ULST Timisoara
Multidisciplinary Conference on Sustainable Development
21-22 May 2026

# ECO SENOLYTICS: REPLACING EXOTIC BIOACTIVES WITH LOCAL ANTIOXIDANT RESOURCES

**Mara Antonia Tazma[1,2], Liana Maria Alda[1,2], Ariana - Bianca Velciov[1,2], Despina-Maria Bordean[1,2,3]***

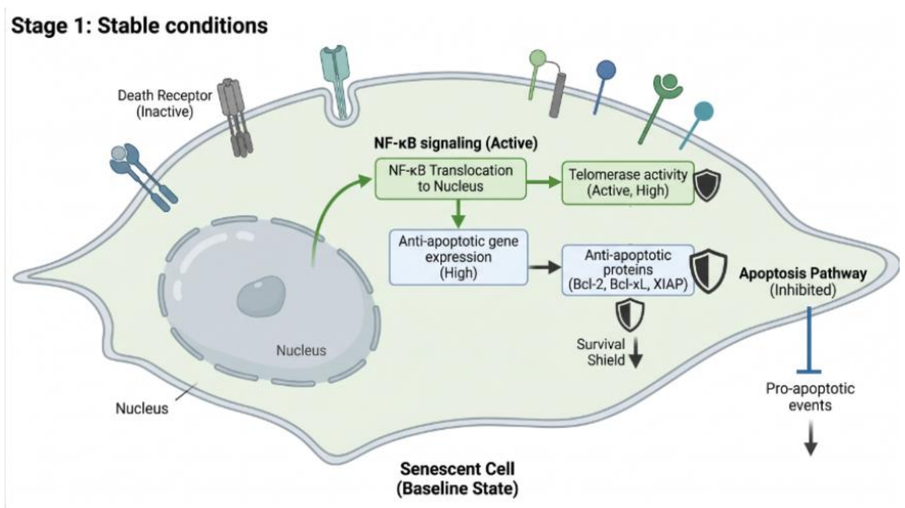
*[1] Faculty of Food Engineering, University of Life Sciences "King Mihai I" from Timisoara, Aradului Street 119, 300645 Timisoara, Romania, AntoniaMara.Tazma.FIA@usvt.ro, lianaalda@usvt.ro, arianavelciov@usvt.ro, despinabordean@usvt.com;*
*[2] Food Science Research Center, University of Life Sciences "King Mihai I" from Timisoara, 300645 Timisoara, Calea Aradului Street 119, Romania, lianaalda@usvt.ro, arianavelciov@usvt.ro, despinabordean@usvt.com;*
*[3] Doctoral School "Engineering of Vegetable and Animal Resources", University of Life Sciences "King Mihai I" from Timisoara, Calea Aradului 119, 300645-Timisoara, Romania; despinabordean@usvt.ro.*

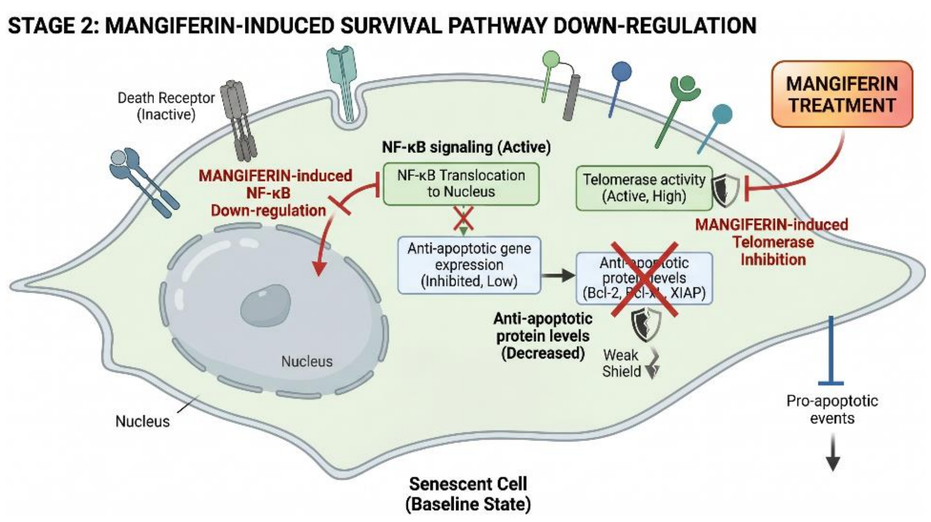
**Corresponding author: despinabordean@usvt.ro*

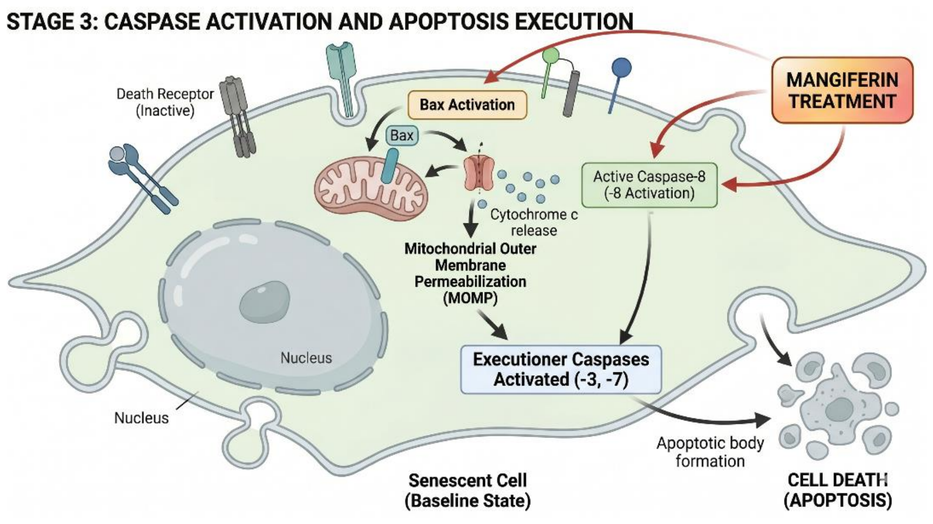
**Abstract:** The accumulation of senescent cells and their associated secretory phenotype (SASP) is a key contributor to cellular dysfunction and biological aging. In search of natural anti-aging solutions, the mango fruit (Mangifera indica) has been noted for its rich bioactive profile, particularly its high content of mangiferin. This xanthone, abundant mainly in the peel and leaves, has demonstrated the ability to to selectively induce apoptosis in senescent cells. However, the environmental impact generated by the import of exotic fruits highlights the need to identify sustainable, locally available alternatives. The aim of this paper is to identify edible wild plants rich in polyphenols with senolytic effects comparable to those of mangiferin. By applying the principles of eco-friendly extraction, the paper demonstrates that local plant resources can provide nutraceutical and anti-aging solutions with comparable efficacy, yet with a significantly reduced environmental footprint. These findings support the integration of circular economy principles into food biotechnology and promote the development of sustainable functional ingredients.

