

# Mutual Influence of Biologically Active Compounds in Medical Plants Composition

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**Abstract**—The article deals with studies of the mutual influence of the components of herbs. The research in this area is too difficult because of the lack of an accurate data about chemical composition of natural raw materials. Therefore, the aim of the research was: to study the aspects of chemical composition of natural substrates, an analytical comparison of the quantitative content of vitamin C and antioxidant activity in medicinal plants, the study of the mutual influence of extracts of medicinal plants in their mixtures, analysis of changes in vitamin C quantity and antioxidant activity of extracts of medicinal plants when the last ones are added to green and black tea solutions and determination of the total content of hamazulen in flowers of chamomile and influence on it of other medicinal plants at the joint presence.

**Keywords**— *medicinal plants, antioxidant activity, vitamin C, hamazulen, joint presence of medicinal plants*

## I. INTRODUCTION

Currently, one of the urgent tasks in the treatment of diseases is searching of methods of alternative medicine. As many people widely use the gifts of nature, the popularity of medicinal plants is increasing. However, among the many plant species known nowadays, only a small part of them is actively used. The objects of our study were the most commonly used medicinal plants.

### *Aloe*

*Aloe arborescens* L. is a famous plant. The birthplace of the plant is southern and eastern Africa. It is currently grown around the world. Aloe has retained its healing value in modern scientific medicine.

Despite such a long period of use of this plant, the chemical composition of aloe has not been adequately studied, especially its activated preparations. The main active ingredients of aloe are considered derivatives of anthracene - emodin, aloin, barboloin, aloedin; resins; essential oils; polysaccharides; succinic acid; salts of K, Ca, Mg, Fe. The plant concentrates salts of Ca, Cu, Zn, Se, Li [1].

The composition of leaves and aloe juice includes resinous substances (up to 10%), organic acids (l-coumaric, cinnamon, citric and isimonc, malic and succinic acids), esters, phenols, polyuronides, C-glycosyl-chromon-aloesin, chrysophane acid, anthrons, homonataloin, emolin, aloin, nataloin, rabarberon, emodin, allantoin, volatile, vitamins C,

E and group B, beta-carotene, micro and macro elements, and other biologically active substances.

Aloe has antioxidant properties, as it contains vitamins E, C, group B and beta-carotene, which is converted into vitamin A in the body - these vitamins are effective protectors of cells against oxidation.

The main field of use of aloe is pharmaceuticals and medicine, it is also used for decorative purposes, in the cosmetics industry and in cooking, as a means to stimulate appetite.

Aloe preparations have a laxative, choleric, antibacterial effect, have expressed anti-inflammatory and anti-burn properties, enhance the secretion of digestive glands, improve appetite and digestion

In official medicine, they are used for diseases of the gastrointestinal tract, in the treatment of burns, long non-healing wounds and ulcers, gastritis, enterocolitis, gastroenteritis, gastric ulcer and duodenal ulcer, as well as bronchial asthma, pulmonary tuberculosis and hypochromic anemia.

From aloe, biogenic stimulants are used for radiation injuries of the skin, anemia, eye diseases, inflammatory diseases of the oral cavity and throat, to normalize menstruation and increase immunity. We note the high effectiveness of the treatment of conjunctivitis, keratitis, blepharitis, opacification of the vitreous body, progressive myopia and other eye diseases with aloe preparations.

Fresh aloe juice improves appetite, increases the body's resistance to infectious diseases and is effective for constipation, gastroenteritis, enterocolitis, chronic gastritis with low acidity. For external use, it is used to treat purulent wounds, burns, osteomyelitis, trophic ulcers, as well as to rinse with diseases of the oral cavity and gums. Compresses from fresh juice are used for tuberculosis of the skin, lupus, eczema and radiation dermatitis of the head.

Aloe liquid extract is recommended for the treatment of eye diseases, with bronchial asthma, gynecological diseases, chronic gastritis, gastric ulcer and duodenal ulcer.

