

Greening the palm oil industry: prospects and barriers of supercritical CO₂ extraction

ABSTRACT

The palm oil industry, a cornerstone of global agribusiness, has faced mounting environmental and social scrutiny due to its significant contributions to deforestation, biodiversity loss, and greenhouse gas (GHG) emissions. In response to these challenges, this review explores the transformative potential of supercritical carbon dioxide (SC-CO₂) extraction as a sustainable alternative for palm oil production. This review provides an in-depth examination of SC-CO₂ extraction principles, processes and its inherent advantages, including minimal environmental impact, enhanced oil quality, and improved yields. While SC-CO₂ extraction holds promise as an eco-friendly solution, it has its challenges. Technical complexities, energy requirements, and economic considerations are among the hurdles that must be addressed to facilitate its widespread adoption. Furthermore, this review offers insights into real-world case studies and scientific research, shedding light on the practical implications of SC-CO₂ extraction in the palm oil industry. It delves into the regulatory and policy frameworks shaping sustainable palm oil production, emphasising SC-CO₂ extraction's role in achieving compliance with stringent sustainability standards.