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Д.В. Сокольский атындағы
«Жанармай, катализ және электрохимия институты» АҚ

ХАБАРЛАРЫ

ИЗВЕСТИЯ

НАЦИОНАЛЬНОЙ АКАДЕМИИ НАУК
РЕСПУБЛИКИ КАЗАХСТАН
АО «Институт топлива, катализа и
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AMINO ACID, FATTY ACID AND VITAMIN COMPOSITION OF ROSA CANINA L.

Abstract: The genus rose hips, or rose (Rosa L.), belongs to the Rosaceae family. It has many cultural forms, bred under the general name Rose. Now, more than 400 species of rose hips known. Usually these are erect shrubs, less often lianas, sometimes-low tree-like forms or almost herbaceous plants. Rosehip is common in the temperate and subtropical zones of the Northern Hemisphere, it can often found in the mountainous regions of the tropical belt. Some types of rose hips distributed from the Arctic Circle in the north to Ethiopia in the south. On the American continent - from Canada to Mexico. The most favorable conditions for Rosehip are in the Mediterranean region. Several species of the genus Rosehip have a wide distribution area.

Kazakhstan possesses significant resources of medicinal plant raw materials. Among the most priority representatives of the wild flora are species of the wild rose genus - Rosa L. as the most valuable medicinal plant. In total, 21 species of wild rose grow in the republic, including 5 in Central Kazakhstan: R. glabrifolia - w. naked, R. laxa Retz. - w. loose, R. acicularis Lindl. - (w. Spiny), R. majalis Herrm. (R. cinnamomea L.) - w. May (w. cinnamon) and R. pimpinellifolia L. (R. spinosissima L.) - w. femoral. Kazakh species of the genus Rosa L

Rosehip fruits distinguished by a high content of biologically active substances and are widely used in medicine.

Plant raw materials collected in the southern region of the Republic of Kazakhstan (Almaty region). The crushed air-dry raw material was extracted with hexane and chloroform in a raw material-reagent ratio (1:10) in a Soxhlet apparatus.

Plants of the genus Rosa are rich in vitamins A, C, E and group B, and also contain sugars, flavonoids, saponins, phytosterols, glycosides, tannins, organic acids, amygdalin, essential oils. Thus, rosehip is a promising raw material for the creation of domestic medicines.

This article examines the study of the quantitative composition of amino acids and vitamins in the fruits of the species of the genus Rosa widespread in Kazakhstan in the supercritical extract, isolated and the fruits of the Rosa canina plant, in order to establish the possibility of using and with the subsequent cultivation of the selected species.

Key words: Rosa, Rosa canina L., Supercritical fluid extraction, amino acid, vitamins.

Introduction.

The genus rose hip, or rose (Rose L.), belongs to the Rosaceae family. It has many cultural forms, bred under the general name of Rose. At the moment, there are more than 400 species of rose hips known. Usually these are erect shrubs, less often lianas, sometimes low tree-like forms or almost herbaceous plants. Rose hip is common in the temperate and subtropical zones of the Northern Hemisphere, and it can often be found in the mountainous regions of the tropical belt.

Kazakhstan possesses significant resources of medicinal plant raw materials. The species of the wild rose genus - Rosa L. as the most valuable medicinal plant. In total, 21 species of wild rose grow in the Republic of Kazakhstan, including 5 in Central Kazakhstan: R. glabrifolia - w. naked, R. laxa Retz. - w. loose, R. acicularis Lindl. - (w. Spiny), R. majalis Herrm. (R. cinnamomea L.) - w. May (w. cinnamon) and R. pimpinellifolia L. (R. spinosissima L.) - w. femoral belong to among the most priority representatives of the wild flora.

Dog rose (Rosa canina) is a shrub of the Rosaceae family, reaching a height of 1.5-3 m, with curved, rarely almost straight branches and with green or red-brown bark, usually without a bluish bloom. Thorns are strong, sickle-curved, sparse or scattered on the main stems, sometimes almost straight, abundant on flowering branches, flattened at the widened base. Leaves of 7-9 cm tend to be long, green and glaucous, glabrous, sometimes with sparse short hairs along the main shaft, compound, pinnate, with five or seven ovate glabrous sharp-serrate leaves. The flowers are usually pale pink, white or bright pink color. The

ripe false fruit is large, 15-26 mm long, broadly oval, less often almost spherical, sometimes elongated-oval, smooth, bright or light red, with characteristic pinnately incised, bent down, sepals falling off when the fruit ripens.

According to literature resources, the rose hips, Rosa canina, are rich in vitamins of C, E, P and group B, also containing sugar, flavonoids, saponins, glycosides, tannins, organic acids, and essential oils. Thus, rose hip is a promising raw material for the creation of domestic medicine. Moreover, the genus rose hips of (Rosa L.) belong to the well-known plants that are used in modern medicine due to their high content of such as carotenoids, amino acids, flavonoids, carbohydrates, tannins, and fatty acids.

