POLLINATION

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WHAT IS POLLINATION?

Pollination is part of the reproduction of flowering plants. It involves the transfer of pollen from the anther of a flower to the stigma of the same or another flower. This process begins seed production in flowering plants.

WHY IS POLLINATION IMPORTANT?

Pollination is necessary for all seed and fruit production. In some crops, it is the seed that is harvested for food, for example: oilseed crops, nuts, legumes such as beans and peas, and cereals like rice and maize. In other crops, we eat the fruit that develops with the seed, for example citrus fruit and tomatoes.

Seed is needed for the production of the next generation of crops, and the process of seed production allows natural selection to take place.

The importance of pollination is not always fully appreciated, although in some parts of the world the need for pollination has long been understood by farmers. For example, in the Middle East, there are well-established procedures to encourage natural pollination: to ensure a good crop of figs, owners of fig groves introduce Capri fig trees. Although the fruit of these trees is inedible, they produce pollen and harbour the tiny wasps that are needed to pollinate the other fig flowers.

HOW DOES POLLINATION TAKE PLACE?

Plants need pollen to be transferred from the anthers to the stigmas of flowers on the same plant, or on a separate plant, that may be some distance away. Each plant species has evolved its own technique for this important transference of pollen. Many plant species depend upon insects to transfer pollen from one flower to another as the insects forage for nectar and/or pollen. Bees are recognised as the most generally efficient pollinators because:

1. Bees have hairy bodies which easily pick up grains of pollen as they move about in flowers
2. Each bee usually visits flowers of a single species during each foraging trip
3. Each foraging bee has not only to collect sufficient food for her own requirements, but must forage continuously for nectar and pollen to supply the daily food needs of the colony.

During a single day, one honey bee may visit several thousand flowers of one plant species, collecting nectar and/or pollen and transferring pollen grains from one flower to another as she goes. Other insects, and in particular flies, can carry much pollen on their bodies, but they are not such consistent foragers as bees.

FLOWER STRUCTURE

The female part of a flower consists of the ovary (containing ovules), the style and the stigma. The male part of the flower consists of the stamens made up of anthers and filaments. Anthers are usually covered by the dust-like pollen that they produce.

HOW DOES POLLINATION BY INSECTS AFFECT CROP YIELD?

- Some crops are self-pollinating but give better yields if pollinated by insects. Examples are field bean, mango.
- Some crops give a substantially increased yield when pollinated by insects. Examples are passion fruit, cowpea, sesame, lychee, mustard, cashew.
- Some crops are completely dependent on pollination by insects and will not otherwise produce seed. Examples are clovers, runner beans, almonds, melons.

Adequate insect pollination affects the *quality* and *quantity* of the crop. Uneven and small fruit are often an indication that pollination has been insufficient.

Adequate pollination by insects also ensures that early flowers set seed: this results in a uniform and early harvest and gives the crop the maximum possible length of time to mature.

It is in everyone's interest to maintain strong populations of honey bees and all other pollinating insects. Some honey bees are managed in hives by beekeepers but they can also be found living in the wild.

Farmers can help by:

- Not using insecticide. If they are to be used, they must be selected and applied with great care. When wild pollinating insects are killed, you risk losing good crop yields in the future.
- Never using insecticide when flowers are open. Foraging insects work on open blossoms and will be killed if you spray at this time. If you must use insecticide, spray early or late in the day when crop flowers are closed.
- Allowing wild plants to flower on waste pieces of land. These will help support populations of wild foraging insects when crops are not flowering.

Everyone can help by:

- Being aware of, and teaching others, the important value of pollination by insects.
- Increasing local forage by making sure that nectar-bearing bushes and trees are included in planting schemes.
- Preventing unnecessary use of pesticides.

POLLINATION BY BEES HAS BEEN PROVED TO INCREASE THE SEED OR FRUIT YIELD OF THESE CROPS

almond
apple
apricot
asparagus
avocado
Brassica species such as cabbage, cauliflower, Chinese cabbage, mustard, oilseed rape, sarson, swede, turnip
buckwheat
cardamom
carrot
cherry
clover species such as ball, crimson, Persian red, sweet, white
coconut palm
coffee
coriander
cotton
cranberry
Cucurbitaceae species such as gourd, pumpkin, squash, cucumber
dill
eggplant
feijoa
field bean
grape
hairy vetch
horse gram
kenaf
kiwi
longan
lucerne
macadamia
mandarin
mango
melon
niger
onion
pawpaw (papaya)
peach
pear
pimento
plum
radish
rambutan
runner bean
safflower
sainfoin
soya bean
strawberry
sunflower
sweet chestnut
sweet vetch

The extent to which insect pollination increases crop yields has not been determined for every tropical crop: much valuable research remains to be done on this subject

BEES AND OTHER INSECTS ARE INVOLVED IN THE POLLINATION OF THESE CROPS

Acacia; various species
acerola
adzuki bean
angelica
anise
arrowroot
artichoke: various species
ash gourd
ber
bergamot
berseem
black medick
black wattle
borage
bottle gourd
box elder
butter bean
carambola
caraway
cashew
cassava
castor
celery
chayote
cherimoya
chestnut, Japanese
chicory
chives
Citrus fruits: some lemon varieties, satsuma, pomelo, orange, grapefruit, citron, tangerine
clove
clover,
cluster bean
cocoa
date palm
derris
durian
endive
Eucalyptus: various species
fennel
fig
flax
granadilla, giant
groundnut; some varieties
guava
haricot bean
hemp
henequen
horse bean
indigo
jujube
kidney vetch
kudzu
leek
lettuce
loofah
lupin
lychee
marjoram
mesquite
milkweed
mint
mung bean
nutmeg
oil palm
okra
parsley
parsnip
passion fruit
pea: various species
peppermint
persimmon
pili nut
quince
quinine
rice bean
rocket cress
rosemary
rubber
para-pyrethrum
saffron
sesame
silk-cotton tree
sisal
sugar beet
sweet potato
sword bean
tamarugo
tea
tephrosia
tobacco
tomato
tonka bean
toria
tung: two species
willow
yam
yucca

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This Information Poster has been prepared by **Bees *for* Development** who work to assist people in developing countries by providing information and advice about apiculture. We believe that apiculture is a feasible way to help people to work their way out of poverty, while at the same time maintaining natural biodiversity. Apiculture gives some of the world's poorest people the opportunity to harvest commodities (honey and beeswax) that can have international quality and value. These people usually have little access to beekeeping information, even though the sector is fast evolving, as markets change and honey bee pests and diseases are spread worldwide. **Bees *for* Development**'s philosophy is to provide information on how to look after bees, and harvest from them in sustainable ways. Our focus is on using indigenous species where possible, and building on traditional techniques to find methods that work according to resources available. **Bees *for* Development** works worldwide, assisting beekeepers in every continent.

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