



zero waste

ACHIEVING OPTIMAL USE OF EVERYTHING WE GROW

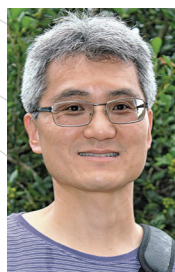
Almonds grow in a shell, protected by a hull, on a tree: products traditionally used for livestock bedding, dairy feed and electricity generation. With changing markets for these coproducts, the almond community is spurring innovation for higher value and more sustainable uses, with promising leads in the areas of recycled plastics, fuel and more. By 2025, the California almond community commits to **ACHIEVE ZERO WASTE IN OUR ORCHARDS BY PUTTING EVERYTHING WE GROW TO OPTIMAL USE.**

Given that almond coproducts are widely utilised already, progress towards this goal focuses on reducing our environmental footprint and adding value—economically and environmentally, via three key measures. These include significant increases in recycling trees into the soil when an orchard is removed, diversifying applications for hulls and shells beyond current uses in the California dairy industry and the effective elimination of open burning as a means to dispose of woody biomass.

Progress toward these goals will be measured with data from the Almond Alliance of California, as it relates to hulls and shells, and almond farmer surveys on woody biomass from the University of California! ➤

NOVEL APPROACH: STRENGTHENING RECYCLED PLASTIC

“The almond industry has traditionally used shells as livestock bedding, but research has shown they can serve a higher purpose with greater economic and environmental benefits. Through torrefaction, burning in the absence of oxygen, almond shells can be ground up and added to post-consumer recycled plastics, giving them added strength, heat stability, and colour. This translates to less new plastic in the world and a valuable new use for almond shells.”



Bor-Sen Chiou, RESEARCH CHEMIST, USDA AGRICULTURAL RESEARCH SERVICE

1. University of California, Davis. Whole Orchard Recycling. orchardrecycling.ucdavis.edu. 2. 17-PREC3-Holtz. Almond Orchard Recycling. 3. Alissa Kendall, et al. "Life Cycle-Based Assessment of Energy Use and Greenhouse Gas Emissions in Almond Production. Part 1: Analytical Framework and Baseline Results." Journal of Industrial Ecology. 2015.

pursuing continuous WASTE improvement

While the Almond Orchard 2025 Goals set finite targets, the almond community's use of almond coproducts has been evolving for decades. This timeline focuses on one coproduct, woody biomass, and how almond trees are utilised at the end of their 25-year lifespan.

PAST

With significantly fewer almond orchards in the state and less protective air quality laws, **BURNING OF AGRICULTURAL WASTE** was the norm prior to the 1990s. This included whole trees upon orchard removal as well as branches from regular tree pruning.

PRESENT

While **COGENERATION FACILITIES** that converted almond tree wood into electricity were a reliable option in the ensuing decades, these power plants are being phased out in California. With that change, farmers have started shifting to a new technique for almonds: whole orchard recycling.

FUTURE

Instead of removing the material from the orchard system, **WHOLE ORCHARD RECYCLING** grinds up the trees, spreads the wood chips across the field and works it into the soil prior to replanting. This practice improves soil health, increasing water infiltration and storage, and slowing the release rate of carbon dioxide, a greenhouse gas, into the atmosphere.³ Researchers are also exploring transforming almond wood into biofuels.

