



MANAGEMENT OF DEFORMED WING VIRUS (DWV) INFECTIONS ON HONEY BEES



Description

Deformed wing virus (DWV) is a viral infection that affects honey bees, characterized by the deformity of the wings and abdominal deformities of infected bees. It is mostly recorded in colonies infested by Varroa mites. Deformed wing virus can also be transmitted between bees through social contact. High levels of DWV in a colony can lead to a reduced lifespan of adult bees, decreased colony strength, and poor honey production. It also causes the colony to be more susceptible to other diseases and pests.



*Bee with normal wings (left) and another with deformed wings (right).
Photo courtesy of IZSLT/Giovanni Formato*

How it presents itself

The presence of the DWV is identified by the characteristic deformities in the wings of adult bees. These deformities include crumpled, curled, or shortened wings and range from mild to severe. The DWV causes other symptoms in adult bees, such as shortened lifespans, decreased activity levels, and reduced ability to forage for food. The DWV presents itself in the form of reduced colony strength and poor honey production. High levels of DWV in a colony lead to reduced numbers of adult bees, as well as increased susceptibility to other diseases and pests. In queens, it causes reduced ability to lay eggs and reduced fertility.



Wobbly and flightless bee as a result of DWV infection. (courtesy of IZSLT/ Giovanni Formato)

Predisposing factors

Here are some predisposing factors that may increase its risk:

- **Varroa mite infestations:** Varroa mites transmit DWV to honey bees. The infestations of these mites increases the risk of DWV in a colony. The varroa mites weaken the immune system of honey bees, making them more susceptible to viral infections, including the DWV.
- **Genetic factors:** Certain genetic traits in honey bees may increase their susceptibility to Deformed Wing Virus. For example, colonies that have a lower genetic diversity may be more prone to DWV infections.
- **Stressful environmental conditions:** Stressful environmental conditions, such as extreme temperatures or lack of food, can weaken honey bees' immune systems and make them more susceptible to Deformed Wing Virus infections.
- **Exposure to contaminated equipment:** Honey bees can be exposed to DWV through contaminated equipment, such as hives or beekeeping tools.
- **Poor hygiene:** Poor hygiene practices in beekeeping, such as failing to remove dead bees or debris from the hive, increase the risk of DWV infections.
- **Movement of honey bee colonies:** The movement of honey bee colonies increases the risk of Deformed Wing Virus spreading, as infected colonies can spread the virus to other colonies in the new location.

Economic importance

Here are some ways in which DWV impacts the economy:

- **Reduced honey production:** Honey bees infected with DWV may be less productive, leading to reduced honey production. This impact the honey industry and causes prices to increase.

- **Reduced crop yields:** Honey bees are important pollinators for many crops, and reduced populations due to the virus lead to reduced crop yields. This impacts the agriculture industry and causes prices to increase.
- **Loss of revenue for beekeepers:** Beekeepers may lose revenue if their honey bee colonies become infected with DWV, as infected colonies may be less productive and may require treatment or replacement.
- **Increased costs for beekeepers:** Beekeepers may incur additional costs for disease monitoring, treatment, and replacement of infected colonies. This can impact the profitability of their operations and lead to higher prices for consumers.
- **Impact on biodiversity:** Honey bees play a critical role in maintaining biodiversity, and the loss of honey bee populations due to Deformed wing virus and other diseases have negative impacts on ecosystems and wildlife.

Deformed wing virus has significant economic and ecological impacts, emphasizing the importance of disease prevention and control measures in the beekeeping industry. Protecting honey bee populations from diseases like Deformed wing virus is crucial to maintaining the health of ecosystems and the economy.

Signs and symptoms

The signs and symptoms of Deformed wing virus infections include the following:

- **Deformed wings:** As the name suggests, Deformed Wing Virus causes deformities in the wings of infected bees. In queen bees, the wings become twisted, stunted, or misshapen.
- **Inability to fly:** Bees infected with Deformed wing virus are unable to fly due to their deformed wings, making it difficult for them to forage or defend the hive.

- **Abnormal behaviour:** Infected bees exhibit abnormal behaviour, such as crawling or twitching instead of flying.
- **Reduced lifespan:** Deformed Wing Virus significantly reduces the lifespan of infected bees, which leads to a decline in the health and productivity of the colony.
- **Reduced colony productivity:** Infected queen bees lay fewer eggs or produce lower-quality offspring, which reduces the productivity of the colony.

It is important to note that this virus may not always present visible signs or symptoms. Some colonies may be infected without showing any obvious signs of the disease. Beekeepers should regularly monitor their hives for signs of Deformed wing virus and other diseases and take measures to prevent and control the spread of the disease if detected. Early detection and treatment can help maintain the health and productivity of honey bee colonies.



Healthy and DWV-infected worker bees nursing brood. (Courtesy of Western Sydney University)

Prevention and Control

It is important for beekeepers to take measures to prevent and control DWV, such as practicing good hygiene, monitoring varroa mite infestations, and avoiding the movement of infected colonies. Early detection and treatment

help prevent the spread of the virus and maintain the health of honey bee colonies.

Prevention and control measures that beekeepers can take to reduce the risk of the Deformed wing virus include:

- **Monitor for Varroa mite infestations:** Varroa mites transmit the Deformed wing virus to honey bees and therefore regular monitoring and treatment for varroa mites help reduce the risk.
- **Practice good hygiene:** Good hygiene practices, such as removing dead bees and debris from the hive, can help prevent the spread of the Deformed wing virus and other diseases.
- **Quarantine new bees:** When introducing new bees to a colony, it is important to quarantine them first to prevent the spread of the Deformed wing virus and other diseases.
- **Avoid moving infected colonies:** Movement of honey bee colonies increases the risk of virus spread, so it is important to avoid moving infected colonies if possible.
- **Use disease-resistant strains of bees:** Certain strains of honey bees may be more resistant to the Deformed wing virus and other diseases, so using disease-resistant strains helps reduce the risk of the Virus. Observant beekeepers can detect the strengths of their colonies and thus do a simple selection of stronger colonies.
- **Control of Varroa mites:** Varroa mites are major vectors of this disease and therefore controlling their infestation will lower the possibility of getting the DWV infections.

Prevention and control of the Deformed wing virus require a combination of good management practices, regular monitoring and early detection. Beekeepers should be vigilant in maintaining the health and productivity of their hives to prevent the spread of disease.

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