Science Societies

Drainage Reduces Arsenic and Methane Emissions from Organic Rice

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Study co-author Henry Perry sampling greenhouse gas emissions in a flooded organic rice field.

Study co-author Henry Perry sampling greenhouse gas emissions in a flooded organic rice field. Perry was a graduate student at UC Davis and passed away in 2022. Photo by Bruce Linquist.

Rice is a source of methane emissions in the atmosphere and arsenic in the human diet. Both issues result from rice being grown in a flooded, anoxic environment. These concerns are even more prevalent for organic rice systems due to the use of organic fertilizers (which promote methane emissions), and because organic rice consumers often prefer brown rice (which contains more arsenic) to white rice. In California, some organic rice growers control weeds by draining the fields for up to 30 days starting about a month after planting. This kills aquatic weeds by drought stress, but the rice survives.

Researchers at the University of California, Davis conducted a field study to quantify the impacts of a “weed control” drain on greenhouse gas emissions and arsenic uptake in organic rice grain. They compared the weed control drain to a continuously flooded treatment and found that the weed control drain reduced methane emissions by 50%, with nitrous oxide emissions remaining low. They also found that arsenic concentrations were 30% lower in rice from the drained treatment.

These results are promising for organic rice producers and consumers and demonstrate how both environmental and health benefits from water management are possible.

Adapted from Linquist, B., & Perry, H. (2023). Greenhouse gas emissions and grain arsenic and cadmium concentrations as affected by a weed control drainage in organic rice systems. Agrosystems, Geosciences & Environment, 6, e20417. https://doi.org/10.1002/agg2.20417
