

SPOTLIGHT ON:

# ZERO WASTE

## Using Everything We Grow



### WHOLE ORCHARD RECYCLING: EXPLAINED

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. This new orchard removal approach extends that carbon sequestration by storing it in the soil, using the trees' woody biomass to build healthier soils and address climate change. Models show that recycling the orchard sequesters 2.4 tons of carbon per acre,<sup>1</sup> equivalent to living car-free for a year.<sup>2</sup>

### HERE'S HOW IT WORKS:

- 1 Each almond tree is knocked over, starting the orchard removal process.
- 2 The trees are put through a large grinder that breaks them down into small wood chips.
- 3 The wood chips are spread evenly across the field and then worked into the soil by a tractor.
- 4 A new orchard is then planted, benefiting from increased soil organic matter and nutrients as well as improved water infiltration and storage, as soil microbes gradually break down the wood.<sup>3</sup>

## A Genuine Bioeconomy

Almonds grow in a shell, protected by a hull, on a tree. Traditionally, these coproducts have been used as livestock bedding, dairy feed and transformed into electricity. However, changing markets and increased production has led the California almond community to investigate new uses.

With 79 research projects funded to date, ABC is supporting scientists exploring innovative applications for almond coproducts that contribute to the larger goal of creating a genuine bioeconomy, where every byproduct is an input for another valuable product. This has the potential to provide value to other industries, farmers and the environment.

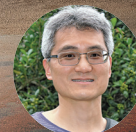
PRODUCED IN 2018<sup>4</sup>

HULLS: 4.5 billion pounds

KERNELS: 2.3 billion pounds

SHELLS: 1.6 billion pounds

GROWING IN CALIFORNIA IN 2019<sup>5</sup>  
165 million almond trees



### Meet Bor-Sen Choi

RESEARCH CHEMIST, USDA  
AGRICULTURAL RESEARCH SERVICE

"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 are transformed into a charcoal-like material that can be ground up and added to post-consumer recycled plastics, giving them added stiffness, heat stability and color. If we can scale this beyond the lab, this will translate to less new plastic in the world."



ACHIEVING ZERO WASTE IN OUR ORCHARDS BY PUTTING EVERYTHING WE GROW TO OPTIMAL USE



1. Michael Wolff, et al. California Department of Food and Agriculture. Whole Orchard Recycling report for the Environmental Farming Act Science Advisory Panel, October 2019. 2. Seth Wynes, et al. The climate mitigation gap: education and government recommendations miss the most effective individual actions. Environmental Research Letters. 2017. 3. Brent Holtz, et al. Whole almond orchard recycling and the effect on second generation tree growth, yield light interception and soil fertility. VII International Symposium on Almonds and Pistachios. 2017. 4. Almond Tree Fruit Weight. 2018/19 Crop Year. Addendum to July 2019 Position Report. August 2019. 5. 2018 NASS Almond Acreage Report. April 2019. 2019 Objective Report. July 2019.