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Sunny side up

A BUYER'S GUIDE
TO SOLAR PANELS

GREEN LIVING MADE EASY

**BEES IN
CRISIS**
HOW IT
AFFECTS
OUR FOOD
SUPPLY

WINTER WARMERS
ECO HEATERS
+
**THE REAL
FACTS ON
WOOL**

**THE RISE OF
ROOFTOP
GARDENS**

**THE NUCLEAR
POWER DEBATE**

**KEEPING KIDS
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No plan B

The humble bee is one of the most important insects on Earth. Around the world, these tiny, tireless workers are under siege and disappearing fast, with a sting in the tail for all of us.

WORDS BY **SARAH KELLETT**





THERE'S GOOD REASON FOR THE OLD CLICHÉ OF THE 'BUSY BEE'. THE SHORT LIVES OF SOME OF NATURE'S HARDEST WORKERS ARE SPENT ON LONG TRIPS TO GATHER HONEY-MAKING NECTAR AS FAR AS 10 KM FROM THE HIVE. AS THEY FLY FROM PLANT TO PLANT, BEES POLLINATE MANY OF OUR PLANTS AND AGRICULTURAL CROPS.

Their toil not only results in the honey you see on the supermarket shelf or your local farmers' market, but also plays a hand in a huge percentage of the food on our plates. One of every three mouthfuls of food we eat is the result of insect pollination, while honey bees also pollinate food for native animals and play a big role in maintaining biodiversity.

Australia's main honey bee species, the European honey bee (*Apis mellifera*), was introduced in the 1820s. It is an industrious pollinator in managed hives and in the wild. But in recent years, our worker bees have been abruptly disappearing from their hives – part of a worldwide phenomenon that has been given the name colony collapse disorder (CCD).

According to a 2010 United Nations Environment Programme report on CCD, Europe is experiencing "unusual weakening and mortality in colonies" while the US battles "drastic losses". So far Australia has dodged the worst of what's happening overseas, but we now face most of the same threats.

"My family have been bee-keepers for four generations," says Jodie Goldsworthy of Beechworth Honey, based in Corowa, NSW. "The past five years of bee-keeping have been the hardest ever...and the most frustrating."

So what's causing these hard-working honey hoarders to suddenly drop like flies? Habitat loss, diseases, invasive species and agricultural insecticides are thought to be among the barrage of contributing factors.

One of the invasive species causing havoc is the small hive beetle, a pest introduced

by means unknown and first identified in Australia in 2002. "Basically it's an opportunistic scavenger," says Des Cannon from the Rural Industries Research and Development Corporation Honeybee Advisory Committee. "It finds a weak hive and moves in." Once ensconced in its new home, the adult beetle lays larvae-bearing eggs that infest and destroy the hive.

Still reeling from the invasion of small hive beetles, Australian bee-keepers were more recently stung by news that the Asian bee (*Apis cerana*) had become our latest unwanted guest. A close cousin of the European honey bee, it was discovered in Cairns in May 2007. Since then, more than 300 swarms of the pest have been destroyed.

Asian bees compete with European bees for nectar and steal honey from managed hives, which can lead to the starvation of those colonies. They're also the natural host of varroa (*Varroa destructor*), a bee mite that has wiped out commercial and feral hives around the world. Australia is the only major bee-keeping country not yet hit by this hitchhiking parasite.

Vampires the size of a pinhead, varroa suck the blood of bees. If left untreated, an infested colony will eventually die. "It's the major pest of bee populations worldwide," says CSIRO research scientist Denis Anderson, who named the species. "There's a high chance of it coming to Australia," he adds.

"The Asian bee had a severe impact when it was introduced to the Solomon Islands in 2003, reducing to just five the number of managed hives by the year 2008 – from a



starting point of 2,000 hives," says Beechworth Honey's Goldsworthy.

It's not just Australia's honey industry at stake. In competing with possums, nectar-eating birds and native bees for food and shelter, the new Asian bee species could have serious repercussions for biodiversity. As Anderson explains: "It is smaller and can use smaller cavities [for nesting] meaning the density will be higher in the bush. Most possum and bird cavities are quite small... we've already found a swarm that killed the birds in the cavity where they were nesting."

