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PLANTS AS POTENTIAL SUGAR SUBSTITUTES

This article presents the results of studying the floral diversity of the Northern region of Kazakhstan, including the Pavlodar region. The studied area is characterized by a rich and diverse nature, combining floodplain, steppe and forest landscapes. More than 500 species of wild higher plants grow in the Pavlodar region, and many of them can be used as food. Plants serve not only as a direct source of food, but also as technological raw materials for processing traditional food products – to obtain original taste qualities and maximum benefit. With the help of wild plants, many everyday problems can be solved – both at home and in the field, not only without food, but also without a hardware store. In addition, plants can provide lovers of artistic creativity with such an amount of decorative materials that cannot be found in specialized stores. And with the introduction of scientific and applied information about wild plants into the educational process, we will be able to educate a creatively thinking specialist who will become the creator of the country's «green economy» in the future. Based on the above, the main task was to study the species composition of edible wild plants of the Pavlodar region and the prospects for their possible use, as well as the introduction of work with wild plants and plant raw materials in the organization of the educational process.

Keywords: wild plants, technology, raw materials, introduced plants, vegetable raw materials.

Introduction

Currently, due to the mass use of food additives by manufacturers, the use of wild plants in the production of food products is of particular relevance. There

was a need for research, since the Pavlodar region of the Republic of Kazakhstan is rich in reserves of green wild plants that can be used in various branches of biotechnology. The list of food wild plants that can be prepared for various dishes is very large.

Material and methods of research

The work on the study of edible wild plants in the vicinity of Pavlodar was carried out by an excursion method, with photographing the species encountered and entering information about them in a field diary. The species status of the collected plants was confirmed by specialists of the Department of General Biology of Pavlodar Pedagogical University.

Information about the use of plants as substitutes for traditional foods, as well as for health and household purposes, we received in special literature and medical reference books, based on the chemical composition and the presence of certain biologically active substances with known properties.

We tested the applied aspects of using plants for food and household purposes in the laboratory and at home, in consultation with specialists from the Pavlodar branch of the Republican Scientific and Technical Library (Patent Fund).

In the summer season, wild sweet dessert can always be found. In the diverse landscapes of the Pavlodar region, many wild berries grow, which can be used for desserts, jams, sweet dishes.

Results and discussions

Identification of the possibilities of using dozens of common wild plants of the Pavlodar region for food purposes, and some species are offered as raw materials for cooking and beverages, as well as in food processing technologies for the first time. From the results obtained, it will allow the data obtained to be used by food technologists, tourism instructors and school leaders for guides, as well as by all nature lovers who want to diversify their menu with unusual products from wild plants. Recommendations and development of applied measures for environmental education will be useful to teachers of all levels of education – in terms of the formation of environmental ethics and skills of rational nature users in students.

The hawthorn is blood-red. It is widespread in the foothills of Bayanaul, occurs in steppe and floodplain stakes, but more often – in artificial plantations. From hawthorn you can make syrup, jam, compote. And for those who do not want to spit out hard bones, it is recommended to grind the berries through a sieve and get a tender sweet mass. Hawthorn has a wide range of health-improving effects: it contains vitamin C and rutin (due to which it strengthens blood vessels and prevents colds), dilates coronary vessels and has a calming effect.

Rosehip cinnamon, dog, loose. All these types of wild rose grow in the floodplain of the Irtysh River and steppe spikes. This is a well-known raw material

for vitamin tea, which has a versatile therapeutic and preventive effect. From false fruits (hypanthias) of rosehip, you can cook jam if you show diligence and remove nuts and rough parts. The collection of rosehip is possible from the end of August until late autumn. But if someone is late with the collection, then you can collect berries that have dried up on the root (ready-made raw materials) all winter until next spring.

The irga is oval. It is widespread in the mountains and foothills of Bayanaul. Compared to the cultivated Canadian irga, these berries are less juicy and sweet, have rough seeds. However, they can be used for compotes, jam, sweet tea. Cultural irga in the vicinity of dachas and settlements often runs wild and can exist and bear fruit for many years without human participation.

