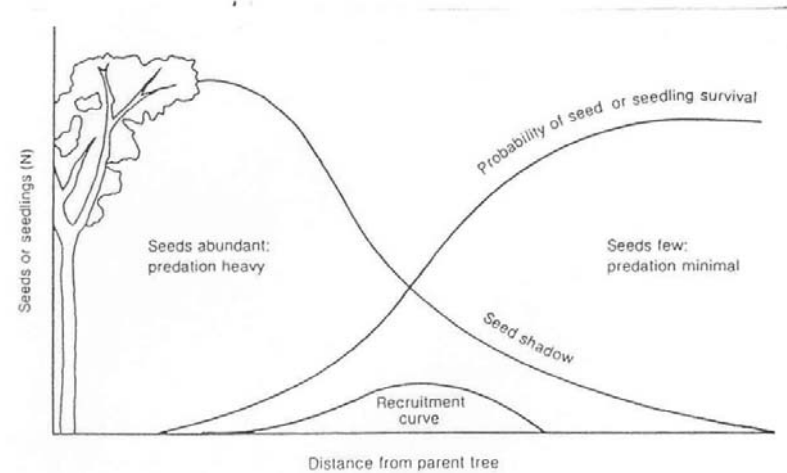


Fig. 7-15 Hypothesized escape of seeds from disproportionate mortality near parent trees. Seeds fall in a skewed distribution with the peak density under or near the parent. Mortality of seeds, seedlings, or saplings is greater near the parent than further away because of attacks by insects, pathogens, or rodents, or because of sibling competition. Consequently, overall survival increases with distance from the fruiting tree. A "recruitment curve" represents the distance at which greatest sapling survival is expected to occur. First proposed by D. H. Janzen (1970).



# Hydrochory

FIGURE 8.26 Sedge adaptation to water dispersal.  
A. A sedge fruit. The seed is enclosed within an inflated covering that enables it to float on water. B. A sedge plant.

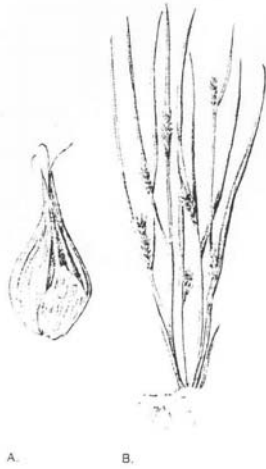
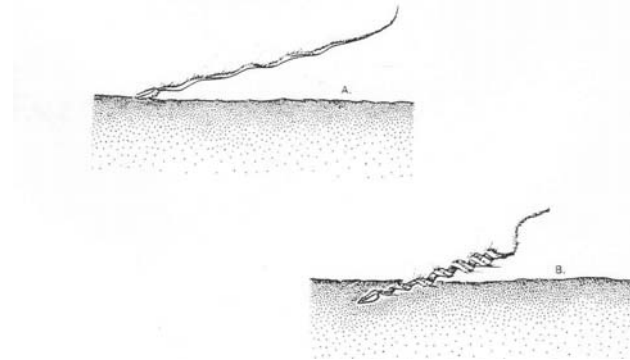
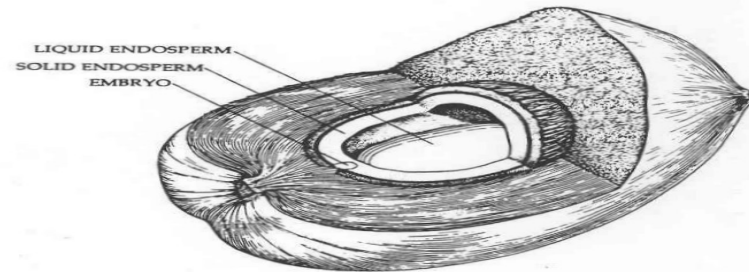


FIGURE 3.17 Filaree fruitlets. A. Under humid conditions. B. Under dry conditions. Alternate coiling and uncoiling causes the fruitlets to be "screwed" into the ground.



(d)

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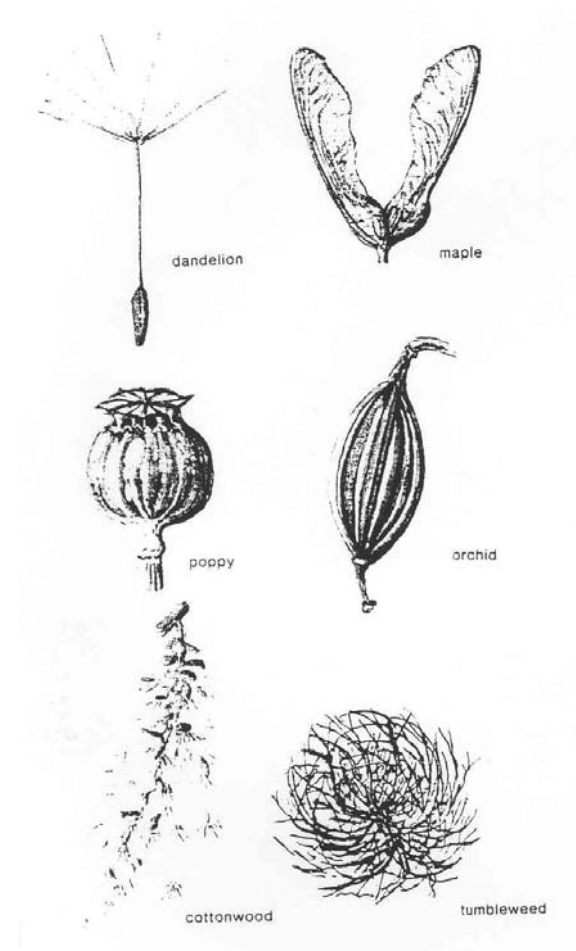
*The fruit of the coconut (*Cocos nucifera*), a drupe. The coconut milk is liquid endosperm; it acquires cell walls by the time of germination. The entire fruit floats easily in the sea, and coconuts are dispersed widely by this means, reaching the most remote islands. When coconuts are transported commercially, their husks are usually removed first, so that in temperate regions people usually see only the stony inner shell of the fruit surrounding the seed.*

