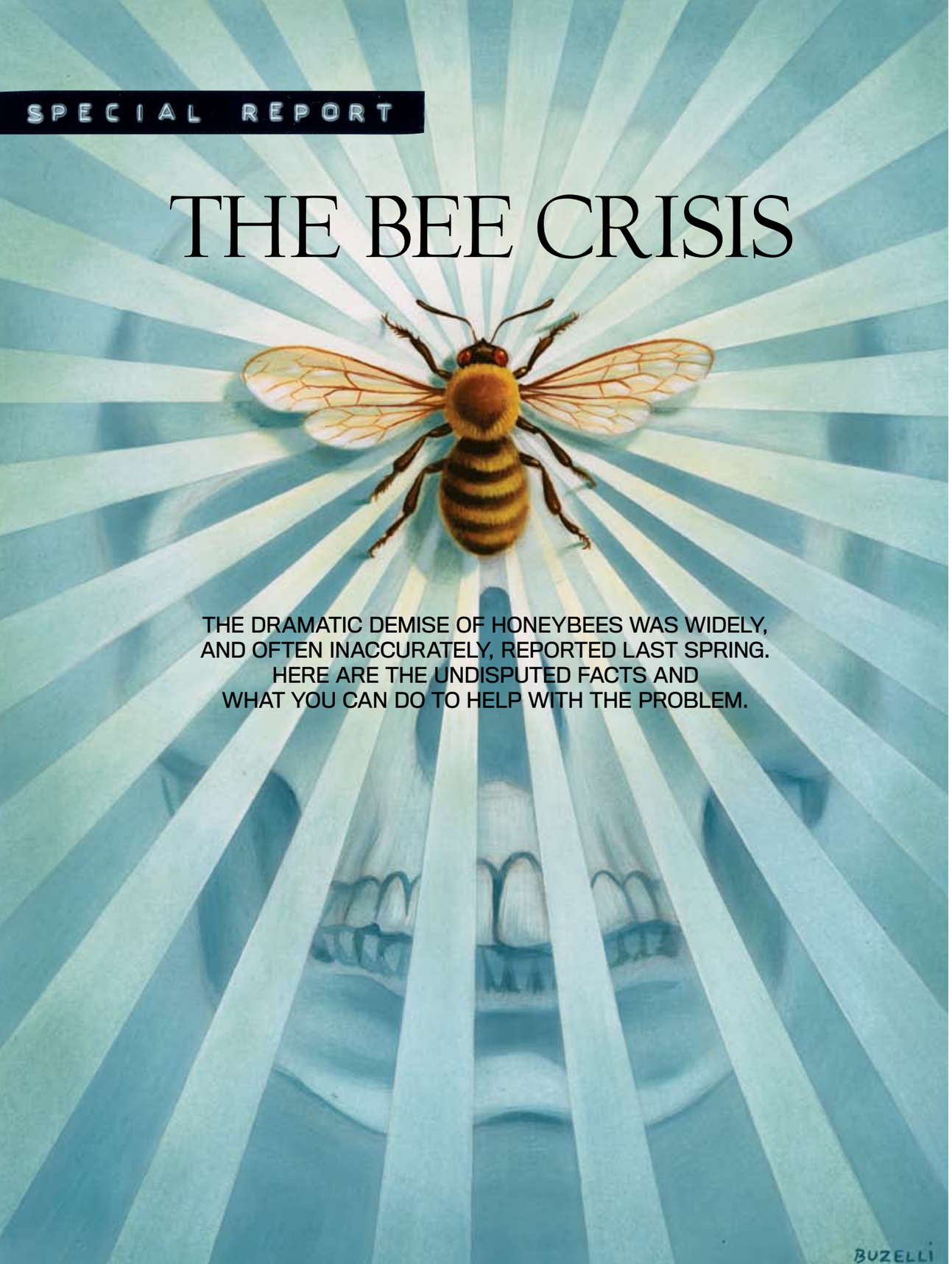
SPECIAL REPORT

THE BEE CRISIS



THE DRAMATIC DEMISE OF HONEYBEES WAS WIDELY, AND OFTEN INACCURATELY, REPORTED LAST SPRING. HERE ARE THE UNDISPUTED FACTS AND WHAT YOU CAN DO TO HELP WITH THE PROBLEM.

