Identification of carotenoids and phenolic compounds in bacteria-based protein using LC and MS techniques

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FOOD DEVELOPMENT

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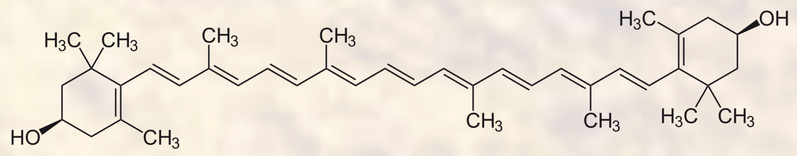
1 Introduction

Global food demand is predicted to increase significantly in the future. Therefore, discovering new protein sources of sustainable origin is important. Bacteria-based protein is an alternative protein source with minimal environmental impact compared to its traditional animal counterparts. In this study we strived to identify the carotenoid and phenolic compound profile of five bacteria-based proteins from different cultivations.



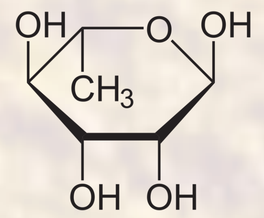
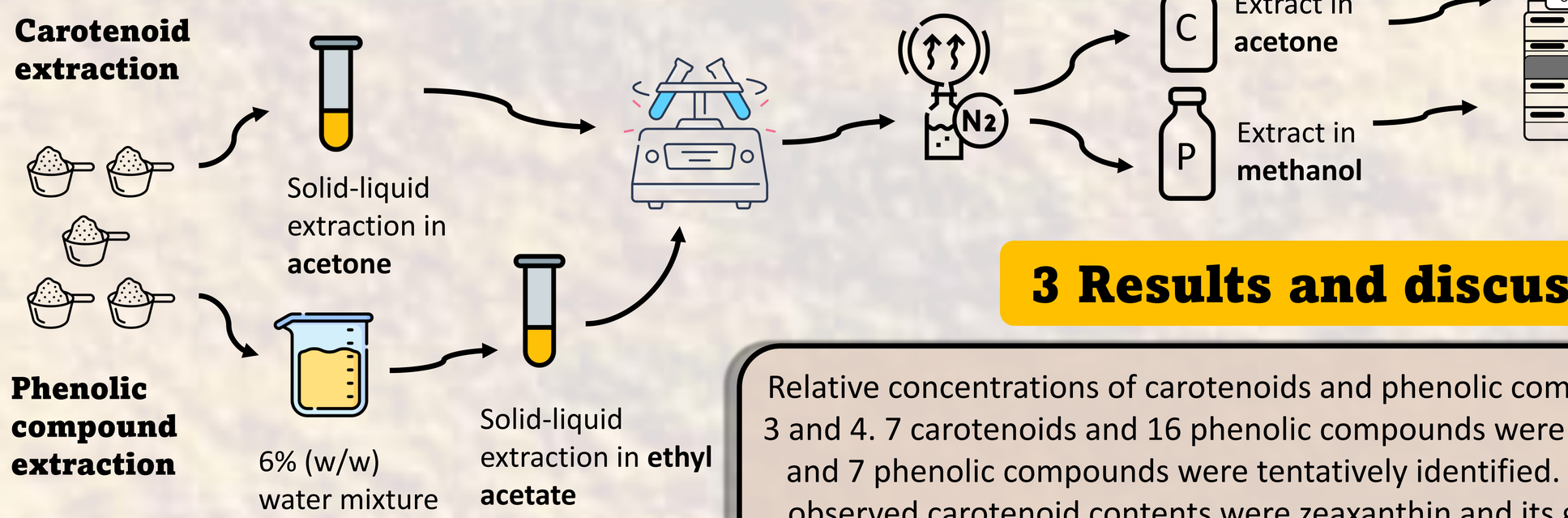


Figure 1. Structure of zeaxanthin (above) and rhamnose (right)

