Study of chemical composition and antioxidant activity of magnolia plant seed

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Abstract. In the article, some physiological and biochemical properties of the seeds, leaves, and inflorescences of Magnolia soulangeana, Magnolia grandiflora, and Magnolia stellate, introduced in Uzbekistan, were studied. In particular, the amount of macro- and micronutrients in the generative organs was determined and analyzed. The amount of heavy metals and toxic substances such as Cd, Sb, Ng, Va, As in Magnolia soulangeana and Magnolia Grandiflora plants was also determined. Antioxidant activity of plant species gultoji leaves was also studied. When comparing the indicators of studied species Magnolia soulangeana, Magnolia Grandiflora and Magnolia stellate, it was observed that antioxidant activity is relatively low in Magnolia Grandiflora species.

1 Introduction

All plants are vital to living things on our planet because they provide us with food, oxygen for breathing, medicine, wood, fuel, fiber and other essential elements for life. In addition, plants are a habitat for many different organisms and species, they conserve soil, regulate moisture and contribute to environmental stability. In addition, the magnolia tree is one of the wonderful and very important plants on our planet [1, 2].

Landscaping and landscaping works are being carried out very intensively in our country. In this regard, the work done in recent years is particularly noteworthy. Growing fruit and ornamental trees is very beneficial for ecology. For this reason, a lot of work is being done in this regard in our country. President Shavkat Mirziyoyev announced the nationwide project "Green Space". 200 million per year within the framework of the project. It is planned to plant trees and shrubs.

The magnolia family is one of the oldest families, including about 100 species, and its representatives are distributed in tropical and subtropical countries. Representatives of this genus are evergreen or deciduous trees and include about 20 species. Such plants grow wild in Southeast Asia and the Atlantic states of North America and Florida [2, 3].

There are about 80 species of evergreen or deciduous trees belonging to the magnolia family in East and South-East Asia, North America, South-East and Central America. Magnolia soulangeana, Magnolia grandiflora and Magnolia stellate are cultivated as

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ornamental plants in Uzbekistan. Of these, the large-flowered Magnolia is widespread as an evergreen ornamental tree. The leaves of the one grown in Uzbekistan fall in autumn. It is 10–13 m tall. The leaves are elliptic or ovate, shiny, banded, arranged in a row. Flowers are large, white, fragrant, solitary. The leaves contain essential oils, glucosides, alkaloids in the bark and root. A liquid extract made from the leaf is used to lower blood pressure [4-6].

In the official list of medicines published by the Ministry of Health in 1990 in our republic, there are about 282 medicinal plants used in medicine [3-13], but currently there is very little information about the pharmaceutical properties of acclimatized plants brought to our country, and the biologically active substances contained in them. In addition, obtaining information about the magnolia plant and its physiological and biochemical properties prompted us to do this work, to study the seed composition of magnolia species introduced to Uzbekistan and some physiological and biochemical properties of the plant.

2 Materials and methods

For this research work, 3 types of evergreen or deciduous tree species belonging to the magnolia family, Magnolia soulangeana, Magnolia grandiflora and Magnolia stellate, which are grown as ornamental plants in Uzbekistan, were studied. As a result of the effect of trace elements in plants, the amount of chlorophyll in the leaves increases, photosynthesis increases, and the assimilative activity of the whole plant increases [5, 6].

Experiments were carried out on seeds, leaves and petals of Magnolia soulangeana, Magnolia Grandiflora and Magnolia stellate species. In this case, 1 gram of raw plant tissue is crushed and homogenized in 50% ethanol. The extract is centrifuged at 7000g for 10 minutes. Research was conducted with the resulting filtrate.

In preliminary experiments, the chemical composition of the seeds of Magnolia soulangeana and Magnolia Grandiflora plants was studied.

From the studied samples, 200 mg is taken on an analytical balance (FA220 4N) to make a clear solution for analysis. A mineralization device (MILESTONE Ethos Easy, Italy) was used to mineralize the sample. For this, a sample (200 mg), 6 ml of nitric acid (HNO_3) purified on the basis of distillation, i.e., acid distilled in an infrared acid purification device (Distillacid BSB-939-IR) and 2 ml of hydrogen peroxide (H_2O_2) as an oxidant, are placed in the test tube of the device. The whole mixture is mineralized at 1800C for 20 minutes.

After the mineralization process is completed, the mixture in the test tube is diluted with distilled water (BIOSAN, Latvia) to 40 ml in a separate conical volumetric flask.

The solution in the flask was placed in special test tubes in the auto-sampling department for analysis. The prepared sample was analyzed in an Avio 200 ISP – OES Inductively Coupled Plasma Optical Emission Spectrometer (Perkin Elmer, USA). The accuracy level of the device is high and it allows to measure the elements contained in the solution to an accuracy of 10-9 g.

The antioxidant activity of the studied plant raw materials was evaluated by their ability to inhibit the autoxidation of adrenaline in vitro and thereby prevent the formation of active forms of oxygen [7].