Nowadays, the ecological and social situations in the world urgently require new approaches to extract biological components from plant materials, since widely used solvents cannot always be completely removed from the obtained extract. Moreover, raw materials undergo an amount of changes due to the use of chemical solvents. In food processing and the industry, the use of a number of extractants with toxic or mutagenic effects is limited, as well as in the pharmaceutical industry. One of the ways to solve this problem is to utilize supercritical carbon dioxide as an extractant. Apart from that, the technology itself is called “supercritical fluid extraction with carbon dioxide from plant raw materials”.

Materials and methods:

The quantitative determination of amino acids by GJC

1 g of the analyzed substance is hydrolyzed in 5 ml of 6 n hydrochloric acid at 105°C for 24 hours in ampoules sealed under a stream of argon. The resulting hydrolyzate is evaporated three times to dryness on a rotary evaporator at a temperature of 40-50°C and a pressure of 1 atmosphere. The formed precipitate is dissolved in 5 ml of sulfosalicylic acid. After centrifugation (1500 rpm) for 5 minutes, the supernatant is passed through a column with Daux 50, H-8, 200-400 mesh ion exchange resin at a rate of 1 drop / s. Thereafter, the resin is washed with 1-2 ml of deionized water and 2 ml of 0.5 N acetic acid; then the resin is washed to neutral pH. In order to elute amino acids from the column, 3 ml of 6N NH_4OH solution is passed through it at a rate of 2 drops / s. The eluate is collected in a round bottom flask together with distilled water, which is used to wash the column to neutral pH. Then the contents of the flask are evaporated to dryness on a rotary evaporator under a pressure of 1 atm, and a temperature of 40-50°C. After adding to this flask, 1 drop of a freshly prepared 1.5% solution of $SnCl_2$, 1 drop of 2,2-dimethoxypropane and 1-2 ml of propanol saturated with hydrochloric acid, and it is heated to 110°C, maintaining this temperature, for 20 minutes, and then the contents again evaporated from the flask on a rotary evaporator. At the next stage, 1 ml of a freshly prepared acetalizing reagent (1 volume of acetic anhydride, 2 volumes of triethylamine, 5 volumes of acetone) is introduced into the flask and heated at 60°C for 1.5-2 minutes. Then the sample is again evaporated on a rotary evaporator to dryness and 2 ml of ethyl acetate and 1 ml of saturated NaCl solution are added to the flask. The contents of the flask are thoroughly mixed and as soon as 2 layers of liquids are clearly formed, the upper (ethyl acetate) layer is taken for gas chromatographic analysis, which was carried out on a gas-liquid chromatograph "Carlo-Erba4200" (Italy-USA).

The quantitative determination of fatty acids by GLC.

1 volume of the sample is extracted with 20 times of the volume of a mixture of CHCl3 and CH3OH (2:1) for 5 minutes. Then the content is filtered through a paper filter to obtain a pure extract, which is evaporated in a round-bottom flask on a rotary evaporator at a bath temperature of 30-40°C to dryness. After that 10 ml of methanol and 2-3 drops of acetyl chloride are added to the flask and methylated at a temperature of 60-70°C in a special system for 30 minutes. The methanol is then evaporated on a rotary evaporator, and the sample is extracted from a flask with 5 ml of hexane and injected into a gas chromatograph.

The quantitative content of vitamin C is determined with the help of titrometrical analysis according to the method. Vitamins A and E are done by the fluorimetric method. The process of determination of vitamin C content: a sample in an amount of at least 0.3 g is placed in a centrifuge tube, the walls of which are covered with sodium citrate powder. After centrifugation of the sample for 30 minutes at 3000 rpm, it is transferred to another tube, and an equal amount of bidistilled water is added there and double the amount of freshly prepared 5% metaphosphoric acid solution. The protein precipitate is stirred with a stick and centrifuged for 10 min at 3000 rpm. The supernatant liquid in an amount of 0.1-0.5 ml is introduced into porcelain titration cuvettes (2 parallel samples) and titrated with 0.001 n - 0.0005 n solution of 2,6-dinitrophenolindophenol sodium salt from a special micropipette with a capacity of 0.1 ml. In parallel, a "blind" experiment is performed with a 5% solution of metaphosphoric acid and bidistilled water (1: 1). At the same time, fluoreometric determination of the concentration of vitamins A and E is carried out. 1 ml of bidistilled water is added to 0.2 ml of the sample and shaken for 30 seconds.

