Improving 'crop per drop' could boost global food security and water sustainability

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Improvements in crop water productivity—the amount of food produced per unit of water consumed—have the potential to improve both food security and water sustainability in many parts of the world, according to a study published online in *Environmental Research Letters* May 29 by scientists with the University of Minnesota's Institute on the Environment (IonE) and the Institute of Crop Science and Resource Conservation (INRES) at the University of Bonn, Germany.

Led by IonE postdoctoral research scholar Kate A. Brauman, the research team analyzed crop production, water use and crop water productivity by climatic zone for 16 staple food crops: wheat, maize, rice, barley, rye, millet, sorghum, soybean, sunflower, potato, cassava, sugarcane, sugar beet, oil palm, rapeseed (canola) and groundnut (peanut). Together these crops constitute 56 percent of global crop production by tonnage, 65 percent of crop water consumption, and 68 percent of all cropland by area. The study is the first of its kind to look at water productivity for this many crops at a global scale.

The wide range of variation in crop water productivity in places that have similar climates means that there are lots of opportunities for improving the trade-off between food and water. And the implications of doing so are substantial: The researchers calculated that in drier regions, bringing up the very lowest performers to just the 20th percentile could increase annual production on rain-fed cropland enough to provide food for an estimated 110 million people without increasing water use or using additional cropland. On irrigated cropland, water

consumption could be reduced enough to meet the annual domestic water demands of nearly 1.4 billion people while maintaining current production.

"Since crop production consumes more freshwater than any other human activity on the planet, the study has significant implications for addressing the twin challenges of water stress and food insecurity," says Brauman.

For example, if low crop water productivity in precipitation-limited regions were raised to the 20th percentile of water productivity, specific to particular crops and climates, total rain-fed food production in Africa could be increased by more than 10 percent without exploiting additional cropland. Similar improvements in crop water productivity on irrigated cropland could reduce total water consumption some 8

More information: iopscience.iop.org/1748-9326/8/2/024030

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