Ethnobotany: Ethnopharmacology to Bioactive Compounds - Book Review

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Book Review

A review of Ethnobotany: Ethnopharmacology to Bioactive Compounds (1st ed.). José L. Martinez, Alfred Maroyi, and Marcelo L. Wagner (Eds). CRC Press, 2023, 246 pp., £42.39 (eBook), ISBN 9781003323969.

Ethnobotany: Ethnopharmacology to Bioactive Compounds, published by CRC Press, discusses ethnopharmacological approaches in phytochemical research to discover bioactive compounds with potential as pharmaceutical drugs. The medicinal plants discussed have complex biological effects, such as additive, antagonistic, and synergistic interactions, making them essential in multidisciplinary research. The bioactive compounds in these plants contribute to various therapeutic effects, making them potential drug development sources. Several sections in this book discuss nutritional aspects, mechanisms of action, and clinical trials of medicinal plants, including resveratrol, coffee, and antidiabetic plants. It reviews the molecular basis of flavonoids as bioactive compounds from the perspective of modern phytochemistry. This book's integration of biological and social science aspects highlights the relationship between humans and plants in ethnobotany. This approach emphasizes the practical application of ethnopharmacology in developing plant-based therapies.

This edited volume consists of ten chapters covering various aspects of ethnobotany, phytochemistry, and health applications of medicinal plants. The first chapter discusses the utilization of therapeutic and nutritional properties of some medicinal plants for use in animal feed. The second chapter reviews resveratrol, from its use in ethnobotany to its applications in human health. The third chapter discusses coffee and traditional medicine, focusing on biological mechanisms and activities. The fourth chapter examines the use of antidiabetic medicinal plants with ethnomedicinal information in clinical trials, emphasizing their bioactive compounds. The fifth chapter explores the ethnobotany and phytochemistry of the Phytolaccaceae and Petiveriaceae families and their medicinal applications. The sixth chapter discusses ethnobotanical comparisons among neurogenic alkaloid-containing *Tabernaemontana* species from Mexico, the Amazon, and *Tabernanthe iboga* shrubs from Africa. The seventh chapter reviews the phytochemicals and bioactive activities of *Huperzia* plants used by traditional healers in the Saraguro community in the Ecuadorian Andes Mountains. The eighth chapter reviews the genus *Alepidea*, including its medical uses, phytochemicals, and pharmacological activities. The ninth chapter discusses the genus *Salvia*, its secondary metabolites, and its role in treating different types of cancer in men and women. The tenth chapter examines the molecular basis in ethnobotany and flavonoid searching with modern analytical approaches in phytochemistry. The book provides a deep insight into the relationship between ethnobotany, phytochemistry, and pharmacology in developing bioactive compounds with potential for medical therapy. Each chapter presents relevant studies offering critical

scientific contributions to developing natural medicines and plant-based medical applications aligned with ethnobotanical studies.

The first chapter discusses medicinal plants' therapeutic and nutritional benefits in animal feed, especially in developing countries that rely on agroforestry systems. The ethnobotanical approach forms the basis for exploring the use of wild plants as a cheaper and sustainable alternative to synthetic drugs in improving animal health and livestock productivity. Some plants such as *Artocarpus altilis*, *Azadirachta indica*, *Manihot esculenta*, and *Prosopis juliflora* have long been used in ethnobotanical practices due to their bioactive compounds that are useful as feed as well as animal medicine. In addition, this chapter also reviews research trends related to the utilization of medicinal plants in animal feed with contributions from various disciplines such as agriculture, biology, pharmacology, medicine, and veterinary medicine at the global level, especially from countries such as India, Brazil, China, the United States, Iran, as well as several countries in Latin America such as Mexico, Colombia, Argentina, and Peru. Although rich in benefits, some plants contain antinutritional factors that can reduce animal digestibility and acceptance, so specific processing is needed to increase their effectiveness. This chapter provides insights into the potential of medicinal plants from an ethnobotanical perspective as innovative solutions in sustainable animal husbandry.

