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PHYTOCHEMICAL COMPOUNDS IN FERULA SYRIACA, FERULA SAMARCANDICA AND FERULA FERULOIDES

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ФИТОХИМИЧЕСКИЕ СОЕДИНЕНИЯ В FERULA SYRIACA, FERULA SAMARCANDICA И FERULA FERULOIDES

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ABSTRACT

In this article, crude extracts were evaluated phytochemically to determine the presence of coumarins, flavonoids, phenols, terpenoids, steroids and other compounds by standard methods. Any change in color or the formation of sediment was used to respond positively to these tests

АННОТАЦИЯ

В статье приведены результаты изучения содержания различных компонентов в составе неочищенного экстракта растений с использованием стандартных методов исследований. Фитохимическим методом охарактеризовано присутствие кумаринов, флавоноидов, фенолов, терпеноидов, стероидов и других соединений. Показано, что с помощью определения изменения цвета исследуемого раствора или по образованию осадка можно оценить наличие различных компонентов экстрактов изучаемых растений.

Keywords: coumarins, flavonoids, phenols, terpenoids, steroids, extracts, aromas, hydrochloric acid, phytochemical, cancer.

Ключевые слова: кумарины, флавоноиды, фенолы, терпеноиды, стероиды, экстракты, ароматизаторы, соляная кислота, фитохимические вещества, рак.

Introduction. Phytochemicals are naturally occurring chemicals produced by plants. Some phytochemicals give plants their pretty colors, like the blues in blueberries and the red in raspberries. Other phytochemicals give plants their distinctive aromas. These ***phytochemicals*** help plants to prosper by attracting insects and other creatures to pollinate the plants or spread the seeds [1]. Phytochemicals are biologically active and can affect your health when you eat the plants that contain the compounds. Preliminary research suggests it's possible that various phytochemicals may help protect from cancer or possibly slow down the growth of cancer[2], as well as reduce inflammation, and help regulate hormones. Human studies on the potential cancer-fighting properties of phytochemicals are limited. To know whether phytochemicals contain verifiable cancer-fighting benefits, more research is still needed. But emerging research has shown that phytochemicals boast important health benefits such as reduced inflammation and hormone function [3].

Research methods and Experimental part. Crude extracts were phytochemically evaluated to determine the presence of coumarins, flavonoids, phenols, terpenoids, steroids, and other compounds according to standard methods. Any change of colours or the precipitate formation was used as indicative of positive response to these tests. Testing for coumarins; 0.5 g of the moistened various extracts was taken in a test tube. The mouth of the tube was covered with filter paper treated with 1 N NaOH solution. Test tube was placed for few minutes in boiling water and then the filter paper was removed and examined under the UV light for yellow fluorescence indicated the presence of coumarins. *Testing for alkaloids:* each extract (10 mg) was dissolved in 2 mL of 5% hydrochloric acid, after mixing and filtering, three aliquots were taken. Drops of Wagner, Mayer, Bouchardat and Dragendorff reagents were added to each. A red-brown precipitate (Wagner), yellowish-white precipitate (Mayer), brown precipitate (Bouchardat) and red–orange precipitate. *Testing for flavonoids:* Shinoda test; 1 mL of absolute ethanol and 3 drops of concentrated hydrochloric acid were added to 0.5 mL of diluted extract in isopropyl alcohol. Formation of red color indicated the presence of aurones and chalcones. In cases where no colour change was observed. The formation of orange, red or magenta coloration indicated the presence of flavones and flavonols, respectively. *Test for steroids (Salkowski test):* 5 mL of chloroform extract was mixed with concentrated H_2SO_4 (3 mL) and shaken. If the reaction is positive it gives red coloration on standing. *Test for terpenoids (Salkowski test):* 0.2 g of the extract of the whole plant sample was mixed with 2 mL of chloroform ($CHCl_3$) and concentrated H_2SO_4 (3 mL) was carefully added to form a layer. A reddish brown colouration of the interface was formed to indicate positive results for the presence of terpenoids (Table 1).

Table 1.