## • Introduction

The study aims to answer one main question: Which are the local mangiferin alternatives with the same senolytic effects on senescent cells?

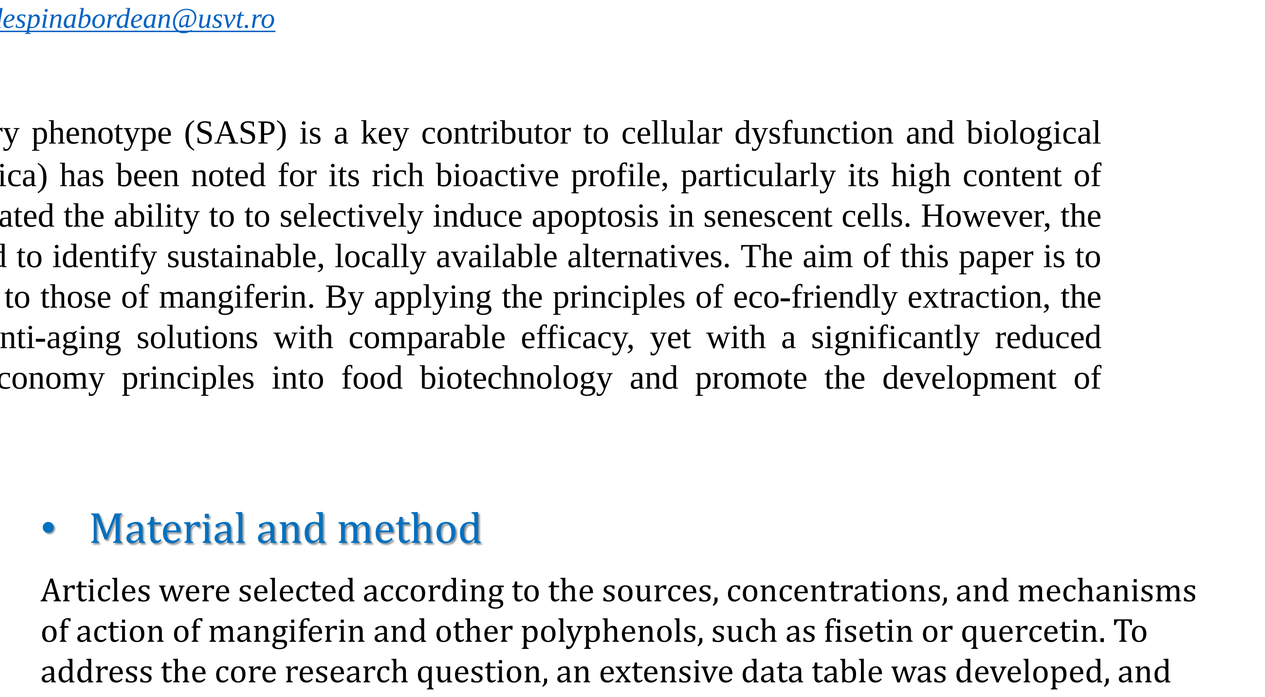



## • Material and method

Articles were selected according to the sources, concentrations, and mechanisms of action of mangiferin and other polyphenols, such as fisetin or quercetin. To address the core research question, an extensive data table was developed, and its graphical fingerprint was created using the MVSP program, version 3.22.




## • Results and discussions

In vivo studies indicate a minimum mangiferin dose of ~100 mg/kg for health benefits. Achieving this requires industrial extraction from mango by-products rather than mango pulp consumption alone, thus supporting a zero-waste bioeconomy. Mangiferin shares senolytic action (by triggering apoptosis via BCL-2 family proteins) with fisetin and quercetin, and senomorphic action (by suppressing inflammation) with rutin and kaempferol.

Moreover, these polyphenols selectively induce apoptosis in senescent cells while activating survival pathways (e.g., PI3K/AKT/Nrf2) in healthy cells via NF-κB inhibition. Finally, Figure 1 highlights viable concentrations for industrial extraction, contrasting high mangiferin levels in mango by-products versus the pulp.

## • Conclusions

This paper validates wild local plants (mulberry, lovage, wild spinach, capers) as viable mangiferin alternatives due to their targeted effects on senescent cells. Specifically, fisetin and quercetin serve as senolytic replacements by inhibiting the BCL-2 family and inducing apoptosis, while rutin and kaempferol act as senomorphics by inhibiting SASP-induced inflammation. Future research should prioritize optimizing green extraction methods to maximize yields from local plants, alongside exploring polyphenol combinations to enhance treatment bioavailability and overall effectiveness.