It is known that approximately 50% of drugs produced in the pharmaceutical industry worldwide are made from medicinal plant raw materials. In the last 10 years, many plants have been used in the treatment of certain diseases all over the world and in Uzbekistan. Their advantage is their low toxicity and the possibility of long-term use [8, 9], the pharmacological activity of phytopreparations is not inferior to their synthetic analogues, while the complex of biologically active substances has a beneficial effect on the human body. shows that it does not have side effects [10].

In this regard, the purpose of our research is to study the amount of micro- and macroelements in Magnolia - Magnolia soulangeana and Magnolia Grandiflora plants acclimatized in our republic in order to improve the functioning of the human body. The following tasks were set to achieve the goal:

1. Determining and analyzing the amount of macro- and micronutrients in the generative organs of Magnolia soulangeana and Magnolia Grandiflora plants acclimatized in Andijan region;

2. Determination of the amount of heavy metals and toxic substances such as Cd, Sb, Ng, Va, As in Magnolia soulangeana and Magnolia Grandiflora plants.

At the beginning of the experiment, the amount of micro- and macroelements in the Magnolia Grandiflora plant was studied, 27 elements were analyzed and the following results were obtained.

According to the results, 27 different chemical elements were checked in the samples, of which the following elements were found in large quantities in the generative organ of the plant - seeds, and they are listed in descending order: P-830.24 mg, K-285.3 mg, Sa-241.4 mg, Mg-172.18 mg , Na-17.46 mg, As-3,286 mg, Al-1,51 mg, etc.

Table 1. Amount of micro- and macroelements in Magnolia Grandiflora plant.

Chemical element name	The amount is mg/100g	Chemical element name	The amount is mg/100g	Chemical element name	The amount is mg/100g
Mg	172.18	**V**	0.36	**Pb**	0.66
Na	17.46	**Mo**	0.22	**Ag**	0
Li	0.06	**Mn**	0.96	**As**	3.286
K	285.3	**Cr**	0.22	**Sb**	0.144
Ca	241.4	**Fe**	0.551	**Hg**	0.04
Al	1.51	**Co**	0	**Ba**	0.06
B	0.04	**Ni**	0.094	**Cd**	0.14
P	830.24	**Cu**	0.276		
S	1.68	**Zn**	0.478		
Se	0.246	**Sn**	0.132		

At the same time, in the analyzed samples, plant seeds contain several heavy metals: Mn-0.96, Cr-0.22, Fe-0.551, Ni-0.094, Cu-0.276, Zn-0.478, Sn-0.132, Pb-0.66, as well as heavy metals. substances with toxic properties, that is, toxic elements, were identified: As-3,286, Sb-0.144, Hg-0.04, Ba-0.06, Cd-0.14. Sometimes the term "toxic elements" is not appropriate, because any elements and their compounds can have a toxic effect on living organisms at a certain concentration and environmental conditions. It was found that toxic and heavy metals from micro- and macroelements in the studied samples did not exceed the permissible limit (Table 1).

3 Result and discussion

In the next experiment, the amount of micro- and macroelements in the Magnolia soulangeana plant was studied, in which 27 elements were analyzed and the following results were obtained.

According to the obtained results, 27 different chemical elements were examined in the samples taken from this type of plant, from which the following elements were examined in

the generative organ of the plant - seeds, and the following results were obtained: P-777.8 mg, K-220.8 mg, Sa-362.8 mg, Mg–127.2 mg, Na–7.36 mg, As–1.894 mg, Al–1.52 mg, etc.

Table 2. Amount of micro- and macroelements in Magnolia soulangeana plant.

Chemical element name	The amount is mg/100g	Chemical element name	The amount is mg/100g	Chemical element name	The amount is mg/100g
Mg	127.2	**V**	0.4	**Pb**	0.68
Na	7.36	**Mo**	0.2	**Ag**	0
Li	0.06	**Mn**	1.5	**As**	1.894
K	221.8	**Cr**	0.26	**Sb**	0.128
Ca	362.8	**Fe**	0.734	**Hg**	0.02
Al	1.52	**Co**	0	**Ba**	0.16
B	0	**Ni**	1.0	**Cd**	0.06
P	777.8	**Cu**	0.207		
S	1.34	**Zn**	0.718		
Se	0.376	**Sn**	0.146		

At the same time, in the analyzed samples, plant seeds contain several heavy metals: Mn-1.5 mg, Cr-0.26 mg, Fe-0.734 mg, Ni-1.0 mg, Cu-0.207 mg, Zn-0.718 mg, Sn-0.146 mg, Pb-0.68 mg, as well as substances with toxic properties, i.e. toxic elements among heavy metals: As-3.286 mg, Sb-0.128 mg, Hg-0.02 mg, Ba-0.16 mg, Formed Cd-0.06 mg. (Table 2).

The amount of micro- and macroelements in Magnolia soulangeana and Magnolia grandiflora plants is different, and the reason for this may depend on the different living conditions of the plants, climatic conditions, soil conditions.

