ID 3052

Evaluation of Antioxidant Components and Antioxidant Activity of Carthamus Caeruleus L.

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ABSTRACT

The use of plant extracts is increasingly recognized with the aim of valorizing new local natural resources. To this end, Carthamus caeruleus L. collected in the Tizi-ouzou region was examined; this wild plant traditionally used for medicinal purposes has recently gained in importance thanks to its characteristic composition. Ethanolic and hydro-ethanolic extracts of Carthamus roots were analyzed for their phenolic profile (i.e. total polyphenols and flavonoids) by spectrophotometric assay; as well as their antioxidant properties, which were measured by DPPH free radical scavenging method. Polyphenols in the extract were 102.5 and 12.5 mg gallic acid equivalent/g, while flavonoids were 8.3 and 23.4 mg quercetin equaoivalent/g of ethanolic and hydro-ethanolic extracts respectively. On the other hand, the antioxidant capacity test by DPPH free radical scavenging method revealed a medium inhibitory effect with an IC50 equal to 29,049 µg/ml for ethanol-water extract.

Keywords: Carthamus caeruleus L., Total polyphenols, Total flavonoids, Antioxidant activity.

1. Introduction

Many cultures around the world have developed their own herbal traditions over the centuries, passing on knowledge of the healing properties of plants from one generation to the next. Today, herbal medicine is enjoying a revival in popularity, as people seek alternative and complementary approaches to conventional medicine. That's why this traditional wisdom is combined with rigorous scientific research to validate the efficacy and safety of herbal treatments.

2. Experimental

2.1 Vegetable matter and extract preparation:

After harvesting, Carthamus's roots were carefully washed under tap water, then air-dried for two weeks, protected from light and moisture; before being ground using an electric grinder. 10 g of the powder were then extracted by cold maceration at the rate of 1/10 with 90% ethanol and 70% hydro-ethanol (v/v) for 24 hours. The extracts were filtered through filter paper, and the filtrate was then subjected to evaporation under reduced pressure at a temperature of 30°C in a rotary evaporator. The crude extracts were kept cool until use.

2.2 Determination of total polyphenols:

Polyphenol content is determined by UV-Visible spectrophotometry using Folin-Ciocalteu reagent. 0.2 ml extract is mixed with 1 ml Folin-Ciocalteu reagent and 0.8 ml 7.5% (w/v) Na2CO3. Absorbance is measured using a UV-VIS spectrophotometer at 765 nm against a blank after 90 min incubation. The same procedure is also applied to the standard gallic acid solution [1].

2.3 Determination of total flavonoids:

1ml extract is added to 1ml AlCl3 (2%). After 10min, absorbance is read at 430nm by a UV-VIS spectrophotometer. The same procedure is also applied to the Quercetin standard solution. [2]

2.4 DPPH radical scavenging assay:

The 2 ml samples are mixed with the 5 ml DPPH solution. After shaking, the solutions are placed in the

DOI: 10.21467/abstracts.169 ISBN: 978-81-970666-4-1 (eBook)

dark for 30 min. then, the optical densities are measured at 520 nm against the blank using a spectrophotometer. For each extract concentration, the percentage inhibition is calculated:

$$DPPH\ (\%) = \frac{A_0 - A_1}{A_0} \times 100$$

A curve of percentage inhibition or percentage trapping effect as a function of sample concentration is then constructed, and the amount of antioxidant required to reduce the initial DPPH concentration by 50% is determined. [3]

3. Results and Discussion

Extraction yield was calculated using the following formula: $R\ (\%) = \frac{m_{ext}}{m_s} \times 100$ and it showed 3,57% and 12,03% for the ethanolic and the hydro-ethanolic extracts respectively. Polyphenols in the extracts were 102.5 and 12.5 mg gallic acid equivalent/g extract for the ethanolic and hydro-ethanolic extracts respectively. while flavonoids were 8.3 mg quercetin equivalent/g of the ethanolic extract and 23.4 mg de quercetin equivalent /g of hydro-ethanolic extract. The results show that the DPPH free radical is effectively inhibited by the extracts tested. This activity obviously increases with extract concentration. Indeed, the highest free radical scavenging capacity was found for the ethanol-water extract, with over 99% inhibition at a concentration of 50 µg/mL, compared to ascorbic acid, whose inhibition percentage was 83% at the same concentration. In the case of ethanol-water extract, however, the percentage of inhibition did not exceed 50% at a concentration of 125 µg/mL.

4. Conclusions

L'extrait de la plante a montré une activité antioxydante remarquable, qui peut être attribuée à sa teneur élevée en composés phénoliques. Ces résultats fournissent des preuves scientifiques des avantages potentiels de la Carthamus caeruleus L. Comme sources d'alimentation et soutiennent son utilisation traditionnelle en tant que plante médicinale.

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ISBN: 978-81-970666-4-1

Series: AIJR Abstracts

DOI: 10.21467/abstracts.169