Wild apple tree (Siberian apple tree, or berry). This is the most frost-resistant type of wild apple trees. It is widespread in Siberia and in the north of Kazakhstan. Small sour fruits are quite suitable for consumption in raw form, compotes, jams, dried fruits. Winter harvesting of fruits dried on the root is possible (unless these natural dried fruits are eaten by birds before humans).

Black currant. It grows wild in the Kazakh Melkosopochnik (Bayanaul district of Pavlodar region). In abandoned suburban areas, cultural currants often run wild and exist for a long time without human participation. Berries are suitable for jam and compotes, leaves are suitable for pickling vegetables and flavoring tea [1].

Red currant. It grows wildly in the mountains and foothills of Bayanaul, and wild fruit and berry bushes are sometimes found on the suburban outskirts of Pavlodar. Sour berries are a dessert and an excellent source of vitamins.

The currant is golden. This currant is native to North America, and in Eurasia, including in various regions of Kazakhstan, it has spread and naturalized due to its use in ornamental forest plantations. The berries are large, edible, with a rough skin, can be used to make jam, jams, compote.

Gooseberry. In the wild state it is found in the Kazakh Small-scale forest. The berries are smaller than those of cultivated varieties, but they have an excellent taste and a high content of sugars and pectins. They can be consumed raw, used for making jams and confections.

Buckthorn buckthorn. It is widely distributed in forest plantations, protective strips, the vicinity of settlements, in garden plots it is sometimes cultivated for the sake of medicinal berries. Thickets of sea buckthorn spread far into the steppe thanks to birds that disseminate fruits. Picking fruits is quite laborious. Sea buckthorn is used to make jam, jams, sea buckthorn oil. Since sea buckthorn berries contain their own oils, as well as many flavonoids, many biologically active substances are extracted from the fruits with vegetable oil.

Obtaining such a drug as sea buckthorn oil is technologically and economically feasible, it has a long shelf life and has a wide range of health-improving effects.

Narrow-leaved loch. This shrub is introduced in the Pavlodar region, it has spread widely due to its use in forest plantations, protective strips and the spreading of fruits by birds. The fruits are white, starchy, not particularly sweet to the taste, but nutritious. They can be consumed fresh and dried, used to make mors, kvass, syrup, pastilles (and without the addition of sugar).

Wild and green strawberries (strawberries). Both types of berries in the Pavlodar region and adjacent regions are common in the mountains and foothills of Bayanaul (Kazakh Melkosopochnik), Chaldai forest, steppe birch and aspen spikes. Wild strawberries usually grow in groves, in shading conditions, and strawberries – in open places. In the first type, the berry is oval, easily separating from the peduncle, in the second – square, it is difficult to separate from the peduncle. Berries are consumed fresh and dried, suitable for jam and other sweet desserts. They have a slight sugar-lowering effect, which is why they are valued in dietary nutrition.

Raspberry. Wild raspberries are found in the natural forests of the Pavlodar region (Bayanaul, Chaldai). Cultural forms in abandoned suburban areas often also turn into a wild state, successfully bear fruit, but produce smaller berries. The fruits are suitable for food in raw and dried form, used for making jams, jellies, pies, fruit drinks.

The blackberry is blue. It is widely distributed in the floodplain of the Irtysh River. Berries are consumed fresh and dry, used for making jam, compote, jelly, confectionery.

Kostyanika. In places it is found in the steppe kolki and the foothills of Bayanaul. Small sour berries with a rough stone, besides difficult to pick, are not considered particularly valuable. But as a summer vitamin dessert, you can eat a handful or two of berries: they are rich in vitamin C, flavonoids, organic acids, and, like raspberries, they have a calming effect.

Kalina. It grows wild in the foothills of Bayanaul. In settlements and suburban areas, *viburnum vulgare* (as well as *baldenezh*) is bred as an ornamental plant. Berries have a lot of useful properties: they contain vitamins, reduce sugar levels and blood pressure, strengthen blood vessels. Another thing is that the sour-bitter taste of the fruit makes *viburnum* not too attractive. A delicious kind of *viburnum*, which is called edible *viburnum*, grows only in Chukotka. And we can only wait for the *viburnum* berries to catch the frost and get rid of the unpleasant bitter taste. *Viburnum* is used for making pies, jams, vitamin drinks [2].