By **Sari Harrar**

One year ago, a bee-wildering problem started making national headlines: More than a half-million honeybee colonies died of mysterious causes in a matter of months—yet no one knew why. Farmers worried: Bee pollination is needed for 35 percent of the nation's food supply. Beekeepers and scientists scrambled for clues. And OG wondered: What does the decline of the honeybee mean to backyard gardeners, especially organic ones?

We investigated. In interviews with top bee researchers, we've uncovered reasons to worry, but also reasons to hope. Time and again, the experts told OG that organic gardeners can be in the forefront of "Plan B for Pollination"—by taking the lead in nurturing the thousands of native bees who already pollinate many backyard vegetables and fruits.

Your job? Don't be complacent—even if you saw plenty of bees in your own gardens last summer. "Bees have died before, but this is the worst crisis we've seen in the history of beekeeping in this country," says Pennsylvania State University honeybee expert Maryann Frazier, a senior extension associate in entomology. "It's dramatic. And sad. It has the potential to be quite critical if it's not addressed in the coming year."

Here's what you need to know—and how you can help.

FINDING#1

America's Top Pollinators Are in Crisis

FACT: It is estimated that more than 30 percent of the nation's 2.4 million honeybee colonies died out over the fall and winter of 2006–2007.

In late 2006, beekeepers first realized that a strange and deadly ailment was decimating their hives. Colony Collapse Disorder (CCD for short) turns a beehive into a ghost town. Gone are field bees—a hive's tens of thousands of mature, female workers who industriously gather nectar and pollen to feed the colony, pollinating more than a third of our nation's food supply along the way. Left behind to starve are the queen bee, her unborn brood, and young "nurse bees."

CCD has claimed bees in 35 states, affecting commercial beekeepers, who truck thousands of hives long distances to pollinate crops, as well as small, local apiaries and amateur beekeepers. In an industry that routinely sees 17 percent of its colonies die out each year (due to cold, disease, and pesticide exposure), CCD's impact was staggering. Some beekeepers lost 80 to 90 percent of their hives.

By late summer 2007, top bee researchers rushed to solve the mystery—and hoped to avert another wave of losses this fall and winter. Hindering their efforts: finding afflicted worker bees to study, because they simply drop to the ground far from the hive.

Some prime suspects have emerged: A recently-discovered disease called Israeli acute paralysis virus was implicated as contributing to CCD. Also, parasites and fungal diseases may be weakening bees. Genetic tests from collapsed California hives turned up a once-rare Asian parasite called *Nosema ceranae* that's been hitting hives in Europe recently, say scientists at the University of California–San Francisco.

A newer class of agricultural insecticides called neonicotinoids—now used more frequently in home gardens, too—could play a role. One, imidacloprid, which is most commonly marketed as Merit, is used to kill grubs in lawns. Neonicotinoids target an insect's central nervous system and may be dimming bees' memories and jamming their navigation systems, Penn State scientists suspect. Chemicals used by beekeepers to kill mites inside beehives may be concentrating in beeswax in the hives and weakening bees' immune systems. And the combined onslaught of several recent bee woes—deadly varroa mite infestations in hives, bad weather that may diminish essential nutrients in pollen, even a lack of genetic diversity—may be adding up to big trouble, too, notes Frazier.

All these factors and more have created a "perfect storm" for honeybees. But forget those rampant Internet rumors that cell-phone radiation and/or genetically modified crops are to blame. "There's no evidence to support those at all," states Frazier.

FINDING#2

Native Pollinators Are Already Picking Up the Slack

FACT: Native bees are—and always have been—important pollinators of many favorite garden vegetables and fruits. In many cases, they're doing 100 percent of the work.

Honeybees get all the credit for pollinating backyard gardens. But if you've ever successfully grown tomatoes, eggplant, watermelon (or other melons), zucchini, winter squash,

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strawberries, raspberries, or blueberries, native pollinators likely had a hand in the production of your harvest. From tiny "sweat bees" barely an eighth of an inch long to big, furry bumblebees, America's 4,000 species of native bees are powerful pollinators in their own right.

