## Global vulnerability of crop yields to climate change

## Objective

Prior research suggests that U.S. farmers have limited capacity to adapt to extreme heat. We test whether this is also true in countries with less developed agricultural systems, and draw implications for climate change impacts on the global calorie supply.

## Approach

Using a longitudinal gridded dataset of yields of five calorie crops, we empirically model the effects of adaptation on responses to temperature and precipitation shocks in the short run (weather) and the long run (climate). Yield impacts are assessed by combining these responses with temperature and precipitation simulated by 21 climate models.



Rice

## Impact

In a RCP 8.5 scenario, by 2050 yields of most calorie crops decline in more than 75% of the places where they are grown. Adverse impacts over the long run are only slightly smaller than those in the short run, highlighting the global nature of limits to agricultural adaptation. Yield declines vary with temperature and precipitation shifts across locations—not climate simulations, and reducing global calorie supplies by 3-12% circa 2050 and 11-25% circa 2090.