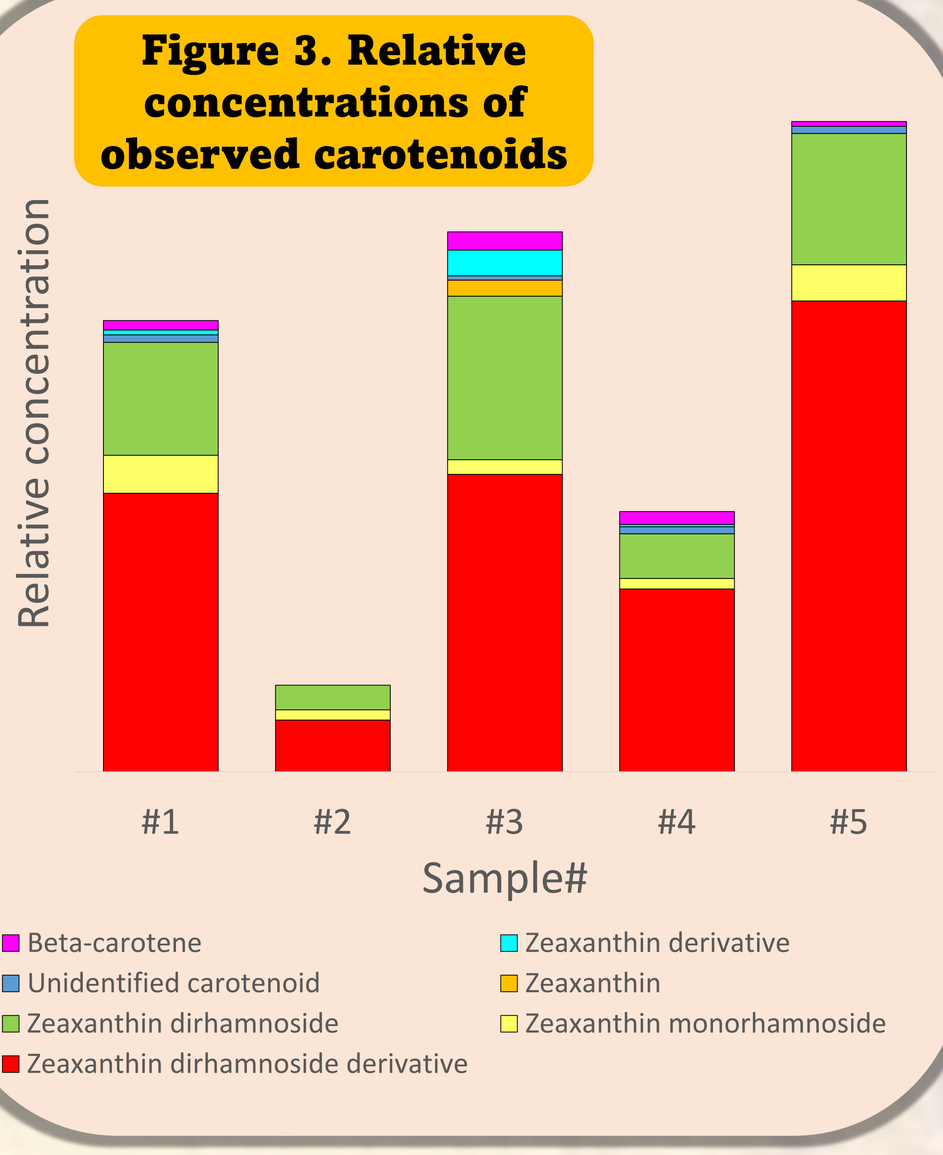
2 Materials and methods



3 Results and discussions

Relative concentrations of carotenoids and phenolic compounds are shown in figures 3 and 4. 7 carotenoids and 16 phenolic compounds were observed, and 6 carotenoids and 7 phenolic compounds were tentatively identified. Approximately 90-100% of observed carotenoid contents were zeaxanthin and its glucosides. Hydroxybenzoic acid was found to account for 20-50% of observed phenolic compound contents.

