

Chasing the causes of colony losses

Unexplained honeybee colony deaths are continuing across the northern hemisphere, although losses this season do not appear to be quite as severe as last spring. Whether the losses are the same, linked, or separate phenomena is unclear, but Max Watkins of Vita believes that varroa is an underlying cause.

Various possible explanations have been put forward for the losses, some plausible, some implausible and there are even suggestions that it is simply a rather extreme manifestation of an ongoing cycle of losses. Max Watkins believes that varroa is at the centre of the problem and that any control strategy must include varroa management at its core.

“We’ve heard lots of possible reasons for the honeybee colony losses, but I think the lowered immunity of honeybees resulting from varroa infestations is the underlying explanatory condition,” explained Max. “Other suspects such as pesticides, a new strain of nosema, specific viruses and malnutrition may be opportunistic causes but I suspect that they are not actually the root cause.

“We also can’t rule out that some of the losses are standard winter losses. There is no doubt in my mind however that the extent of current losses in recent years is a new development.

“Varroa debilitates colonies, leads to increased transmission of viruses and leaves them open to all sorts of maladies. Integrated Pest Management with alternating treatment types has to be the most sensible way forward.”

As a result Vita is continuing to research varroa control treatments to complement Apistan and Apiguard, and has also introduced two new feeds. Vita Feed Gold and Vita Feed Green promote healthy bees, help build up general and specific immunity and should ensure adequate nutrition in spring and autumn.

“What used to be minor ailments, are now sometimes thought of as suspected killers and our feeds are designed to help the build-up of healthy colonies,” said Max Watkins.

Colony losses across the globe

USA – best estimate that 8-10% of all US colonies in 2007 were lost to CCD. The rest being normal losses.

Italy, Spain and France – *Nosema ceranae* implicated in large-scale losses especially in 2005/06, but poor foraging conditions also suspected.

UK – the “Marie Celeste phenomenon” strikes some dispersed apiaries in 2007. No clear cause.

Jordan – Deformed Wing Virus implicated in colony losses in 2007.

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See page 4 for the story

Odd research ideas

CCD – chasing the cause

Explanations of Colony Collapse Disorder (CCD), aka Vanishing Bee Syndrome and Fall Dwindle Disease, have stimulated imaginations. Here are some of our favourite so-called explanations which we will definitely not be researching:

- mobile phones (cell phones) disrupting bees’ orientation (a global news story based on a misreading of minor research)
- honeybee rapture whereby bees have ascended en masse into that great apiary in the sky
- chemtrails, a plan to kill people that backfired and killed honeybees instead
- thieving aliens.

Anyone with a more plausible hypothesis is invited to apply for the Vita Research Prize. See www.vita-europe.com

EDITORIAL



Another Apimondia has come and gone and we look forward to seeing many of you again in France in 2009.

I suspect that we will be talking about colony collapses at the Montpellier congress and well beyond that.

As we outline on page one, the phenomenon continues, but so too does the research (see page three). While breeding varroa-tolerant bees may be possible, I'm very sceptical about the practicalities of maintaining a varroa-resistant stock across a substantial area.

I think that varroacides will be an essential part of beekeeping for decades to come.

Even with genetic modification – something which I know many beekeepers abhor – progress is likely to be slow. I even heard a geneticist raise concerns recently about the dangers of creating too narrow a gene pool. But with the nature of honeybee mating – uncontrolled and on the wing with many drones – I think that would be rather unlikely.

Max Watkins
Technical Director
Vita (Europe) Ltd

NEW PRODUCT DEVELOPMENT FOCUS

Vita R&D news

Vita research award

The closing date for the next Vita Research Award application is 30 May 2008.

Projects can focus on any aspect of honeybee health. Applications from individuals or organisations are welcome.

The first award was won by Dr Alexandros Papachristoforou of the Aristotle University of Thessaloniki in Greece for his work on chalkbrood, and the second by Dr Nizar Haddad of Jordan's National Center for Agricultural Research and Extension for his work on honeybee viruses.

The research prizes have been £5-8,000 (Euros 6,500 to 10,000).

See www.vita-europe.com for details.