New research conducted on small farms in New Jersey found that native bees are responsible for much of the pollination now taking place in some melon, pepper, and tomato crops—even when farmers are renting honeybee colonies for pollination, reports ecologist Rachael Winfree, Ph.D., a University of California–Berkeley postdoctoral researcher. "I counted more native bees than honeybees on peppers and tomatoes, and similar numbers of honeybees and native bees on cantaloupes," she says. "At 91 percent of the farms I studied, native bees were fully pollinating the watermelons."

It's probably the same story in your backyard. Native-bee researcher James H. Cane, Ph.D., an entomologist with the USDA's Bee Biology and Systematics Lab in Logan, Utah, believes native bees have been picking up the slack in home gardens for more than a decade, ever since a variety of diseases killed off 90 percent of "wild" honeybee colonies that had escaped from hives and were living in trees. "If honeybees continue to decline, the native bees will be doing even more," Cane says.

If you grow zucchini, pumpkins, or any type of winter squash, you've got a native bee to thank. "All across the United States—and from Canada to southern Brazil—a group of closely related solitary, native bees called the squash bees are the most prevalent pollinators of summer squash and of winter squashes like pumpkins, acorn squash, and butternut squash," Cane says. "Honeybees can pollinate squash, but squash bees do a better job and usually get there first."

Truth is, native bees have been in the Americas just about forever, while honeybees are newcomers who first arrived in 1600s with English and Dutch settlers—and later with Spanish priests in Mexico and the Southwest. Farmers prefer honeybees for pollinating big fields of a single crop—after all, their hives are portable and come packed with thousands of eager workers. Native bees are the underappreciated local talent. They live alone or in tiny groups in tunnels in the ground or in wood. They can't pollinate most huge, single-crop farm fields. Almost none of them make honey. However, the more scientists look, the more they appreciate the power and potential of native pollinators.

Native bees have some surprising abilities. Take "buzz pollination." The flowers of tomatoes, eggplant, blueberries, and some other crops keep their pollen encased in tiny tubes. Bumblebees and a few other natives hold on and vibrate their flight muscles until the pollen erupts through tiny holes in the tube. "Honeybees can't do this," Cane says. "But it's the only way to pollinate some crops. It's the reason tomato growers bring bumblebees into greenhouses."

They also have a stellar work ethic, says Matthew Shepherd, senior conservation associate for the Xerces Society, a Portland, Oregon–based group whose mission includes the preservation of native pollinators. "Squash bees get up earlier in the morning than honeybees," he notes. "And orchard mason bees will work in colder, wetter weather."

FINDING #3

Organic Gardeners Can Save Native Pollinators

FACT: Suburban backyards and city garden plots support as many native bees as farm fields and forests do, if not more.

"Home gardeners may not be able to single-handedly save endangered animals such as owls or frogs, but they can nurture significant numbers of native pollinators," says native-bee researcher Neal Williams, an assistant professor of biology at Bryn Mawr College in Pennsylvania. "This is really important right now, because we think the numbers of native pollinators are falling—just when we need them most."

A 2006 National Academy of Sciences report found that America's wild pollinators are on the decline for many reasons, including exposure to toxic pesticides, diseases that have jumped from commercial bumblebees (used to pollinate those greenhouse tomatoes) to wild bumblebees, loss of nesting areas and food sources, and perhaps even competition with honeybees. "Protecting native bees is an insurance policy for our food supply," Cane says.

The good news: Organic gardeners are in a perfect position to give native pollinators the food and shelter they need. The immediate benefit: More pollinators for your own garden. The bigger contribution: You're helping to save a fragile and crucial link in the food chain. "There's a huge opportunity for organic gardeners to make a big difference for bees," Winfree says. "It's a win-win situation."

Chances are you've already got dozens of species whizzing around your flowers and vegetable plot from spring until fall. Natives love backyards. When Winfree surveyed 40 suburban, farm, and forest areas in southern New Jersey, she found high numbers of natives and good species diversity in suburban gardens and farms—more, in fact, than exist in forests there. "Gardens are more likely to have flowers throughout the season, which bees need for nectar and pollen," Winfree says. "We're finding a similar pattern in central New Jersey and in Pennsylvania. Human-disturbed habitats can be good bee habitats. Gardens and backyards can help save our native pollinators."

