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Optimization of Extraction Conditions for Phenolic Compounds from *Myrtus Communis* L. Leaves Using Multiple Response Surface Methodology

Aissaoui. Lydia [1]*, Benchohra. Hadria Amel[1]

[1] Valorization of Phytoresources and Eco-Development of Spaces Laboratory. Department of Environmental Sciences, Faculty of Natural and Life Sciences, University of Djilali Liabes, 22000, Sidi bel Abbes, Algeria.
*Corresponding author's email: liliaissaoui96@gmail.com

ABSTRACT

Secondary metabolites of Algerian myrtle aerial organs, such as polyphenols, tannins and flavonoids, have shown a potentially positive effect on human health. Efficient extraction methods must be used to obtain maximum quantities of these beneficial compounds from common myrtle. In this respect, the aim of this work was to develop an extraction procedure using response surface methodology (RSM), in order to evaluate the extraction yield and total phenolic compound (TPC) content of *Myrtus communis* L. leaves. Extraction of the latter and of the response variables was optimized by means of a Box-Behnken design (BBD), which was carried out according to the effect of ethanol/water ratio, temperature, extraction duration and extraction time. The optimum conditions obtained with the established method were 75% (v/v), 70°C and 150 min. The results revealed an optimum yield of leaf extracts with a predicted value of 28%. Subsequently, the maximum conditions enabled us to achieve a higher total polyphenol recovery of 271.35 mg Eq AG/g E. In conclusion, the extraction yield and quantity of secondary substances of myrtle extracts can be improved when appropriate extraction conditions are applied.

Keywords: Secondary metabolites, Box–Behnken design, *Myrtus communis* L., phenolic compounds

1. Introduction

Phenolic compounds constitute a vast class of secondary metabolites playing many roles in plant defense and survival [1]. Also, these substances have shown a potentially positive effect on human health. Efficient extraction methods must be used to obtain maximum quantities of these beneficial compounds from medicinal and aromatic plant (MAP) such as common myrtle. In this respect, the aim of this work was to develop an extraction procedure using response surface methodology (RSM), in order to evaluate the extraction yield and total phenolic compound (TPC) content of Myrtus communis L. leaves harvested in the Beni-Ghobri Forest.

2. Experimental

The extraction yield and extraction of total polyphenols (TPP) from myrtle leaves and response variables was optimized using a Box-Behnken design (BBD); according to the protocol written by Mahardika and Roanisca, [2] with modification, which was performed based on the effect of ethanol/water ratio, temperature, extraction duration and extraction time. On the other hand, extraction yield is calculated using the formula given by Falleh et *al.*, [3].

3. Results and Discussion

The results of extraction yield optimization are shown in figure 1. The optimum conditions obtained with the established method were 75% (v/v), 70°C and 180 min. The results revealed an optimum yield of leaf extracts with a predicted value of 28%. Subsequently, the maximum conditions enabled us to obtain a higher total polyphenol recovery of 271.35 mg Eq AG/g E. on the other hand, other results reported that ultrasound-assisted extraction of myrtle pericarps yielded interesting total polyphenol contents compared with simple methods [4].

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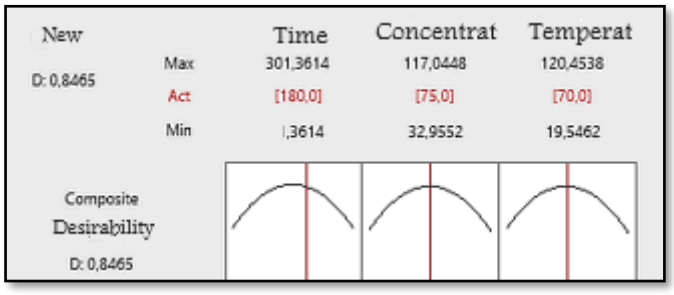

Figure 1: Pareto chart of yield according to the four assumptions (solvent type and concentration, extraction time and temperature.

4. Conclusions

In conclusion, it is possible to optimize the extraction yield and phenolic content of myrtle extracts under the right extraction conditions. The results confirm that various factors can influence the quantity of secondary metabolites from the shrub and other plants.

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