Labelling Vita Feeds

Vita's new feeds, Vita Feed Gold and Vita Feed Green, have posed some labelling challenges. What is a legitimate statement in one country may contravene the regulations of another. Even in Europe where there is some standardisation of labelling regulations, we have to keep on our toes.

That's why references to the feeds' effectiveness with dysentery, nosema and chalkbrood are often circumspect. Vita has shown in trials that the feeds are effective in combating all of these, but without going through the rigours of

independent tests and bureaucratic form-filling, we are usually constrained to say that the feeds promote health.

In France, for example, Vita cannot even mention diseases on the feeds' labels.

In Italy, there is a little more leeway and it is possible to say what has been observed in trials.

In the UK, the feeds are not sold as a veterinary product, but it has been possible to remark that Vita believes it has a beneficial effect in controlling diarrhoea.

But please don't misinterpret our message. We are very supportive of rigorous testing and in regulations that ensure that labelling claims can be trusted. It's just that the economics of the labelling regulation regimes mean that often we cannot state as much as we would like.



Go east young man

Sebastian Owen has left Vita after a very successful three-year appointment. He opened up many new opportunities for Vita in Eastern Europe and made his last major appearance for Vita at Apimondia in Australia in September 2007.

Sebastian is now working for a German-owned company in Hong Kong finding new trade opportunities with the emerging Chinese economy.



CURRENT DEVELOPMENTS

Colony collapse & viruses

Dr Nizar Haddad, winner of the 2007 Vita Research Prize, is already producing results from his innovative research into the genetic analysis of honeybee viruses. He reports that in Jordan he has often found Deformed Wing Virus in dying colonies.

In Jordan where honeybee pollination has been valued at more than \$50 million per year, beekeepers have been reporting collapsing colonies and there is serious concern about the economic repercussions.

Dr Haddad collected samples from 13 collapsing colonies in seven dispersed apiaries in Ajlon, the most badly affected province. He then extracted RNA (ribonucleic acid) molecules and examined them for viruses.

Of the 13 colonies, 12 were found to be infected with Deformed Wing Virus (DWV), one with Sac Brood Virus and two with Acute Bee Paralysis Virus.

Several colonies were infected with more than one virus, but, as reported in studies from other countries, DWV was the single virus most frequently associated with dying colonies.

Dr Haddad said: "The diseases and parasites that threaten the bee industry world-wide seem to be very similar to those in Arab countries.

"Although we have found DWV in collapsing colonies, we should not jump to conclusions as it may be a symptom rather than the cause.

"Further research is needed into the other possible factors associated with colony collapse. Infestation with parasitic mites (*Varroa destructor*, *Acarapis woodi*), *Nosema apis* and *Nosema cerana*, bacterial diseases and even the possible effects of chemical treatment of colonies or foraged plants are the other sorts of factors that need to be researched."

Breeding frenzy

The race is on to try to breed a honeybee that is resistant to varroa. Then comes the near impossible challenge of maintaining those traits in honeybees throughout any geographical region.

Almost ten years ago, in 1999, an article by Erickson *et al* in the American Bee Journal presented a straightforward "recipe" for beekeepers to produce varroa-tolerant honeybees by selective breeding from their existing colonies.

Before that, in 1994, USDA (US Department of Agriculture) in Baton Rouge, Louisiana, had embarked on a search for varroa resistant bees in Russia. It is now completing its project and releasing queens to American beekeepers. In the process they identified two traits in honeybees that might help to control varroa populations by suppressing reproduction of the mites.

Traits that have been identified often focus on the hygienic behaviour of honeybees. One such named trait, SMRD (delayed suppressed mite reproduction), is now more widely known as VSH (Varroa Sensitive or Specific Hygiene). Bees with this trait remove varroa-infested pupae from capped brood cells at an early enough stage to disrupt varroa reproduction.

A group of British beekeepers, working in Cornwall, a very large peninsula in SW England, have hopes of producing resistant bees and then flooding their region with varroa-resistant drones, but recognise the enormity of the task.

In New Zealand, the agriculture department is using an island off Coromandel, North Island, to try to develop and maintain resistant stock which can then be used for artificial insemination for colonies across the rest of the country. They don't believe that varroa-resistant populations can be sustained throughout the country.

