

Aspartame and neotame:

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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. Non-nutritive sweeteners are one option for allowing people to still enjoy sweet foods, and reduce their added sugar intake. 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 sweeteners is needed.

Aims: For this study we conducted an environmental life cycle assessment to understand the impacts of producing the sweeteners, aspartame and neotame. Aspartame is made by combining two amino acids (aspartic acid and phenylalanine) in a chemical process. It has a sweetness which is about 200-times that of sugar. Neotame is made by further modifying aspartame to enhance its sweetness to about 8000-times that of sugar. The aim was to calculate the environmental impact of making 1 kg of aspartame and neotame, and then to go one step further and compare them to the equivalent sweetness of sugar. This is important because neither sweetener replaces sugar on a like for like weight basis. Instead, 1 kg of sugar can be replaced by about 5 g aspartame or 0.125 g neotame.

What did we do: We studied the manufacturing processes of both sweeteners to build up a picture of the resources needed to make them from more simple molecules. To do this we used multiple sources, including patents and other scientific literature. The model let us calculate quantities of materials, such as chemicals, and energy needed, and also to identify possible emissions created. The calculated environmental impact results let us compare 5 g of aspartame, or 0.125 g of neotame, to 1 kg sugar. 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 both aspartame and neotame have a lower environmental impact than the same sweetness of sugar. The results were the same across nearly all impact categories. For example, aspartame has about 18% the global warming potential of sugar, 0.3% for land use, or 1.7% water consumption. This shows that not only does aspartame production cause less greenhouse gas emissions, but it also has the potential to save other precious resources, such as water or land area. Even more stark is the comparison between neotame and sugar. Neotame has about 0.7% the global warming potential of sugar, 0.01% for land use, or 0.05% water consumption! This is all thanks to neotame's incredible sweetening power.

What does this mean: Currently, about 85% of all sweeteners consumed by people are in drinks. This research shows that replacing sugar in drinks with aspartame or neotame has the potential to markedly reduce the environmental impact of those drinks.