

Yield Gaps

Mueller ND, Gerber JS, Johnston M, Ray DK, Ramankutty N, Foley JA.
2012. Closing yield gaps through nutrient and water management.
Nature **490**: 254.

Only some areas obtain max yield

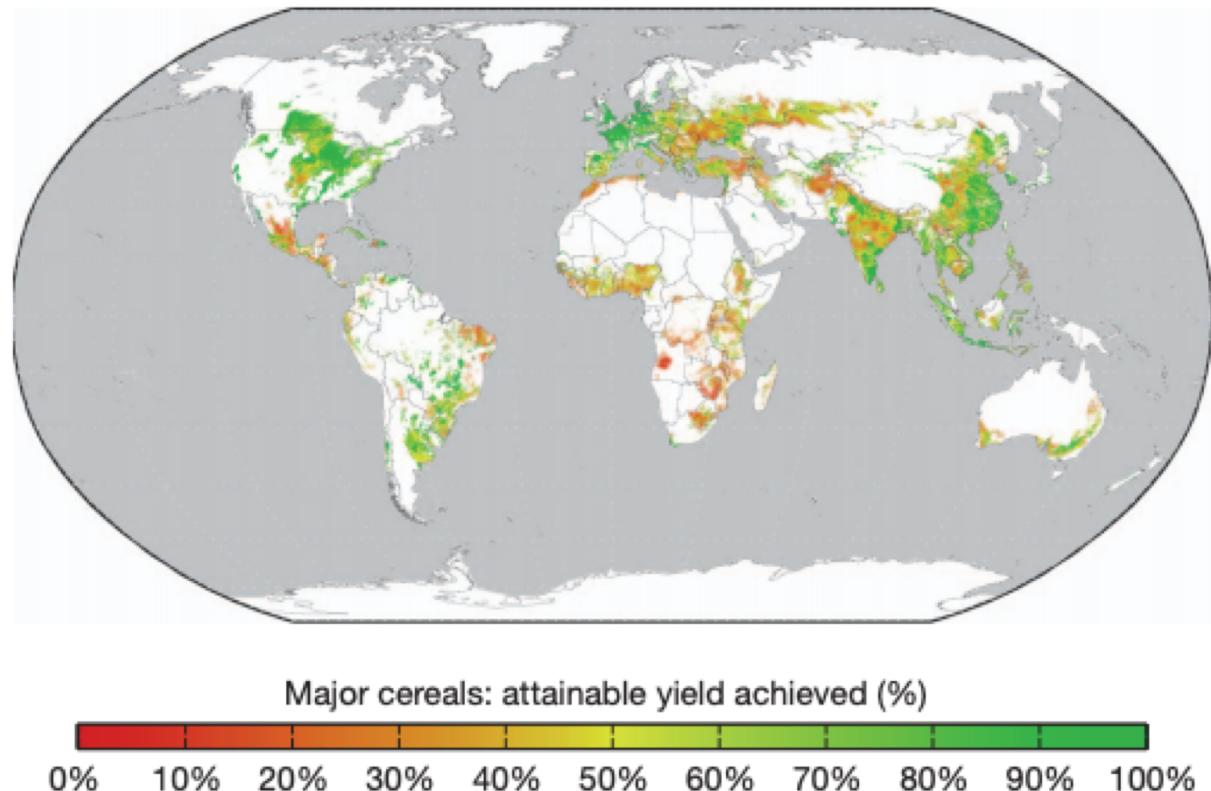


Figure 1 | Average yield gaps for maize, wheat and rice. These were measured as a percentage of the attainable yield achieved circa the year 2000. Yield gap in each grid cell is calculated as an area-weighted average across the crops and is displayed on the top 98% of growing area.

