Can scientists create a new green revolution?

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Can scientists improve photosynthesis and increase the productivity of crops to answer the problem of a growing population? Padraic Flood, winner of science communication competition FameLab 2014, explains.

What is photosynthesis?

Imagine you're inside a leaf; it's a sunny day and the cells around you are glowing with a soft green light. You move into one of these cells and see that this green glow is coming from melon-shaped objects called chloroplasts. As you look closer, you see tiny antennae harvesting this light and channeling it to a reaction centre. It's at this point that light becomes life.

This process is known as photosynthesis — literally building with light — and it's the foundation of all life on earth. The energy I am using to write this right now, the air you are breathing, even the fossil fuels that power our economy... they all come from photosynthesis.

The problem of the population bomb has been solved before

I'm telling you this because our population looks set to reach nine to ten billion by 2050. This is a massive increase in the number of people who need to be fed, and is way beyond our current capacity to produce food. But, believe it or not, we have faced such a challenge before. In the 1950s, the world population reached 2.5 billion, and for many
experts, further sustainable growth seemed an impossibility. They predicted massive famines and the collapse of our civilisation, and referred to it as 'The Population Bomb'.

Thankfully, some scientists didn't give up. They had a vision, and collectively brought about an agricultural transformation like nothing we had ever seen before. They quadrupled yields in a matter of years in what became known as the Green Revolution. The man who spearheaded this was Nobel prize-winner Norman Borlaug, who is credited with saving more lives than any other individual in the history of our species. His work was so incredibly successful that in the developed world we went from a potential food shortage to food mountains. But this is no longer the case; the population time bomb has not stopped ticking, and this is where photosynthesis comes in.

**What this has to do with photosynthesis**

The scientists of the Green Revolution did an amazing job at increasing crop productivity, but they never managed to improve photosynthesis. In fact, some scientists still say that it can't be done. But already from my own research, I say otherwise. There is a resource out there, a resource which is the fuel of evolution and which we can tap into. This resource is genetic variation. In the case of photosynthesis, this variation manifests as differences in the efficiency at which plants convert light to life. The genetic basis of these differences can be used to create plants which will feed and fuel our future. We must improve the productivity of our crops so we can buy the world time to get to a point of population stability. In the words of Norman Borlaug: 'You can't build a peaceful world on empty stomachs and human misery.' We need a second green revolution, and photosynthesis is one key which cannot be left unturned.