Aloe and its preparations are contraindicated for: hemorrhoids, menstruation, pregnancy, acute diseases of the kidneys and gall bladder, during periods of exacerbation of diseases of the gastrointestinal tract (gastritis, ulcer, cholecystitis and others), uterine and hemorrhoidal

hemorrhages, hemoptysis, individual intolerance and small children .

### **Hawthorn**

*Crataegus sanguinea* Pall. This is a well-known and very common medicinal plant. A plant in medical practice since ancient times. It is official in modern scientific medicine.

Varieties of hawthorn contain essential oil. Hawthorn fruits are rich in flavonoids - quercetin, hyperoside, vitexin. Fruits also contain organic acids - citric, oleanic, ursolic, crotegus, coffee, chlorogenic. Carotenoids, tannins, fatty oils, pectins, triterpene and flavonoid glycosides, b-sitosterol, choline, sugars, vitamins were also determined. Hawthorn fruits contain in large quantities I, vitamins B1, B2, PP, C, E [2].

Most often, hawthorn is used in the form of tinctures, infusions, decoctions. Alcohol tinctures are stored much longer, and this is their undoubted advantage.

Hawthorn is a producing plant. The fruits are harvested at the stage of full maturity and dried in warm rooms or in dryers at temperatures up to +70 ° C on sieves. The main active ingredients are flavonoids: hyperoside, quercetrin, quercetin, vitexin, acetylvitexin, as well as hydroxycinnamic acids - coffee and chlorogenic [3].

In folk medicine, tea from dried fruits and leaves of hawthorn is drunk for heart pain, suffocation, hypertension, and gastrointestinal diseases [2].

Hawthorn can be taken without much concern, since it is completely non-toxic. But still, you should beware of hawthorn if you have hypotension, bradycardia, during pregnancy or breastfeeding.

### **Red rowan**

*Sorbus aucuparia*. This tree, less often a shrub, with smooth gray bark and pubescent young shoots, which then become bare, shiny, grayish-reddish.

The fruits contain vitamin C (up to 160 mg%), flavonols (150 - 229 mg%), catechins (114 - 412 mg%), anthocyanins, carotenoids:  $\beta$ -carotene (0.53 - 4.62 mg%),  $\beta$  -carotene epoxide, cryptoxanthin, malic (2.01 - 2.70%), citric, tartaric, succinic, grape acids; sugar: glucose (3.8%), fructose (4.3%), sucrose (0.7%), l-sorbose; alcohol-sorbitol, ursolic acid, tannins (about 0.3%), a significant amount of amino acids (235.9 mg%), among which cystine, cysteine, lysine, histidine, arginine, aspartic acid, glycine,  $\alpha$ -alanine were found, tyrosine and others. The bitter taste of the fruit is due to parasorbic acid monoglycoside (0.8%). The amount of vitamins, organic acids and sugars varies depending on the place of growth and the degree of maturity of the fruit. By the amount of carotene, the fruits of red rowan exceed a number of varieties of carrots. According to the content of P-active substances, mountain ash can be put on one of the first places among fruit and berry crops [4].

In medical practice, the dried fruits of red rowan are used mainly in the form of tea and fees as a preventive and therapeutic agent for scurvy and other vitamin deficiencies,

and the liquid extract from fresh berries is used as a gentle laxative.

The experiment found that the mountain ash essential extract increases blood coagulation, sorbic acid has a bactericidal effect.

Red rowan is widely used as a remedy abroad. In Bulgaria it is used as a laxative, diuretic, hemostatic, for rheumatism, kidney stones and the bladder and as a high-vitamin remedy. In Poland - with diabetes, kidney disease, liver, bladder and vitamin deficiency. In Hungary, it treats dysentery, in Norway - dropsy, and is also used externally as poultices to treat open wounds and fractures.

In Russian folk medicine, fresh fruits of red rowan are used as a diuretic, hemostatic and laxative, and juice and dry berries are used for dysentery and for stimulating appetite, and infusion of dried berries for hemorrhoids and as an anti-scurvy agent. Rowan fruits are also used for atherosclerosis, hypertension and kidney stone disease.