But it takes a lot of resources to get there

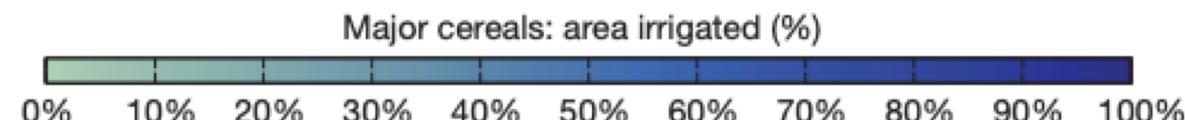
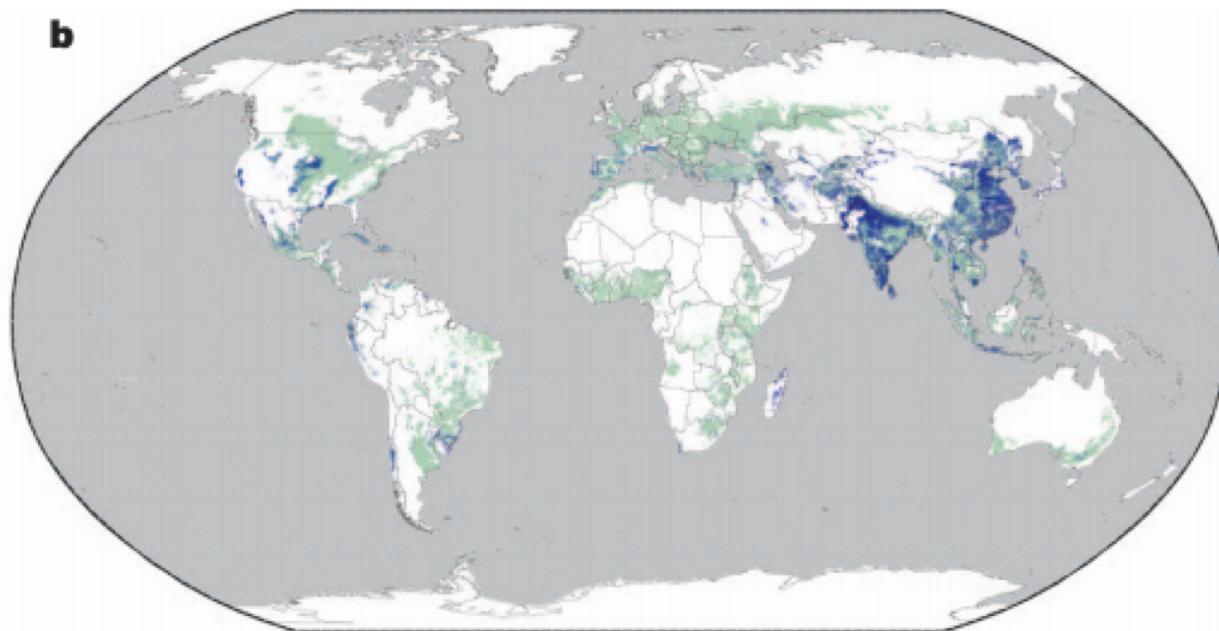
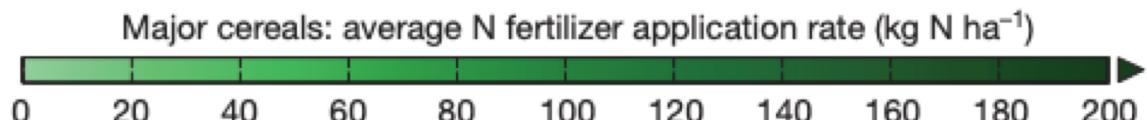
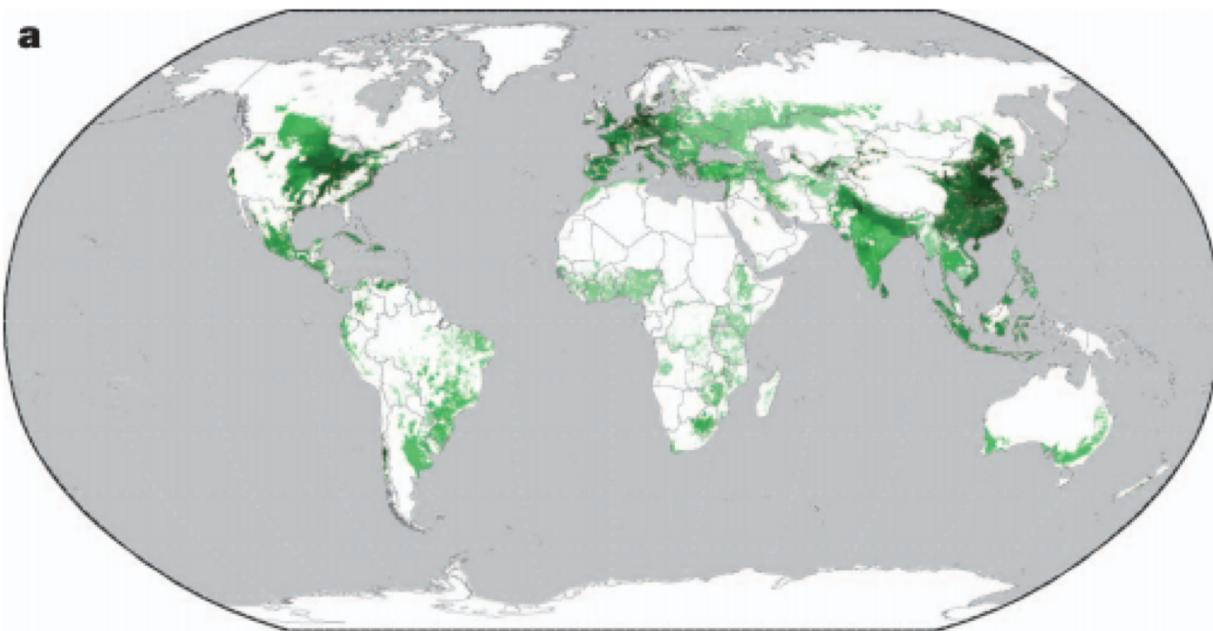


