

The Role of Anthocyanins in Purple Pansies (*Viola tricolor* L.) in Inflammatory Bowel Disease – Does the Hue Matter?

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Attributed to their bioactive compounds, edible flowers are seen as a healthier and more sustainable food source. Among the various natural bioactive compounds, anthocyanins represent one of the most interesting classes, responsible for the vibrant colours ranging from blue to red in various foods and possessing well-established bioactive properties today.

Of the different species of edible flowers, some are rich in anthocyanins, making them particularly interesting as a source of this group of bioactive compounds. However, other compounds such as polyphenols or carotenoids are also present in these flowers. Therefore, it is essential to understand how the integrative and combined actions of these different compounds occur (synergistic or antagonistic) in terms of their bioactivity, to fully grasp the potential of these flowers.

Inflammatory Bowel Disease (IBD), on the other hand, is characterised by chronic and recurrent inflammation of the digestive tract. It is a progressive disease that can worsen over time and lead to other complications—anaemia, osteoporosis, arthritis, ocular inflammation, among others—if not properly diagnosed and treated. Various *in vitro* models have been developed, and today they are well established as a solid starting point for studying this disease, thus overcoming the limitations of *in vivo* studies.

This project will therefore focus on studying the bioactive compounds of the *Viola tricolor* L. flower, with a particular focus on the role of anthocyanins and their interactions with other classes of compounds, using flowers with different hues.

This will be a **MULTIDISCIPLINARY ANALYSIS**, employing the latest techniques, including: In the first phase, extraction using green methods and solid-phase extraction (SPE with cation exchange) and structural characterisation using different analytical techniques (HPLC-DAD; LC-MS). In the second phase, the study of the effects of bioactives on IBD using a cell co-culture model (Caco-2/HT-29 MTX): evaluating intestinal barrier integrity in inflamed and non-inflamed states using Transwell® and ECIS® systems; assessing the effect of bioactives on intestinal mucus production using fluorescence microscopy; evaluating the modulation of reactive oxygen species and pro- and anti-inflammatory cytokines using spectrophotometric methods.

Additionally, the antioxidant properties of the different extracts will be assessed using techniques such as DPPH and FRAP.

The findings will contribute to a better understanding of the potential health benefits associated with the consumption of edible flowers and pave the way for new applications in the field of functional foods and nutraceuticals.



Figura 1. Purple wild pansies (*Viola tricolor* L.) of intermediate hue.