Common mountain ash. In the Pavlodar region, it is an introduced plant, it has spread from forest plantations into natural biotopes. Rowan is widely used

for flavoring wine and vodka products. But it's too bitter for food or jam: like viburnum, all hope is for the first frosts, which will make the berry more or less edible. Winter collection of rowan fruits is possible: they will have completely lost their bitterness by then.

Chokeberry (aronia). It settled in steppe biotopes and kolki from abandoned suburban areas. Even without human involvement, Aronia retains enormous fertility. Its berries, unlike real mountain ash, although rough and tart, but do not have a repulsive bitterness. Chokeberry strengthens blood vessels well and lowers blood pressure. However, elderly people should be careful: these berries lead to increased blood clotting, and this creates a threat of a heart attack or stroke. In a word, chokeberry should not be a constant diet of the elderly (as well as cabbage soup from nettle, which promotes blood coagulation), but it is best to combine it with herbal teas that dilute blood (for example, from sweet clover, lime color) [3, 10, 11].

Elderberry is red and black. These berries do not have a particularly pleasant taste. But elderberry tea is a recognized remedy for colds. And elderberry berries, with complete harmlessness to humans, scare away mice and rats (this is a reliable and proven remedy).

Bird cherry. An amazing plant that always justifies the folk sign that cherry blossoms are always accompanied by a strong spring cold snap. In the Pavlodar region, the bird cherry grows wildly in a small patch, and in other regions it is an introduced plant and spreads to the steppe or semi-cultural landscapes from artificial plantings. Cherry fruits are consumed fresh and dried, used for compotes and other desserts. Decoction of fruits is a recognized remedy for gastrointestinal disorders due to its astringent action. Dried cherry leaves are considered a remedy for the Colorado potato beetle [4].

Cerapadus. It is a hybrid of Maak cherry and shrub cherry, obtained artificially and does not exist in nature. In the Pavlodar region, it grows in the vicinity of suburban areas and settlements, artificial forest plantations, often spreads far into the steppe. Fruits (dark cherry, larger than cherry, but smaller than cherry) are consumed fresh and dried, used for compotes. They have astringent properties, for therapeutic and prophylactic purposes they may well replace bird cherry [8, 9].

Turn. It is often cultivated in garden plots, along with cultural plum. The latter does not exist in nature, it is a hybrid of thorn and cherry plum and is bred in culture. However, both the blackthorn and the cultural plum can run wild and exist independently of a person. The fruits of the thorn are smaller and tart in taste compared to the plum, they can be consumed raw, used for the preparation of dried fruits, jams, jams, as well as for cryopreservation (freezing) for the winter.

The cherry is sandy. It is often found in steppe biotopes. In the vicinity of dachas and abandoned garden plots, wild and cultivated cherries often coexist (and the latter begins to produce smaller fruits without care). Berries are suitable for fresh food, used for making jam, jelly, fruit drinks.

It should be noted that in cherries, thorns, cerapadus, in addition to berries, gum (solidifying discharge from wounds) can also be used for food and technological purposes. Gum consists of glucuronic acids, has bactericidal properties, mixes with water in any ratio. It can be used as a substitute for lollipops and sucking candies, as well as as a raw material for making fruit jellies (instead of gelatin and agar). Aqueous colloidal solutions of gum (1:1) can be stored for a long time without signs of spoilage. They were recommended to be used as a toothpaste for teeth whitening and removal of dental deposits (not only plaque, but also hardened tartar) [5]. Sucking gum also cleanses tooth enamel well and cures many diseases of the gastrointestinal tract (due to the bactericidal and enveloping properties of gum).

