

Radical Increases in Crop Yield: The Role of Improved Photosynthesis

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Land plants are green and most big seaweeds are brown, but apart from that we do not think much about photosynthesis. Nonetheless, this silent, largely invisible (if we forget the green and the brown) process drives the Earth's ecosystems, provides us with food we eat, and largely in fossil form, is the source of much of the energy that has driven our industrial economies for the last few hundred years. The photosynthesis of plants and algae performs the really useful trick of converting inorganic carbon into biologically useful organic carbon. Despite its importance as the engine of agricultural productivity, photosynthesis remains as the last, major crop-yield related trait that has not been subject to any serious attempt to improve its efficiency. Given that other major crop-yield related traits have been pushed to their limits, future large yield increases will most likely depend on doing clever things with photosynthesis to make it better. The last 15 years or so have seen a progressive increase in research into improving photosynthesis, supported both by governments and philanthropists. This has resulted in important proof-of-principle experiments that have demonstrated that photosynthesis can be improved and that these improvements do result in crop-yield increases. The magic of photosynthesis is set to be unleashed.