Figure 3 | Management intensity of nitrogen fertilizer and irrigated area¹⁴ varies widely across the world's croplands. a, b, Fertilizer (a) and irrigation (b) values are area-weighted averages across major cereals.

Increased efficiency could reduce N and P use by 28% and 38% globally

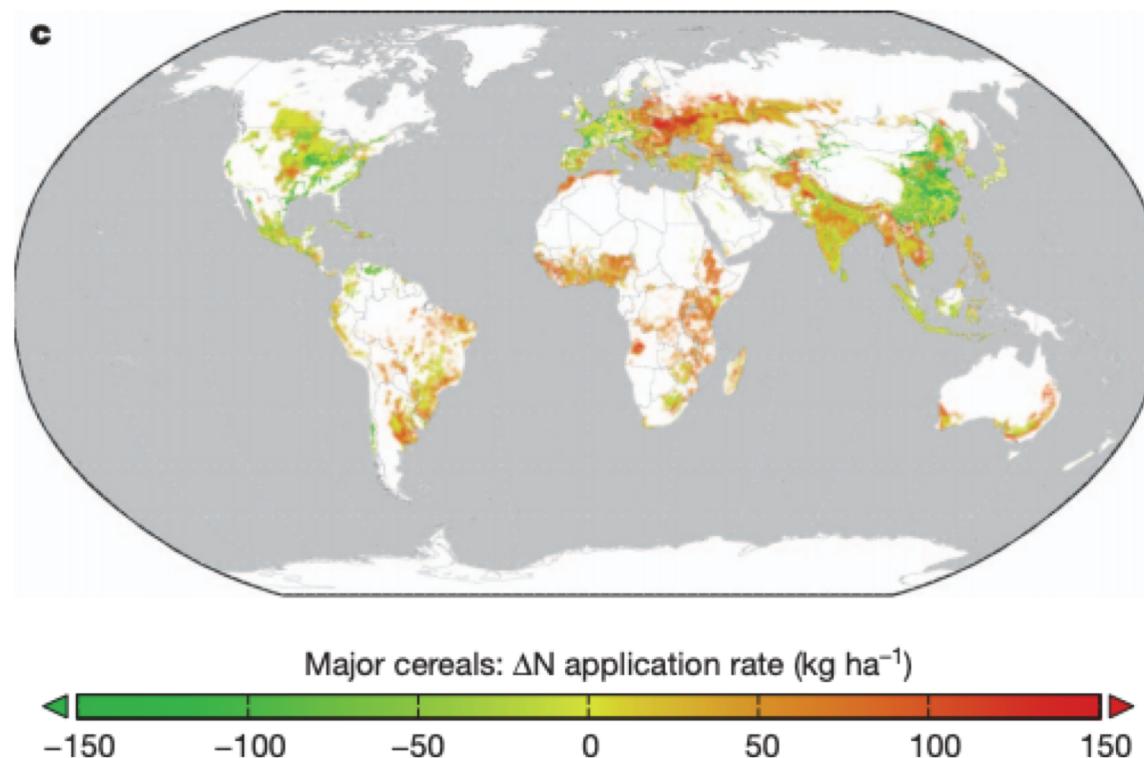


Figure 5 | Closing yield gaps through changes in agricultural management.
a, b, Projected increases in nitrogen application rates (a) and irrigated areas (b) necessary to close maize, wheat and rice yield gaps to 75% of attainable yields. c, Projected net changes in nitrogen application rates when closing yield gaps and eliminating input imbalances and inefficiencies.

(green areas are using more nutrients than necessary)

