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CHEMICAL DETECTION OF SOME ACTIVE COMPOUNDS PRESENT IN CERTAIN SPECIES OF THE GENUS ACHILLEA MILLEFOLIUM FROM THE ASTERACEAE FAMILY USING HPLC TECHNOLOGY

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Abstract: The plant used in this study was collected from the wild in the city of Tikrit during January. The study was conducted in the postgraduate laboratories of the College of Education for Pure Sciences at the University of Tikrit. The results of the detection of active compounds in the Achillea millefolium plant showed that it contains rutin, chlorogenic acid, apigenin, gallic acid, ferulic acid, kaempferol, and quercetin. The Achillea millefolium plant recorded the highest content of rutin, reaching 95.0, while the lowest content was recorded for kaempferol at 33.6. The plant showed an intermediate content of ferulic acid, which was 50.4.

Keywords: Achilla millefolium, active compounds, HPLC.

Introduction:

The yarrow plant (Achillea millefolium), also known as milfoil or sneezewort, is a perennial herb that belongs to the genus Achillea in the Asteraceae family. Yarrow is found in various regions of Europe, including Eastern and Southeastern areas, as well as the southern edge of the Alps in Switzerland. It is also present in the eastern and northeastern regions of Iraq [1]. Yarrow is described as an evergreen herbaceous plant that ranges in height from 30 to 60 cm and has a distinctive aromatic scent. The plant appears gray-green and is covered with numerous small hairs[2]. It has an erect, simple stem with alternate leaves that are narrow, thin, and lobed. The flowers are multicolored, ranging from white to yellow, and are arranged terminally [3]

Yarrow has numerous medicinal benefits and is one of the most widely used medicinal plants globally. It can be used in its entirety or just its flowers for treating various ailments. Yarrow is used for treating wounds, digestive issues, respiratory inflammations, and fevers. In North America, it has been used as a pain reliever (Al-Nisani, 2020; Grieve, 1981). Additionally, yarrow is employed in treating biliary tract diseases, toothaches, and reducing tissue swelling (Hussey, 1974).

Methods:

1.2 Sample Collection:

The plant used in this study was collected from the wilderness of Tikrit during January. It was cleaned of impurities and dirt using distilled water, then dried at room temperature with constant stirring to prevent mold. After drying, the plant was ground using an electric grinder to obtain a fine powder, which was then stored in plastic containers until use.

2.2 Sample Extraction:

Three grams of finely powdered samples were mixed with 60 ml of methanol/water (40/60) for 24 hours. The mixture was filtered, and the filtrate was concentrated under low pressure (40°C) to a volume of 5 ml. This solution was hydrolyzed using 5 ml of 2N NaOH for 30 minutes. The pH of the mixture was adjusted to 7.00 using 2N HCl, and the phenolic acids were extracted by liquid-liquid extraction with ethyl acetate (20 ml × 3). The extracts were combined and the ethyl acetate was removed under low pressure. The remaining material was dissolved in 7 ml of methanol, and 10 microliters were analyzed by HPLC.

3.2 HPLC Conditions:

High-Performance Liquid Chromatography (HPLC) analysis was performed on a SYKAM HPLC system (Germany) equipped with a C18-ODS column (250 × 4.6 mm, 5 µm). The samples (100 microliters) were injected into the system. The mobile phase consisted of 95% acetonitrile + 0.01% trifluoroacetic acid (solvent A) and 5% acetonitrile + 0.01% trifluoroacetic acid (solvent B) at a flow rate of 1 ml/min. The gradient program was as follows: 10% A from 0 to 5 minutes; 25% A from 5-7 minutes; 40% A from 7 to 13 minutes; then returning to initial conditions. Detection of phenolic compounds was performed using a UV-visible detector at 278 nm.

Results and Discussion:

Name (ppm)	Achillea R-N
Rutin	95.0
Chlorogenic acid	74.5
Qurcetine	50.6
Apigenin	47.9
Gallic acid	35.9
Protocatechuic acid	
Ferulic acid	50.4
Kaempferol	33.6
p-coumaric acid	

The detection of some active compounds in Achillea millefolium is shown in Table 3-1. It can be observed from this table that Achillea millefolium recorded the highest content of rutin at 95.0 ppm, while it recorded the lowest content of kaempferol at 33.6 ppm. The plant showed an intermediate content of ferulic acid at 50.4 ppm

Conclusion

The Achilla millefolium plant contains medically important flavonoids, such as Rutin and Qurcetine, identified using HPLC technology.

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