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Whole orchard recycling as a sustainable approach to managing California's almond orchards

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Field instruments (LICOR smart chamber 8200-01S, LI-7810 and LI-7820 analyzers, and LI-8200-104 Opaque Long-Term Chamber) used to measure greenhouse gas emissions in a young almond orchard four years after whole orchard recycling in Parlier, CA. Photo courtesy of Dr. Touyee Thao.

Whole orchard recycling (WOR), or the process of shredding entire orchards into wood chips, spreading the material on the soil surface, and incorporating it into the soil before replanting, is gaining attention in California as a sustainable approach to managing unproductive orchard biomass. However, its long-term effects on soil health and ecosystem services, particularly greenhouse gas emissions and soil carbon and nitrogen dynamics, remain unclear.

Researchers from University of California Agriculture and Natural Resources and the USDA-ARS evaluated these effects in a replanted almond orchard four years after WOR. They found that cumulative soil carbon dioxide emissions were higher in WOR-treated plots than in control plots, although this difference decreased over time. Biomass incorporation did not significantly affect nitrous oxide or methane emissions. Importantly, WOR increased soil carbon sequestration and nitrogen retention without increasing the potential for nitrate leaching.

Overall, the study suggests that WOR can provide important soil health benefits while supporting sustainable almond orchard management in California.

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Thao, T., Gao, S., Culumber, C. M., Poret-Peterson, A. T., Perez, J., & Holtz, B. A. (2026). Four years after whole orchard recycling: Effects on soil ecosystem services in a young almond orchard. *Vadose Zone Journal*, 25, e70099. <https://doi.org/10.1002/vzj2.70099>

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