




Abstract

A Comprehensive Chemical Analysis of New Zealand Yacon Concentrate †

Keegan Chessum ¹, Rothman Kam ¹, Tony Chen ¹ and Mary Yan ^{2,*}

¹ Department of Food Science and Microbiology, Auckland University of Technology, Auckland 1010, New Zealand

² School of Healthcare and Social Practice, Unitec New Zealand, Auckland 0612, New Zealand

* Correspondence: myan@unitec.ac.nz; Tel.: +64-9-8928465

† Presented at the Annual Scientific Meeting of the Nutrition Society of New Zealand 2022, Wellington, New Zealand, 1–2 December 2022.

Abstract: Yacon (*Smallanthus sonchifolius*) is an ancient Andean crop, traditionally used for both food and medicinal purposes, which was first introduced to New Zealand in the 1980s. In recent years, there has been growing global interest in yacon due to its potential as a functional food, which could be related to its unique profile of bioactive compounds, including prebiotic compounds, such as fructooligosaccharides (FOS), and phenolic compounds, which may have a range of activities, including antioxidant ones. FOS are non-digestible prebiotic carbohydrates, providing low calorific value and a positive impact on gut microflora. Our objective was to conduct a comprehensive chemical analysis of New Zealand yacon concentrate (NZYC, a sweet syrup produced from juice extracted from New Zealand grown yacon roots). Analysis included proximate composition, mineral, sugar, phenolic, amino acid, and organic acid profiles as well as antioxidant activity. The major mineral identified in NZYC was potassium (658 ± 6 mg/100 g), with significant concentrations of phosphorus, calcium, magnesium, and iron also determined by microwave plasma atomic emission spectrometry. The FOS content of NZYC ranged from 17.6 ± 0.3 to 52.7 ± 0.8 g/100 g as determined by high-performance liquid chromatography (HPLC), coupled with an evaporating light scattering detector (ELSD). The total phenolic content of NZYC ranged from 565 ± 9 to 785 ± 43 mg gallic acid equivalents per 100 g by the Folin-Ciocalteu method. Chlorogenic acid and caffeic acid were quantified as the major phenolic compounds. The major amino acids quantified were L-arginine, L-glutamic acid, L-proline, L-aspartic acid, and asparagine. The major organic acids quantified were citric, malic, quinic, and fumaric acids. The antioxidant activity of NZYC was determined by the ferric-reducing antioxidant power (FRAP) assay, cupric ion-reducing antioxidant capacity (CUPRAC) assay, and 2,2-diphenyl-1-picrylhydrazyl (DPPH) radical scavenging activity, and it was several times higher than both Manuka honey and goji berries by the basis of weight. These results support the classification of New Zealand yacon concentrate as a nutraceutical food product and its use in further development of novel food products.

Keywords: yacon concentrate; fructooligosaccharides; mineral profile; free amino acids; sugar profile; phenolic profile; organic acids



Citation: Chessum, K.; Kam, R.; Chen, T.; Yan, M. A Comprehensive Chemical Analysis of New Zealand Yacon Concentrate. *Med. Sci. Forum* **2023**, *18*, 6. <https://doi.org/10.3390/msf2023018006>

Academic Editors: Claire Smith, Sally Mackay, Shabnam Jalili-Moghaddan and Michelle Gibbs

Published: 7 March 2023



Copyright: © 2023 by the authors. Licensee MDPI, Basel, Switzerland. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license (<https://creativecommons.org/licenses/by/4.0/>).

Author Contributions: Conceptualization, K.C. and R.K.; methodology, K.C. and T.C.; software, T.C.; validation, K.C. and T.C.; formal analysis, K.C.; investigation, K.C.; resources, R.K.; data curation, K.C.; writing-original draft preparation, K.C.; writing-review and editing, R.K. and M.Y.; visualization, K.C. and R.K.; supervision, R.K. and M.Y.; project administration, R.K.; funding acquisition, M.Y. All authors have read and agreed to the published version of the manuscript.

Funding: This research was funded by Yacon New Zealand Ltd. (Auckland, New Zealand).

Institutional Review Board Statement: Not applicable.

Informed Consent Statement: Not applicable.

Data Availability Statement: The data presented in this study are available on request from the corresponding author.

Conflicts of Interest: The authors declare no conflict of interest.

Disclaimer/Publisher's Note: The statements, opinions and data contained in all publications are solely those of the individual author(s) and contributor(s) and not of MDPI and/or the editor(s). MDPI and/or the editor(s) disclaim responsibility for any injury to people or property resulting from any ideas, methods, instructions or products referred to in the content.