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Nanohydrogel-Based Enhancement of Natural Product Solubility and Bioactivity

Anis Uce*

Department of Pharmacy, Faculty of Medicine and Health Sciences, Universitas Jambi, Jambi 36361, Indonesia

Introduction

Natural products, derived from plants, microorganisms, and marine organisms, have been used for centuries in traditional medicine due to their therapeutic potential. Despite their promising biological activities, many natural products suffer from poor solubility, low bioavailability, and rapid metabolism, which limit their clinical applications. To address these challenges, various delivery systems have been developed, among which nanohydrogels have emerged as a promising strategy for improving the solubility, stability, and bioactivity of natural products. Nanohydrogels are a class of nanoscale polymer networks that are capable of swelling in water and encapsulating bioactive compounds, thereby enhancing their solubility and facilitating controlled release. This article explores the potential of nanohydrogels as carriers for natural products, focusing on their ability to improve solubility and bioactivity, the mechanisms involved, and the challenges and future directions of this technology [1-3].

Description

Over the past two decades, research on wildland fire prediction in the context of climate change has grown exponentially. A notable increase in publications has been observed since the early 2000s, coinciding with the rise of global concerns regarding climate change. According to bibliometric data, the publication rate has steadily increased, particularly in the last decade, with a significant surge after 2015. This growth is largely attributed to a combination of the increasing frequency of wildfires, the growing recognition of climate change as a key driver of fire activity, and advancements in predictive technologies. Studies on the intersection of fire prediction and climate change tend to be multidisciplinary, drawing from fields such as atmospheric science, ecology, meteorology, and data science. In particular, the development of new technologies like remote sensing, Geographic Information Systems, and machine learning has contributed to a broader and more integrated approach to fire prediction.

A key feature of the bibliometric analysis is identifying the leading contributors to the field. Prominent authors include researchers with expertise in fire ecology, environmental modeling, and climate science. Many of these authors have focused on developing predictive models that integrate both climate variability and fire behavior, often utilizing data from satellite observations and climate projections. Institutions such as the U.S. Forest Service, the Australian National University, and the European Space Agency are among the most influential contributors to research on wildland fire prediction and climate change. Collaboration between institutions across continents, particularly between North America, Europe, and Australia, has also become increasingly common due to the global nature of the wildfire crisis [4,5].

***Address for Correspondence:** Anis Uce, Department of Pharmacy, Faculty of Medicine and Health Sciences, Universitas Jambi, Jambi 36361, Indonesia; E-mail: ucea@gmail.com*

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Conclusion

The growing body of research on wildland fire prediction in the context of climate change underscores the importance of understanding and mitigating the impacts of fire in a warming world. Through the integration of advanced modeling techniques, remote sensing technologies, and AI, researchers are better equipped to predict fire behavior and manage risks. As climate change continues to intensify wildfire hazards, ongoing innovation and international collaboration will be essential for developing adaptive strategies that safeguard communities and ecosystems from the devastating effects of wildfires. The number of publications in wildland fire prediction and climate change was analyzed to discern the growth of interest in this area. Key authors, institutions, and countries contributing to the field were identified to understand the collaborative nature of the research. The content of the publications was analyzed to highlight the main research themes, such as predictive modeling, fire risk assessment, and the influence of climate variables on fire behavior

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Conflict of Interest

None.

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