"This is not something that can be managed, it must be eradicated and destroyed or we live with it forever," says Goldsworthy. She is one of many bee-keepers, farmers and green groups lobbying the Australian Government to increase and maintain Asian bee eradication efforts following a decision to cut funding earlier this year.

If, or more likely when, varroa does arrive, bee-keepers could protect their hives with miticides – which are strong pesticides.

"There's an insidious impact. We have a lot of feral [European] bees in the bush and these do most of the pollination of native plants," says Anderson. "This free pollination would dry up."

"We could certainly live without honey, the problem is if we don't have the bees, we don't have pollination," says Goldsworthy. And without pollination, there's no food security.

And humans aren't the only ones who could be left hungry. "For our particular repertoire of native plants, the 1,500 species of native bee have evolved with them," says

Anne Dollin from the Australian Native Bee Research Centre. "If we lose them, we lose the pollinators for our native trees." As those plants provide food for native animals, the impact spreads through the ecosystem.

"There are complex, cumulative and interrelated threats faced by honey bees," says Goldsworthy. One that has been linked to CCD is exposure to pesticides. Of particular concern is a class of insecticides known as neonicotinoids – the most widely used worldwide – which act on the central nervous system of insects. Unlike other pesticides that are sprayed onto crops, neonicotinoids are applied as a seed coating so the chemical concoction is taken up through the plant into the pollen where it's available to bees.

"We acknowledge there is significant concern around the world about neonicotinoids related to CCD," says Felicity McDonald from the Australian Pesticides and Veterinary Medicines Authority, "but we have not experienced the same effects of CCD as overseas, despite neonicotinoids being available in Australia for several years."

Habitat destruction also takes its toll. "When large areas of bush are cleared for residential areas, the population is destroyed," says Dollin. Remaining green areas such as ovals are typically absent of nectar or nesting places. Add climate change and air pollution to the long list of threats facing bees, and their future looks grim.

Though Australia has so far avoided the large declines happening in Europe and the USA, we need to prepare for the coming storm. What can we do to help? >>





BACKYARD BEE-KEEPING

One way to help local bee populations is to become a backyard bee-keeper. “There are a lot of people getting interested in bee-keeping,” says Tim Malfroy, who teaches natural bee-keeping classes through Milkwood Permaculture. Natural bee-keeping is gentler than the conventional approach and gives bees more control over their environment. As a commercial bee-keeper for family-owned company Malfroy’s Gold, Malfroy has seen the benefits first hand. “You end up with healthier, more contented bees so you don’t get stung so much,” he says. “The honey is better quality as it’s virgin comb.”

Keeping bees naturally

The hive design used in natural bee-keeping was developed by French monk Abbé Warré in the early 20th century. Instead of frames, Warré hives use top bars – removable pieces of wood with a small edging of wax to which the bees attach their comb.

Malfroy recommends beginners add side-bars or use normal frames without the foundation, which is a sheet of beeswax embossed with hexagonal cells. Without the foundation, bees can build combs with cell sizes that suit them.

Swot up

Learn the basics of bee-keeping by reading, attending a workshop or joining your local bee-keeping association. Start now and you’ll be ready for spring swarming.

Location, location, location

“Most normal-sized urban backyards are suited for one or two hives,” says Malfroy. Hives should face east to north-east towards the morning sun, with the entrance more than two metres from any walls, facing away from traffic. Check with your council regarding regulations.



Get equipped

Hives can be bought from bee-keepers with or without bees, but be sure to ask for a vendor declaration to avoid disease in the bees or hive. Or you could make a Warré hive based on designs available online, adapted for Australian frame sizes. You’ll also need a smoker, a hive tool, and protective equipment such as a veil, gloves, bee suit or bee jacket.

Obtain bees

If you feel adventurous, you can catch your own bees. “If you see a swarm of bees, you can shake them into a box,” says Malfroy. “You get locally adapted bees.” Be safe and prepared before catching your first swarm. Of course, you can always buy bees from another keeper.

Bee care

“Cats, dogs and rabbits are all a responsibility, and bees are in exactly the same category. You need to care for them as you would for any other animal,” says Doug Somerville from the NSW Department of Primary Industries. That means ensuring a good supply of nectar and water, and keeping the bees healthy.

