

## Article

# Investigation into the Phytochemical Composition, Antioxidant Properties, and In-Vitro Anti-Diabetic Efficacy of *Ulva lactuca* Extracts

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**Abstract:** In this research, the chemical compositions of various extracts obtained from *Ulva lactuca*, a type of green seaweed collected from the Nador lagoon in the northern region of Morocco, were compared. Their antioxidant and anti-diabetic properties were also studied. Using GC-MS technology, the fatty acid content of the samples was analyzed, revealing that palmitic acid, eicosenoic acid, and linoleic acid were the most abundant unsaturated fatty acids present in all samples. The HPLC analysis indicated that sinapic acid, naringin, rutin, quercetin, cinnamic acid, salicylic acid, apigenin, flavone, and flavanone were the most prevalent phenolic compounds. The aqueous extract obtained by maceration showed high levels of polyphenols and flavonoids, with values of  $379.67 \pm 0.09$  mg GAE/g and  $212.11 \pm 0.11$  mg QE/g, respectively. This extract also exhibited an impressive ability to scavenge DPPH radicals, as indicated by its IC<sub>50</sub> value of  $0.095 \pm 0.12$  mg/mL. Additionally, the methanolic extract obtained using the Soxhlet method demonstrated antioxidant properties by preventing  $\beta$ -carotene discoloration, with an IC<sub>50</sub> of  $0.087 \pm 0.14$  mg/mL. Results from in-vitro studies showed that extracts from *U. lactuca* were able to significantly inhibit the enzymatic activity of  $\alpha$ -amylase and  $\alpha$ -glucosidase. Among the various extracts, methanolic extract (S) has been identified as the most potent inhibitor, exhibiting a statistically similar effect to that of acarbose. Furthermore, molecular docking models were used to evaluate the interaction between the primary phytochemicals found in these extracts and the human pancreatic  $\alpha$ -amylase and  $\alpha$ -glucosidase enzymes. These findings suggest that *U. lactuca* extracts contain bioactive substances that are capable of reducing enzyme activity more effectively than the commercially available drug, acarbose.

**Keywords:** *Ulva lactuca*; fatty acids; phenolic compounds; antioxidant activity; enzyme inhibition; anti-diabetic properties; molecular docking

# Investigation Of Phytochemical Composition Of

**Irina Ielciu,Rajeev K. Singla,Hanganu  
Daniela,Michel Frederich**

## **Investigation Of Phytochemical Composition Of:**

*The Chemical Investigation of Plants* Leopold Rosenthaler, 1930      **Handbook of Plant Food Phytochemicals** Brijesh K. Tiwari, Nigel P. Brunton, Charles Brennan, 2013-01-02

Handbook of Plant Food Phytochemicals Phytochemicals are plant derived chemicals which may bestow health benefits when consumed whether medicinally or as part of a balanced diet Given that plant foods are a major component of most diets worldwide it is unsurprising that these foods represent the greatest source of phytochemicals for most people Yet it is only relatively recently that due recognition has been given to the importance of phytochemicals in maintaining our health New evidence for the role of specific plant food phytochemicals in protecting against the onset of diseases such as cancers and heart disease is continually being put forward The increasing awareness of consumers of the link between diet and health has exponentially increased the number of scientific studies into the biological effects of these substances The Handbook of Plant Food Phytochemicals provides a comprehensive overview of the occurrence significance and factors affecting phytochemicals in plant foods A key objective of the book is to critically evaluate these aspects Evaluation of the evidence for and against the quantifiable health benefits being imparted is expressed in terms of the reduction in the risk of disease conferred through the consumption of foods that are rich in phytochemicals With world leading editors and contributors the Handbook of Plant Food Phytochemicals is an invaluable cutting edge resource for food scientists nutritionists and plant biochemists It covers the processing techniques aimed at the production of phytochemical rich foods which can have a role in disease prevention making it ideal for both the food industry and those who are researching the health benefits of particular foods Lecturers and advanced students will find it a helpful and readable guide to a constantly expanding subject area

*Reviews in Ethnopharmacology: 2023* Irina Ielciu, Rajeev K. Singla, Hanganu Daniela, Michel Frederich, 2025-04-15

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**Report of the Chief of the Bureau of Chemistry and Soils** United States. Bureau of Chemistry and Soils, The Bureau of Chemistry and Soils was created July 1 1927 for the purpose of correlating all the research work formerly carried on by the Bureau of Chemistry Bureau of Soils Fixed Nitrogen Research Laboratory and the Division of Soil Fertility and Soil Bacteriology of the Bureau of Plant Industry