What do bees need from you? A lush flower garden that blooms in three seasons. Some bare ground and/or suitable wood for nesting. Water. And protection from chemical attacks, even organic ones. "They're a joy to watch," James Cane says. "And a joy to protect."

Sari Harrar is a freelance health and science journalist who writes for many national magazines. In 2003, she won a Council for Advancement of Science Education fellowship to learn about targeted cancer therapies at Harvard Medical School. She's hoping her three hives of honeybees survive the winter of 2008 in the backyard of her southeastern Pennsylvania home.

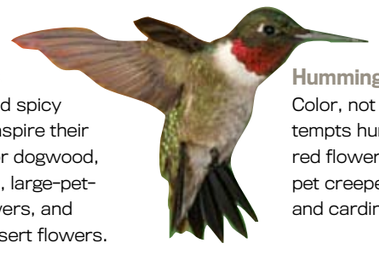
WWW Read whether CCD is affecting backyard gardeners and organic seed growers, learn how to create bee nesting areas, and find links to bee-preservation Web sites at *OrganicGardening.com.*

IN SUPPORTING ROLES

Flies
Where bees are scarce, apples and early spring flowers depend on these little buggers for their reproductive services.

Moths
An attraction to heavy, sweet scents, after-dark bloomers suggests that moths are hopeless romantics with an unquenchable love for evening primrose and yucca.

Beetles
Fruity and spicy scents inspire their desire for dogwood, magnolia, large-petaled flowers, and many desert flowers.



Hummingbirds
Color, not scent, tempts hummers to red flowers like trumpet creeper, bee balm, and cardinal flower.

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Invite the Natives

Here's how to attract and nurture pollinators wherever you live.

Offer a flower buffet. Bees need nectar for energy and protein-rich pollen to raise their young. "Planting a variety of flower types and colors attracts and supports the biggest variety of native pollinators," says entomologist James Cane. Favorite colors: Blue, purple, violet, white, and yellow. Plant annuals *and* perennials—some bee families prefer one over the other.

Got mostly shade? Good news: Bees like nectar and pollen from hosta flowers, too. (Note: Go easy on weeding your lawn. Bees love dandelions and Dutch clover.)

Include native wildflowers—they may be four times more attractive than exotics. "But you can get by with either," says bee researcher Rachel Winfree. "Let the bees choose your plants. Visit a garden center with lots of flowers in bloom. Choose whatever has the most bees on it! That's what I do."

Skip the "poodles." Garden show-offs with ruffly, doubled petals such as marigolds and double hollyhocks are a bust for bees—some have no pollen or nectar; others are too dense for bees to penetrate. "If you can't see the flower's sexual parts, chances are the bee won't be able to reach them," Cane says. Impatiens and annual salvia don't provide nectar or pollen, either.

Go for a continuous, three-season bloom. Different bees have different life cycles–and need food at different times of year. "Spring is tough for bees," Winfree notes. "Common spring bulbs like tulips and daffodils aren't attractive to bees. It's good to have fruit trees or flowering shrubs to cover their early-season needs." Borage, calendula, and wild lilac (*Ceanothus* spp.) are good spring choices, too. For fall, consider sedum, asters, and goldenrod.

Plant clumps. Research suggests that bees stay longer in gardens at least 3 to 4 feet in diameter. Plant large clumps of each flower type—finicky bees may ignore small displays, even if they're bursting with pollen and nectar!

Add water. A birdbath, trickling hose, or drip-irrigation line provides thirsty bees with clean water—and keeps them in your garden instead of scouting elsewhere for H_2O. Some experts suggest mixing a little sea salt or wood ash with earth, then keeping it moist and muddy, providing bees with sodium and other minerals.

Leave the ground bare. Skip plastic weed barriers and heavy mulches. Most native bees live alone in the ground. Each female digs her own nest tunnel, creates cells for raising a few offspring, then stocks it with pollen and nectar. She needs bare ground that's well drained and sunny. Spread these areas around—some bees prefer steep, south-facing slopes, while others call flat ground home. Or create nesting areas with wood blocks or tubes for the native bees who naturally nest in abandoned beetle tunnels.