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EMODIN, AN ANTHRAQUINONE DERIVATIVE FROM Rumex pamiricus Rech. f

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ЭМОДИН, ПРОИЗВОДНОЕ АНТРАХИНОНА ОТ Rumex pamiricus Rech. f

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ABSTRACT

In this article, we are going to report the results of study the root part of the plant Rumex pamiricus Rech. f., which belongs to the family of Polygonaceae, growing in Uzbekistan, a new rich source of unique anthraquinone emodin (1,3,8-trihydroxy-6-methyl-9,10-anthraquinone) isolated from the chloroform fraction, as well as the beneficial properties of emodin.

АННОТАЦИЯ

В этой статье мы сообщим о результатах изучения корневой части растения Rumex pamiricus Rech. f., принадлежащая к семейству Polygonaceae, произрастающая в Узбекистане, новый богатый источник уникального антрахинона эмодина (1,3,8-тригидрокси-6-метил-9,10-антрахинона) выделенной из хлороформной фракции, а также о полезных свойствах эмодина.

Keywords: Polygonaceae, Rumex pamiricus, emodin, anthraquinone derivative, coronavirus (SARS-CoV).
Ключевые слова: Polygonaceae, Rumex pamiricus, эмодин, производное антрахинона, коронавирус (SARS-CoV).

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1. INTRODUCTION

The interest of natural drugs as adjunctive therapy for acute and chronic diseases has grown significantly in the recent years. Herbal remedies play an important role in modern medicine and it appears feasible that the compounds from herbs can be helpful in prevention or treatment of different diseases[1]. The name *Rumex* derived from the Latin word for dart, alluding to the shape of the leaves. It is the largest genus of family *Polygonaceae* [2]. This genus includes more than 250 species distributed worldwide. 16 species grow in Uzbekistan [3,4]. Since ancient times *Rumex L*. (dock, sorrel) species have been well known for their use in traditional medicine, due to therapeutic efficacy and various biological activities [5].The herb *Rumex pamiricus* belongs to the family of *Polygonaceae*, which is widespread in Central Asia (Pamir-Alay,Tian Shan, Dzungarian Alatau), Kashgaria. One of the most common types of *Rumex* in Uzbekistan (Samarkand and Kashkadarya regions). It grows along wet mountain meadows, along the banks of mountain rivers and lakes. Perennial herbaceous plant reaching 60–100 cm in height **(Figure -1**) [6]. Since ancient times, concoction or tea from various parts of this herb has been used in folk medicine to treat diarrhea, dysentery, stercoral ulcer, as apetizer, analeptic medicine for lever, heart, as antihaemorrhagic, to treat

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hepatitis, fever and other diseases [7,8]. The anthraquinone emodin, identified in 17 plant families distributed worldwide, has numerous biological activities [9].

Figure 1. Rumex pamiricus Rech. f.

2. MATERIALS AND METHODS

2.1 Plant material

The roots of *Rumex Pamiricus* were collected from Botanic Garden, Tashkent, Uzbekistan, on August 2020.

2.2 Extraction

The roots of the herb *Rumex Pamiricus* were collected in August and dried at room temperature, in shade. The pounded herb roots were first subjected to extraction in chloroform, then three times in 70% acetone hydrous solution. The acetone extract was distilled under vacuum, the remaining water solution was subjected to extraction with ethyl acetate. Ethyl acetate extracts were collected and were dehydrated by adding anhydrous salt Na2SO4. The dehydrated extract was filtered, its concentartion increased under vacuum, the total phenols were precipitated by adding pure hexane to the condensed extract. The created precipitate was washed, and filtered and the extracted total phenols of chloroform and ethyl acetate fractions constituted 3.4% of the herb dry weight.

3. RESULTS

The roots are the best organs for the accumulation of anthraquinones. Continuous studies on the chemical composition of *Rumex pamiricus* led to the isolation of anthraquinone emodin, from the plant root extract using column chromatography on KSK silica gel, eluted with a mixture of extraction benzene – ethyl acetate: (50:1, 40:1, 30:1, 20:1,10:1 and 5:1). The structure of emodin (1,3,8-trihydroxy-6-methyl-9,10-anthraquinone) was established on the basis of the analysis of the data of MS **(Figure -2**), 1H, and 13C NMR spectra, and of the DEPT, HSQC and HMBC experiments.

