

Hype versus reality in current expectations to raise crop yield potential

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Average crop yields have to almost double by 2050 to cope with increasing food demand and avoid further expansion of cropland area into biodiversity-rich ecosystem and associated GHG derived from land-use change. However, analysis of post-green revolution trends in crop yields indicates that annual rate of yield gain has been steadily linear over time, which implies that the relative rate of yield gain has decreased over time, and presence of yield plateaus in many high-yield crop systems. In this context, there are two available ways to accelerate rates in food production on existing crop land: increase the upper ceiling for crop yields (yield potential), reduce the gaps between farmer yield and potential yield, or both. My presentation will address avenues to increase crop yield potential of major cereals (maize, wheat, and rice), focusing in the following topics: (i) biophysical drivers of yield potential, (ii) post-green revolution changes in yield potential of major crops and underpinning drivers, (iii) appropriate framework to design 'new genotypes' and effective scale up from lab to field, (iv) opportunities to raise yield potential by quantum-loop changes in fundamental physiological processes and associated timeframes.