

THE IMPORTANCE OF HONEYBEES TO CROP POLLINATION IN VIETNAM



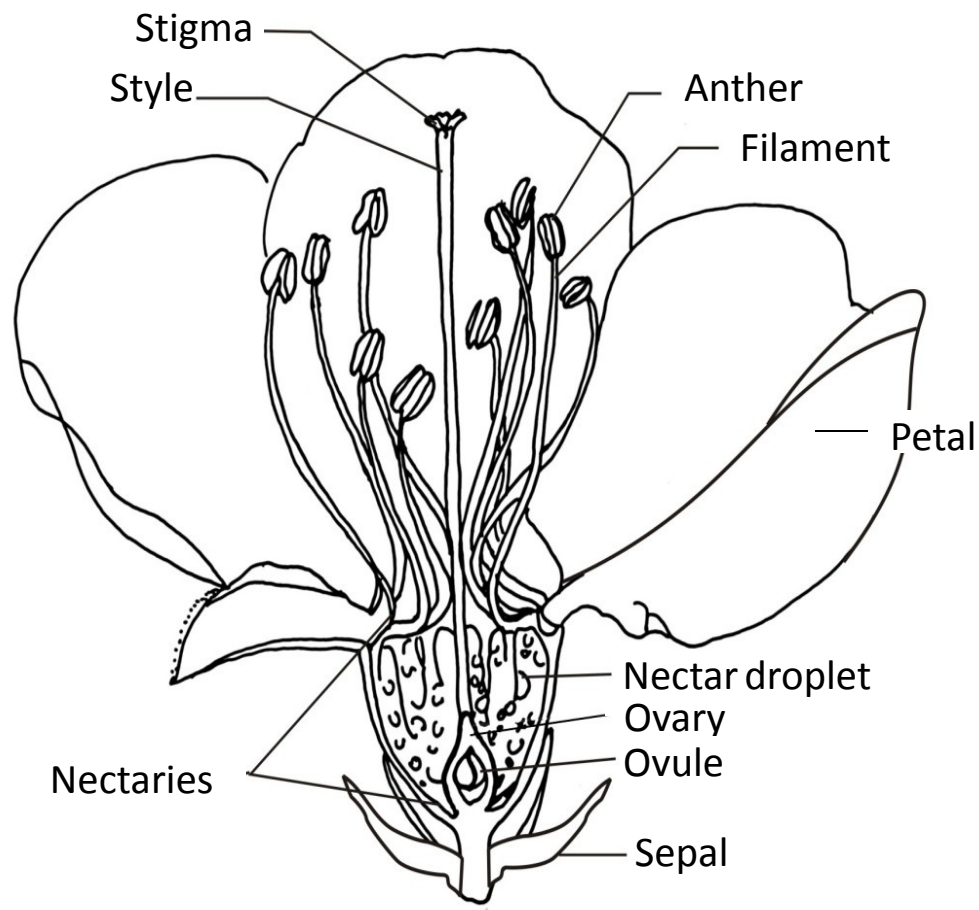
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General structure of complete flower with both male and female structures



**Pollination: transfer
of pollen from
anthers to stigma
of the flower**

**Self-pollination vs.
cross pollination**

Pollinators



- ❑ Insects:
 - Bees
 - Butterflies
 - Flies
- ❑ Birds
- ❑ Bats
- ❑ Wind

The importance of pollination



- 30% of food in developed countries results from bee pollination
- Economic value of pollination worldwide
 - Amounted to CAD \$254 billion in 2005
 - Represented 9.5% of the value of the world agriculture production (Gallai, N., et al., 2008)

The importance of pollination



- Canada:
 - 70% of Canadian food crops need insects for pollination
 - The value of honeybee pollination: about 9X more than the value of the honey and beeswax produced (\$443 million vs. \$49.6 million, 1985-1989)
(Canadian Association of Professional Apiculturists, 1995)

The importance of pollination



□ USA:

- Number of colonies rented for pollination increased from 2,035,000 in 1989 to 2,500,000 in 1998 (22.8%)
- Value of the increased yield and quality achieved through pollination by honeybees was \$9.3 billion in 1989 and \$14.6 billion in 1998 (a 57% increase) (Morse R. & Calderone N., 2000).

Situation of pollination in Vietnam

- Vietnam is tropical country
- Average temperatures:
 - *Hanoi: 29.2°C (summer) and 17.2 C (winter)
 - *HCM city: 26°C average
- Flowers and bee forage are available all year round
- Many crops require insect pollination



Situation of pollination in Vietnam

Honeybees in Vietnam



Apis cerana
apiary



Pham Thi Huyen

Apis dorsata

Apis mellifera
colonies



Pham Thi Huyen

Apis florea

Situation of pollination in Vietnam



Crops that benefit from bees and other insects:

- Fruit trees
- Melons
- Vegetables
- Oil-seed crops
- Perennial crops (e.g., coffee)



Situation of pollination in Vietnam



- No commercial pollination services.
- Crops must rely on natural pollination
- Few research studies have been done
- Generally farmers do not know much about the importance of pollinators
- A few farmers take actions to improve crop yields.

