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A plant can form fruit and seeds when it is pollinated. Animals and wind help spread pollen from one plant to another. But do you know how insects pick up pollen from flowers? Or how each part of a flower helps pollination? Let's experiment to find out!

Learn more about plants in the **Plant Experiments** series—part of the **Lightning Bolt Books™** collection. With high-energy designs, exciting photos, and fun text, **Lightning Bolt Books™** bring nonfiction topics to life!

Plant Experiments

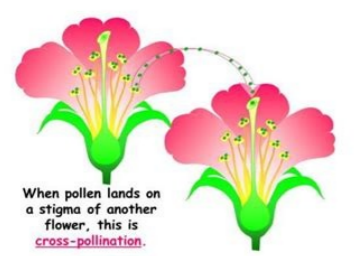
- Experiment with a Plant's Living Environment
- Experiment with a Plant's Roots
- Experiment with Parts of a Plant
- Experiment with Photosynthesis
- Experiment with Pollination
- Experiment with What a Plant Needs to Grow

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5. It ensures seed production. Rather it is used as fail safe device for crosspollinated flowers. 6. Self-pollination eliminates some bad recessive characters Disadvantages of Self Pollination: 1. New useful characters are seldom introduced. 2. Vigor and vitality of the race decreases with prolonged self-pollination. 3. Immunity to diseases decreases. 4. Variability and hence adaptability to changed environment are reduced. **CROSS POLLINATION** (xenogamy/allogamy) Cross pollination is the transfer of pollen grains from the anther of one flower to the stigma of a genetically different flower. It is also called xenogamy (Gk. xenos - strange, gamos- marriage). The term allogamy (Gk. alios- other, gamos- marriage) includes both geitonogamy and xenogamy. Cross pollination is performed with the help of an external agency. Agents of Pollination In angiosperms, pollen are immoile and thus have to be carried to the stigma by external pollinating agents. Depending upon their nature the agents may be - 1. Biotic agents: Insects, Birds, Snails etc. 2. Abiotic agents: Wind, Water. **BIOTIC AGENTS I.** Entomophily : It refers to the transfer of pollen grains through the agency of insects like moths,butterflies, wasps, bees, beetles, etc. Ex: Salvia, Yucca, Ficus Characters: They are showy or brightly colored. Most insect pollinated flowers have a landing platform. The pollen grains are spiny, heavy and surrounded by a yellow oily sticky substance called pollen kit.

CROSS POLLINATION (xenogamy/allogamy)

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When pollen lands on a stigma of another flower, this is cross-pollination.

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Stigmas are often inserted and sticky. Some flowers provide safe place to insects for laying eggs, e.g., Yucca. II. Ornithophily It refers to the pollination brought about by birds. Pollination by butterfly, example the Indian painbrush (Castilleja sp.) by swallowtail butterfly. **ABIOTIC AGENTS I.** Anemophily It is a mode of cross pollination or transfer of pollen grains through the agency of wind. Ex: Coconut palm, Date palm, Maize, many grasses, Cannabis. Characteristics: ■ The flowers are colorless, odorless and nectarless. ■ Pollen grains are light, small and winged or dusty, dry, smooth, non-sticky and non wettable. ■ Stigma is hairy, feathery or branched to catch the wind-borne pollen grains. ■ Pollen grains are produced in very large number. II. Hydrophily It is the mode of pollination or transfer of pollen grains through the agency of water. Ex: Zostera, Vallisneria Characters: ■ Flowers are small and inconspicuous. ■ Nectar and odor are absent. ■ Pollen grains are light and non-wettable due to presence of mucilage cover. ■ Stigma is long, sticky but wettable. It is further divided into two parts: Epiphydrophily: Pollination occurring on the water surface Ex: Elodes, Hydrilla, Vallisneria. Hypohydrophily: pollination occurring beneath the water surface. Ex: Najas, Ceratophyllum, Zostera. **Methods to Ensure Cross pollination** Dichogamy: The maturation of the stamens and pistils of a bisexual flower at different times, so that self-pollination is prevented. -Protoandry Anthers mature earlier than the stigma of the same flower. There pollen grains become available to stigmas of the older flowers. , ex: Sunflower, Salvia -Protogyny Stigmas mature earlier so that they get pollinated before the anthers of the same flower develop pollen grains, e.g., Mirabilis jalapa (4 O'clock), Herkogamy It is a common strategy employed by hermaphroditic angiosperms to reduce sexual interference between male (anthers) and female (stigma) function. Self-incompatibility (SI) It is a general name for several genetic mechanisms in angiosperms, which prevent self-fertilization and thus encourage outcrossing and allogamy. Heterostyly The condition (e.g. in primroses) of having styles of different lengths relative to the stamens in the flowers of different individual plants, to reduce self-fertilization. Prepotency Pollen grains of another flower germinate more rapidly over the stigma than the pollen grains of the same flower, e.g., Apple, Grape. Dicliny (Uni-sexuality) Flowers are unisexual so that self-pollination is not possible. The plants may be monoecious (bearing both male and female flowers, e.g., Maize) or dioecious (bearing male and female flowers on different plants, e.g., Mulberry, Papaya). **Artificial Hybridization** Artificial hybridization refers to instances in which these crosses occur under controlled conditions, often under the direction of plant or animal breeders. **PROCEDURE:** 1. Emasculation: The removal of the anthers of a flower in order to prevent self-pollination or the undesirable pollination of neighboring plants. 2. Bagging The emasculated flowers are immediately covered by paper, plastic or polythene bags. The process is called bagging. It prevents unwanted pollen to come in contact with emasculated flowers. This prevents contamination from foreign pollen grains 3. Rebagging When the flower is bagged lower attains receptivity, mature pollen grains collected from anthers are dusted on the stigma and the flower is rebagged. **Advantages Of cross Pollination** ■ Cross pollination introduces genetic re-combinations and hence variations in the progeny. ■ Cross pollination increases the adaptability of the offspring towards changes in the environment. ■ It makes the organisms better fitted in the struggle for existence. ■ The plants produced through cross pollination are more resistant to diseases. ■ The seeds produced are usually larger and the offspring have characters better than the parents due to the phenomenon of hybrid vigour. ■ New and more useful varieties can be produced through cross pollination. ■ The defective characters of the race are eliminated and replaced by better characters. ■ Yield never falls below an average minimum. **Disadvantages of Cross Pollination** □ It is highly wasteful because plants have to produce a larger number of pollen grains and other accessory structures in order to suit the various pollinating agencies. ■ A factor of chance is always involved in cross pollination. ■ It is less economical. ■ Some undesirable characters may creep in the race. ■ The very good characters of the race are likely to be spoiled.