Impact of Digestion on the Bioacessibility of Baby Spinach

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Introduction

- Baby spinach (Spinacia oleracea) is a leafy vegetable commonly used in salads, sandwiches, and smoothies.
- Baby spinach's **bioactive compounds**, such as phenolic acids, flavonoids, and carotenoids, are known to have **antioxidant** and **anti-inflammatory** effects.
- It is unknown how baby spinach's compounds interact with the **digestive system**, and how that **interaction** affects its **phytochemical composition**.
- **In-vitro digestion** simulates the three phases of the digestive system, **oral**, **gastric**, and **intestinal**.
- Different conditions, such as **storage life** and **temperatures**, were manipulated to explore which methods will maximize spinach's **bioaccessibility**.

Results

- The trend is that the abundance of bioactive compounds decrease with longer storage durations.
- Storing baby spinach at room temperature accelerates the diminish of bioactive compound abundance.
- Baby spinach stored at room temperature for two days showed similar abundances to those stored at 4°C for six days.
- Compounds common in baby spinach biochemistry, such as p-coumaric acid, ferulic acid, and spinacetin, validate the in-vitro digestion model.
- Compounds that are less typical in baby spinach, such as pyrogallol and 4-aminophenol, could be due to enzymatic reactions.
- Future antioxidant assays and gut microbiome tests will refine digestion's impact on baby spinach's bioactive compounds.

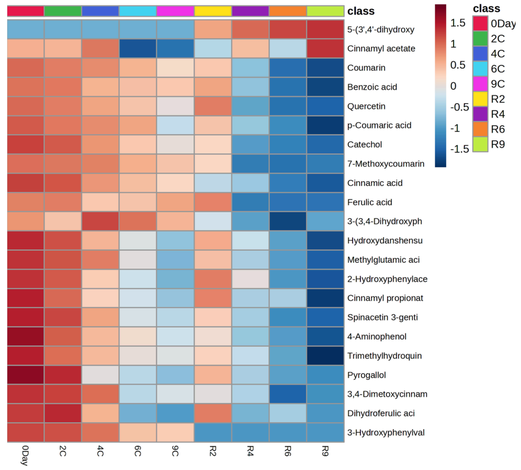

Figure 1: Heatmap of the relative abundance of selected phenolic compounds across different temperatures and durations in the intestinal stage.

Methodology

- Samples were stored for up to nine days, either at room temperature or at 4°C.
- The quantity of each sample's compounds were compared between storage conditions and digestive phases.
- Phenolic compounds were measured using LC-ESI-QTOF/MS in fresh and stored spinach.

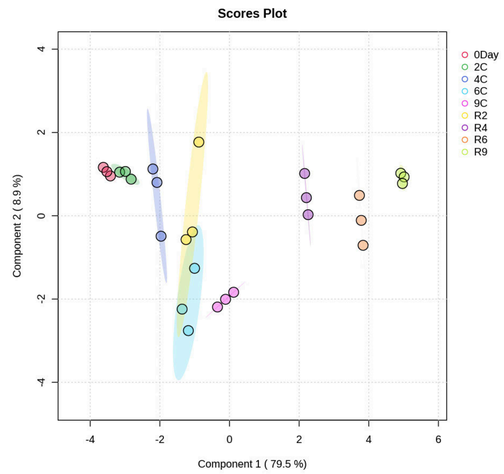

Figure 2: PCA scores plot showing the clustering of samples stored under different temperatures and durations in the intestinal stage.

Discussion

- Spinach's nutraceutical value decreases with increasing storage duration and temperature.
- This study helps us better understand which methods are best for optimizing the nutrients of spinach to treat autoimmune diseases.
- Future studies should be conducted assessing the nutraceutical values using different digestive conditions, including pH levels, enzyme concentrations, and gut microbiota compositions.

References