Following these, actions add 1 ml of 96% ethanol and shake again for 30 seconds. Then, after adding 5 ml of hexane, repeat the procedure, shaking it all again. After that the sample is centrifuged for 10 minutes at 1500 rpm. For spectrometry, a clearly separated hexane layer (3 ml) is taken, which can be stored for 2 hours in tightly sealed tubes in a dark place. Standard and control (blank) samples are prepared in parallel with the test samples. In standard samples, 0.2 ml of a standard solution (tocopherol

and retinol acetate in ethanol) is taken instead of a prototype. In control samples, water is utilized instead of experimental samples. Spectrofluorimetry (spectrofluorimeter "Hitachi", Japan) of tocopherol is carried out at an excitation wavelength of 292 nm and fluorescence of 310 nm; retinol - at 335 and 340 nm, accordingly.

The analysis results are presented in Figures 1-3.

Results and discussion:

Figure 1. Amino acid composition of rose hips fruits of Rosa canina

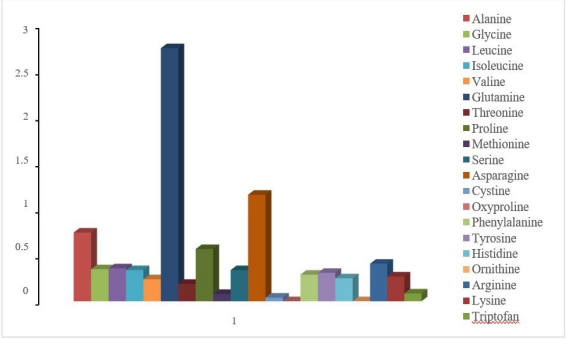
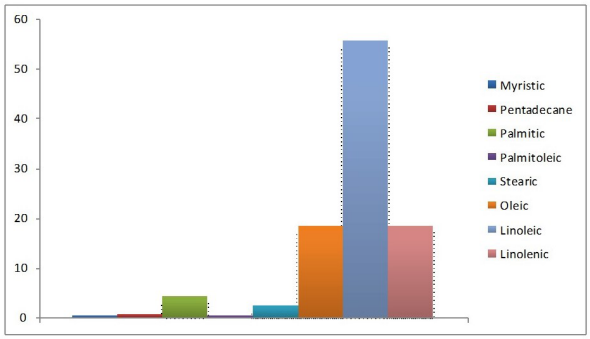


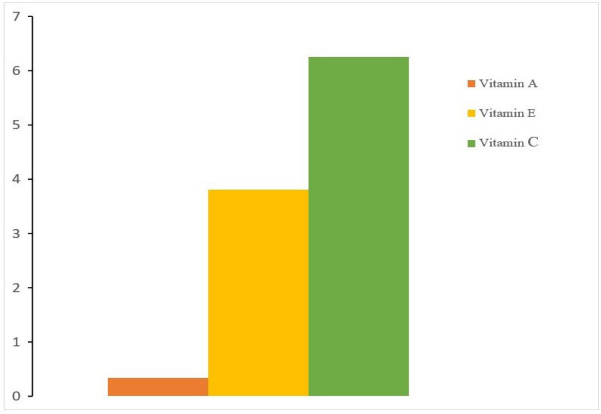
Figure 1 illustrates that rose hip Rosa canina fruits contain the most amino acids such as glutamine, aspargine, alanine, and proline

Figure 2. The fatty acid composition of rose hips of Rosa Canina



Rosa canina rose hips contain mainly linoleic and oleic acids. Linoleic and oleic acids are essential fatty acids, and they are parts of the Omega-9 and Omega-6 unsaturated acids.

Figure 3. The quantitative content of vitamins A, E, C in the fruits of rose hips Rosa canina.



According to the study results, it can be concluded that the fruits of the rose hip Rosa canina are rich in vitamins C, therefore, they can be utilized in the food industry, as well as in medicine as biologically active food additives.

Conclusion

According to the vitamin, fatty acid and amino acid composition containment test results of rose hips Rosa canina of the genus Rosa, it was established, in accordance with the data obtained, that the amino acid composition generally corresponds to such type of the genus Rosa within the vitamin and fatty acid compositions. Earlier, we found that the pharmacopoeial parameters of the collected medicinal plant raw materials meet the established standards, which allows us to consider Rosa canina as an independent herbal medicine and as a raw material for the isolation of vitamins and amino acids.

Biologically active substances found in the fruits and flowers of Rosa canina l, such as bioflavonoids (plant polyphenolic compounds), tannins, quercitin,pectin, hyperoside; vitexin; sugar (fructose); organic acids; vitamins - β-carotene (provitamin A), C, E and K; trace elements (potassium, zinc, iron, manganese, magnesium, zinc) are used in medicinal products and contribute to its widespread use in medicine.

