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Title: How much can sustainable intensification increase yields in smallholder systems?



In order to meet growing food demand, which is estimated to increase by up to 70% by mid-century, many scholars and policy makers have called for a second Green Revolution. Yet, agricultural production already has a large and unsustainable environmental footprint, consuming approximately 70% of all freshwater withdrawals and leading to reduced water quality and eutrophication in many systems worldwide. There has therefore been a push for an ‘Evergreen Revolution’, which aims to meet growing food demand using sustainable intensification strategies that increase yield per unit input of water or fertilizer. While many researchers and policy makers have called for sustainable intensification of agricultural systems, there is little understanding of the relative efficacy of different techniques and the extent to which existing strategies can increase yields. This paper systematically reviews the most common sustainable intensification strategies, ranging from zero till agriculture to the use of drip irrigation, and quantifies the yield gains that these technologies provide across a range of studies and locations. We focus specifically on smallholder systems, as these regions have some of the largest yield gaps and are expected to face some of the greatest increases in food demand over the coming decades. We find that sustainable intensification interventions on average increase yields in smallholder systems by approximately 10%, which suggests that sustainable intensification may not be enough to meet growing food demand over the coming decades. In addition, we find that there is a large disparity in where sustainable intensification studies have been conducted, with studies heavily focused on South Asia, particularly India, and fewer studies in sub-Saharan Africa.