

DETERMINATION OF THE AMOUNT OF CERTAIN REPRESENTATIVES OF FLAVONOIDS IN SAFFRAN AND THEIR IMPORTANCE IN FOLK MEDICINE.

Ubaydullayev Komiljon Tursunboyevich,

Andijan State Medical Institute

Doctor of Philosophy (PhD) in Chemical Sciences,

Senior Lecturer of the Department of Biological Chemistry

(komiljonubay84@gmail.com)

Abstract: Saffron is a valuable plant that has been used in folk medicine for the treatment of many diseases since ancient times. Saffron contains carbohydrates, proteins, water, caratinoids, flavonoids, vitamins and inorganic substances.

In this study, we determined the amount of some representatives of flavonoids in the extract prepared from saffron stigmas using the method of high-performance liquid chromatography.

Keywords: Saffron, flavonoids, bioactive compounds, antioxidant, anti-inflammatory.

Introduction. In folk medicine, saffron has long been used for the treatment and prevention of a number of diseases, such as headaches, bronchitis, kidney stones, nasal diseases, weakness, cirrhosis of the liver, sexual weakness, bleeding gums, epilepsy, heart disease, and it is a plant that has not lost its importance and value in modern medicine[1].

It has been established that the petals of saffron have antioxidant activity, therefore saffron is a promising natural product in this regard. It has been established that saffron flowers contain some representatives of flavonoids and contribute to the antioxidant activity of saffron[2].

Flavonoids are found everywhere in the plant world. They appear as the main part of the daily diet, such as vegetables, fruits, nuts, seeds, stems, flowers, tea, and wine[3].

In addition to the use of gallic acid and its ester derivatives in the food industry as fragrances and preservatives, there are various scientific reports on the biological and pharmacological activity of these phytochemicals, such as antioxidant, antimicrobial, anti-inflammatory, anti-cancer, cardioprotective, gastroprotective, and neuroprotective effects[4].

Rutin is a flavonole, abundant in plants such as buckwheat, tea, and apples, and it is an important ingredient in food products. Chemically, it is a glycoside that exhibited a range of pharmacological activities, including antioxidant, cytoprotective, vasoprotective, anticarcinogenic, neuroprotective, and cardioprotective[5].

Studies have shown that quercetin has several beneficial biological properties, including antioxidant, anti-inflammatory, antitumor, and antiviral properties[6].

Analysis of the literature indicates that apigenin has several important pharmacological properties. These include diseases such as diabetes, cancer, and insomnia[7].

Several studies have shown that consuming foods containing campferol can reduce the risk of developing a number of diseases, including cancer and cardiovascular diseases[8].



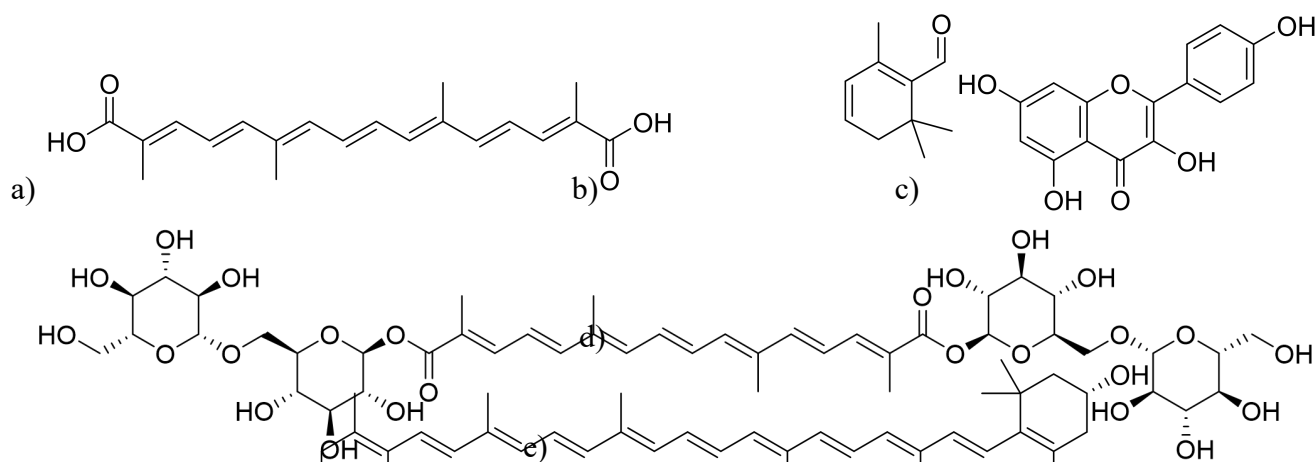


Figure 1. Structural formulas of some representatives of flavonoids: a) crocetin; b) safranal; c) campferol; d) crosin; e) zeaxanthin;

Experimental part. The following method was used for the qualitative and quantitative determination of flavonoids in the stigma of saffron flowers.