Avocado (*Persea americana*)



- Value of crop: 7.3 million \$US/year
- Pollinators: honeybees, stingless bees, flies, wasps
- Proportion of yield attributed to pollinators: 50% (Kalman, 1979)
- Value of honeybees regarding to pollination: from 3.6 to 5.9 million \$US/year

Coffee (*Coffea arabica*, *C. canephora*, *C. excelsa*)



- Value of crop: 1,400 million \$US/year
 - Pollinators: honeybees, stingless bees, wasps
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- Proportion of yield attributed to pollinators : 50% + (Roubik, 2002; Raw & Free, 1977)
 - Value of honeybees regarding to pollination: over 700 million \$US/year

Cucumber (*Cucumis sativus*)



- Value of crop: over 600 thousand \$US/year
- Pollinators: honeybees, stingless bees, solitary bees, butterflies
- Proportion of yield attributed to pollinators : 90% (Canadian Association of Professional Apiculturists, 1995)
- Value of honeybees regarding to pollination: 550,000 \$US/year

Litchi (*Litchi chinensis*)



- Value of crop: 72.3 million \$US/year
 - Pollinators: honeybees, stingless bees, fly
 - Proportion of yield attributed to pollinators : 100% (Indian Bee Journal, 1981b; YaoChun, 1993)
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- Value of honeybees regarding to pollination: 72.3 million \$US/per year

Longan (*Dimocarpus longan*)



- Value of crop: 245 million \$US/year
- Pollinators: honeybees, stingless bees, fly
- Proportion of yield attributed to pollinators : 30% (Wongsiri, 1984 (cited by Crane & Walker, 1984))
- Value of honeybees regarding to pollination: 73.6 million \$US/year

Melon and watermelon (*Citrullus* spp.)



- Value of crop: 102 million \$US per year
- Pollinators: honeybees, solitary bees, stingless bees
- Proportion of yield attributed to pollinators : 80% (Canadian Association of Professional Apiculturists, 1995)
- Value of honeybees regarding to pollination: \$81.2 million USD per year

Pumpkin and Squash (*Cucurbita* spp.)



- Value of crop: 820 thousand \$US/year
- Pollinators: honeybees, flies, beetles
- Proportion of yield attributed to pollinators : 60% (Canadian Association of Professional Apiculturists, 1995)
- Value of honeybees regarding to pollination: over 490,000 \$US/year

Sesame (*Sesamum indicum*)



- Value of crop: 42.5 million \$US/per year
- Pollinators: honeybees, stingless bees, solitary bees
- Proportion of yield attributed to pollinators: 32% (Indian Bee Journal, 1981b)
- Value of honeybees regarding to pollination: 13.6 million \$US/year.

Summary

English name	Area (ha)	Total production (tons)	Total value (million \$US)	Increase due to honey bees pollination (%)	Value due to Honeybees (million \$US)
Avocado	2,694	40,000 t	\$7.3	50%; 81.25%	\$3.6-5.9
Coffee	506,400	961,000 t	\$1,400	over 50%	over \$700
Cucumber	316	2,500 t	\$0.6	90%	\$0.5
Litchi	87,296	596,000 t	\$72.3	100%	\$72.3
Longan	97,900	578,000 t	\$245.4	30%	\$73.6
Melons and water melons	3,223	837,000 t	\$101.5	80%	\$81.2
Pumpkin and Squash	900	9,000 t	\$0.8	60%	\$0.5
Sesame	44,700	28,000 t	\$42.5	32%	\$13.6
Total			\$1,870		\$945

Discussion



- The table reveals that the honeybees contribute over 50% of the value of some important crops
- Value of animal pollinators, especially honeybees, that contribute to agriculture in Vietnam is enormous and significant
- Reasons that honeybees are important pollinators:
 - ▣ Managed easily
 - ▣ Transported easily
 - ▣ Kept for other purpose (honey) rather than pollination

Discussion



- Reasons that honeybees are important pollinators:
 - ▣ Pollinate many crops
 - ▣ Can be present in large numbers where and when they are required to pollinate a crop; not possible with most other insects
 - ▣ Honeybees pollination is less costly (time and labor) than hand pollination
- Acreages for many crops are underestimated.
- Pollination requirements of many crops are still poorly understood

- Most research conducted in developed countries
- Research needs to be done in order to:
 - ▣ Identify diversity of pollinators for crops under different conditions
 - ▣ Identify modes of pollination for major crops
 - ▣ Identify contribution of pollination to total yield for each crop in different regions and countries
 - ▣ Raise awareness of extension agents and officers, beekeepers , and famers about the value of honeybees in Asian agriculture
 - ▣ Call for protection of honeybee and other insect pollinators.

Thank you for your attention!



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