

Глава 5.

**ФИЗИОЛОГИЯ И БИОХИМИЯ РАСТЕНИЙ**

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**TEA PRODUCTION  
USING DIFFERENT PLANT ADDITIVES**

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The paper is devoted to tea production using various herbal supplements, as well as tea and vegetable supplements for tea production (as well as hawthorn). Their chemical composition is studied. Tea product was accepted in advance for processing tea and other leafy raw materials, 4–7 minutes of fixation, granulation, fermentation and dryness. Blending, granulation and dryness in the case of fruit addition was made. Recycling techniques and modes, formulation and chemico-organoleptic indicators of the new product – "Tea with wild rose hip leaves", "Tea with wild rose hip fruit", "Tea with hawthorn leaves", and "Tea with hawthorn fruit" are selected.

**Key words:** tea, additions, chemical composition, *Rosa caninal* (wild Rose), hawthorn (*Crataegus pentagyna*).

Plant raw material is one of the important sources of food and medicines for humans. Tea's influence on the human body was the subject of interest in the millennium. It affects a lot of human organisms due to the substances included in it, such as alkaloids – caffeine, theophylline and theobromine, phenolic compounds, vitamins, amino acids, micro elements, essential oils, etc. Tea also has anticarcinogenic effect. Polyphenols in its composition have the ability to actively tighten carcinogens. In addition, polyphenols enhance immunity, which is additional protection against carcinogens.

Scientists from different countries studied the anti-cancer drug and found that the most effective effect was tea.

In addition to carcinogens tea is released from the body: toxins; chemical substances and medicines; drugs, including nicotine and alcohol.

Tea is the best way to have a cooling effect on the central nervous system, as well as a psycho-stimulator. Tea exacerbates the work of visual analyzers, which increases the nervous system's sensitivity and sensitivity; accelerates the speed of reactions; improves the adoption and dissemination of new information; facilitates concentration [1, 2].

The quality of tea product depends on the quality of its raw materials, which in turn causes the chemical composition. The bud and the first leaf provide the highest quality products, and the lower the 2–3rd, and so on. The gentle elements of the toe are better off technological impacts and contain more quantities of substances that produce chemicals on the basis of enzymatic and chemical transformations.

**Object:** To ensure the maximum use of modern tea raw material, tea was used to produce non-conventional raw materials needed to enrich the ingredients needed for human organism. That's because, it has been selected as an additive for tea and hawthorn, which are rich in vitamins, phenolic compounds, microelements and other useful substances.

Our country's tea industry mainly works on local and Chinese hybrid tea raw materials, which is due to its frost and other positive properties, as well as high quality tea products. The composition of green tea leaves and ready-made products differ significantly from each other. Some ingredients disappear during tea leaves, some are completely or partially oxidized, taking part in different chemical transformations and forming a completely new substance. To enhance the tea product obtained from modern raw materials [4, 5] the leaves and fruits of hawthorn plants and wild rose were used.

**Rosa caninal** (wild Rose) is the name of a rose family. Evergreen or foliage, sometimes almonds, thorny shrubs. They have cautious leaves, beautiful and fragrant flowers (pink, red, white, seldom yellow) as umbrella – the plot is collected in a flask. The fruit is the one-eyed calf. Dry fetish skin is cool, gentle, glossy surface, more or less, inside the fruit is exhibited with long, rough, brush burns. The color of the fruit is the orange – from the red to the mulberry – to the red, the odorless, sweet taste, a little bit of taste. About 400 species are known, 25 are spread in Georgia, 5 of them are endemic.

The ripe fruit contains water, proteins, carbohydrates, food fibers, free organic acids. It contains 18 % B<sub>1</sub>, B<sub>2</sub>, P, K vitamins, minerals and carotene (40 mg%), sugar 18 %, pectinas 3,7 %, lemon and apple acids 1,8 %. It is also called vitamins natural concentration. Ascorbic acid (C vitamin) is an average of 10 times more than in a black cousin, 50 times more than in lemon and 100 times more than apples. Considering this, the vitamin C containing the varies between 7–18 % [6, 7].

Apart from the fruits of honey, the leaves have a rich chemical composition. They are in second place with ascorbic acid, compared with the vegetative part of the plant. In the leaves of honey is defined as a biologically active substance such as carotenoids (lycopene and  $\beta$ -carotene), chlorophyll, tocopherols and flavonides [8, 9]. Therefore, her nutrients are therapeutic and prophylactic unique means of healing and hemorrhoids and vitamin

hypothyroidism and avitaminosis, arthrosclerosis, healing of wounds and bleeding from uterine bleeding, kidney and gallbladder. In keeping with the proper conditions, planting fruit, timely collecting and draining, vitamins biological activity over the next two years is maintained [6, 7].

