

Among the stunningly beautiful sights in California's verdant Central Valley are the acres of in-bloom almond trees; vast orchards that generate the world's supply of this luscious nut. But in a stinging rebuke to nature, this essential bounty couldn't be had without hired help—billions of *very* busy bees.



B U Z Z

W O R T H Y



by
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A Space Oddity
The grid of an almond orchard is precise; so is the hive placement.



It's mid February, and John Miller picks me up in his red Corvette, transfers me to a large, red pickup with a Miller Honey Farms logo on the side, and heads 70 miles south from Sacramento to Modesto, California.

Miller, 57, is one of the country's most colorful migratory beekeepers, and he buzzes with the hyperactivity of his vast swarm. As we drive, he tells me about his bees (about half a billion of them, and they sting him a lot), his trucks (he's partial to his "yoda," a Toyota pickup), and his fellow beekeepers ("knuckle-dragging Neanderthals," all of them—himself included). The time passes quickly, and a couple of hours later we pull into a motel humming with beekeepers, brokers, and a lot of hired help.

Modesto lies at the center of California's Central Valley, which lies at the center of California, which lies at the center of the agricultural universe. The area is the most productive farming region on earth. But there is little rural romance here. The valley smells like a brew of fertilizer, chemicals, and manure, and it hosts an eternal ebb and flow of migrant workers. Venture along Crows Landing Road, Modesto's gritty agricultural strip, and you'll find more tractor dealerships than anywhere else on the planet, along with flea markets ("You can buy anything you want; a wet umbrella, a dry umbrella," Miller notes), and, of course, acres beyond acres of almond trees. There is no better place to grow almonds. "When God was thinking about almonds," says Miller, "this was the dirt he made."

February is the moment commercial beekeepers wait for all winter, when 740,000 acres of almonds flower simultaneously in the Central Valley. Almond pollen is too heavy for the wind to transport, so the trees depend instead on such stout pollinators as bumblebees, bats, and especially honey bees to introduce pollen to stigma, male to female, to create nuts. Three quarters of a million acres of blooming trees make a lot of flowers, so almond farmers rely on beekeepers like Miller, who descend with billions of hardworking bees to accomplish the onerous but glorious task of turning almond blossoms into nuts. In the annals of symbiotic relationships, the almond and the beekeeper have, lately, acquired almost mythical status: Without bees and the beekeepers who tend them, there would be very few almonds. And without almonds and the lucrative pollination paydays they provide, there would be very few commercial beekeepers left in America today.

THE 400-MILE STRETCH OF the Central Valley between Bakersfield in the south and Red Bluff in the north is the only place in North America where almonds can be cultivated for bulk commercial sale. The sandy loam and Mediterranean conditions here are perfect for the mass produc-

tion of almonds—dry, hot summers; 600 annual chilling hours during November and December; mild Januaries and Februaries; 15 to 20 inches of rain a year; well-drained soil; flood irrigation. Farmers here have made a science of the ostensibly natural process of growing the nuts: The trees are planted in a perfectly spaced, 19-by-20-foot diamond grid, each tree leaning ever so slightly to the northwest, whence come the most damaging winds. Thanks to extensive research into almond productivity, the grid has grown tighter

over the years: In 1985, the standard almond grid was 95 trees per acre; now it's up to 150 in some spots.

The bloom begins around Valentine's Day and the harvest winds down at Halloween. In between, buds form and open into whitish-pink flowers and then fall, petals covering the orchard floors like snow. Nuts begin to grow in the flowers' place. As the almonds ripen on the tree, their greenish hulls harden and then, in July, crack open, the fissure widening through late summer and early fall to reveal a pale inner

shell. Inside the shell sits the oblong, brown-skinned kernel—the nut that consumes the Central Valley. The preparation for the harvest begins in early August, when "shakers" come through, knocking the nuts to the ground, where they lie in the sun for a week or two to dry. Before the early 1960s, workers tapped trees with tall mallets to shake the fruit down onto a canvas; now they drive hundred-thousand-dollar tractors, with air-conditioned cabs, that use hydraulic pincers to grip the trunks and jiggle them with a force that has been

compared to an earthquake. The machines can strip a tree of nearly every nut in less than a minute.

Next, "sweepers"—low-slung contraptions that look like a cross between a street sweeper and a tank—pass through, using brushes to push and blow the nuts, leaves, and discarded lunch wrappers into neat rows between the trees. Then comes the pickup machine, whose belt looks like a vacuum-cleaner rotary. It sucks up everything in sight, leaving the ground utterly bare but for enormous pluming clouds of



Early Risers
Hives are placed at night, while the bees are dormant.

dust. The pickup machine deposits its load onto a screen that sifts out the nuts, which then travel to a processing plant, where they are sorted, piled, fumigated, hulled, shelled, packed, and shipped.

California supplies the vast majority of the world's almonds, both a pleasant accident of geography—the valley's superlative climate and soil—and a purposeful result of the industry's remarkable productivity. Almonds are California's leading

agricultural export, ahead of avocados, raisins, strawberries, lettuce, and cattle. They book more than twice the revenues of the state's wine exports. In recent years, the nut has become ludicrously profitable. Almond ranchers break even if their almonds sell for more than a dollar a pound wholesale. In 2005 they sold for three times that price, grossing California growers about \$3 billion. In the summer, bees make honey. In spring, they make money. A lot of it.

