Chapter 14
The Secondary Metabolites of Bryophytes and Their Therapeutic Applications

Atakan Benek
https://orcid.org/0000-0001-6726-5968
Dokuz Eylül University, Turkey

Dilay Turu
https://orcid.org/0000-0002-8485-0488
Graduate School of Natural and Applied Sciences, Dokuz Eylül University, Turkey

Mustafa Eray Bozyel
https://orcid.org/0000-0001-5556-4880
Dokuz Eylül University, Turkey

Özcan Simsek
https://orcid.org/0000-0002-3210-7641
Yenice Vocational School, Çanakkale Onsekiz Mart University, Turkey

Kerem Canlı
https://orcid.org/0000-0001-6061-6948
Dokuz Eylül University, Turkey

ABSTRACT

Bryophytes, which include about 24,000 taxa and consist of mosses (Bryopsida), liverworts (Hepaticopsida), and hornworts (Anthocerotopsida), are the largest

DOI: 10.4018/979-8-3693-9112-9.ch014

group of secondary terrestrial plants after angiosperms. Indigenous communities globally use bryophytes for various medicinal purposes, including antimicrobial, antipyretic, dermatological, hepatic, cardiovascular, and wound-healing properties. Found in diverse habitats, excluding oceans, bryophytes are significant sources of bioactive compounds, particularly secondary metabolites such as steroids, alkaloids, phenols, coumarins, flavonoids, and tannins. These compounds demonstrate various therapeutic activities, including antimicrobial, antioxidant, anti-inflammatory, antidiabetic, and anti-cancer effects. This study aims to provide a comprehensive review of the ethnomedicinal uses of bryophytes and the therapeutic applications of their secondary metabolites.

1. INTRODUCTION

Bryophytes are "nonvascular plants" also termed "amphibious plants" and the second largest group of terrestrial plants. The Ancient Greek words "φυτόν" (phutón,-phyton) meaning plant and "βρύον" (brúon, bryon) meaning tree moss, liverwort, are the origin of the name "bryophyte''. The plants have survived in both aquatic and terrestrial environments under a wide range of environmental and climatic conditions and have been evolving for a longer period than other groups of land plants, (Asakawa, Ludwiczuk, & Nagashua, 2013a) (Hanson & Rice, 2013) (Smithsonian Tropical Research Institute, 2021). Comprising three plant phyla, 'bryophytes' are characterized by a common haploid-dominant life cycle and unbranched sporophytes with a sporangium. These groups include mosses (*Bryophyta*), liverworts (*Marchantiophyta*), and hornworts (*Anthocerophyta*), (Shaw & Renzaglia, 2004). There are approximately 23,000 bryophyte taxa worldwide. *Marchantiophyta*, consists of 6000 species, Anthocerotophyta, consists of 300 species, and *Bryophyta* consist of 14,000 species. However, the number of taxa changes almost every year due to synonymization of some species and discovery of new ones, (Sabovljević *et al*., 2016).

It has been demonstrated that it would be more accurate to examine the three plant classes that make up this group at the division level as a result of research done on the rbcl chloroplast genes of the plants included in the bryophyte group and the analysis of morphological characteristics and rRNA sequences together, (Glime, 2022). Nonetheless, taking into account the conventional application of the term "Bryophyte," it is acknowledged that the *Bryophyta* division continues to encompass three classes collectively because of the strong ties among the three groups it covers and the fact that some researcher has examined the three groups concurrently, (Canli, 2012). The International Code of Botanical Nomenclature/Vienna Code/ ICN (formerly known as the International Code of Botanical Nomenclature/ICBN)