There are many species of *Crataegus*. Two types of hawthorn – black eucalyan, usually and red hawthorn, are used for treatment. The hawthorn leaves are gray, the leaves are naked, the fruit has 2–3 karaks, and the red hawthorn young branches are reddish-brown, shiny, leafy, and the fruit has 3–4 karaks. In the Caucasus, there are about 20 species of naturally grown in Georgia – 9 of them are Caucasian hawthorn (*Crataegus caucasica*) and the *Colataeus colchica* endemic, the first south-east Caucasus, the second – the Colchis.

The wildest species is the most commonly black or the five bubble hawthorn (*Crataegus pentagyna*) and the indigenous caucasus (*Crataegus curvisepala*). It is found in Georgia everywhere in the form of shrubs. The hawthorn for the soil is quite indistinguishable, but it falls on deeper, moderately humid and sprouting grounds, blossoming in April-July, the fruit ripen in September-October.

The fruit of the hawthorn is composed of vegetable sugars, tissue substances, phytosteries, saponins, flavonoids, glycosides, choline, carotene, and organic acids: ascorbic acid, lemon, apple, wine and others. Seeds contain precious essential oils and more useful substances - amigidal. Flowers are rich in caffeine, chlorogenic and other essential oils, flavonoids and saponins. Hawthorne preparations are used in the function of cardiac muscle function, hypertonic disease, paroxysmal tachycardia, general atherosclerosis and climacterial neurosis, stimulates the thyroid function. Hawthorne is a drug in cardiovascular. Hawthorne preparations are less toxic and the contraindications are not observed [6, 7].

Until recently it was considered that only the fruit of hawthorn was distinguished with medicinal properties. Recent studies have confirmed that its flower and foliage contain more active substances, so the hawthorn preparations are produced by different combinations of its constituents. According to the standard, the drug should contain 2,2 % flavonides or 18,75 % oligomeric proponents [11].

We have selected non-conventional raw materials (deaf ears, third, fourth and fifth leaf) of tea, have been processed in laboratory conditions in green and black tea (small teas), adding to a certain amount of coarse granulated dried leaves and fruits. The optimum ratio of tea was selected by considering the composition of the biologically active substances (vitamins-C, B, P, PP, etc., phenolic compounds, alkaloids, organic acids, etc.) of tea and vegetable additives as supplements for the following products: "Tea with honey leaves",

"Tea fruits", "Tea honey otlebit", "Hawthorn fruit tea", in accordance with the ratio of 1 : 1, 2 : 1, 1 : 1, 2 : 1 number. Their tensile strength, titrated phenolic compounds, alkaloids, vitamin C, extractability and organoleptic parameters were measured.

**Method:** To get tea enriched with plant supplements, gentle tea leaves and dough are taken by 4–7-th leaves. Tea processing of black and green tea was made as follows: to obtain green tea, the leaf was applied 3–5 minutes after the water steam was cooled and sprayed to 5–7 % to moisture. To take the tea was 62–64 % of the moisture, which was cooled into a mammalian breastfeeding and was enlarged at 2.5–3.0 hours, and was 5–7 % wasted moisture. The green and black tea was added to granulated leaves and fruits of hazelnut and hawthorn in the appropriate weight. Their leaves were recycled in accordance with technological regulations of black and green tea production. The number of tea and additives was selected, the chemical and organoleptic indicators of the new product received in table 1 and table 2.

Table 1

**Bioactive supplements enriched  
with tea products chemical composition (calculation of dry substance)**

Name of the sample	Tan, %	Extractable Substances, %	Total phenolic compounds, %	Caffeine, %	Vitamin C, mg/c
Tea leaf	70.03	34.77	15.43	1.35	5.58
Tea with wild rose hip leaves	6.8	32.24	12.26	0.67	4.29
Tea with wild rose hip fruit	6.78	23.33	14.67	0.90	7.72
Tea with hawthorn leaves	6.5	33.17	14.56	0.69	4.04
Tea with hawthorn fruit	6.52	22.67	11.97	0.88	4.55

**Result:** Table 1 shows that the tea is added with wild rose leaves and hawthorn in their chemical content – extractive substances, caffeine and vitamin C are slightly different from each other, except for phenolic compounds (tannin) where tea with hawthorn leaves contains 2.3 % than tea – with leaflet additives. The same is the result of tea additives in contrast to the addition of tea with hawthorn containing the addition of 3.2 % vitamin C and 2.7 % more phenolic compounds.

Table 2 shows that the supplemental tea factor of the supplements corresponds to the first quality black and green tea indicators, which have a taste and aroma of honey and honey that make it more pleasant to drink tea.