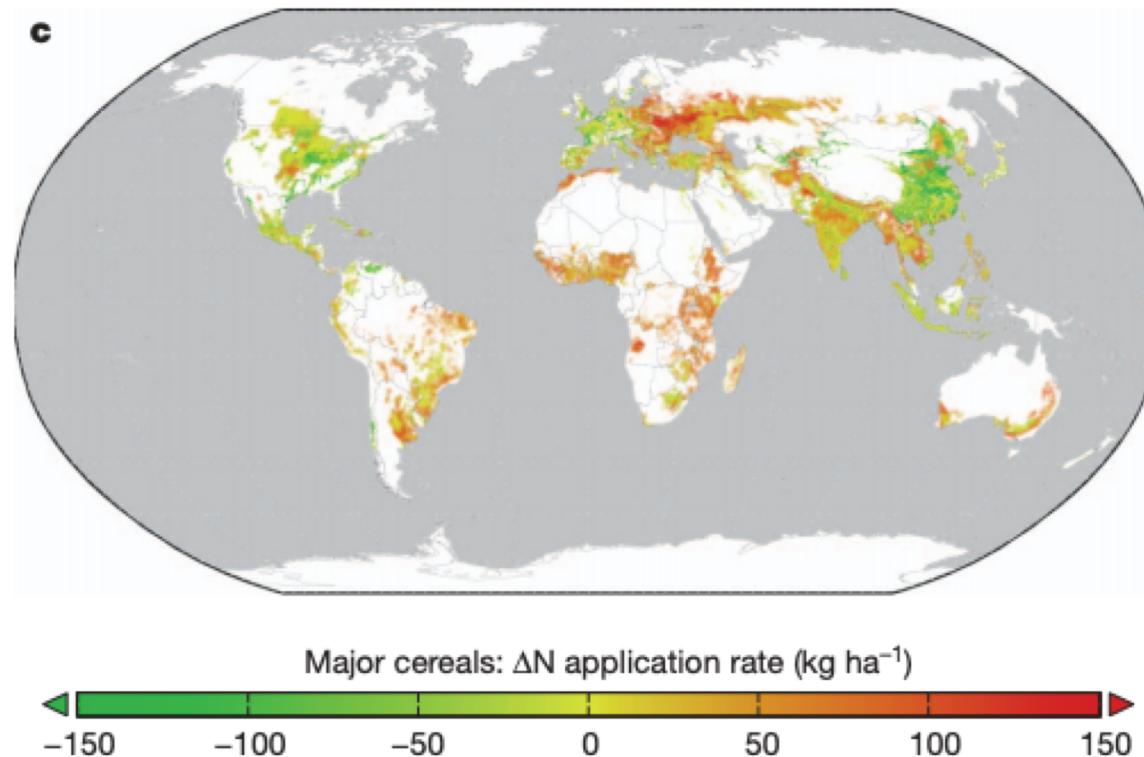


Figure 5 | Closing yield gaps through changes in agricultural management.
a, b, Projected increases in nitrogen application rates (a) and irrigated areas (b) necessary to close maize, wheat and rice yield gaps to 75% of attainable yields. c, Projected net changes in nitrogen application rates when closing yield gaps and eliminating input imbalances and inefficiencies.

Closing yield gap requires more input (in some place), but mostly better management

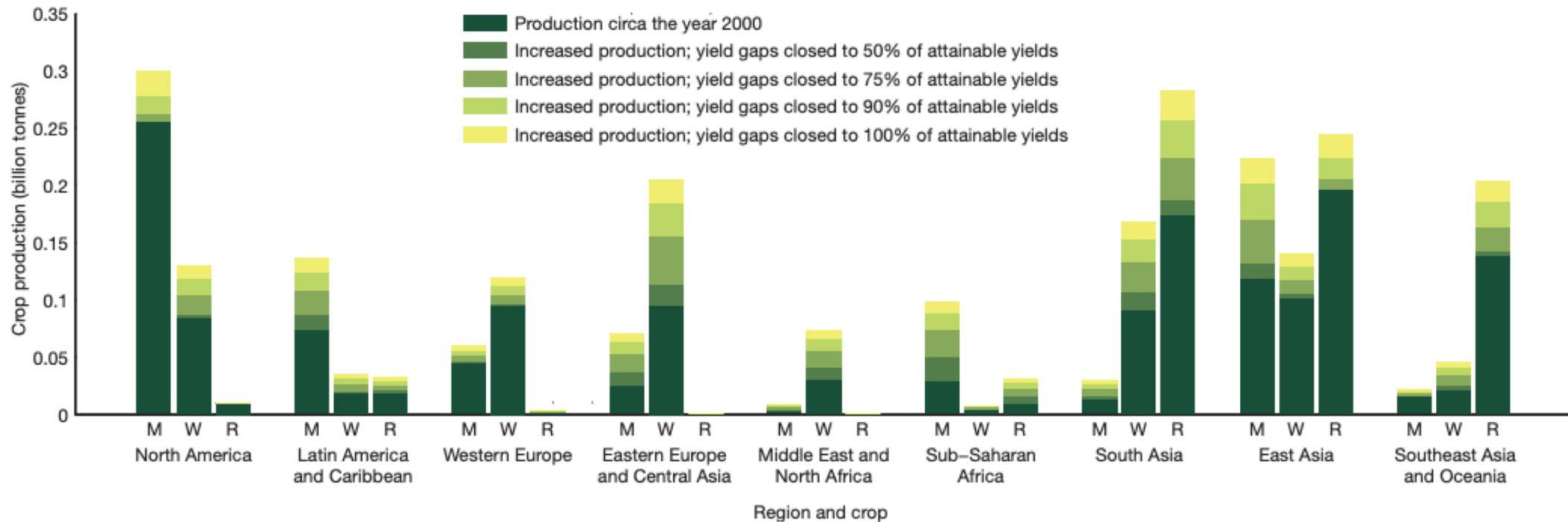


Figure 2 | Global production increases for maize, wheat and rice from closing yield gaps to 50%, 75%, 90% and 100% of attainable yields. The greatest opportunities for increases in absolute production (from closing yield gaps to 100% of estimated attainable yields) are wheat (W) in Eastern Europe and Central Asia, rice (R) in South Asia and maize (M) in East Asia. Absolute

production increases for individual crops in Sub-Saharan Africa are smaller owing to lower attainable yields and diverse cropping systems (that is, less area devoted to any one crop). The region could still achieve large production increases in cassava, maize and sugarcane.