BUZZWORDS

The view from Wall St

A definition of beefarmers from *Fortune* magazine:

"a rare breed of truck drivers who also happen to be applied entomologists, amateur botanists, skilled nursemaids of cussed old machines, travelling salesmen, and Job-like nurturers of finicky, stinging insects."

British bee lobby

British beekeepers have been running a sustained media campaign about the plight of the honeybee. They are asking the government to invest £8 million (Euros 10.5 million) in research. There has been national media coverage, but as yet no new funds.

Bear facts

A Macedonian beekeeper has taken a bear to court and won. The bear had been raiding his hives and Zoran Kiseloski was at his wit's end. Serbian folk music played at huge volumes had scared the bear away for a while, but the power ran out.

So, Mr Kiseloski took the bear to court, It didn't show up, but, because it was a protected species, the court ordered the state to pay the beekeeper Euros 2238 in compensation.

Dwarf bees in Jordan

The dwarf honeybee (*Apis florea*) has been discovered in Jordan. Highly adaptable, it originated in SE Asia, but has been moving westwards. Researching its advance, Dr Nizar Haddad has found dozens of colonies near the Red Sea port of Aqaba that may have arrived more than one year earlier. He expects them to spread further, perhaps even to the Mediterranean.

RESEARCH

How honeybees kill hornets

While Japanese honeybees kill hornets by ‘cooking’ them, a Vita liaison researcher and a team of Greek and French university researchers, have discovered that Cyprian honeybees kill hornets by suffocating them. Stinging is not a viable option.

It was originally thought that honeybees killed hornets by stinging them, but few stings have ever been found in hornets killed by bees. Then Japanese researchers found that Asian honeybees cluster around or “ball” hornets and raise the temperature to over-heat and kill them. But now it has been discovered that honeybees in Cyprus (*Apis mellifera cyprica*) ball the Oriental hornet (*Vespa orientalis*) to asphyxiate it.

Dr Alexandros Papachristoforou, at the Aristotle University of Thessaloniki and a liaison researcher for Vita (Europe) Ltd, explained: “We discovered that the Oriental hornet found in Greece has a high heat tolerance which means that bees cannot kill them by over-heating them which has been reported in Japan. However, we did discover that the bees clamber onto the hornet to stop it respiring. The hornet has to pump its abdomen up and down to circulate air through the spiracles but as the bees press down they stop this movement. With the increase in heat caused by balling the poor old hornet is asphyxiated!”



Photo: Emmanouil Filippou



Photo: Emmanouil Filippou www.greecephotobank.com

Although the bees can raise the temperature in the ball from 20°C to 44°C, that is insufficient to kill the Oriental hornet which is well adapted to hot conditions and can survive temperatures exceeding 50°C. Unlike many insects the hornet breathes by abdominal, rather than thoracic pumping. By restricting the expansion of the abdomen the bees ensure that the hornet’s spiracles cannot move to enable breathing.

Max Watkins, Technical Director of Vita (Europe) Ltd which helps fund some of Papachristoforou’s

work commented: “The honeybee may be the most studied insect in the world, but there are still plenty of surprises in store. Alexandros and his team have given us a fascinating insight and shown that it’s no fluffy, cuddly Disneyworld in the hive! It’s death by venom, cooking or – in this case – lack of inspiration!”

The scientific paper, Smothered to death: Hornets asphyxiated by honeybees, is in *Current Biology* 2007 Vol 17, No 18.

Royal jelly’s trick

Scientists at the Australian National University (ANU) have discovered that royal jelly flicks a genetic switch in larvae that stops them becoming workers and leads to them becoming queens.

The royal jelly seems to chemically modify the bee’s genome and disrupts the genes that turn young bees into workers. The process is called DNA methylation.

The process has previously been identified in vertebrates, but the researchers think that this is the first time it has been observed in insects.

The finding has implications way beyond bees because it impinges on the nature-nurture debate. Here, environment (food) is affecting genetic development. The work grew out of the honeybee genome project.

Vita products

Apistan

Varroa control strips (pyrethroid)

Apiguard

Varroa control gel (thymol)

EFB Testing Kit

European Foulbrood hiveside test

AFB Testing Kit

American Foulbrood hiveside test

B401

Biological wax moth control

Vita Feed Green

to strengthen colonies

Vita Feed Gold

to help prevent diarrhoea and strengthen weak colonies



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