

## BROADLEAF REPRODUCTIVE BIOLOGY

Seed plants started to evolve 340 million years ago with Angiosperms arising about 130 million years ago, but it was about 100 million years ago that the number of species began to rapidly evolve. Angiosperms produce true flowers which can be either perfect or imperfect. Perfect flowers contain both male and female reproductive structures whereas imperfect flowers are either sex. Flowers occur in a variety of arrangements such as: spike, raceme, panicle, corymb, cyme, umbel, catkin, and head. Some genera or species are monoecious where both males and females occur on the same tree as opposed to dioecious species where males and females occur on separate trees. Pollen that is dispersed by wind (anemophilous) is small and is dispersed over great distances. Pollen from species that produce showy, fragrant flowers is generally dispersed by insects (entomophilous). This pollen is larger and its dispersal is generally limited. Broadleaved species produce fruit that contains the seed. The type of fruit produced is species-dependent. Examples include: achene – sycamore (*Platanus occidentalis*); double samara – maple (*Acer* spp.); single samara – elm (*Ulmus* spp.), ash (*Fraxinus* spp.); acorn – oak (*Quercus* spp.); nut – hickory (*Carya* spp.), butternut (*Juglans cinerea*); legume - Kentucky coffeetree (*Gymnocladus dioica*); capsule – poplar (*Populus* spp.); pome – apple (*Malus* spp.), mountain ash (*Sorbus* spp.); and drupe – cherry (*Prunus* spp.). Fruits are shed by most species in late summer and fall and are primarily dispersed by wind. Dispersal by animals is important for species such as mountain ash, cherries, oaks, and butternut. Seed of broadleaved species often exhibits dormancy due to seed coat, embryo, morphology or a combination. Seed coat dormancy can be alleviated by soaking seed in cold or hot water or treating the seed with acid to allow moisture to enter. Moist chilling or combinations of warm, moist incubation and moist chilling alleviate embryo and morphological dormancy.

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