



UNIVERSITÀ DEGLI STUDI DI SALERNO

Department of Industrial Engineering

Master's Degree in Food Engineering

Development and optimization of extraction conditions of Erucin from *Eruca sativa*

Thesis in
Transport Phenomena

Supervisors:

Prof. Eng. Gaetano Lamberti

Eng. Diego Caccavo

Candidate:

Martina Giannattasio

Number 0622800725

Academic Year 2022/2023

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The scheduled date for the thesis discussion is 26/10/2023
Fisciano, 09/10/2023

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Abstract

Cruciferous vegetables, such as rocket salad, are rich of secondary metabolites like glucosinolates. Upon tissue damage resulting from plant injury or chewing, the endogenous plant enzyme myrosinase is released and catalyzes the hydrolysis of glucosinolates into isothiocyanates. Among these isothiocyanates, erucin has emerged as a natural compound of considerable interest in both nutraceutical and pharmaceutical industries due to its promising health-promoting properties, including its potential as a chemo-preventive agent and its demonstrated antioxidant and anti-inflammatory effects. Nutritional and health studies require gram quantities of isothiocyanates, and the utilization of these compounds is often limited because either they are not commercially available, or their cost is very high. Transforming surplus rocket salad leaves and their by-products into nutraceuticals through enzymatic erucin extraction offers a sustainable and economically viable solution to both reduce waste and create health-promoting products, thereby enhancing the circularity of the rocket salad production chain. The present study develops a viable method for the extraction and quantification of erucin from rocket salad leaves, ensuring attainable concentration for subsequent analysis. Furthermore, the same extraction and quantification method is applied to rocket salad seeds. High-Performance Liquid Chromatography is employed as the analytical technique to detect and estimate the amount of erucin in the extracted samples. However, this analysis presents several challenges due to the low concentration of erucin in the plant material as well as the presence of other compounds that may interfere during the analysis. Overcoming these challenges is crucial to obtain accurate and reliable results. *Eruca sativa* seeds exhibited the highest erucin content at 272.2 micrograms per gram of dry weight, while the leaves contained erucin at levels of 18.1 and 19.1 micrograms per gram of dry weight (18.59 ± 0.71).

Chapter One

Introduction

The objective of this chapter is to present an overview of rocket salad and its active compounds, focusing the attention on glucosinolates from which erucin is obtained. The glucosinolate-myrosinase system, the extraction techniques, and the health-promoting activity of erucin are discussed. Finally, the aims of the thesis work are reported.

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