

CRISIS TIME FOR HONEYBEES

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The general concern in the community about disappearing bees is well justified. Indeed, it is world-wide and most relevant in the northern hemisphere where dwindling bee populations are causing more pressing problems than we are experiencing here. And well might the community be concerned, for more than half the world's major food crops depend on the European honeybee, *Apis mellifera* for pollination and the slogan "pollinate or perish" is not an idle one. It has been said, allegedly originally by Albert Einstein, that humankind would not survive more than a few years without the honeybee.

So what is the problem? In northern hemisphere winters it is normal for apiarists to lose up to 15% of hives, but in recent years losses have been much greater. A condition called Colony Collapse Disorder has been the subject of much publicity, in the public media and even more in beekeeping and scientific literature. It is the syndrome of the disappearing bees, and while not confined to the northern climates, it has not been formally recognised in this country--yet.

Examining a dwindling colony reveals that the queen, brood and young bees are there but there are no oldies. The bees you see in your garden and on the crops, the foragers, are the oldies of the colony, and it seems that they just do not return from their missions with their loads of nectar and pollen. Why?

Many theories have been advanced and debunked over the years, some quite fanciful such as high tension electrical wires and electronic waves of mobile phones. The cause may well be "multifactorial" which cynics might interpret as "we don't really know". A lot of research has been devoted to the problem and currently there are three strong suspects: pesticides, poor nutrition and pathogenic infections.

Insecticides are undoubtedly major villains, particularly their indiscriminate use. Current agricultural practice involves growing huge monocrops, hectares and hectares of the same crop, corn, canola, almonds and many more. It seems that with many of these crops production is dependent on the use of insecticides, and the poisons most widely used are a group called "neonicotinoids".

So what are neonicotinoids?

"Neo" means "new", "oid" means "like" and nicotine is a powerful nerve poison. In miniscule amounts it is within all of us, playing an essential role in nerve transmission, but excessive exogenous doses can wreck the system completely. As an insecticide it is called a systemic poison; soak the seeds in it and it pervades the whole plant, the sap, the pollen and the nectar.

So, as she sucks up the sweet nectar from the flowers the foraging bee cops a dose of insecticide. It may not be enough to be immediately lethal, but sub-lethal doses can so interfere with navigation that she doesn't make it home. Hence the disappearing oldies of Colony Collapse Disorder. And if she does make it home, it can interfere with her immune system making her vulnerable to infections that she would otherwise resist. Notable among these is one called Nosema, a gut infection by a parasitic fungus-like organism which causes diarrhoea and malnutrition and which is hard to detect without laboratory tests. Thus the contribution of pathogens into this multifactorial aetiology.

Poor nutrition is an obvious consequence of foraging bees not returning with the goodies to feed the colony, but there may be more. Feeding on a massive crop of one plant species the protein content of the pollen harvested does not contain all the essential amino acids and cannot provide adequate nourishment. Just as we need a variety of protein sources for a balanced diet, so the bee needs to forage on a variety of pollens to satisfy dietary requirements.

So there we have it, disappearing bees (Colony Collapse Disorder) due to insecticide poisoning, secondary infections with diseases the bees would otherwise be able to withstand, and malnutrition because their foraging bees are not making it home with the goodies.

Can bees live with the wide use of neonicotinoids? The huge insecticide manufacturing companies, of course, deny their primary causal involvement, but neonicotinoids have been banned in some European countries but not in Britain and not in Australia. More important are the questions:

Can the world be fed without insecticides?

Can the world be fed without bees?

Unfortunately, the answer to the first is probably negative and the second definitely negative.

There is yet another major disaster afflicting the beekeeping industry all over the world, except Australia. Ours is the last continent to be free of the parasitic mite *Varroa destructor*. A mite is an arachnid, a tiny spider-like creature about the size of a pinhead. It loves beehives where it breeds prolifically, and loves bees upon which feeds by puncturing their cuticle (skin) and sucking out their haemolymph (bee "blood"). Obviously this weakens the bee but it also leaves an open wound rending the bee vulnerable to infection by viruses. The pest is widespread throughout the northern hemisphere where it is probably another contributor to Colony Collapse Disorder. This century it arrived in New Zealand's north island and has spread relentlessly south, even jumping the Cook Strait.