The second chapter reviews the role of resveratrol as a bioactive compound found in many plants, especially black grapes, in treating various diseases, including from an ethnobotanical perspective. Since ancient times, resveratrol has been used in traditional medicine for wound healing and treatment of respiratory diseases before receiving more attention in modern scientific research. Increasing interest in herbal medicine due to the limitations of modern medicine has led to resveratrol being investigated for its antioxidant, anti-inflammatory, and antibacterial properties. This chapter shows that resveratrol has the potential to address asthma, pneumonia, and chronic obstructive pulmonary disease, with mechanisms that involve the inhibition of inflammation and oxidative stress. In addition, resveratrol was also studied concerning idiopathic pulmonary fibrosis, ischemia-reperfusion, and lung cancer, explaining that this compound exhibits protective effects and the ability to suppress cancer cell growth. Resveratrol is a potential candidate for developing natural compound-based therapies for various respiratory diseases and cancer, and many studies support its therapeutic benefits.

The third chapter explores the relationship between coffee and traditional medicine, highlighting how its bioactive compounds have been used in public health practices since ancient times. It illustrates how coffee consumption in various cultures is rooted in social aspects and has therapeutic implications, such as in treating cardiovascular diseases, cancer, and neurodegenerative disorders. It also reviews the complex chemical composition of coffee, including caffeine and chlorogenic acid, which play a role in its pharmacological effects. This chapter confirms that coffee is not just a beverage but part of a rich ethnobotanical heritage with far-reaching impacts on human health, supported by an in-depth scientific review.

The fourth chapter focuses on the role of ethnomedicine in antidiabetic medicinal plant research. Traditional knowledge can help direct more efficient clinical trials. Some plants, such as *Morus alba*, *Juglans regia*, and *Salacia reticulata*, have been shown to have hypoglycemic effects. The mechanism of action of their bioactive compounds includes inhibition of α-glucosidase enzyme and stimulation of insulin secretion. This chapter reinforces that the ethnobotanical approach provides an opportunity to integrate herbal medicine with modern therapies.

The fifth chapter provides the ethnobotany and phytochemistry of Phytolaccaceae and Petiveriaceae in the order Caryophyllales. Ethnobotanical studies show that plants in these families have various traditional benefits, especially in herbal medicine. For example, *Gallesia integrifolia* is known for its sulfur content, which plays a role in insecticidal and antimicrobial activities. *Petiveria alliacea* has a long history in ethnomedicine and is used as an anti-inflammatory and immunomodulator. In addition, *Rivina humilis* is rich in betalains, which have antioxidant activity and food industry potential. The phytochemistry of this species reveals unique bioactive compounds that contribute to its therapeutic properties. However, some species have toxicity that needs to be further assessed for their safe use. This chapter review strengthens the understanding of the relationship between biodiversity and ethnobotanical utilization. This chapter also emphasizes the importance of further exploration of pharmaceutical and industrial applications.

The sixth chapter addresses the comparative ethnobotany of *Tabernaemontana* plants containing neurogenic alkaloids from Mexico, the Amazon, and Africa. This chapter reveals that although the species share chemical similarities, their uses in ethnomedical practice differ significantly based on cultural and historical factors. In Africa, *Tabernanthe iboga* is known in Bwiti rituals for spiritual experiences, while in the Americas, *Tabernaemontana* species are more commonly used to treat wounds and pain. It also shows that the diversity of plant uses depends not only on the phytochemical content but also on

the ethnohistorical heritage of each society. In addition, the chapter highlights the new medical potential of ibogan alkaloids, such as their use in addiction rehabilitation in Bolivia. It shows that ethnobotanical knowledge is known to influence the utilization of biological resources globally.