Rowan fruits are widely used in the food and confectionery industry for the preparation of preserves, marshmallows, juices, fruit drinks, fillings, vinegar. Especially valuable are varieties with large and sweet fruits, rich in juice (44 - 56%). Ripe fruits can be used to produce carotene, and green fruits are a valuable raw material for producing malic acid.

Red rowan can bring people with increased blood coagulation. It is worth refusing to consume fruits for some heart diseases, for example, with coronary heart disease. Contraindications to the use of red mountain ash are in people with increased acidity of gastric juice. Do not use berries with a tendency to thrombosis and hyperacid gastritis.

### **Peppermint**

*Mentha piperita* L. Perennial herb. Peppermint is one of the most common types of medicinal plants. It is widely used in medicine, cooking, household chemicals and cosmetology.

Peppermint contains an essential oil (2-3%), the main component of which is menthol, which determines the taste and anesthetic properties of mint, as well as other substances: esters, felandren, pinene, yasmol, piperitone, mentofuran, etc. It also contains rutin (0.015%) and other polyphenolic compounds, tannins and tarry substances, carotene (0.01%), ascorbic acid (0.01%) [5].

In addition to menthol, leaf oil contains meyton, menthyl acetate, pinene, limonene, cineole, puluegon, jasmone and other monocyclic terpenes. The main components of the inflorescence essential oil are ketone l-menton, l-menthol and mentofuran. Flavonoids, ursolic and oleanolic acids, carotene, hesperidin, betaine, sterols were found in the leaves. Azulenes, polyphenols, anthocyanins and leukoanthocyanins, trace elements (copper, manganese, strontium, etc.) were also isolated.

Peppermint is used as a medicine externally and orally in the form of infusions and teas for gastrointestinal diseases,

to lower the temperature for colds, as a sedative for palpitations, depression and insomnia, as a painkiller in the form of compresses from the decoction, as an anesthetic for burns and bites insects, and also relieves stress and headache. Peppermint has long been used in the form of galenic preparations, infusions and tinctures. Mint is used as a remedy that reflexively improves blood circulation in the vessels of the brain and heart, as an antispasmodic for spastic phenomena in the gastrointestinal tract, bile ducts, and pancreatic ducts [6]. Mint and its preparations cannot be used uncontrollably. The pungent smell of peppermint preparations, the excess of their dose in inhalation devices can provoke bronchospasm, respiratory disorders until it stops. Perhaps the appearance of pain in the heart with excessive consumption of peppermint preparations.

### **Chamomile**

*Matricaria chamomile* L. This is one of the most popular medicinal plants. Chamomile has been used as a medicine since ancient times.

For the preparation of medicinal raw materials, chamomile inflorescences are used. The uniqueness of chamomile inflorescences lies in their chemical composition. The pharmacological effect of chamomile preparations is due to the presence of essential oil in it, the main component of which is essential oils, including chamomile; derivatives of luteolin, apigenin, quercetin; free organic acids: antemismic, caprylic, salicylic, isovalerianic; phytosterols; coumarins umbelliferon and herniorin; mucous and tannins; ascorbic (C) and nicotinic acid (PP); carotene; protein compounds; glycosides; flavonoids. Due to this composition, chamomile has a wide range of medicinal properties. Let us dwell in more detail on some of the most significant components of this plant [7].

Chamomile azulene is called chamazulen. Typically, its content in essential oil is from 1.5 to 9%, but in breeding varieties of chamomile pharmacy, the content of chamazulen can reach 10% or more. Chamazulen, like, however, all azulenes, has anti-allergenic, anti-inflammatory and bacteriostatic activity.

Chamomile pharmacy has been widely used in the form of decoctions, infusions, baths. The oil obtained from it is also used. Flowers are part of many gastric and diaphoretic collections. The infusion prepared on their basis has a number of actions: anti-inflammatory; antiseptic; painkiller; hemostatic; sedative; soft binder; choleric; sweatshops; anticonvulsant [8].

