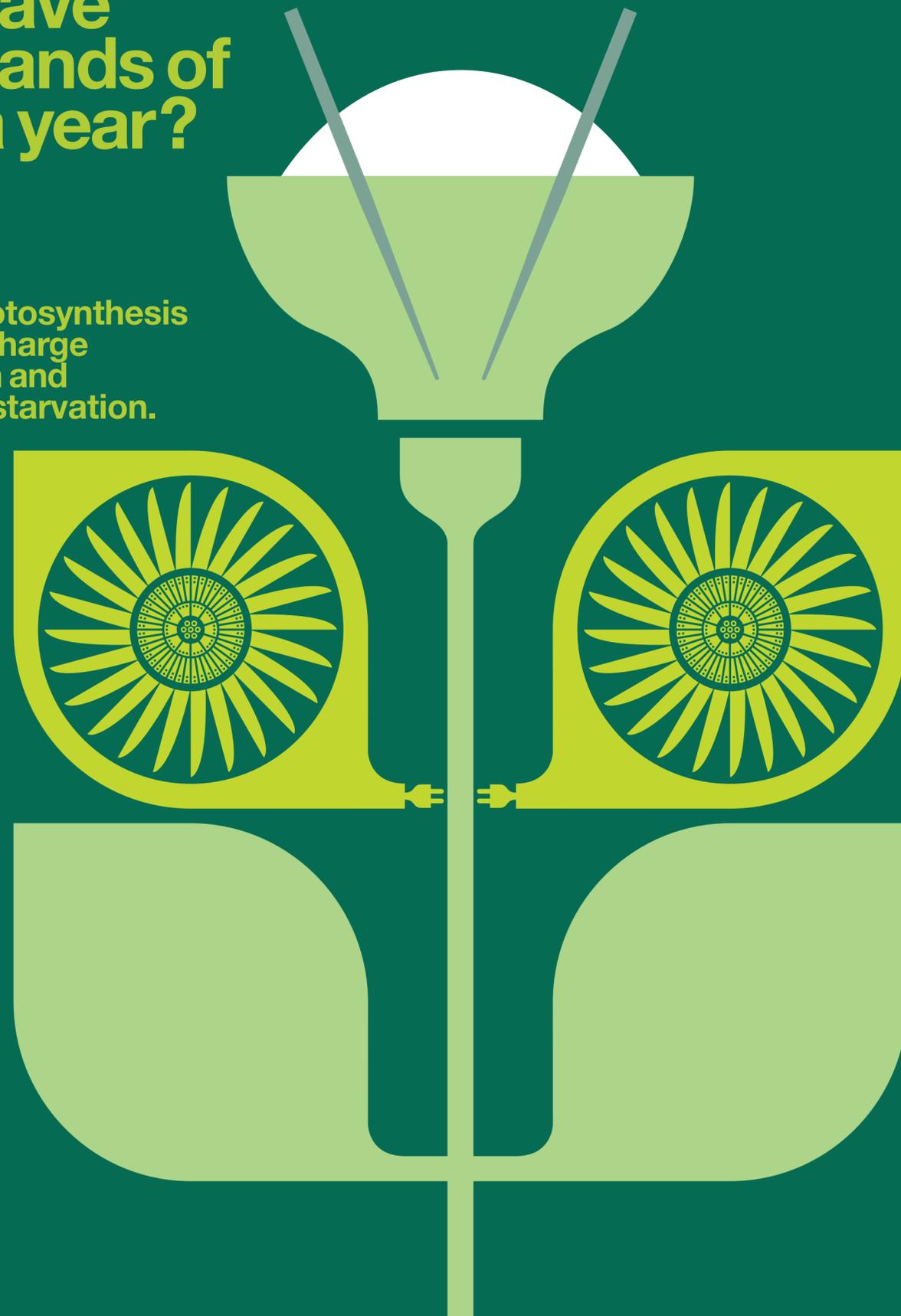


PlantPower

Can understanding photosynthesis help save thousands of lives a year?