Checking for disease is important, but frequently opening the hive changes its internal temperature, causing stress. Natural bee-keepers read entrance behaviour for signs of distress, and open hives only when necessary.



“NATIVE STINGLESS BEES ARE BETTER SUITED TO THE WARMER AREAS OF AUSTRALIA.”

Get registered

All bee-keepers must register with the Department of Primary Industries or other relevant department in their state for a small fee. Registration makes it possible for the state authorities to carry out disease prevention and control programs.

Harvest honey

“The buzz with bee-keeping is having a jar of honey to share with your friends and neighbours,” says Somerville.

Natural bee-keeping is about letting bees be bees – this means leaving them with the honey they need to survive, and only harvesting any surplus.

“Honey harvest depends on the season,” says Malfroy. “If you shake a big swarm into a foundationless natural hive, you could get 30 kg in a good season.”

Create candles

Occasional beeswax is another bonus of bee-keeping. Jeffrey Gibbs is the founder of Northern Light Candle Company, which specialises in organic beeswax candles. He says making beeswax candles can be tricky, but is worth trying at home.

Stings

One person in every 10,000 is highly allergic to bee venom, but most people find they feel less pain with every sting. Malfroy remembers growing up on a

commercial bee farm and being stung as often as 100 times a day, even with a suit. With natural bee-keeping, he is very rarely stung. “The main thing that really surprises people is how gentle they are.”

Native or European?

European honey bees have been kept by bee-keepers for thousands of years. More recently, some Australian bee-keepers have set their sights on domesticating native stingless bees, the only native species that produce honey.

“Bee-keeping stingless bees is in its infancy,” says CSIRO entomologist Tim Heard. “It’s still a wild species that we’re utilising.”

Heard also runs a company called Sugarbag, which sells hives of stingless native bees. Sugarbag is the name for the honey produced by stingless bees, which has long been enjoyed by indigenous Australians. The yield is far less than that of European bees (about 1 kg a year) but has a distinctive flavour.

European honey bees can deal with colder climates, and thrive anywhere in Australia, while native stingless bees are better suited to the warmer areas of Australia, including the NT, Qld and in NSW, north of Sydney. If you want to keep stingless native bees, choose a species local to your area.

For more info visit: www.biobeas.com and www.aussiebee.com.au. >>

CREATING A BEE-FRIENDLY GARDEN

If bee-keeping is not for you, why not provide local bees with a safe haven? These tips will make your garden more bee-friendly, and are suitable for renters and flowerpot gardeners.

- “Plant a variety of species native to the area,” advises Heard. Gum trees are great for larger backyards. Palm and grass trees are more suitable for smaller gardens.

Most flowering native shrubs, including grevillea, tea tree, and bottlebrush, are an excellent source of food for bees.

