Application of *Viola tricolor* extracts in cleaning products

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INTRODUCTION

Plants play an important role in everyday life. They constitute a large part of the diet but also have other uses as medicines, soaps, furniture, textiles, etc. Although we now live in a highly industrialized society, this dependence on plants has not been lost.Jiratchaya Wisetkomolmat and collaborators conducted a study to access the existing knowledge of Thai plants with almost forgotten detergent properties by using chemometric tools. [1] Tura et al conducted a similar study in Ethiopia evaluating the detergent properties of Phytolacca dodecandra fruits, Rumex nepalensis leaves, Grewia ferruginea bark and leaves. [2] Artur Seweryn and Tomasz Wasilewski developed recipes and technologies for the manufacture of washing agents containing extracts in concentrations of 0.1; 0.3 and 0.5% by weight, plant-based, with high efficiency in the field of detergents. [3]Technological developments in chemicals have made it possible to mass produce at relatively low cost detergents, soaps and wet wipes that have superior properties and address different consumer needs.A number of herbal extract products are available on the market, but most of them do not use the spontaneous flora or the synergistic action of these herbs because the available studies are very limited. [4-5]

VIOLA TRICOLOR

Viola tricolor (Heartsease or Wild Pansy) belongs to the division Magnoliophyta, class Magnoliopsida, order Malpighiales, family Violaceae, and genus Viola (Fig. 1).

Fig. 1 *Viola tricolor*
Source: https://twinings.co.uk/blogs/news/heartsease

The aerial parts of Viola tricolor, known as Violae tricoloris herba, are pharmaceutically important due to the rich content of bioactive compounds. These include saponins, flavonoids, salicylic compounds, alkaloids, carotenoids, anthocyanins, tannins, volatile oils, and vitamins. Traditionally, the herb is recommended for the treatment of various dermatological conditions such as eczema, hives (urticaria), acne, and furunculosis, due to its well-documented antibacterial and soothing properties.
Given its antimicrobial and soothing characteristics, extracts from Viola tricolor present potential applications in the formulation of cleaning products aimed at reducing skin irritation and providing mild, yet effective, antibacterial activity. The presence of flavonoids and tannins supports its role as a natural cleansing agent, while saponins act as surfactants, making it an eco-friendly alternative to synthetic detergents.
Future research could explore the potential of Viola tricolor in developing natural, skin-friendly cleaning formulations that cater to consumers seeking gentler, environmentally sustainable alternatives.[6-13]

FORMULATION OF A NEW RANGE OF DETERGENTS WITH VIOLA TRICOLOR EXTRACT

Viola tricolor Extract Preparation

The extraction process of Viola tricolor begins with the fresh, flowering herb (herba), which is rich in bioactive compounds. To ensure optimal extraction of its phytochemicals, the herb is macerated in a 70% ethanol solution. This concentration of ethanol is ideal for extracting both polar and moderately non-polar compounds, allowing the extraction of a broad range of active components such as flavonoids, saponins, alkaloids, and tannins.
The 1:1 ratio between the plant material and the solvent ensures a balanced concentration, maximizing the solubilization of the herb's active ingredients. Maceration was performed for 24 hours at 20°C, a temperature chosen to maintain the stability of temperature-sensitive compounds, such as vitamins and volatile oils, which could degrade at higher temperatures.
To protect these compounds from degradation by light, the process was conducted in complete darkness, which helps prevent the oxidation of sensitive compounds like carotenoids and anthocyanins. This step is critical for maintaining the integrity and potency of the extract, which could otherwise lose efficacy if exposed to light.
After the maceration period, the mixture is typically filtered to separate the plant material from the solvent, yielding a concentrated extract that contains a complex mixture of bioactive compounds. This extract can then be used in various formulations, including cosmetics, cleaning products, or pharmaceutical preparations, where its anti-inflammatory, antibacterial, and skin-soothing properties offer significant functional benefits.

Detergent for floors

The product was obtained by homogenizing the ingredients until complete dissolution, following the established recipe (table 1).

Table 1. Floor detergent recipe with plant extract

Raw material	Recipe percentage
Demineralized water	97.576%
Viola tricolor extract	0.500%
4-(5-Dodecyl) benzene sulfonate	1.924%
Total	100.000%

Experimental Report - Detergent with Plant Extracts

The objective of this experiment was to demonstrate the functionality of a floor detergent containing plant extracts. The main parameter tested was the microbiological load. The floor of a laboratory (1 m²) was cleaned twice a week for two weeks by the same person. Samples were collected before cleaning, immediately after, and 24 hours post-cleaning. These samples were analyzed using the PCR kit according to the manufacturer's instructions.

CONCLUSIONS

- **A reduction of the microbiological load on the surface after applying the new detergent containing plant extracts was observed;**
- **Therefore, this product could offer a more environmentally friendly alternative with gradual reduction of microbial presence on treated surfaces.**

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