Figure 3. Relative concentrations of observed carotenoids



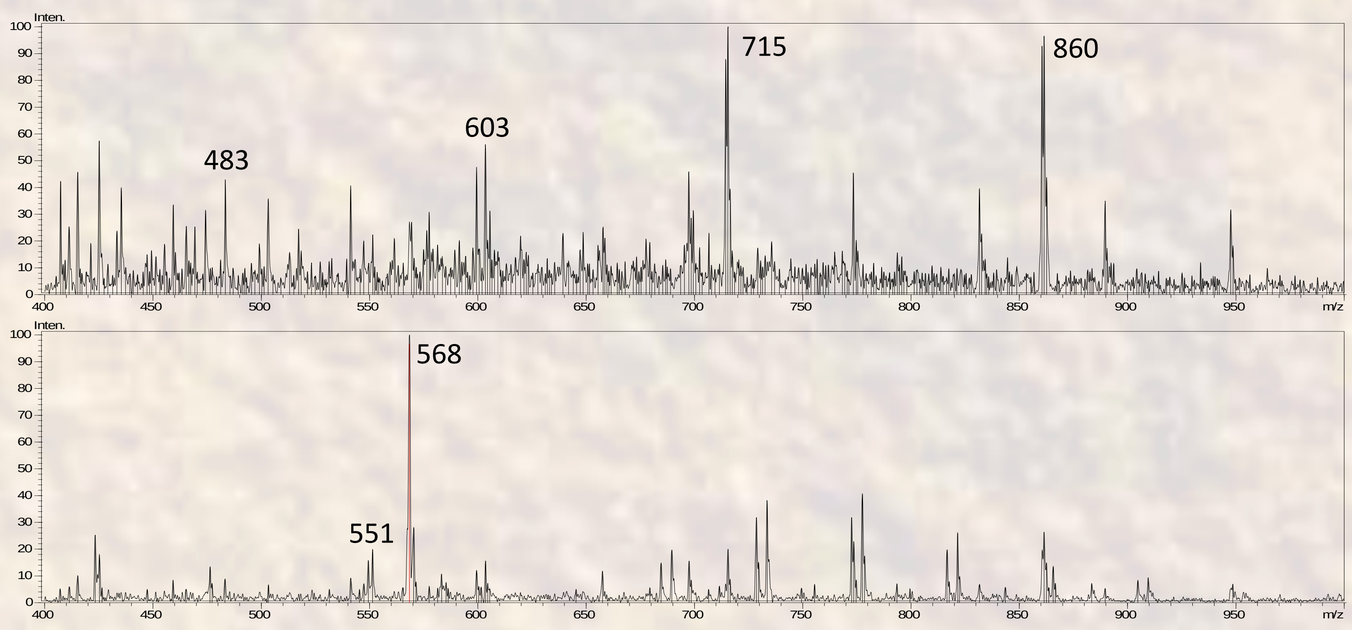
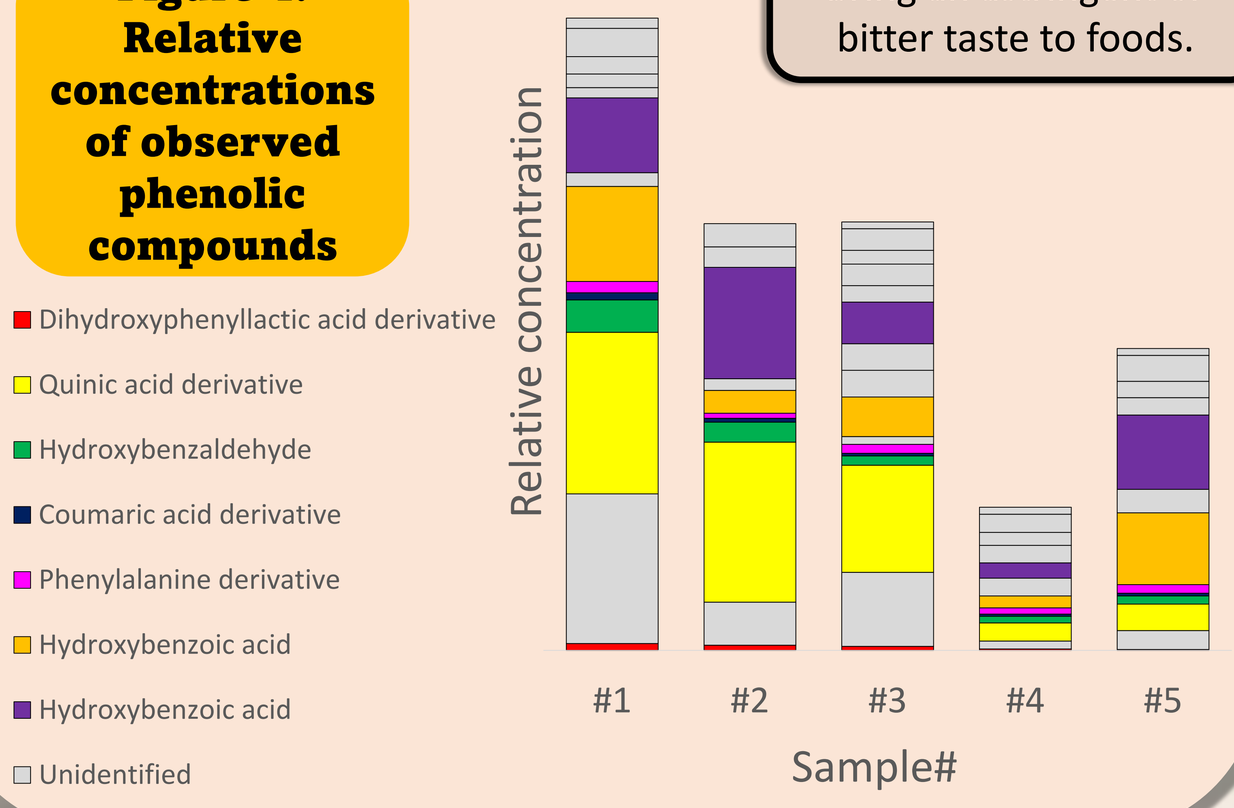


Figure 2. Mass spectra of zeaxanthin dirhamnoside (above) and free zeaxanthin (below) from positive precursor ion scan of sample 3

Phenolic compounds may bring an astringent or bitter taste to foods.

Figure 4. Relative concentrations of observed phenolic compounds



4 Conclusions

Phenolic compounds were found to be most abundant in sample 1, and least abundant in sample 4. Moreover, sample 2 had the lowest content of carotenoids. Results from the study correlated with sensory tests done on the same samples. However, more studies are needed for a thorough quantification and identification of all carotenoids and phenolic compounds, and to discover their role on the sensory quality of the product.