Chamomile preparations have been used as an antispasmodic, carminative. They are widely used for: intestinal cramps; gastritis; colitis; diarrhea; flatulence; menstrual irregularities.

Outwardly infusion and decoction of chamomile pharmacy are used: for baths; for rinsing the mouth, throat; in the form of poultices (steamed flowers are used); like an eye lotion; for washing purulent wounds.

Despite the exceptional healing properties, in some cases chamomile cannot be used. In particular, doctors do not

recommend it during pregnancy, since this plant contains substances that stimulate the production of estrogen, which is undesirable during the period of gestation and can even provoke a miscarriage. An overdose of chamomile-based drugs is also dangerous. It often causes severe headaches, dizziness, and irritability.

### **Sage**

*Salvia officinalis* L. Known spice and medicinal plant. A plant from ancient times in medical practice. One of the oldest remedies.

Sage leaves contain up to 2.5% of essential oil, which includes cineole, pinene, thujone, borneol and other terpene compounds; as well as phenolic compounds - flavonoids (derivatives of luteolin and apigenin), tannins, derivatives of hydroxycinnamic acids (rosmarinic, coffee, chlorogenic, ferulic), sugars and polysaccharides, vitamins of group B, PP and C, triterpene saponins - derivatives of ursolic and oleanol acids [9].

Sage has a very long history of effective use as a means for oral administration in the form of decoctions for diseases of the predominantly digestive system. In official medicine, sage is known primarily for its anti-inflammatory and antimicrobial properties, which make mouth and mouth rinses effective for treating inflammation, ulcers, etc. In addition, it has astringent, choleric, antispasmodic, vasodilating, stimulating and tonic properties. Sage is also used in the treatment of excessive lactation, excessive night sweats, excessive salivation (as with Parkinson's disease), profuse sweating (as with tuberculosis), with female infertility and problems in menopause [10].

Sage cannot be drunk with acute inflammation of the kidneys, hypothyroidism (decreased production of thyroid hormones), as well as with individual hypersensitivity to active substances. Since healing grass has estrogenic properties, it is categorically contraindicated in women with diagnosed polycystic, myoma, or endometriosis. Another contraindication to taking Sage preparations is pregnancy and the period of breastfeeding.

### **Rosehip**

*Rosa cinnamomea* L. This is a wild bush with healthy fruits. A very common and very famous medicinal plant. As an ornamental plant, it is grown very rarely.

Rosehip berries contain more ascorbic acid than lemons and currants. It is a good natural antioxidant. Rosehips contain a large number of vitamins such as A, P, E, K, B2. Found carbohydrates, carboxylic acids, amino acids, flavonoids, carotenoids, pectin substances. Among its useful properties is a bactericidal effect [11].

Rosehip have useful properties, many people know: it strengthens the immune system, makes the body resistant to various diseases, treats chronic and acute inflammatory processes.

Useful properties of rosehip berries are used in the treatment of gallstone disease. Rosehip is also able to

stimulate the function of the gonads, stop bleeding, and reduce vascular fragility.

Rosehip tea is drunk as a preventive measure during influenza epidemics. Mixed with honey, drink it and patients with respiratory viral infections. This speeds up recovery and makes symptoms and complications easier.

Rosehip is contraindicated in both cores and people with a tendency to form blood clots. People with high blood pressure should not drink alcoholic tinctures of rose hips (generally, nobody should drink alcoholic tinctures - alcohol is harmful and dangerous, no rosehip can fix this), and hypotonics - water tinctures.

If you take drugs from rose hips for a long time, this can adversely affect the health of the liver, until the appearance of non-infectious jaundice.

### **Tea**

*Camellia sinensis* L. Unique chemical factory. The first serious studies of tea chemistry began as early as the beginning of the 20th century on Javanese plantations, however, the exact composition of tea is still unknown.

