ORCHARD UPDATE: RALLYING AROUND RESEARCH

CHRISTINE GEMPERLE, GEMPERLE ORCHARDS

Almond farmer Christine Gemperle, who grew up on her family's almond orchard in California's Central Valley, believes that today's food system requires continued on-farm innovation and collaboration in the face of climate change.

"As you look at the future of farming and the planet, we hear every day that the clock is ticking," Gemperle observes. Compared to previous generations, "there's a different approach and a different quality of concern." When it comes to almonds, growers like Gemperle are continuously improving upon best almond farming practices and working with others to solve complex sets of challenges across key areas— including honey bee health.

POLLINATION PARTNERS

Honey bees play a vital role in the food supply with 35 percent of the world's food crops relying on pollinators to some degree, but the population faces several health challenges. Honey bees are the principal pollinators of almond trees, so although the bees are only with the California almond industry for two months of the year, the industry works to support pollinator health for all twelve.

While the total number of honey bee hives in the U.S. has remained steady for the past 20 years, beekeepers experience significant in-season hive losses and must work hard to keep their hives healthy.

Since 2013, almond farmers have added pollinator habitat to more than

82,000 ACRES

of almond orchards with the Seeds for Bees program.

Dubbed colony-collapse disorder, the hive loss phenomenon, which continues to this day, poses an existential risk not only to bees, but to beekeeping and almond agriculture, as well. "The truth is, we have a symbiotic relationship with the beekeeping industry," says Gemperle, who as a hobbyist beekeeper has both served as secretary of the Delta Bee Club and is now the newest board member at Project Apis m., a nonprofit that funds and directs research on honey bee health.

Beekeepers and almond growers are trying to better understand the situation and are uncovering several potential culprits in the process. One is depredation from the *Varroa* mite, a parasite and disease vector that can destroy entire hives. It's not native, but it's rampant and incredibly hard to control.

Another potential factor is loss of honeybee habitat and forage that both climate change and drought impact. But in a happy coincidence, sustainable farming practices like cover cropping may help fill the gap. In April 2021, the Almond Board joined with Pollinator Partnership and the California Department of Food and Agriculture to convene The California Pollinator Coalition. The Coalition and its 20+ members have pledged to increase habitat for pollinators on working lands and promote research for the benefit of biodiversity and food production.

"When the bees come to California to pollinate the trees," Gemperle explains, "the mustard is blooming in a lot of places before the almonds do, and that gives them something nutritious right when they get here. Then they move to the almonds, which are also incredibly nutritious forage, and then to clover, which you see in a lot of cover crop mixes."

CRITICAL COVER CROPPING

"I've gotten hardcore these last eight or nine years into cover cropping," Gemperle says, "and I love it."

Farmers plant cover crops not to harvest, but to provide pollinator habitat and manage soil erosion and quality, water retention, weeds, pests, diseases and more. The practice's appeal to Gemperle is evident in the results.

"In May, I used a third less water than last year because my cover crops were still really heavy. And I was just blown away," she says. The abundance of organic matter that the cover crops contribute helps soil retain more moisture, and for longer. "And it has great water penetration from all those roots being in the ground year after year," Gemperle adds.

"By using cover crops, we've been able to save ourselves money and water," Gemperle concludes. Even better, when she mows the crops back into the soil, they biodegrade, improving its quality.

A LEARNING PROCESS

Not surprisingly, many of the cover-cropping best practices that growers like Gemperle implement emerge from studies that the Almond Board of California (ABC) supported. "The Almond Board of California does so much research," she says. "We're constantly learning." And cover-cropping is just the start.

The ABC also helped fund University of California Cooperative Extension and California Department of Food and Agriculture research into **whole-orchard recycling (WOR)**, the practice of grinding whole trees into chips that are distributed over the soil surface and reincorporated before orchard replanting. Almond orchards generally live for 25 years, during which the trees remove carbon dioxide from the air and store it as wood, a process known as carbon sequestration. The studies took almost a decade to bear fruit, but that fruit's now showing how WOR increases soil organic matter, boosts water-holding capacity and raises orchard yields over time. Now, research is also showing that the practice extends the tree's carbon sequestration by storing it the soil, which could help address climate change.

Farms that use whole orchard recycling sequester 2.4 tons of carbon per acre, equivalent to living car-free for a year.

SUSTAINABILITY IS SURVIVAL

Knowing that research is key to advancing the industry, Gemperle's participation on the ABC's Biomass Task Force and Nutritional Research Committee gives her even more leverage both to spearhead the spread of sustainable almond-growing practices and to shape the science behind it.

Even so, she cherishes the intuition that's guided almond-growing since before there even was an Almond Board. "I will never let go of that," she says. "That's what I learned from my dad. He didn't have a lot of research or innovation to fall back on, so he had to go into the orchards to tell if something was wrong—he might not quite know what it was, but he'd know that it didn't look right."

Moving in step with emerging research, Gemperle knows that "doing the right thing is never cheap." Beyond that, she continues, "Sustainability is about sustaining the farmer as much as it's about sustaining the land they farm and life on this planet— because the land's not going to farm itself, so the farmer needs to survive to continue growing food. And to sustain the farmer, practices have to be realistic, doable and affordable."

As long as she has a say in the matter, that's just what they'll be.

"We're racing against the clock here," Gemperle admits. But she's already lacing up her trainers. "I'm taking the risk of doing whole-orchard recycling, putting in top-of-the-line irrigation systems and cover-cropping," she says. "And I am *going* to grow almonds with less water and take advantage of every program that's out there to help and teach me more about it. Because as farmers, we have the land where change can happen. I want to change the world and change attitudes—and change the way we farm. I think we can do this."