

Measuring phenolic compounds in Mankai: a novel polyphenol and amino rich plant protein source.

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Background

Mankai is a cultivated strain of *Wolffia globosa*, an aquatic plant, belonging to the family of *Lemnaceae*, known commonly as Duckweeds. The nutritional composition of this plant has been determined and found to be high in protein, containing all the essential and conditionally essential amino acids, dietary fibers and several vitamins and minerals. Due to its exclusive nutritional profile, Mankai has been chosen as a test food in a long-term intervention (DIRECT-PLUS) which aims to compare the effect of green-Mediterranean diet (enriched with Mankai) + physical activity (PA) vs. Mediterranean diet+PA vs in people suffering from cardiometabolic disease. However, molecular characterization of phenolic composition of Mankai plant has not previously been reported. Dietary polyphenols have been associated with several health benefits, including lowering the risk of CVDs (cardiovascular disease). Therefore, measuring and characterizing phenolic compounds in the Mankai plant will extend the knowledge on the nutrient content of this potentially beneficial plant and provide more insights into how this plant may mediate health effects in the DIRECT- PLUS study ([https:// clinicaltrials.gov/ ct2/ show/ NCT03020186](https://clinicaltrials.gov/ct2/show/NCT03020186)).

Results

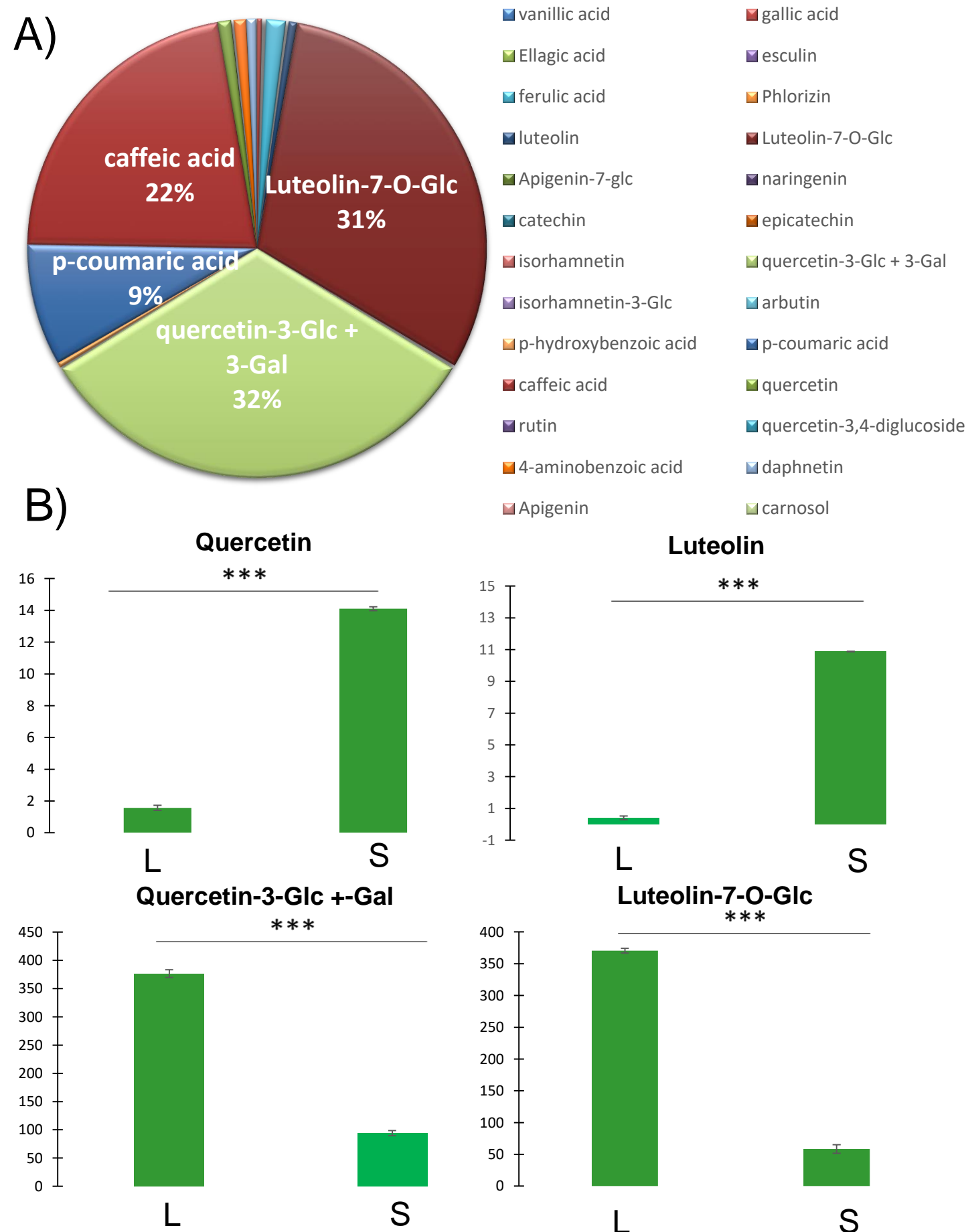


Fig.1 : A) LC-MS polyphenols characterization.
B) Mean value (mg/kg) \pm SD (n=5), $p < 0.001$, L= Led light S= Sunlight

Materials and Methods

- 10 samples of different Mankai batches from University of Ben Gurion (Israel).
- 2 treatments: 5 samples \rightarrow Sunlight
- 5 samples \rightarrow Led light
- Phenolic compounds were determined according to (Vrhovsek *et al.* 2012) with some modifications.
- The total phenolic content was determined by the Folin–Ciocalteu method.



Conclusions

- Total amount of polyphenols = **860.67 g/kg**.
- Polyphenols identified = 26.
- Polyphenol profile changes in based of the treatment.
- Led light seems to enhance the glycated form of luteolin and quercetin compared to sunlight and the aglycone form of luteolin and quercetin are higher in sunlight treatment.
- Comparing with other polyphenols enriched food the content of Mankai polyphenols is high (Table 1).
- Due to the high polyphenol content, we want to test whether Mankai can potentially exert protective effects on cardiometabolic risk factor if consumed as a part of a daily diet in the DIRECT-PLUS study.

Polyphenols enriched food commonly consumed	Polyphenols content (100 mg/kg)
Blackberries *	260
Apple *	136
Spinach *	119
Mankai	86
Peach*	59
Broccoli *	45
Walnut*	28
Potato *	28
Pear*	17
Carrot *	14

Table.1 : * Sum of the content of individual polyphenols as determined by chromatography and of proanthocyanidin oligomers as determined by direct-phase highperformance liquid chromatography.

References

- U. Vrhovsek, D. Masuero, M. Gasperotti, P. Franceschi, L. Caputi, R. Viola, et al. A versatile targeted metabolomics method for the rapid quantification of multiple classes of phenolics in fruits and beverages *J. Agric. Food Chem.*, 60 (2012), pp. 8831-8840
- J Pe´rez-Jime´nez, V Neveu1, F Vos1, and A Scalbert, Identification of the 100 richest dietary sources of polyphenols: an application of the Phenol-Explorer database *European Journal of Clinical Nutrition* (2010) 64, S112–S120