Leaves contain 9-36% tannins, among them up to 26% soluble and up to 10% insoluble, resins, nucleoproteins containing iron and manganese. The composition of soluble tannins includes gallic catechin gallate, L-epicatechin gallate, L-epigallocatechin, L-gallocatechin gallate and L-epicatechin, free gallic acid and other substances. Alkaloids were also found in the leaves — caffeine (1.5–3.5%), theophylline, theobromine, xanthine, adenine, hypoxanthine, paraxanthin, methylxanthine, isatin, and other organic bases. Flavonoids were found - kempferol, 3-ramnoglycoside kempferol, quercetin, quercetrin, isocvercitrin, rutin, etc.

A significant part of the leaves and branches of tea cut off when caring for tea bush plantations (during molding), as well as tea dust generated in tea-packing factories, are used as raw materials for the factory production of caffeine and theophylline alkaloids. Caffeine is an important drug. It acts exciting and tonic on the central nervous system, improves mental and physical activity, is a diuretic and a remedy for migraines. Theophylline is used as a means of improving coronary circulation, as a diuretic for circulatory disorders of cardiac and renal origin. Tea alkaloids are included in a number of drugs (aminophylline, diuretin, etc.) used for coronary insufficiency, hypertension, bronchial asthma, angina pectoris, cardiac edema, etc.

In addition, a complex of catechins with P-vitamin activity is obtained from old tea leaves and tea dust, used for disorders of permeability and increased fragility of blood vessels, hemorrhagic diathesis, retinal hemorrhages, radiation therapy, hypertension, etc. Due to the presence of caffeine and tannins Tea drink and secreted alkaloid caffeine are used as an antidote for poisoning by poisons, narcotic substances and alcohol.

Despite all the positive properties of tea, do not abuse it. Since tea lowers blood pressure, hypotonics should not be drunk. You cannot get carried away with tea with: acute form of hypotension; any diseases in the exacerbation phase;

diseases accompanied by high fever. It should be remembered that tea enhances the acidity of gastric juice, which is undesirable for stomach ulcers and duodenal ulcers. Suffering from rheumatoid arthritis is also better to refuse this drink. Exciting substances that make up tea - caffeine, theobromine and theophylline - are active on the nervous and cardiovascular systems. Therefore, do not get involved in tea, especially strong ones, for people suffering from tachycardia, increased irritability, and insomnia. Remember that in the tea left for later, the amount of purine compounds and caffeine increases. Such tea is especially dangerous for patients with hypertension, glaucoma and gout. Tea is not recommended to drink on an empty stomach, as well as while taking alcohol. Tea with alcohol forms aldehydes that have a poor effect on the kidneys.

Thus, it is of interest to study not only the properties of individual extracts of medicinal plants, but also how medicinal plants can influence on each other in terms of the manifestation of their antioxidant activity and the content of the main biologically active substances in the preparation of drug collections.

## **II. EXPERIMENTAL**

The objects of study was:

Raw aloe-vera leaves grown in the hostel No. 4 of the Belgorod State University. They were taken in 2017 from three-year-old plants. Fresh undamaged leaves of various lengths, as well as parts of the leaf, were selected for the study.

The fruits of the pharmaceutical hawthorn were produced by the company Krasnogorskskleksredstva OJSC, Russia, 143444, Moscow Region, the city of Krasnogorsk, Opalikha microdistrict, Mira Street, 25; Harvested in March 2016 and valid until April 2018.

Peppermint pharmacy leaves were produced by the Claimant PKF Fitofarm LLC, Russia, 353440, Krasnodar Territory, Anapa city, Lenina street, 112; harvested in January 2016 and valid until February 2018.

The fruits of frozen red rowan were harvested in February 2017 in Belgorod, on Belgorod Avenue.

Pharmacy chamomile flowers were produced by the company Krasnogorskleksredstva AO, Russia, 143444, Moscow Region, the city of Krasnogorsk, Opaliha microdistrict, Mira Street, 25; Harvested in August 2016 and valid until September 2019.