# Anemochory



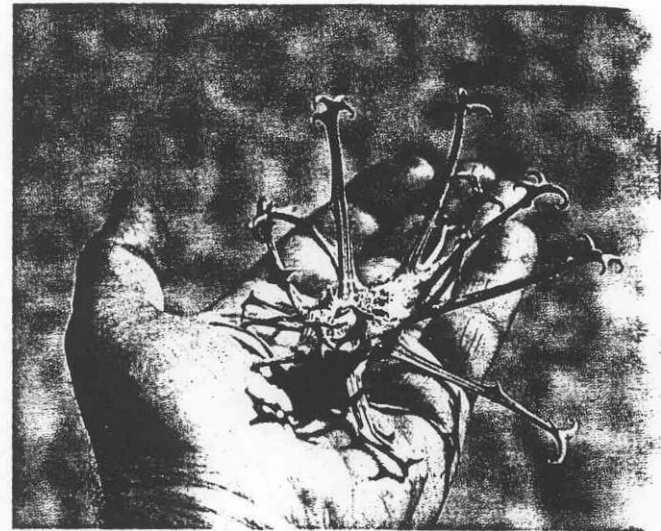
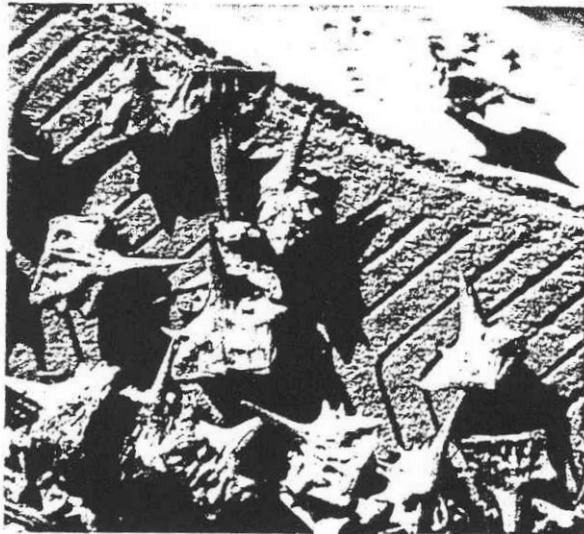
(c)

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# Zoochory

FIGURE 8.24 Fruits of a puncture vine clinging to a hiking boot. (Courtesy Robert A. Schlising)



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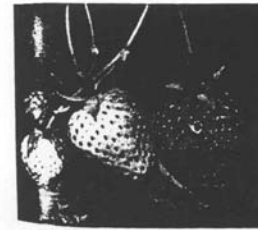
*The fruits of the African plant Harpagophytum, a member of the sesame family (Pedaliaceae) are equipped with "grappling hooks," by means of which they catch in the fur on the legs of large mammals and thus are spread from place to place.*

# Zoochory

FIGURE 8.25 Seeds of the Pacific bleeding heart. The glistening appendages are *elaiosomes*, which are removed from the seeds by ants and used for food.



myrmechochory



(a)



(b)



(c)

The seeds of fleshy fruits are usually dispersed by vertebrates that eat the fruits and either regurgitate the seeds or pass them as part of their feces. Examples of vertebrate-dispersed fruits are shown here. (a) Strawberries (*Fragaria*), an example of an aggregate fruit. The achenes are borne on the surface of a fleshy

receptacle. Immature strawberries, like many bird- or mammal-dispersed fruits, are green, but they become red when the seeds are mature and thus ready for dispersal. (b) The berries of many cacti, such as this prickly pear (*Opuntia*), growing in southern Mexico, are conspicuous at maturity. (c) Berries of

chaparral honeysuckle, *Lonicera hispidula*. Such berries develop from the inferior ovaries of this species, and therefore have fused portions of the outer floral whorls incorporated in them. A flower of this species is shown in Figure 29-13c.

# Zoochory

Figure 5-6 The relationship between seed density and the distance of seed dispersal from an isolated plant of *Verbascum thapsus* and from the edge of a dense population of *Tussilago farfara*. (© 1977 by J. L. Harper, *Population Biology of Plants*.)