The seventh chapter discusses the ethnobotany and phytochemistry of *Huperzia*, which is used by the Saraguro community in the Southern Andes, Ecuador, in traditional healing practices. It highlights the potential of bioactive compounds such as Huperzine A and B, which are acetylcholinesterase inhibitors and have potential in Alzheimer's treatment. In addition, the plant is often used alongside other herbs, such as *Echinopsis pachanoi* and *Brugmansia* spp., for spiritual and therapeutic purposes. This chapter also emphasizes the importance of traditional knowledge in discovering new drugs and the role of scientific approaches in supporting local biodiversity conservation. The collaboration between scientists and the Saraguro community has been instrumental in further exploration of the bioactive compounds of *Huperzia*, potentially leading to breakthroughs in pharmaceutical development.

The eighth chapter reviews the genus *Alepidea*, part of the Apiaceae family with the most incredible diversity in Southern Africa. This chapter highlights the ethnobotanical utilization of various *Alepidea* species in traditional medicine to treat various ailments. It is known that these plants contain kaurene compounds that have pharmacological activities such as antibacterial, antifungal, anti-HIV, anti-inflammatory, and antioxidant. Some extracts of *Alepidea* species also have antihypertensive and antiplasmodial potential, making them essential candidates for further research. Although their biological activities have been extensively tested in vitro, in vivo studies, preclinical trials, and clinical trials are still urgently needed to prove their effectiveness and safety for humans. This chapter also describes the research method used: a literature review of various scientific sources, including articles, books, and dissertations. Therefore, further research on Alepidea can significantly contribute to developing ethnobotanical-based herbal medicines.

The ninth chapter discusses the genus *Salvia* of the Lamiaceae family, which comprises about 1,000 species with the potential for cancer treatment. It highlights various secondary metabolites of *Salvia*, such as phenolics and terpenes, which play a role in suppressing cancer cell growth through specific molecular mechanisms. *Salvia*, in ethnobotanical studies, has long been used as a spice and traditional medicine, attracting the attention of scientists for its pharmacological effects with minimal toxicity. This chapter also reveals that most of the studies on *Salvia*'s anticancer activity are still conducted in vitro, so there is not enough evidence for clinical application. That suggests that further studies on in vivo models must confirm its benefits and understand its potential side effects in cancer therapy.

The tenth chapter describes the molecular basis of ethnobotany, the role of flavonoids in traditional medicine, and their application in modern research. This chapter highlights how the relationship between humans and plants has shaped civilization and how flavonoids contained in plants have various biological activities, such as antioxidants and anti-inflammatories. Traditional knowledge of medicinal plants is known to have long been used. Still, this chapter emphasizes converting intuitive insights into scientific language through advanced analytical methods such as MS, NMR, and hyphenation techniques. Despite advances in analytical technology, an in-depth understanding of plant extracts remains a challenge that requires a multidisciplinary approach. This chapter emphasizes that ethnobotanical research is a look into the past and a key to future innovations in exploring plant bioactive compounds.

Ethnobotany: Ethnopharmacology to Bioactive Compounds is a valuable reference source for academics, scientists, and practitioners in ethnobotany and pharmacy who are researching the potential of medicinal plants as sources of bioactive compounds. The book presents a comprehensive analysis of the relationship between ethnobotany, phytochemistry, and pharmacology, as well as the application of multidisciplinary approaches in research and medical applications. The emphasis on the complex interactions of bioactive compounds provides essential insights for researchers seeking to integrate traditional knowledge with modern scientific methods. Each chapter presents theoretical and applied studies on the utilization of medicinal plants, making it relevant for biologists, pharmacologists, and professionals in the healthcare sector and pharmaceutical industry. The integrative approach links ethnobotanical research with contemporary pharmaceutical science, expanding the understanding of the therapeutic potential of medicinal plants. In addition, the book discusses the molecular basis of bioactive compounds from a modern phytochemical perspective, enriching readers' insights into understanding the mechanism of action of natural compounds. The link between science and clinical practice is reinforced through research-based discussions, encouraging cross-disciplinary collaboration in utilizing biological resources to develop nature-based therapies. The broad relevance of this book makes it an essential reference for anyone who wants to explore the scientific and applicative aspects of ethnopharmacology.

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