The leaves of the pharmacy sage were produced by LLC Zdorovye Firm, Russia, 121170, Moscow city, 1812 1812 goda, house 2; harvested in January 2016 and valid until February 2019.

Pharmaceutical rose hips were produced by Zdorovye Firm LLC, 121170, Moscow; harvested in April 2016 and valid until October 2018.

Greenfield Green Tea Flying Dragon tea was made by ORIMI LLC, 188682, Russia, Leningrad Region, Vsevolozhsk District, Sverdlov Village, 1 microdistrict,



district 15/4; harvested in November 2015 and valid until October 2018.

Black Tea Collection Darjeeling Pure Black Tea made in India; harvested in April 2015 and valid until 2018.

Extracts of medicinal plants were prepared in accordance with State standards methodology. The moisture content of medicinal plants was determined by drying in an oven.

The content of ascorbic acid was determined by iodometric titration. Permanganate antioxidant activity was determined by the Leventhal method.

Also in this work, the standardization of raw chamomile pharmacy using picric acid was proposed. A method was developed for the quantitative determination of the total content of chamazulene in the flowers of a pharmacy chamomile by the spectrophotometric method. In the study of the absorption spectrum of an alcoholic solution of essential oil of pharmacy chamomile after treatment with picric acid, it was found that its maximum is at the 657 nm and it coincides with that of chamazulene. The point at 657 nm was chosen as the analytical wavelength.

The total content of chamazulene in the flowers of pharmacy chamomile is in the range of 8.49 - 20.05 mg%. The content of chamazulene in terms of absolutely dry raw materials should be at least - 8 mg%.

### III. RESULTS AND DISCUSSION

The humidity of the studied medicinal plants was determined (table I).

The data obtained were used for further calculations of the content of vitamin C, antioxidant activity and chamazulene.

Content Averaged Results for vitamin C in various extracts of the studied medicinal plants are presented in table II.

The highest content of vitamin C was found in extracts of green tea - 1.96 mg / g, black tea - 1.62 mg / g, and also in aloe extract - 1.5 mg / g. Other indicators have lower values.

In comparison with the original extracts, a decrease in the amount of vitamin C was shown when the plants were mixed with each other (table III,IV).

Further, drug substrates were added to various varieties of tea. From the data it is seen that when medicinal plants are added to black tea, the amount of vitamin C increases

TABLE I. HUMIDITY OF MEDICINAL PLANTS

№	Samples	Moisture content, %
1	Aloe	98,32
2	Hawthorn	7,62
3	Red rowan	65,46
4	Mint	8,92
5	Chamomile	8,54
6	Sage	8,93
7	Rosehip	7,06
8	Green tea	6,09
9	Black tea	7,73

compared with the initial one, but it is not additive. A similar pattern for green tea, with the exception of red rowan and hawthorn.

Next, antioxidant activity was determined in various extracts of medicinal plants (table V).

From the data it follows that the greatest antioxidant activity was found in extracts of black and green tea, and the smallest in extracts of red mountain ash and hawthorn.

TABLE II. VITAMIN C CONTENT IN MEDICINAL PLANTS

№	Samples	Vitamin C, mg[g(1)]
1	Green tea	1,96
2	Black tea	1,62
3	Sage	0,38
4	Chamomile	0,33
5	Mint	0,39
6	Rosehip	0,73
7	Hawthorn	0,23
8	Red rowan	0,17
9	Aloe	1,50

TABLE III. VITAMIN C CONTENT IN MIXTURES OF MEDICINAL PLANTS

№	Mixture		Vitamin C, mg[g(1)]
1	HERBS	Sage + chamomile	0,20
2		Sage + mint	0,22
3		Chamomile + mint	0,22
4		Sage + chamomile + mint	0,27
1	BERRIES	Rosehip + hawthorn	0,19
2		Rosehip + red rowan	0,25
3		Hawthorn + red rowan	0,11
4		Rosehip + hawthorn + red rowan	0,24