N O ONE KNOWS EXACTLY when the bee began doing the reproductive work of the flowering plant. Palaeobotanists place the development around 100 million years ago, when the number of plant species grew more than sevenfold and flowers learned that visiting bugs or birds could make their procreative task much easier. Some flowering plants pollinate themselves. But many make seeds and reproduce only when pollen—

the sticky powder in flowers—moves from one plant to the next. Although some types of pollen travel on the wind, many fruiting plants require outside help from insects and birds.

There are other insects that are more efficient than honey bees. Blue orchard bees, for instance, can pollinate 50 times the flowers that honey bees can. But they are solitary creatures, and their population increases by a factor of only three to eight a year; honey bees can expand from a

queen and few dozen attendants to tens of thousands of bees in just a few weeks. And honey bees live in naturally portable communities that are easy to move from bloom to bloom. That appeals to the almond farmer, who has a lot of flowers to pollinate—about three-and-a-half million flowers per acre. Multiply that by three quarters of a million acres of Central Valley's almond orchards and you've got a staggeringly large number of flowers. For that, solitary bees won't do; you need a mob. And for a mob of bees, you need a mob of beekeepers.

Beekeepers pull off a remarkable feat—one that, like pollination itself, is so invisible as to be almost mundane, and so complicated as to be almost inconceivable. Every January, 1.5 million hives—somewhere in the vicinity of two thirds of the nation's bees—are imported to California to fulfill the almond farmers' needs. John Miller brings his in from their winter quarters in Idaho.

With so many acres of almonds, the months preceding the February almond bloom are, for Miller, a virtual bazaar, a flurry of phone calls, e-mails, inspections, wheeling and dealing, matching hives to acres, tinkering with contracts, and praying that the bees arrive healthy enough to keep his promises and to do their job. It culminates

with Miller and his crew, in full beekeeping gear, methodically placing thousands of hives along the almond grids; leaving the bees for a month or so to get very, very busy pollinating flowers; then rounding them up and hauling them away. Pollinating crops for farmers is like being a street-walker, Miller quips: "I come in the night; I wear a veil; they give me their money; and a few weeks later they call and tell me to get out of there."

Probably, the weeks that follow the frantic pollination season are, in Miller's world at least, even

more antic. In late March, when his 14,000 hives worth of bees are released from their almond duties, Miller sends half of them to Washington State to pollinate apples and brings half home to his headquarters in Newcastle, California, where the hives will be "split, nuked, and requeened." The language suggests atomic precision, and, indeed, the annual breeding and regeneration of the honey bee population is a highly delicate transaction.

It's customary for beekeepers to position their apiaries (clusters of hives) across vast acreage. During the breeding season, most of these beekeepers travel from yard to yard, hauling the necessary boxes, frames, and pallets to each apiary, then opening and dividing ("nuking") the wooden-framed hives and carefully placing within each a virgin queen that will repopulate the colony.

It's the way Miller would prefer to do it if his outfit were small, if he didn't have so many bee yards scattered across so many miles, and if he weren't obsessively concerned with making things more efficient in the world of beekeeping. But instead of dragging his equipment and large team of workers from yard to yard for two and half weeks in March and April, he drags 3,500 far-flung

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hives home to Newcastle. There, under a tent in a clearing below his headquarters, he has designed his own "nuking machine," an elaborate rig that conducts much of the labor-intensive work of dismantling the hives for virgin-queen implantation.

Miller's nuking line is highly efficient and—he's the first to admit—utterly appalling. There is no approaching the tent without a full bee suit and veil—and double gloves, if you're smart. Angry bees fill the



A Blooming Biz
In the '60s, a hive rented for \$6; in 2010, up to \$210.



air like a black hailstorm, alighting on any warm surface—the apex of the tent, the crowns of employees’ heads, their temperate butt cracks. Bees swirl and dive-bomb, bouncing off veils like popcorn. The nearby trees droop with escaped swarms, which Miller will coax back to safety

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later in the evening, when the bees’ ill tempers cool. Even up the hill at Miller’s office, the air is filled with angry drifters, who cluster on coffee tins and honey pails and shrubs. It is no fun for the bees; it is no party for the beekeepers, either. During nucking season, Miller’s hands and gloves are speckled with stingers. He sees bees in his dreams. But he knows no better option. The survival of his bees, of his business, and indeed, of the honey bee in America, depends on this violent springtime ritual.

In recent years, the honey bee has suffered terrible blows. There was a mass die-off in 2005, and another, much more widely reported crisis in 2007, the precise cause of which remains a mystery despite the affliction having been given a name: Colony Collapse Disorder. Many bee-

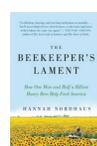
keepers suspect their bees suffer from their time in the almond orchards, when colonies from operations all over the country are there “swapping spit,” as Miller puts it, exposing each other to all manner of novel pests and pathogens. But here’s a surprising fact: For all the recent carnage, the number of managed beehives in America has held steady. Individual honey bees are unimaginably fragile, but as a community, as a species, they have an astonishing capacity to regenerate. They work hard, remember; a queen can lay thousands of eggs a day to repopulate a hive. That’s a strategy

honey bees use to recover from the misfortunes that befall them daily, and it’s also the strategy beekeepers use to recoup lost hives.

Without new queens, national hive numbers would have plummeted in the recent bad years. New queens are also the reason that predictions of honey bee extinction are probably off the mark. Lucky for bees, they have beekeepers like John Miller to keep them going. No one has ever doubted that honey bees, with their wee 900,000-neuron brains, are awfully savvy in their quest for survival: Just look how they have enlisted these improvident humans to risk all manner of painful indignity so that they can prosper.

How smart is that?

From The Beekeeper’s Lament: How One Man and Half a Billion Honey Bees Help



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