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 AL04156

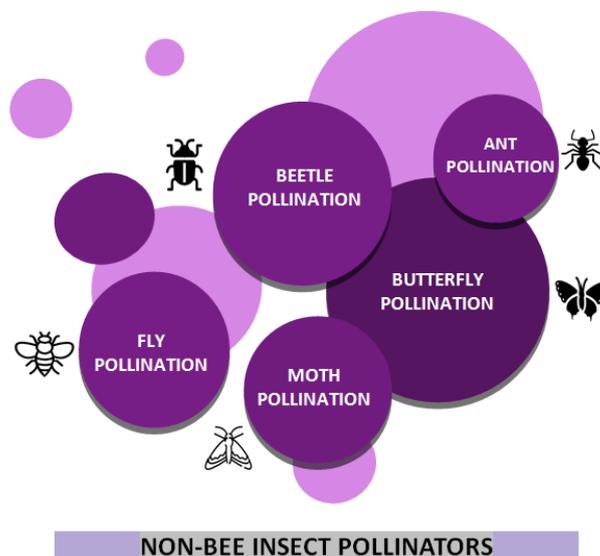
## NON-BEE INSECTS: VISITORS AND POLLINATORS OF CROPS

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**P**ollination is the transfer of pollen grains from anther of male flower to stigma of the female flower. The agents (living & non-living) which carry out pollination is called as pollinators. Non-living pollinators includes wind, water, etc., while living pollinators includes animals, insects, etc. It is estimated that worldwide around 35% of crops grown and one-third of food we eat relies on pollination by insects. Insect pollinators provides substantial crop pollination services. Often, bees are considered as the most essential crop pollinators as they are effective pollinators and are easy to manage. Both managed and wild bees are responsible for crop pollination services in most of the crops. However, other than bees, there are other insect pollinators that provide significant pollination services. With the growing human population and thereby increasing global food demand, there is therefore a need to recognize the aspects that affect the world crop yield for sustainable crop production.

Non-bee insects consist of insect pollinators like flies, beetles, wasps, moths, butterflies, etc. These non-bee insects can help in protecting agriculture and promote sustainable crop pollination. The following are the non-bee insect pollinators:



1. **Flies:** Flies are considered as important pollinators of various vegetable and fruit crops. Among flies, hoverflies or flower flies is the most acknowledged and important group of pollinators. These flies hover in air while flying, hence the name hoverflies. They resemble bees except they have a single pair of wings whereas bees have two pairs of wings. Also, it does not possess sting unlike bees. Hoverflies provide double benefits for human beings as the immature stages (larva) act as predators of aphids and other soft-bodied insects and the adults act as pollinators of various crops.

Other flies like blowflies are pollinators of vegetable crops. Houseflies are recognized as pollinators of mango flower. Tiny flies are responsible for pollination of cocoa plant which are used to produce chocolate.



**Fig 1:** Fly pollinators: left to right, top - thick headed fly, dagger fly, flesh fly; middle - hover fly, blowfly, blowfly; bottom -horsefly, mosquito, bee-like fly

Courtesy: Sean McCann

2. **Wasps:** Wasps look like bees, but their body has less hairs than bees. They mostly visit flowers for nectar. As their tongues are short, they select flowers with readily available nectar droplets. Among wasps, fig wasp pollinates several species of figs. The fig and fig wasp have a mutualistic interaction i.e., one cannot live and breed without the other.



**Fig 2:** Potter wasps (Vespidae)

Source: Wikipedia



**Fig 3:** wasps (Agaonidae)

Courtesy: Wang Gang

3. **Beetles and Weevils:** They are considered as one of the primitive insects to visit flowers. They tend to visit flowers for feeding on pollen, petals, anthers, or stigmatic secretions. Some of them use flowers as a place to stay so that they can prey on other insects e.g., ladybird beetles. Oil palm, a plant which produces edible vegetable oil, is pollinated by oil palm weevil. Pollination by this weevil has shown to increase fruit set and bunch weight of oil palm.



**Fig 4:** Locust Borer beetle

Courtesy: Bonnie Ott.



**Fig 5:** Long horned beetle on *Magnolia grandiflora*

Courtesy: D. Hill

4. **Moths:** They are pollinators which are mostly active during nighttime. They visit flowers for nectar. While walking around flower in search of nectar, their body picks up pollen and thus transfers it to another flower. Moths visit many flowers and fly long distances; thus, they can act as effective pollinators.



**Fig 6:** Armyworm moth on an apple flower

Courtesy: Stephen Robertson

5. **Butterflies:** They pollinate various flowers during the daytime and often prefer large, brightly coloured flowers having flat surfaces to land upon it. They visit flowers for

sugary nectar and sit or rest on flowers, thereby collecting pollen on their body and legs while searching for food.



**Fig 7:** Monarch Butterfly  
 Courtesy: Patrice Thrives

Non-bee insects have several advantages like:

- i) They play dual role as predators/parasites and pollinators, for e.g., hoverflies, parasitic wasps, etc.
- ii) They respond less negatively than bees to land use changes.
- iii) Some of them like flies, beetles and butterflies can fly long distances in comparison to bees.
- iv) They can act as pollination insurance incase of bee decline.

However, it is also important to note that for making decisions and strategies for promoting non-bee insect pollinators, it requires careful planning as some of these pollinators (like flies, etc.) can spread diseases in crops and livestock. Also, the immature stages of certain insects (moths, etc.) are pests of crops. Recognizing practical management choices are thus required under such circumstances.

In recent years, populations of pollinators have been decreasing around the world. Pollinator decline is due to causes like

- i) Anthropogenic (man-made) causes such as deforestation, habitat fragmentation (i.e., large tracts of land are fragmented into smaller fragments due to road construction, agriculture, etc.),
- ii) Climate changes which include high temperature, flood, drought, other extreme climatic conditions, and changes of flowering time which hinders pollination by desynchronizing the blooming of flowers with the supply of pollinators,
- iii) Use of pesticides, fungicides and herbicides which are harmful to the pollinators and,

- iv) Introduction of parasites & diseases (e.g., Varroa mite in honeybees)

There is an increasing need to conserve these pollinators by adopting methods like

- i) Planting native or wildflower strips – plants that supports wellbeing of pollinators by providing them with a place to live, eat and lay eggs.
- ii) Using less toxic pesticides or alternative pest management practices.
- iii) Providing nesting sites and artificial food supplements in dearth period.

### Conclusion

Although non-bee insects are essential contributors to world crop production, many of them are still insufficiently studied and often overlooked. From the perspective of maintaining biodiversity, we should not solely depend upon a single pollinator species especially since the health of managed honeybee colonies are currently threatened. Therefore, research studies and proper exploration of these pollinators should be conducted for determining their effectiveness and efficiency as pollinators and people should be made aware about the importance of these pollinators.

### References

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