TABLE IV. VITAMIN C CONTENT IN TEAS WHEN MEDICINAL PLANTS ARE ADDED

№	Samples	Vitamin C, mg mg[g(1)]	
		Green tea	Black tea
1	Sage	2,79	3,05
2	Chamomile	2,98	3,40
3	Mint	2,93	3,25
4	Rosehip	2,12	2,57
5	Hawthorn	1,74	2,34
6	Red rowan	1,42	1,97
7	Aloe	3,00	3,40

TABLE V. ANTIOXIDANT ACTIVITY OF MEDICINAL PLANTS

№	Samples	AOA, mgO <sub>2</sub> mg[g(1)]
1	Green tea	98,04
2	Black tea	94,62
3	Sage	41,83
4	Chamomile	28,93
5	Mint	31,95
6	Rosehip	29,61
7	Hawthorn	5,73
8	Red rowan	4,90
9	Aloe	18,90

When the antioxidant activity in mixtures of medicinal substrates was determined, it decreased in comparison with the initial values (table VI).

The antioxidant activity of the substrates when adding medicinal plants to green tea also becomes less than the initial values, it practically does not change in black tea (table VII).

Next, we determined the total content of hamazulene in terms of absolutely dry raw materials in the dried flowers of chamomile pharmacy, and it amounted to 10.29 mg%. This result is consistent with published data. The averaged data of chamazulene in chamomile and its mixtures are presented in table VIII.

The research results showed that with the addition of herbal extracts to the chamomile pharmacy, the content of chamazulene decreases compared to the individual component. And when adding green and black tea, the value is almost equivalent.

TABLE VI. AOA OF MEDICINAL PLANTS MIXTURES

№	Mixture		AOA, mgO <sub>2</sub> mg[g(1)]
1	HERBS	Sage + chamomile	27,54
2		Sage + mint	24,70
3		Chamomile + mint	24,64
4		Sage + chamomile + mint	31,59
1	BERRIES	Rosehip + hawthorn	14,64
2		Rosehip + red rowan	11,95
3		Hawthorn + red rowan	4,49
4		Rosehip + hawthorn + red rowan	11,08

TABLE VII. AOA IN TEAS WHEN ADDING MEDICINAL PLANTS

№	Samples	AOA, mgO <sub>2</sub> mg[g(1)]	
		Green tea	Black tea
1	Sage	80,10	126,99
2	Chamomile	92,77	108,00
3	Mint	97,25	122,66
4	Rosehip	92,04	130,00
5	Hawthorn	69,59	114,63
6	Red rowan	54,58	105,84
7	Aloe	116,37	113,01

TABLE VIII. THE TOTAL CONTENT OF CHAMAZULENE IN CHAMOMILE AND ITS MIXTURES WITH MEDICINAL PLANTS

№	Samples	Hamazulene, mg%
1	Chamomile	10.29
2	Chamomile +Green tea	10.56
3	Chamomile +Black tea	10.56
4	Chamomile +Sage	8.53
5	Chamomile+Sage+Mint	8.49
6	Chamomile +Mint	8.54

#### IV. CONCLUSION

The data obtained showed that green, black tea and aloe contain the largest amount of vitamin C among the studied objects (more than 1.5 mg [g(1)]), it was revealed that the highest antioxidant activity was found in extracts of green and black tea (≈100 mg O<sub>2</sub> [g(1)]).

It was found that when berries and herbs are mixed together, the amount of vitamin C and antioxidant activity decreases, however, compared with the initial values, the amount of vitamin C becomes higher when medicinal plants are added to black and green tea.

When medicinal plants are added to green tea, the value of antioxidant activity decreases, in black it practically does not change. It was found that with the addition of herbal extracts, the content of hamazulene decreases, compared with its amount in the chamomile itself. And when you add green and black tea - it does not change.

Thus, studies have shown that to preserve vitamin C, medicinal plants should not be mixed together, but you can add them to tea; to preserve antioxidant activity, it is not recommended to mix and add herbs to tea, and to preserve hamazulene, do not mix chamomile with sage and mint.

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