

Thaumatococcus:

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What is this study important: What we eat is a key factor in not only our health and well-being, but also our environmental footprint. From the health side, excessive consumption of added sugar is increasingly linked to various non-communicable diseases. Sweetness enhancers are one option for allowing people to still enjoy sweet foods, and reduce their added sugar intake by replacing some of the sugar within a food or drink. But while the health effects are highly scrutinised, to date there has been very little research on the environmental impacts of making the swap. Research into the environmental impact of sweetness enhancers is needed.

Aims: For this study we conducted an environmental life cycle assessment to understand the impacts of producing the sweetness enhancer thaumatin. The aim was to calculate the environmental impact of making 1 kg thaumatin. A second aim was to understand the net impact of using thaumatin alongside sugar to boost the sugar's sweet taste. Thaumatin can make sugar taste approximately 25% sweeter. This means that 0.4 mg thaumatin can be used with 800 g sugar to make it taste as sweet as 1 kg sugar.

What did we do: We collaborated with the world's largest thaumatin manufacturer to understand the resources required to produce 1 kg thaumatin from the fruit of *Thaumatococcus daniellii* (aka katemfe), grown in West Africa and extracted in the UK. They worked with us to understand fruit harvesting, preparation of the fruit for transport to the UK, and the thaumatin extraction process. We quantified all the resources needed, such as energy, transport, or materials needed, and any wastes which occurred, for example unused fruit. The calculated environmental impact results let us compare 1 kg sugar with a mixture of 800 g sugar and 0.4 mg thaumatin. The study was conducted in line with the ISO 14040 and 14044 standards for life cycle assessment studies.

What did we find: The results showed that sugar mixed with thaumatin has a lower environmental impact than the same sweetness of sugar by itself. The results were the same across all impact categories. For example, global warming potential was reduced by 20%, as was water consumption. Land use was reduced by 10%. This shows that not only thaumatin production cause less greenhouse gas emissions, but it also has the potential to save other precious resources, such as water, or land area.

What does this mean: Currently, about 85% of all sweeteners consumed by people are in drinks. This research shows that if some of that sugar were replaced with thaumatin, there is potential to reduce the environmental impact of those drinks.