Table 2

**Determination of organoleptic properties  
of tea that is enriched with bioactive supplements**

Name of the sample	Color		Aroma and taste		Find a leaf		External face	
	black	green	black	green	black	green	black	green
Tea leaf	Transparent, bright yellow		A pleasant aroma and a sufficiently tart taste		Insufficiently homogeneous, yellowish color		Sufficiently equal, spherical or elongated form	
Tea with wild rose hip leaves	Insufficiently bright, transparent, medium	Transparent, bright yellow	A nice gentle flavor, tart of taste	A pleasant aroma and a sufficiently tart of taste	heterogeneous, dark brown, greenish color is allowed	Insufficiently homogeneous yellow color	Sufficiently equal, spherical or elongated form	
Tea with wild rose hip fruit	Bright, transparent, medium	Transparent, bright, amber color	The taste of the tasteless taste of a gentle aroma	A pleasant aroma and Sufficiently tart of taste	heterogeneous, dark brown, permeable greenish, with particles of hawthorn	Insufficiently homogeneous yellow color with particles of wild rose	Sufficiently equal, spherical or elongated form with particles of granulated fruits	
Tea with hawthorn leaves	Insufficiently bright, transparent, medium	Transparent, bright yellow	A nice gentle flavor, tart of taste	A nice gentle flavor, tart of taste	heterogeneous, dark brown, greenish color is allowed	Insufficiently uniformly tuned	Sufficiently equal, spherical or elongated form	
Tea with hawthorn fruit	Bright, transparent, medium	Transparent, bright, reddish – amber color	The taste of the tasteless taste of a gentle aroma	A pleasant hawthorn flavor and tart of taste	heterogeneous, dark brown, permeable greenish, with hawthorn particles	Insufficiently homogeneous yellowish particles of hawthorn fruit	Sufficiently equal, spherical or elongated form of naturalized particles of hawthorn	

#### Referents

1. Kobakhidze Sh. Tea chemistry // ed. "Education". – Tbilisi. – 1974. – 276 p. (in georgian).
2. Pruidze M., Bendeliani E. Tea Goods and Expertise. – Kutaisi. – 2014. – 275 p. (in georgian).
3. Pruidze M., Bendeliani E. Practical techno-chemical control of the production of subtropical crops. – Kutaisi. – 2012. – Atsu. – 185 p. (in georgian).
4. Pruidze M., Chakvetadze Sh. Impact of Quality Indicators of Tea Ripe on Different Types of Tea // Agro NEVS, Periodic Scientific Journal. – Kutaisi, 2017. – P. 85-90 (in georgian). – ISSN 3375-2389.
5. Pruidze M.R., Bendeliani E., Chakvetadze Sh.M. Modern state of tea production in Georgia and its development opportunities // Sixth International Scientific Practical Internet Conference Collection "Bio-Safe Food Problems and Business Environment". – Kutaisi, 2016. – P. 109-114 (in georgian).
6. Shengelia Z. Georgian Medicinal Plants. – Tbilisi, 1952. – 301 p. (in georgian).
7. Khidasheli Sh., Papunidze V. Georgian Herbs of Forests // Batumi "Soviet Adjara". – 1985. – 351 p. (in georgian).
8. D'Archivio M., Filesi C., Di Benedetto R., Gargiulo R., Giovannini C., Masella R. Polyphenols, dietary sources and bioavailability // Ann. Ist. Super. Sanita. – 2007. – 348-361 p. – ISSN 0021-2571.
9. Ghazghazi H., Miguel M.G., Hasnaoui B., Sebei H., Ksontini M., Pedro L.G. Phenols essential oils and carotenoids of Rosa canina from Tunisia and their antioxidant activities. // African J. Biotechnology. – 2010. – Vol. 9. – № 18. – P. 2709-2716. – ISSN 1684-5315.
10. Ivkova A.V, Petrova S. N // Sastav hexan extract of leaves of the dog rose. Modern problems of chemical science and education, coll. materials Всерос. Conf. With the international. Participation, dedicated to the 75th anniversary of the birth of V.V. Kormachyov in the 2m. T.2. Cheboksary: 2012. – 136-137 p.
11. Hawthorn for heart health. [URL] – Access mode: <https://mkurnali.ge/fitoterapia2/samkurnalo-mcenareebi/7092-kuneli-gulis-janmrthelobisthvis.html>
12. Микаберидзе М.Ш., Чакветадзе Ш. М., Пруидзе М. Р. Интенсификация процессов сушки ягод в поле ИК лучей // Экономика: экономика и сельское хозяйство. – (20). URL № 8, 2017. 1/9-9/9.

### ПРОИЗВОДСТВО ЧАЯ С ИСПОЛЬЗОВАНИЕМ РАЗЛИЧНЫХ ДОБАВОК РАСТИТЕЛЬНОГО СЫРЬЯ

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Статья посвящена производству чая с использованием различных растительных добавок, а также чайно-растительных добавок для производства чая (в том числе боярышника). Изучен их химический состав. Чайный продукт был принят заранее для обработки чайного и другого листового сырья, 4–7 минутной фиксации, грануляции, ферментации и высушивания. Было проведено смешивание, гранулирование и высушивание при фруктовых добавках. Отобраны методы и режимы переработки, рецептуры и химические органолептические показатели нового продукта – "Чая с листьями шиповника", "Чая с плодами шиповника", "Чая с листьями боярышника" и "Чая с плодами боярышника".

**Ключевые слова:** чай, добавки, химический состав, *Rosa caninal* (шиповник), боярышник (*Crataegus pentagyna*).