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ROSA CANINA L АМИН ҚЫШҚЫЛЫ, МАЙ ҚЫШҚЫЛЫ ЖӘНЕ ВИТАМИНДІК ҚҰРАМЫ

Аннотация. Итмұрын немесе раушан (Rosa L.), қызғылт түсті (Rosaceae) тұқымдасына жатады. Жалпы көптеген нысандар Раушан атауымен өсіріледі. Қазіргі уақытта итмұрынның 400-ден астам түрі белгілі. Әдетте бұл тік бұталар, сирек Лиана, кейде биік емес ағаш тәріздес немесе шөпті өсімдіктер. Итмұрын Солтүстік жарты шардың қалыпты және субтропикалық аймақтарында таралған, оны тропикалық белдеудің таулы аудандарында кездестіруге болады. Итмұрынның кейбір түрлері солтүстіктегі полярлық шеңберден оңтүстіктегі Эфиопияға дейін жетеді. Ал Америка құрлығында-Канададан Мексикаға дейін барады. Итмұрын үшін қолайлы жағдай Жерорта теңізі аймағы. Итмұрын түрінің бірнеше түрі таралған.

Қазақстанда өсімдік тектес дәрілік шикізаттың елеулі ресурстары бар. Жабайы өсетін флораның ең басым өкілдерінің қатарына итмұрын – Rosa L. тегінің түрлері жатады. Республикада итмұрынның 21 түрі өседі, оның ішінде Орталық Қазақстанда-5: R. glabrifolia – бас сүйекті итмұрын, R. laxa Retz. – борпылдақ итмұрын, R. acicularis Lindl. – (ине итмұрын), R. majalis Herrm. (R. cinnamomea L.) – май итмұрын (сиыр итмұрын) и R. pimpinellifolia L. (R. spinosissima L.) – бедренцелистік итмұрын.

L Қызғылт тұқымдасының Қазақ түрі итмұрын жемістері биологиялық белсенді заттардың жоғары болуымен ерекшеленеді және медицинада да, кулинарияда да кеңінен қолданылады. Өсімдік шикізаты Қазақстан Республикасының оңтүстік өңірінде (Алматы облысында) жиналған. Ұсақталған ауа-құрғақ шикізат Сокслет аппаратындағы шикізат-реагент (1:10) қатынасында гексан және хлороформмен экстрагерленді.

Rosa L түрлерінің өсімдіктері А, С, Е, дәрумендеріне және В тобына, сондай-ақ глюкоза, флавоноидтар, сапониндер, фитостероидтар, гликозидтер, таниндер, органикалық қышқылдар, амигдалин, эфир майларына бай. Осылайша, Раушан жамбастары отандық медицинаны дамыту үшін перспективті шикізат болып табылады.

Түйін сөздер: Rosa canina L., ЖКФ-экстракция, никотин, GC-MS, химиялық құрамы.

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АМИНОКИСЛОТНЫЙ, ЖИРНОКИСЛОТНЫЙ И ВИТАМИННЫЙ ROSA CANINA L.

Аннотация: Плоды шиповника или розы (Rosa L.) относятся к семейству розоцветных. Под названием розы выращивают множество культурных форм. К настоящему времени известно более 400 видов шиповников. Обычно это вертикальные кустарники, реже лианы, а иногда невысокие древовидной формы или почти травянистые растения. Шиповник широко распространен в умеренных и субтропических зонах Северного полушария, а также часто встречается в горных районах тропиков. Некоторые виды шиповника широко распространены от Северного полярного круга на севере до Эфиопии на юге. На американском континенте они распространены от Канады до Мексики. Самые благоприятные условия для шиповника - в Средиземноморском регионе. Распространены несколько видов плодов шиповника.

Казахстан обладает значительными ресурсами лекарственного растительного сырья. Среди преобладающих представителей дикой флоры - виды шиповника как ценнейшего лекарственного растения Rosa L. В целом в стране произрастает 21 вид шиповника, в том числе в Центральном Казахстане 5: R. glabrifolia - w. голый, P. laxa Retz. - ш. рыхлый, R. acicularis Lindl. - (со шпинатом) R. majalis Herrm. (R. cinnamomea L.) - ш. Май (с корицей) и R. pimpinellifolia L. (R. spinosissima L.) - у. бедренный.

Казахский вид розового семейства L Шиповник богат биологически активными веществами и широко используется в медицине. Растительное сырье собирается в южном регионе Республики Казахстан (Алматинская область). Сухое сырье измельчали с воздухом при соотношении гексана и хлороформа к исходному материалу (1:10) в аппарате Сокслета.

Растения вида Rosa L. богаты витаминами А, С, Е и группы В, а также глюкозой, флавоноидами, сапонинами, фитостеринами, гликозидами, дубильными веществами, органическими кислотами, амигдалином, эфирными маслами. Таким образом, плоды шиповника – перспективное сырье для развития отечественной медицины.

Ключевые слова: Rosa, Rosa canina L., СКФ-экстракция, аминокислоты, витамины.

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