



BEEKEEPING BASICS - PESTS AND DISEASES

# Black Queen Cell Virus

Black Queen Cell Virus (BQCV) is a devastating disease primarily affecting queen pupae and larvae. Caused by *Cripavirus*, the disease causes death in queen bee pupae and larvae with affected brood turning yellow to brown/black.

BQCV was first identified in dead queen pupae and larvae. Research studies have shown this disease to be one of the most common causes of queen larvae death throughout Australia and likely, in many other areas throughout the world. Studies also show that the disease may be linked to another parasitic infestation, *Nosema apis*. This disease is introduced to the colony through the gut of adult honeybees returning to the hive.



## Symptoms

Symptoms of BQCV presence include:

### **PUPAE/LARVAE DYING AND TURNING YELLOW TO DARK BROWN OR BLACK**

The virus process first kills queen larvae (or pupae) and turns it a distinctive yellow colour. From there, the colour slowly fades into a dark brown or black.

### **SAC-LIKE FORMATION OVER AFFECTED QUEEN LARVAE**

In most cases, a sac-like formation appears on the affected larvae. Beekeepers can distinguish BQCV from Sacbrood (another infection) by the distinctive colouring already mentioned.



## How it spreads

Most research indicates the disease is spread when nurse bees inadvertently feed the brood infected food. The virus itself remains in dead larvae, pollen and honey for up to four weeks which can lead to continued spread. Additionally, the related virus *Nosema apis* carried by worker bees may also introduce BQCV into the hive.

Some research suggests that honeybees drifting between hives may transmit the disease across multiple colonies. Water and related beekeeping equipment may also carry the virus and cause transmission between hives.



## Eradication

Beekeepers who suspect BQCV should immediately cease any breeding and sales/distribution of potentially infected queen brood. Additionally, they should isolate additional larvae and pupae and monitor them to see if they also become symptomatic. This is the first step toward removing continual infection risk from other pupae or larvae.

Once BQCV has infiltrated a hive, no medication or vaccination can eliminate the virus. Beekeepers should immediately sanitise all grafting tools and related beekeeping equipment. Additionally, standing water sources and containers should also be fully cleaned and sanitised as the virus can be spread through the water as well.

Beyond prevention and isolation methods, a few more strategies may be used to prevent full colony devastation. Anecdotal evidence from multiple beekeepers suggests that the use of antibiotics such as fumagillin or oxytetracycline hydrochloride may help reduce or eliminate the presence of BQCV in the hive. We don't recommend this and suggest this method should only be used if other control/elimination strategies are ineffective.



## Prevention

Prevention of BQCV often comes down to appropriate hive hygiene and care-taking procedures. Beekeepers should adopt all the following strategies to help prevent introduction of this disease into their hives.

### APPROPRIATE NUTRITION & STRONG HIVE POPULATION

Breeding a strong hive first comes through proper nutrition. A weak hive invites BQCV and other infectious diseases and parasites into a colony. By keeping the bees well-fed and maintained, they will carry a stronger resistance to BQCV and other viruses.

### ROTATING COMBS EVERY 3-4 YEARS

Continued rotation of combs should be a standard operating procedure for proper hive maintenance and care. Rotation encourages healthy and robust bee activity. Additionally, it allows beekeepers direct opportunities to monitor the hives, bees and comb (and identify issues such as BQCV).

### HIVE PLACEMENT IN WARM/SUNNY AREAS DURING COLDER MONTHS

BQCV tends to present during the cooler seasons — particularly the fall, winter and spring. Beekeepers should place hives in areas that receive more sunlight during these colder months. The warmth acts as a preventative measure to the spread of BQCV.

### VIGILANT HIVE & EQUIPMENT HYGIENE

Like most other diseases and infestations, proper hive/colony maintenance and hygiene can serve as a strong preventative measure against BQCV. Follow strict protocols for equipment hygiene, ongoing hive monitoring and related activities. All it takes is one small watering or use of an infected piece of equipment to introduce BQCV into a colony.

### AWARENESS OF SYMPTOMS TO PREVENT FURTHER SPREAD

Finally, preventing the ongoing spread of BQCV comes down to beekeeper awareness and identification. If the virus is detected or suspected in a queen breeding hive, beekeepers should cease any sale or distribution of queen pupae and larvae. Additionally, they should also contact their nearest department of agriculture for lab tests to confirm the presence of BQCV.

Responsible apiary management will help prevent BQCV from continuing its spread throughout the world. That is why ongoing awareness and preventative hive maintenance is so critical for disease prevention.



## Detecting BQCV in your colony

In many cases, BQCV is identified through the signature colour changes of dead queen pupae and larvae. The dead queen first turns yellow and quickly changes into a dark brown or black colour. Additionally, the skin of the pupae itself becomes sac-like in its appearance.

It's important for beekeepers to distinguish between BQCV and the similar Sacbrood virus as the sac-like appearance of pupae is similar in both diseases. However, Sacbrood typically affects worker bee larvae whereas BQCV impacts queen bee pupae.

Beyond visual identification of dead pupae and larvae,

immunodiffusion testing is the most commonly used method to confirm the disease presence. Laboratories use immunodiffusion to detect specific antisera within pupae cells specific to this infection. While this method is not always foolproof, it can add more specificity to disease identification when multiple colony symptoms are present.

### SOURCES

<http://beeinformed.org/2013/12/bqcv-black-queen-cell-virus/>  
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### BANNER PHOTOS ON PAGE 1

1. A queen cell with BQCV. PHOTO: Rob Snyder
2. Healthy Queen with cell pulled opened up for the photograph. PHOTO: Rob Snyder