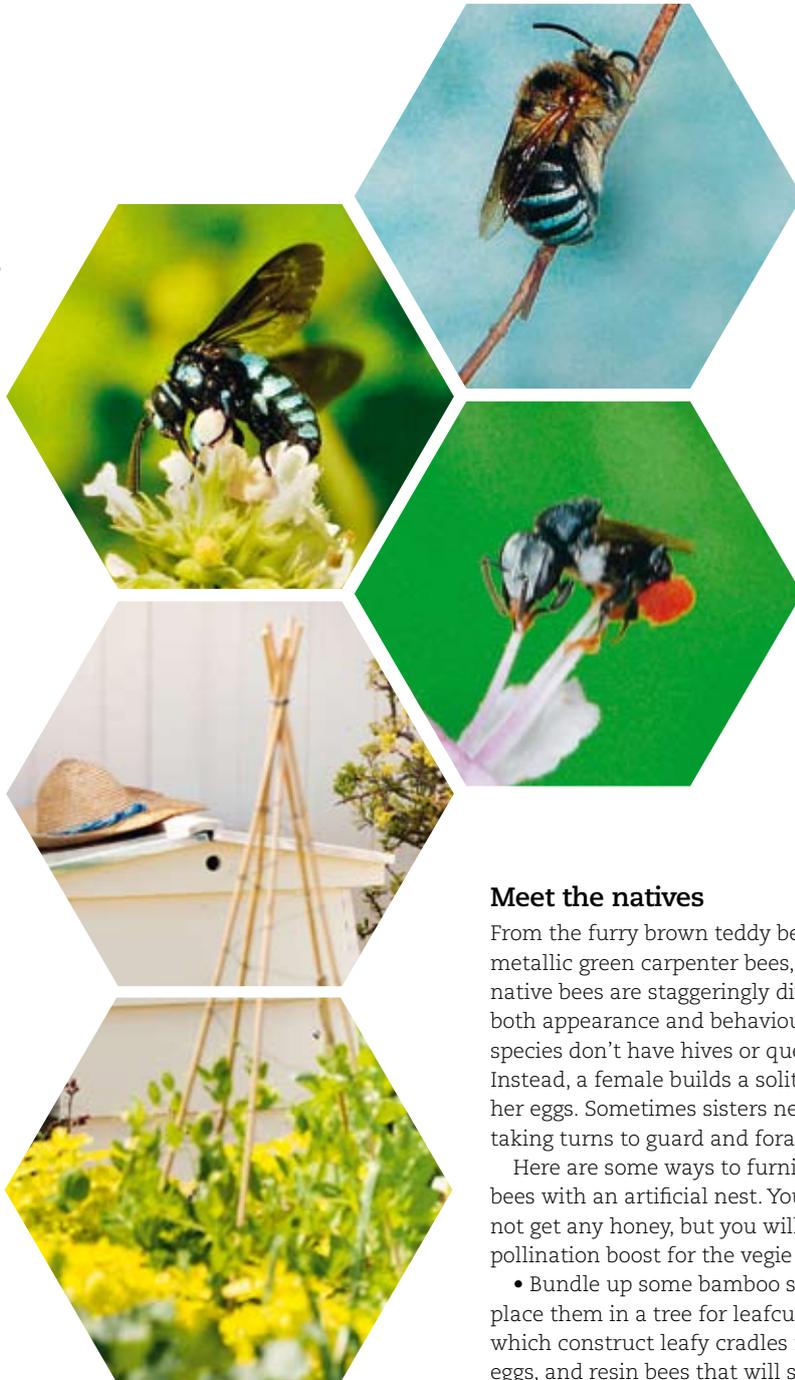
- In terms of introduced plants, try lavender, thyme and salvias. A broad variety provides a steadier supply of nectar throughout the seasons.

- Avoid pesticides and seeds that have been coated with systemic insecticides such as neonicotinoids.

- Experiment with companion gardening, partnering high-nectar flowers with vegetables that need pollination.

- Provide refreshments. Malfroy recommends “a shallow tray with a bit of timber or leaves floating in it, or a pond with some aquatic plants. Something the bees can sit on while they’re drinking”.

- Let areas of your garden go wild. Dead stems, tree hollows and undisturbed soil provide nesting places for native bees.



Meet the natives

From the furry brown teddy bear bees to metallic green carpenter bees, Australian native bees are staggeringly diverse in both appearance and behaviour. Most species don't have hives or queens. Instead, a female builds a solitary nest for her eggs. Sometimes sisters nest together, taking turns to guard and forage.

Here are some ways to furnish native bees with an artificial nest. You might not get any honey, but you will get a pollination boost for the veggie patch:

- Bundle up some bamboo stalks and place them in a tree for leafcutter bees, which construct leafy cradles for their eggs, and resin bees that will seal the entrance with tree resin. Resin bees also nest in blocks of wood drilled with holes 4 to 9 mm wide and 150 mm deep.

- Homalictus bees come in dazzling colours such as golden blue, coppery red and green tinged with purple. They are ground-dwellers, so provide sandy, clayey and muddy soils for their burrows.

- Blue-banded bees love mud blocks. Cut sections of rectangular PVC downpipe and fill with clay mixed with water. Dry for two hours, then poke two holes in the top with a pen. Dry again and shake loose from the PVC. Unlike European honey bees, these brightly striped native bees can pollinate tomatoes.

The Australian Native Bee Research Centre has information, photos and videos at www.aussiebee.com.au