So far Australia is free of this pest but experts warn that with modern transport it is only a matter of time; when, not if it gets here. There are sentinel hives at all ports of entry to detect any such arrival and extensive contingency plans are in place to spring into action when it appears.

Our species of honeybee is particularly vulnerable to *Varroa*, in contrast with its Asian neighbour, *Apis cerana* which has managed to cope with it, apparently by effective grooming; wiping the thing off itself! In May 2007 a swarm of the Asian bee hitched a ride on the mast of a boat and arrived in Cairns whence it has spread significantly despite vigorous measures by Queensland Biosecurity to eradicate or contain it. The concern about the incursion was not just that this bee is useless from man's perspective because it does not store harvestable amounts of honey, but because of its propensity to carry *Varroa*. Mercifully, the Cairns invaders did not bring it with them. Another incursion in Botany Bay did bring a mite but it was of a less harmful variety.

Varroa is susceptible to insecticides, but so is the bee, making control a major and expensive challenge.

Well what about us? What about Australia now?

As indicated above, we don't have *Varroa* and Colony Collapse Disorder has not been formally identified as an entity in the industry. One scientist argues, however, that we have always had it but to a very minor extent.

But we do have other pests and diseases, some of which were unheard of when I started beekeeping as a teenager back in the 1940s. The Small Hive Beetle arrived from South Africa in 2002, first detected in Sydney area and now spread widely in the state. Capable of wiping out colonies it poses a further threat to the industry and a major challenge to all beekeepers, including amateurs.

It is evident to discerning members of the community that the threat to bees and the future of the beekeeping industry is with us even here. Amateur beekeepers are repeatedly asked, "Why am I not seeing bees on my flowers?" Or, "How can I have some beehives to pollinate my garden?"

There are many more problems facing professional apiarists. They need several hundred hives to be viable and they must take those hives to where the honey flow is strongest. This is called migratory beekeeping and the honey produced can be labeled according to the species of flower which most contributed. They have to know as much about floral sources as they do about bees, and they have to have access to these sources such as forests and crops. They need trucks and lifting equipment; they need fuel which grows ever more expensive. They have increasing challenges from pests and diseases which add to time and expense. They are subject to levies from regulatory authorities with threats of more to come. They have to cope with the many diseases we already have (since 2002 especially the Small Hive Beetle) and to prepare for the arrival of further pests like Varroa. On top of these increasing costs, their return for their products is modest indeed, competing unfairly with cheaper imports.

As if this is not enough, there are those who would deny them access to rich sources of honey. Jane Dixon of the Australian National University wrote that certain conservationists regard the European honeybee as an exotic pest, like rabbits, and should be excluded from national parks and forests alleging that it competes unfairly with native pollinators. Given that a large proportion (quoted percentages vary) of our food crops are pollination dependent, relying substantially or entirely on the best pollinator there is, the honeybee, this view is incomprehensible and irresponsible.

Thus professional beekeepers are under enormous pressure and their numbers are falling significantly. In contrast, amateur beekeeping is thriving. The local Hunter Valley Branch of the Amateur Beekeepers' Association of NSW used to have a dozen or so members meeting under a tree in the Botanic Gardens, but now we have over a hundred members, young and old, men and women and meetings overflow a modest meeting hall. This is a striking indication of community insight into the risk to our bees with more people in country and suburbia putting up their hands to learn how to adopt apiculture as a hobby.

One of these new members lives is establishing bees in community gardens in the heart of Newcastle city, and is endeavouring to obtain native bees for her small backyard.

But not everyone will want to go that far, and one may well ask, "What can the ordinary person do to help?"

First, support our local beekeepers by buying locally produced honey and turning your back on imported super market honey. And you will find it far tastier, especially if you buy it straight from the bee man.

Second, take care with the use of any pesticide in your garden. Avoid their use where possible and where not possible avoid using it when bees are obviously about, such as flowering time. Bees do not forage at night. But remember the story of how some insecticides such as the neonicotinoids

pervade the whole plant contaminating nectar and pollen. If you MUST use a pesticide use one least threatening to bees.

Third, try and influence our local members and councils to adopt policies which support rather than further burden agricultural and apicultural industries.

Some names of neonicotinoids to watch out for and avoid:

Imadacloprid, Acetamiprid, Clothianidin, Thiacloprid, Thiamethoxan