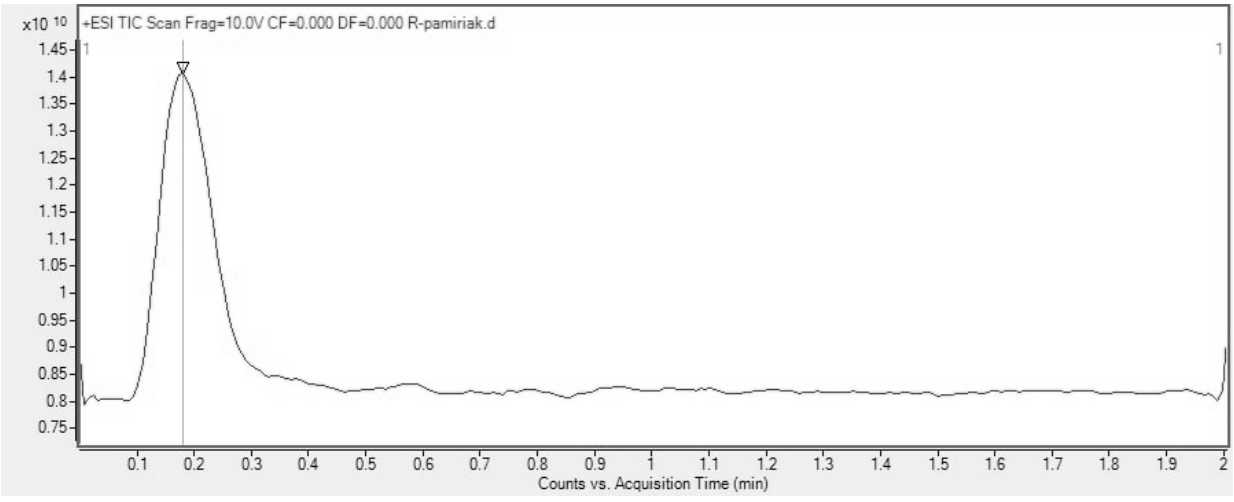

Figure 2. Mass spectrum of emodin

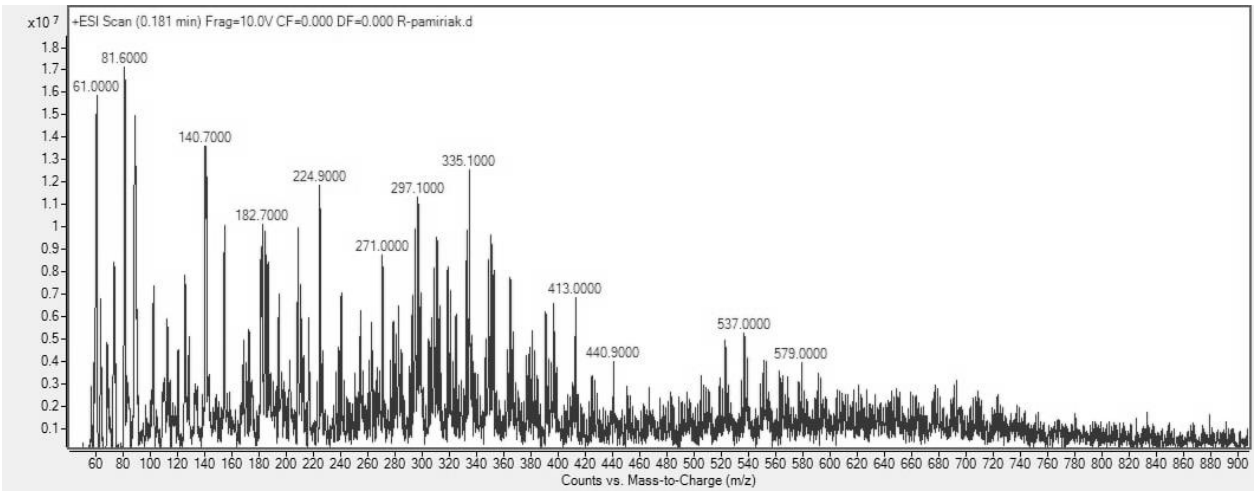

Figure 3. Thin Layer Chromatography (TLC) of emodin

4. CONCLUSION

In this article, we are going to report the results of study the root part of the plant Rumex pamiricus Rech. f., which belongs to the family of Polygonaceae, growing in Uzbekistan, a new rich source of unique anthraquinone emodin isolated from the chloroform fraction, as well as the beneficial properties of emodin. Emodin (1,3,8-trihydroxy-6-methyl-9,10-anthraquinone) were separated from *Rumex pamiricus* plant for the first time (**Figure -4)**. and the study of the root part of this plant continues.

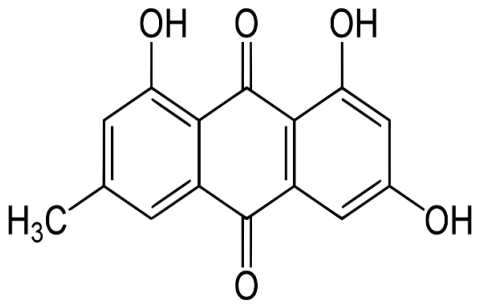

Figure 4. Chemical structure of emodin (1,3,8-trihydroxy-6-methyl-9,10-anthraquinone)

Emodin an anthraquinone derivative, is an anti-SARS-CoV compound [10]. Severe acute respiratory syndrome (SARS) is an emerging infectious disease caused by a novel coronavirus (SARS-CoV) and that results in progressive respiratory failure and death in close to 10% of infected individuals. Emodin blocks the SARS coronavirus spike protein and angiotensin-converting enzyme 2 (ACE2) interaction[11].

A joint research group from KAIST (The Korea Advanced Institute of Science and Technology) have identified repurposed drugs for COVID-19 treatment through virtual screening and cell-based assays. Researchers screened 6,218 drugs from a collection of FDA-approved drugs or those under clinical trial and identified 38 potential repurposed drugs for COVID-19 with this strategy. Among them, seven compounds inhibited SARS-CoV-2 replication in Vero cells. Three of these drugs, emodin, omipalisib, and tipifarnib, showed anti-SARS-CoV-2 activity in human lung cells, Calu-3 [12].

To date, articles have been published about it by scientists around the world. The scientists of our institute are currently conducting additional research and screening work on this compound.

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