

# HONEY BEES AS POLLINATORS

## (A SUMMARY)

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### A. WHY AND HOW BEES VISIT FLOWERS

- Visit flowers for nectar and/or pollen.

#### 1. NECTAR:

- from nectaries found on receptacle, sepals, petals or at base of pistil or filaments.
- provides bees with carbohydrates (sucrose, glucose and fructose).
- bees prefer flowers with at least 30-40% sugar (depends largely on plant species and weather).
- average load of 20-40 mg carried internally in honey sac.
- nectar collectors are usually not good pollinators because they often miss anthers and stigma.

#### 2. POLLEN:

- from anthers found on filaments.
- provides protein, fats, minerals and vitamins for adult bees and brood.
- one load (2 pellets) on legs weighs 10-20 mg.
- each colony requires about 20 kg/year.
- records of up to 4 million pollen grains on body depending on plant species.
- carried in pollen baskets and on body hairs.
- pollen collectors are usually good pollinators because they frequently cross anthers and stigma.
- "trick" is to get more pollen collectors on the "target" crop - the most feasible is to use a strong building colony.
- other systems may work but are usually not practical.

## B. "BEE-FLOWER" RELATIONSHIPS

Flowers and bees are well adapted to each other;

<u>Flower</u>	<u>Bee</u>
Colour	Colour Sense
Shape	Eyes adapted
Movement	Attracted to this
Perfume	Antennae
Nectar (sugar)	Taste, tongue, honey sac
Pollen (odour)	Smell, brushes, hair, baskets, jaws, antennae cleaner.

Bees are also assisted by:

1. Wings - hook together; move bees in three dimensions.
2. Navigational skills - use landmarks and sun as a compass.
3. Communication skills - gives distance, direction, odour, taste of food.
4. Time sense - can visit three different sites at three different times in one day.

## C. FORAGING BEHAVIOUR OF HONEY BEES

### 1. COLONY FACTORS:

- strain of bee
- growing colony population
- colony needs (pollen vs nectar)
- general management
- rotate hives

### 2. ENVIRONMENTAL FACTORS:

- Temperature: Need warm site, forage best above 20°C.
- Light: on entrance helps.
- Wind: The bee stops foraging above 24 km/hour. Prefers shelter - no turbulence.

- Rain: return home, forage close to hive.
- Landmarks: lose bees after move hives. Depends on time in home site, distance from home site and cues in new site.

(NOTE - majority of bees orient selves very quickly).

### 3. BEE AND FLORAL FACTORS:

Remember, two important ground rules:

- (a) Honey bee is an "animal of choice" - has scout bees always on the move.
- (b) Target crop and other crops "compete" for bees - called "floral competition".

Therefore options are:

- make target crop attractive
- fence bees in (??)
- reduce competition
- add more bees

NOTE: Bees are good pollinators because they usually "work" one plant species per trip and work small areas.

However, their:

- (a) dispersal (time, area, distance and direction)
- (b) crop preferences
- (c) nectar vs pollen collection

depends mostly on -

- (a) population and needs of colony
- (b) floral competition

D. To Summarise: if we are dealing with a honey bee pollinated crop, then to assist in pollen transfer the following is required:

1. An overlap in time and space of:
  - correct number of compatible pollinizing varieties.
  - viable pollen
  - receptive female flowers
  
2. Presence on "target crop" of correct number of pollen-collecting bees at the correct time.
  - This implies good flying weather and low floral competition.

NOTE: One of the chief problems appears to revolve about the difficulty of holding bees on a crop that requires pollination!

This is a universal problem.