Phytochemical constituents of F. syriaca, F. samarcandica and F. feruloides

		Extracts		
No	**Phytochemicals**	***F. syriaca***	***F. samarcandica***	***F. feruloides***
1	Tannins	+	+	+
2	Flavonoids	+	+	+
3	Cardiac glycosides	+	+	+
4	Saponins	+	+	+
5	Terpenoids	+	+++	+++
6	Alkaloids	–	–	–
7	Steroids	++	+	+
8	Coumarins	+++	+++	+++
9	Secoiridoids	+++	+	+

Results and Discussions. Phytochemical screening of ethanolic extracts of three medicinal plants was carried out using various chemical assay (such as TLC, HPLC, GC-MS) in order to identify either the presence or absence of secondary metabolites such as alkaloids, coumarins, phenolic compounds, flavonoids, glycosides, quinones, tannins, steroids and triterpenoids. The presence of coumarins, secoiridoids, and phenylethanoids is a characteristic feature of *Fraxinus species*. The secoiridoids occur mainly in the form of glucosides and esters of hydroxyphenylethyl alcohols. Lignans, flavonoids and simple phenolic compounds are also common, but they appear to have more limited distribution. The occurrence of coumarins distinguishes the genus *Fraxinus* from the other genera in Oleaceae. *Effects of extraction solvent:* To find the optimal and effective solvent for the extraction process, various solvents were tested as shown in fig 1. Extraction with 70% to 90% ethanol, preferably from: 60% to 90%, and most preferably: 70%. Yielded extract of 10g (60%), 13.7g (70%), 12.2g (80%), 10g (90%) from 100 g of dried *Fraxinus syriaca* plant. In our experiments, 70% ethanol was used due to the highest yield of extraction and the less toxicity of ethanol compared to the other solvents tested in this study (Fig 1).

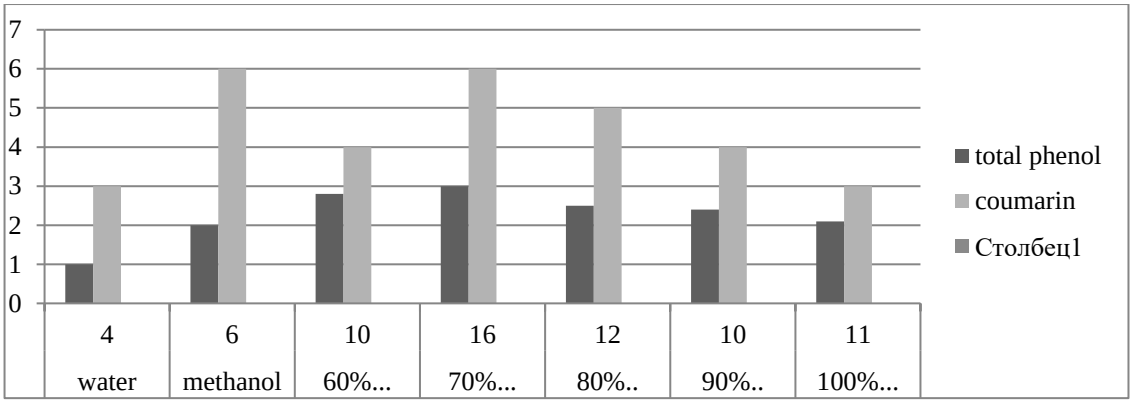

Figure 1 Effect of extraction time on total phenols and flavonoids yield (g/100 g)

The aerial parts of *F syriaca* (1 kg) were extracted at room temperature at 45˚C with 70% EtOH (15 L × 6 times, each time 48 h). The crude extract was suspended in water (1:1) and fractionated successively with *n*-hexane, $CHCl_3$, EtOAc and n-BuOH. Phenolic compounds especially coumarins were detected from the aqueous extract by two-dimensional paper chromatography in system solvents (butyl alcohol: acetic acid: water (40:12.5:29), were detected the phenolic compounds especially coumarins. Steroids and terpenoids were detected by TLC method using cerium sulfate as developer.

In conclude, The article presents the results of studying the content of various components in the composition of a crude plant extract using standard research methods. The phytochemical method was used to characterize the presence of coumarins, flavonoids, phenols, terpenoids, steroids and other compounds. It was shown that by determining the change in the color of the test solution or by the formation of sediment, it is possible to assess the presence of various components of the extracts of the studied plants.

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