

Succinct declarative title

Comparing apples and oranges

Introductory statement that outlines the background and significance of the study

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The idiom, *comparing apples and oranges*, refers to the differences between items that render them incomparable. In vernacular use, this statement is typically exploited as an analogy to resolve differing philosophical or logical viewpoints. However, from a rationale standpoint this idiom also presents the framework for testable scientific hypothesis. Here we sought to investigate the heavy metal content of apples and oranges to assess whether they could be compared between these two types of fruit and, if so, what differences were present. Pink Lady, Granny Smith and Royal Gala apples ($n = 10$) were compared Sunkist Navel oranges ($n = 10$). Both apples and oranges were dessicated at 70 °C for 72 hours. Ten grams of each sample were mixed with 3.5% HNO₃ and incubated at 90 °C for 60 min. Samples were cooled to 25 °C and centrifuged at 15,000 × g for 60 min to remove insoluble material. The supernatant was collected and analysed by inductively coupled plasma mass spectrometry on an Agilent 7500cx ICP-MS for first row transition metal ions. Elemental profiles reveal that all types of apples and the oranges have highly similar elemental profiles with no significant differences in the abundances of manganese, iron, cobalt, nickel, copper or zinc ($p > 0.05$, one-way ANOVA). Taken together, these data demonstrate that not only is it possible to perform a direct comparison of apples and oranges, but there are no significant differences in this heavy metal contents of the two types of fruits. Therefore, the idiom, as used in the vernacular, can be considered to be scientifically inaccurate. The broader implication of this startling finding is that it is likely to have dramatic effects on the application of this analogy in situations to resolve different philosophical viewpoints in the English language.

Short description of methods or approach

Concluding statement

Summary of major results/findings