How C4 photosynthesis can turbo-charge crop growth and help tackle starvation.

www.saps.org.uk/c4rice



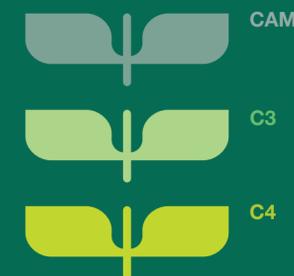
Rice is among the three most important crops in the world. It is the staple food source for more than half the world's population. Like many crops rice uses an inefficient method of photosynthesis known as C3.

But some other plants have evolved a more efficient method, called C4 photosynthesis. UK plant scientists are looking at ways of re-engineering rice to incorporate C4 photosynthesis properties. For farmers in the developing world, this could mean much higher crop yields, helping them to feed their families and pay for health care and education.

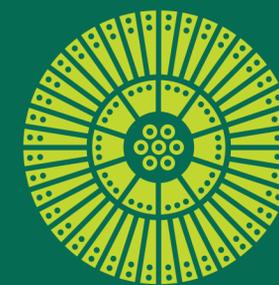
How it works

1

Three different forms of photosynthesis evolved on Earth: C3, C4 and CAM. Understanding them better might help save tens of thousands of lives every year.



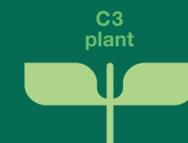
2



C4 modified anatomy, with mesophyll cells surrounding bundle sheath cells

In C3 plants, CO₂ and O₂ compete for the enzyme RuBisCo. When RuBisCo reacts with O₂ instead of CO₂, a wasteful reaction called photorespiration occurs instead of photosynthesis. C4 plants concentrate CO₂ using a modified anatomy that captures the CO₂ in one cell and transfers it to other cells deeper in the leaf. Here, with less competition from O₂, the RuBisCo enzyme operates more efficiently.

Over temperatures of 20°C, C4 photosynthesis is much more efficient than C3. C4 plants also lose less water to transpiration for each CO₂ fixed.



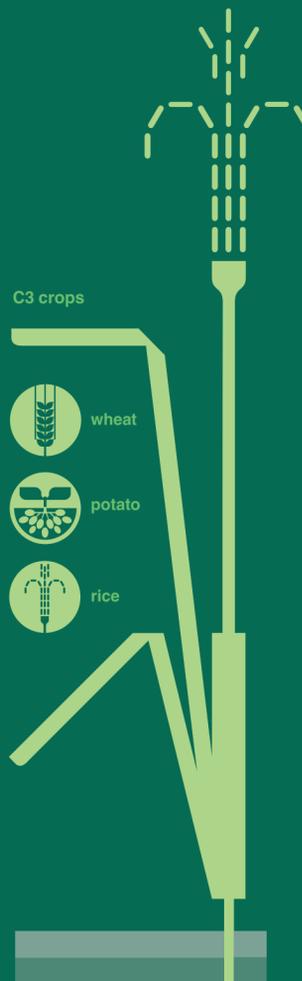
1 in 2 people in the world depend on rice as their staple food



25,000 deaths per day from hunger and malnutrition

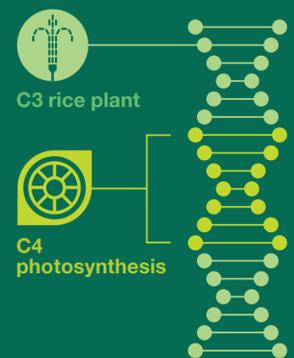
3

Many of the world's key food sources, like rice, use C3 photosynthesis. In hot parts of the world, this makes them grow more slowly and produce less grain than is needed.



4

Plant scientists in the UK are looking at ways of re-engineering C3 rice to create more efficient varieties which incorporate C4 photosynthesis properties. This could reduce the number of global deaths due to hunger and malnutrition.



For rice farmers, a new variety of rice with C4 turbo-boosted growth means they could increase their crop yields by up to 50%, enabling them to sell on excess rice to pay for education and health care.