96% ethyl alcohol was used as a solvent for the extraction of the determined substances from the saffron sample. For this, 0.5 grams of the saffron sample were weighed, mixed with 20 ml of alcohol, and extracted using a magnetic stirrer at a temperature of 30°C for 75 minutes. The content of rutin, gallic acid, and quercetin in the samples was determined using the Agilent Zorbax 4.6 mm ID x 12.5 mm cartridge and the Perkin Elmer C18 250x4.6 mm 5 µm C18 (USA) column as a stationary phase. For this purpose, a calibration curve was obtained from a 0.5% solution of acetic acid in a ratio of 35:65 and standard solutions in acetonitrile of various concentrations: 0.025 mg/ml and 0.05 mg/ml, with a flow rate of 1 ml/min, a thermostat temperature of 40°C, and an injection sample volume of 10 µl. The following chromatogram was obtained on a HPLC (LC 2030 C3D Plus Shimadzu Japan) device based on standard samples with 2.5 minutes of gallic acid, 3.6 minutes of rutin, and 16 minutes of quercetin.

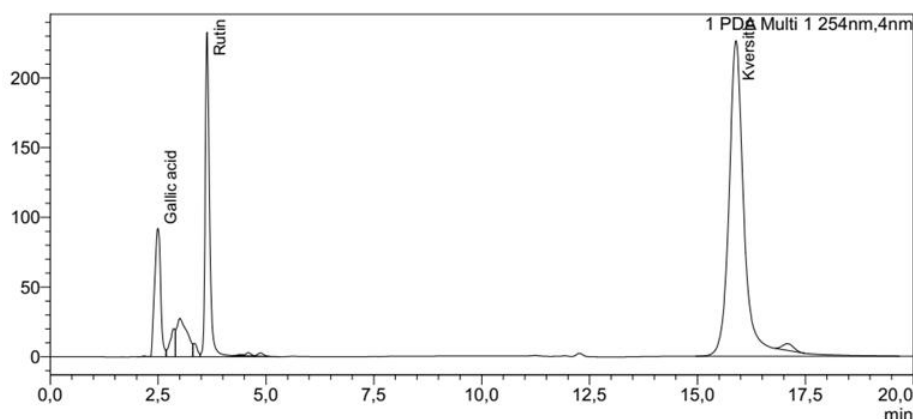


Figure 2. Chromatogram of standard solutions.



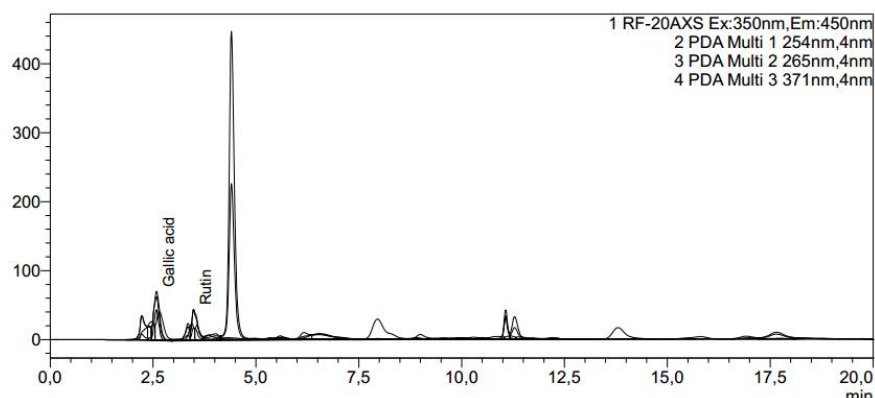


Figure 3. Chromatogram of saffron extract.

During the analysis of apigenin and campferol, based on the parameters of the above device, a chromatogram was obtained at a flow rate of 0.75 ml/min at 12 min. in the following gradient mode.

