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EXPRESS METHOD FOR THE QUANTITATIVE DETERMINATION OF THE TOTAL FLAVONOIDS IN THE FLOWERS OF *Sophora japonica*

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Flavonoids that possess the capacity for decreasing the permeability and fragility of capillaries belong to the vitamin P group. They are present in the form of glycosides in many plants. Great interest is presented by *Sophora japonica* — the main natural source of rutin, a representative of the vitamin P group.

In the present paper we consider the results of an investigation of the content of flavonoids in *Sophora japonica* flowers. Our aim was to develop an express method and to determine the level of flavonoids in the flowers of *Sophora japonica* growing under the conditions of the Zaporozhskaya oblast of the Ukraine.

The flavonoid composition of the *Sophora japonica* flowers was investigated by thin-layer chromatography, and it was established that the main component was rutin. This agrees with the results of an investigation of *Sophora japonica* growing in the Northern Caucasus [2]. In the report mentioned, it is stated that the buds, flowers, and leaves of the plant contain only rutin, sometimes in admixture with a small amount of quercetin, and it is shown that the maximum amount of rutin in the dried buds may amount to 34.5%, after which, in the flowering period, it falls and at the end of flowering it amounts to 15—17%.

In view of what has been said above, it is desirable to determine flavonoids calculated as rutin.

Highly selective methods for the quantitative determination of rutin by a spectrophotometric method in combination with thin-layer chromatography have been described [3, 4]. The methods are characterized by long times (more than 6 h) and presuppose the use of a toxic reagent in short supply — methanol. It is not desirable to use these methods for the express evaluation of the level of rutin in raw material.

An advantage of the method that we propose is its rapidity (about 4 h) and the convenience of the conditions used. For the quantitative determination of flavonoids in *Sophora japonica* flowers we have developed an analytical procedure consisting of the following stages: comminution of the raw material, extraction, performance of a reaction, and spectrophotometric determination.

For the extraction of the total flavonoids, 1 g (accurately weighed) of air-dry comminuted raw material is covered with 10 ml of 70% ethanol. The mixture is boiled on the water bath for 30—40 min, the alcoholic solution is filtered, and extraction with ethanol is continued (3—4 times, until the reaction on flavonoids — cyanidin test — is negative).

The extracts obtained are combined in a 50-ml measuring flask and brought up to the mark with 70% ethanol. To 10 ml of this diluted extract in a 25-ml measuring flask are added 0.5 ml of a 0.1% solution of copper chloride, 2 ml of a 0.1% solution of Diazol Rose O (4-nitro-2-methoxyaminobenzenediazonium naphthalene-2,7-disulfonate), and 1 ml of 10% sodium carbonate solution, and the mixture is made up to the mark with water and carefully mixed.

The optical density is measured with the aid of a SF-46 instrument in cells with a layer thickness of 1 cm at 424 nm against a background of a control solution. An experiment with 1 ml of 0.06% solution of rutin (solution of a standard specimen — SSS) prepared by dissolving a weighed amount of rutin in 70% ethanol with heating on the water bath in a 25-ml measuring flask was carried out under analogous conditions.

The control solution — 0.5 ml of a 0.1% solution of copper chloride, 2 ml of a 1% solution of Diazol Rose O, and 1 ml of a 10% solution of sodium carbonate — was added to a 25-ml measuring flask and brought up to the mark. Flavonoid contents were calculated by the formula generally adopted.

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TABLE 1

Number of determinations, n	x, %	s^2	$s_r \times 10^2$
6	13.22	1.749×10^{-1}	1.323

The results of a quantitative determination of flavonoids in *Sophora japonica* flowers, calculated as rutin, are given in Table 1.

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