**A Textbook of Medicinal Plants from Nigeria** Tolu Odugbemi,2008

**Toxicology of Herbal Products** Olavi Pelkonen,Pierre Duez,Pia Maarit Vuorela,Heikki Vuorela,2017-03-07 This volume provides a comprehensive overview of the hazards inherent in herbal medicinal products with systematic coverage of major toxicities Topics include composition and quality control toxicokinetics interactions safety pharmacology approaches to studying complex mixtures including metabolomics and systems network pharmacology and long term toxicity The volume also discusses various organ toxicities with a special emphasis on basic mechanisms of actions and the multicomponent and multi target nature of herbal products It concludes with a look to future challenges and opportunities With contributions from noted experts Toxicology of Herbal Products is a necessary resource for physicians pharmacists and toxicologists interested in complex plant derived products

10 Years of Ethnopharmacology Michael Heinrich,2020-07-08 The contributions selected for this ebook span the entire ten year period and we have selected examples which have had a particular impact on the debates in the field Broadly speaking they fall into four main areas Overarching reviews within ethnopharmacology Reviews of specific species or other taxa regarding their pharmacology phytochemistry and local traditional use Assessments of the pharmacological evidence for specific active compounds or classes of compounds Assessments of the safety and potential risks of herbal substances With these themes this eBook contributes to the debate about the evidence base of such practices incorporating both the scientific evidence available and the local traditional concepts associated with their use

*The Bureau of Chemistry and Soils* Gustavus Adolphus Weber,1928

*Service Monographs of the United States Government* Brookings Institution. Institute for Government Research,1928

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**Sorghum and Millets** John Taylor,Scott R. Bean,Kwaku G. Duodu,2025-07-01 Sorghum and Millets Chemistry Technology and Nutritional Attributes Third Edition is the leading resource for state of art knowledge on grain science and utilization surrounding sorghum and millets The book covers important scientific knowledge including basic science genetics chemistry and biochemistry food chemistry nutritional quality and health promoting attributes agronomy and food and feed processing technologies Other sections delve into structure chemistry biochemistry grain components and the technologies used for food processing

Additionally it provides holistic and complete information about all technologies in the sorghum and millets food value chain from genomics based breeding to grain and product quality assurance Sorghum and the millets are the 5th and 6th most important cereal grains in terms of production and are cultivated across the world They have a very wide range of end uses as traditional staple foods and beverages modern processed foods and with respect to sorghum industrial applications including biofuels and as an animal and aquaculture feedstuff Covers core information on the structure chemistry and biochemistry of sorghum and millet grains Contains expanded coverage of AI in quality assurance Explores use cases as food and feed for animals aquaculture and phytochemical opportunities Progresses from agronomy and breeding through processing into food and nonfood products Provides workflow graphics on processes Highlights the attributes of sorghum and millet for meeting world food feed and industrial needs

**The Bureau of Chemistry and Oils** Gustavus Adolphus Weber,1928 Report United States. Bureau of Chemistry and Soils,1928 **The Global Nexus 2025** Dr. Pratisha Kumari,Dr. J P Dash ,Dr. Sandhya M. Khedekar ,2025-03-25 It is with great pride and deep appreciation that we present this special volume of The Global Nexus 2025 a compendium of scholarly works that reflect the remarkable spirit of research innovation and collaboration across disciplines This publication stands as a celebration of intellectual rigor and a testament to the power of global academic exchange We take this opportunity to extend our heartfelt congratulations to all the authors whose manuscripts have been selected for inclusion in this prestigious ISBN publication Your work has been chosen through a rigorous peer review process reflecting both the quality of your research and its relevance to the evolving discourse in management law humanities and social sciences Each accepted manuscript adds immense value to this volume contributing to the collective knowledge that will inform future research policy and practice Your contributions go beyond the printed pages they are voices in a global dialogue that seeks to reshape our understanding of the world and our approach to its challenges As editors we have been inspired by your dedication originality and commitment to excellence It is your pursuit of knowledge and innovation that truly makes The Global Nexus 2025 a meaningful and impactful initiative We also extend our sincere gratitude to the partner institutions Eudoxia Research University USA Eudoxia Research Centre India IISc Mumbai India National Academy of Defence Production Nagpur and Gokhale Education Society s SMRK BK AK Mahila Mahavidyalaya Nashik for their unwavering support in making this international conference and publication a resounding success We hope this book not only serves as a reference for scholars and practitioners across the globe but also as an inspiration for future explorations and collaborative efforts in academic and applied research Once again congratulations to all contributing authors Your voices have become part of a global movement toward knowledge driven progress *Journal of the Chemical Society* Chemical Society (Great Britain),1900 New Zealand Journal of Science ,1970 *Membranes, Special Materials and Technologies for Different Application* Ke Chen,Agus Dwi Anggono,Wanlop Kitisatorn,Sugianto Sugianto,2024-12-16 Special topic volume with invited peer reviewed papers only *Indian Agriculturist* ,1987 *Bibliography of Agriculture*

,1986 *Chemical & Metallurgical Engineering* Eugene Franz Roeber,Howard Coon Parmelee,1921

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