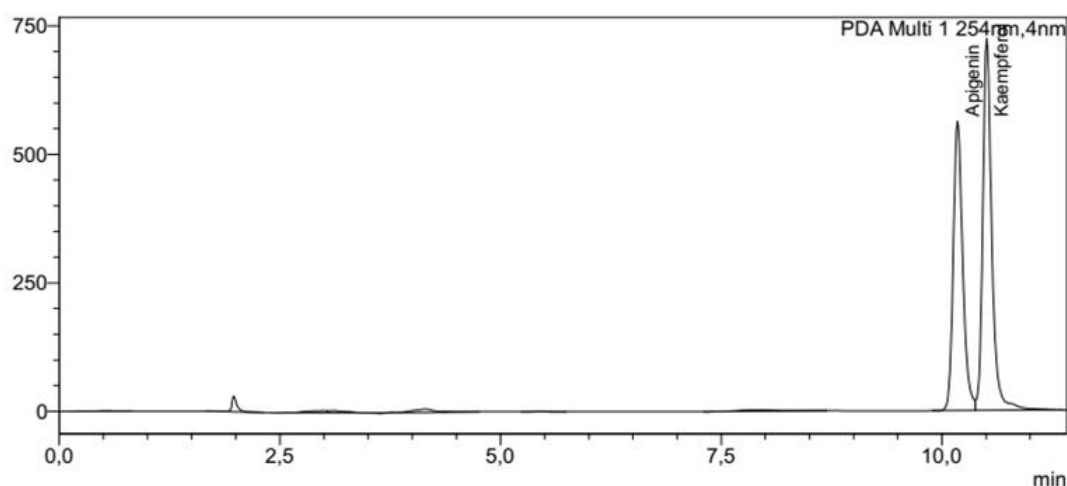


Figure 4. Chromatogram of standard solutions.

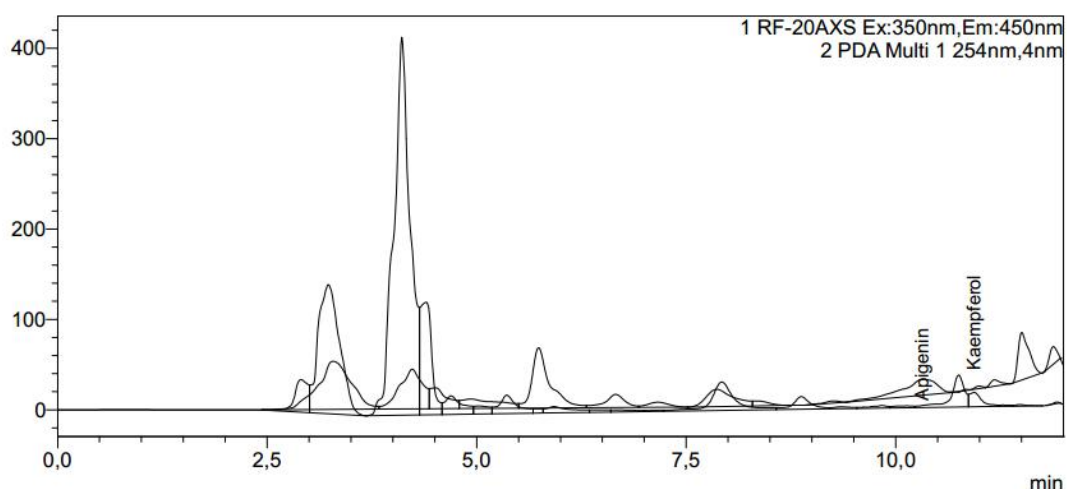


Figure 5. Chromatogram of saffron extract.

The content of flavonoids in the extracted saffron sample is presented below (Table 1).



Table 1.**Results of determining the content of some flavonoids in saffron extract by high-performance liquid chromatography**

	Gallic acid (mg/g)	Rutin (mg/g)	Kversitin (mg/g)	Apigenin (mg/g)	Kaempferol (mg/g)
Saffron	1.56	0.56	0	0.04	0.4

The indicators presented in Figures 3 and 5 and Table 1 above show that the amount of gallic acid, rutin, and campferol in the extract obtained from saffron rose petals is significantly higher than the amount of apigenin, while quercetin is not detected.

Conclusion. Due to the presence of many biologically active substances in saffron, it has been used in folk medicine for many centuries to treat many diseases. Flavonoids also make a worthy contribution to its acquisition of these valuable properties.

As a result of our research, the presence of important representatives of flavonoids, gallic acid, rutin, quercetin, and campferol in the extract prepared from the stigma of saffron, grown in the Surkhandarya region of Uzbekistan, was determined by high-performance liquid chromatography.

Based on this, we propose the use of extracts, ointments, and food supplements based on this plant in folk medicine for the prevention and treatment of various diseases, such as inflammation, cancer, cardiovascular diseases, diabetes, and insomnia.

Especially since it has a flavonoid composition, this plant has a natural healing antioxidant nature.

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