



BEEKEEPING BASICS - PESTS AND DISEASES

American foulbrood

American foulbrood (AFB) is the highly destructive effect of the spore-forming bacterium, *Paenibacillus larvae*. Bee larvae under three days old ingest the spores which germinate in and derive nourishment from the gut of the larva. In its vegetative form, the bacteria will die along with the larva, but will first produce many millions of spores which will spread throughout the hive and then to other colonies. If left untreated or unmanaged, almost all infected hives will weaken and die over the course of between a month and two years.



Where is it found?

American foulbrood has spread to much of Europe and North America. Central America, parts of South America, Africa and Asia, Australasia, and other Pacific territories are also affected.



Symptoms

The most widespread and potentially devastating brood disease, American foulbrood is characterised by brood cell capping dampening and sinking inwards as the infected brood beneath dies and decays. Some of the cells may be visibly punctured

where bees have tried to remove the dead larvae from infected cells.

Brood infected with AFB usually dies after the cells have been capped and will be found stretched out on their backs, with their heads facing the cell cappings (Pic 2). Sometimes their tongues will be attached to the top side of the cell (Pic 3).

When the infection becomes severe, the brood comb will have an uneven appearance with healthy cells mixed with affected ones. There will often also be a nasty odour emanating from the hive. Dead larvae will “rope” meaning that their remains will stretch out if you poke them with a stick and gently pull (Pic 1).



How it spreads

Within the hive, the bees themselves spread the spores as they attempt to clean up the mess the disease makes. Between colonies, AFB is usually spread by wild or feral bees which have consumed infected honey (spores remain viable in honey for decades), or even more commonly, by beekeepers using infected frames, boxes, or other equipment.



Prevention

The best method of prevention is to maintain a healthy hive. In times when little forage is available or there are other factors such as bad weather, the best defence is to ensure your bees have plenty of their own food resources available. If that's not possible, ensure they have plenty of protein-rich pollen to feed on and that they otherwise have what they need to defend themselves.

Cleanliness and maintaining a vigilant checking schedule are the keys to curbing the spread and impact of American foulbrood. Hives must be regularly inspected for signs of infection. The frequency of this varies depending on where you live, but twice a year, in spring and autumn as the minimum, keep your hives with consistency. If you're removing frames, make sure they go back into their original box. If you're using used equipment, be sure it has been thoroughly sterilised. If you know it has been infected at any point, of course, don't use it at all.

Some beekeepers (especially in a commercial context) will use antibiotics to treat the problem, but there is a risk of contaminating the honey and reducing its quality.

A more holistic approach is to use non-conventional methods including essential oils. Lemon grass, thyme, basil and cinnamon oils have been shown to be effective.



Eradication

Unfortunately, the only certain method of treatment is to destroy everything living in the hive. If you're using plastic or metal frames, gamma irradiation can be used. Anything wooden should be incinerated.

Make a pile of the affected equipment and dig a hole next to it of at least one metre (three feet) in width and 30cm (one foot) deep, bigger if multiple hives are being disposed of. Carry complete hives whenever possible and avoid dropping any bees, comb or honey during transportation as this will further spread disease. Frames containing infected honey should be set around the main fire until they too are dry enough to burn and so the honey does not stifle the fire.



Beehives with American Foulbrood should be burned due to spores that remain viable for up to 40 years. PHOTO: JRMGKIA (own work)

Please use all precautions when burning the hives, and have a ready means of extinguishment nearby. Of course, all local fire regulations must be adhered to. When the equipment has been incinerated, the ashes and remnants should then be buried.



Locate the source

To stop the spread of American foulbrood, it's important to figure out how your hives came to be infected in the first place. Consider:

- recently acquired equipment (especially used)
- shared equipment such as a centrifuge
- recently re-used equipment
- any other nearby apiaries
- nearby rubbish dumps
- nearby extraction sheds
- recently introduced swarms
- visits by other beekeepers.

SOURCES

http://www.dpi.nsw.gov.au/__data/assets/pdf_file/0003/66216/American-foulbrood.pdf
<https://u.osu.edu/beelab/files/2015/05/AFB-tew-1daf1ga.pdf>
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<http://www.theabk.com.au/article/american-foulbrood-%E2%80%93-disease-can-be-eradicated>
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<http://www.bulletinofinsectology.org/pdfarticles/vol62-2009-093-097gende.pdf>

BANNER PHOTOS ON PAGE 1

1. Affected larvae will stretch or 'rope' when a stick is inserted and gently pulled. PHOTO: Tanarus
2. American foulbrood *Paenibacillus larvae* ssp. larvae symptoms. PHOTO: Georgia Department of Agriculture Archive, Bugwood.org
3. American foulbrood *Paenibacillus larvae* ssp. larvae on honey bee (*Apis mellifera*). PHOTO: Georgia Department of Agriculture Archive, Bugwood.org