Many heavy and toxic metals, such as iron, copper, zinc, molybdenum, participate in biological processes and are microelements necessary for the activity of plants, animals and humans in certain quantities. On the other hand, heavy metals and their compounds can have a harmful effect on the human body, they can accumulate in tissues and cause a number of diseases. Elements such as vanadium or cadmium, which are usually toxic to living organisms, may be beneficial to certain types of plants or animals [5, 6].

To regulate the concentration of free radicals in living organisms, special substances - various enzymes, vitamins with antioxidant properties are produced. These compounds are free radical scavengers. Naturally, preparations containing plant antioxidants are recommended for the prevention of various diseases [11, 12].

Antioxidant properties of flavonoids depend on the amount of hydroxyl groups [14, 15]. Therefore, before recommending this medicinal plant as a product containing antioxidants, it is necessary to study its antioxidant properties, indicating the geographical area and time of collection of the plant.

In subsequent experiments, the antioxidant activity of the yellow leaves of three types of magnolia plants - Magnolia soulangeana, Magnolia grandiflora, Magnolia stellata - was studied.

In the experiments, the extracts of apricot leaves in different concentrations of alcohol were studied in the study of the antioxidant activity of the leaves of plants. In the 96% alcohol extract of plants, the following values of antioxidant activity were obtained: Magnolia soulangeana - 97%, Magnolia grandiflora - 15%, Magnolia stellate - 50.1%. In the 74% alcohol extract -64%, 19%, and in the 40% extract - 15%, 10% and 31%. Based on the obtained results, it can be said that the indicator of antioxidant activity in different extracts of the studied plant species was different. Magnolia soulangeana showed high

antioxidant activity. In the case of Magnolia stellate type, the high indicator was shown in 74% alcohol extract, and the indicator was relatively low in the rest of the extracts. The antioxidant activity of Magnolia grandiflora species was also shown in 74% alcohol extract, and the indicator was low in the other experimental groups (Fig .1).

Among the Magnolia soulangeana, Magnolia grandiflora and Magnolia stellate species of the studied plant, the lowest indicator of antioxidant activity is observed in the Magnolia grandiflora species can be.

According to the scientific literature, the antioxidant activity and composition of each plant is qualitatively and quantitatively specific to the plant itself. Each plant has a unique composition of antioxidants, which depends on the growing season, geographical location and climatic conditions of growth [14-36].

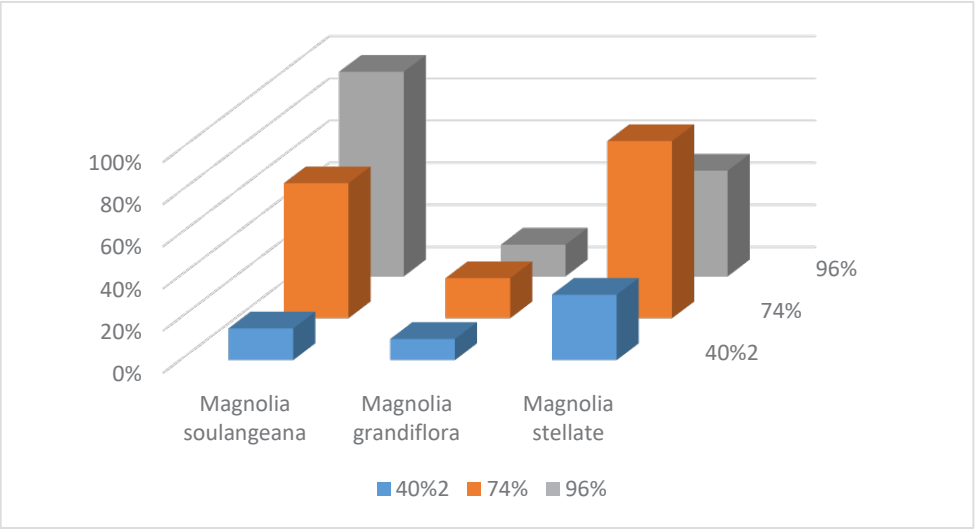

Fig. 1. Antioxidant activity in yellow leaves of Magnolia soulangeana, Magnolia grandiflora and Magnolia stellate species (in %).

In conclusion, we can state the following points, the elements (Mg, K, Mn, Se) in the studied plant species can be considered promising sources for obtaining biologically active substances. The amount of heavy and toxic elements in the seeds of Magnolia soulangeana and Magnolia grandiflora species was found not to exceed the permissible limit (PDK), which indicates that the raw materials of medicinal plants are ecologically clean and safe, and that they can be recommended for use as biologically active substances for medical purposes. .

When comparing the indicators of Magnolia soulangeana, Magnolia grandiflora and Magnolia stellate species of the studied plant, the indicator of antioxidant activity is the lowest in Magnolia grandiflora species, and the reason for this depends on the growing area, climate and soil composition of this species. can be According to the scientific literature, the antioxidant activity and composition of each plant is qualitatively and quantitatively unique to the plant itself. Each plant has its own antioxidant composition, which depends on the growing season, geographical location and climatic conditions of growth.

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