Wild grapes. Wild grapes grow naturally in the Kazakh Melkosopchnik (Bayanaul district). We have repeatedly observed the wildness of local grape varieties in abandoned suburban areas and in the vicinity of horticulture, and such wild grapes (small, sweet and sour, with black round fruits) exist without human care for 25–30 years or more. Another type of grape – maiden grapes, bred exclusively for decorative purposes (with small and sour fruits), has spread widely in settlements [6].

Accidentally or intentionally planted maiden grapes have been growing for decades even on the streets of the regional center with high-rise buildings, climbing windows and balconies to a height of 3-5 floors. Wild grapes are quite suitable for food, can be consumed fresh and dried, as well as for making juice and drinks. Due to the significant glucose content, grape fruits are distinguished by the highest nutritional value. It should be noted that the facts of the wild grape growing in the territory of Pavlodar and Pavlodar region are recorded in the works of N. K. Aralbai [7].

Nightshade is black. This weed plant grows everywhere, blooms and bears fruit from midsummer to late autumn. Its black fruits are completely harmless, tasty and nutritious. They can be eaten raw, used for jam, jam, pies. Nightshade has a mild laxative effect and improves the functioning of the gastrointestinal tract (including constipation and sluggish digestion).

From sugar surrogates, licorice roots and their aqueous decoction can be recommended. Only the underground parts of licorice contain not ordinary sugars, but their derivative – glycoside inulin, due to which the decoctions have a specific taste. Licorice has long been used not only as a well-known cough remedy, but also as a spice for salting vegetables and a substitute for sugar. And

also decoctions and syrups of licorice contain substances that resemble the action of natural and synthetic hormones of the adrenal cortex. Therefore, they are used as a substitute for prednisone tablets and are prescribed at the end of the course of treatment – to avoid the so-called withdrawal syndrome. Licorice preparations and drinks can help emaciated people gain weight (due to glycyrrhizin, similar in action to corticosteroids, as well as saponins that improve the absorption of food in the intestine [3]). However, licorice should not be abused by overweight people who are prone to edema and high blood pressure. Perhaps someone will be surprised by the fact that licorice is used in firefighting - to enhance foaming in fire extinguishers. But there is nothing surprising in this: saponins contained in it are surfactants that reduce the surface tension of water and contribute to the formation of foam.

From wild and vegetable plants, rhubarb stalks are quite suitable for cooking jam and making sweet desserts. Along with cultivated rhubarb (which is grown in suburban areas and often goes wild), Tangut rhubarb grows wildly in the steppe. Its young stalks can also be eaten raw, used for pies and jam.

The source of sweet dishes and jam can also be flowers and petals. There are recipes for jam made from rose petals, dandelion flowers, white and yellow acacia. After all, many flowers contain nectar - the precursor of natural honey (which, as you know, consists of a mixture of two simple sugars – glucose and fructose). A decoction of hawthorn flowers has not only a calming effect: it normalizes the work of the thyroid gland, especially with its increased function.

In the spring, during the sap flow near the trees, you should not miss the opportunity to enjoy natural sweet drinks containing not only sugar, but also a lot of biologically active substances. In late March – early April, you can collect the juice of birch, American and Tatar maple. Only you need to do this carefully so as not to deplete the tree, and after collecting the juice, cover the wound with garden brew. Maple juice is even sweeter than birch. This is not surprising: the sycamore maple (whose leaf is the national symbol of Canada) served as the main source of sugar for the Indians.

Conclusion

Of the wild fruit and berry plants of the Pavlodar region, suitable for the preparation of desserts, one can name hawthorn, various types of rosehip, oval irga (and wild Canadian), red, black and golden currants, wild gooseberries, buckthorn buckthorn, narrow-leaved loch, wild strawberries and green, raspberries, blackberries, boneberries, viburnum, mountain ash, aronia, elderberry, cherry, cerapadus, sandy cherry, wild grapes, from herbaceous plants – black nightshade, which gives delicious and harmless fruits. Rhubarb stalks can be used as raw materials for jams and desserts, licorice roots can be used as a sugar substitute,

and gum can be used as an agar substitute. As desserts and a source of sugars in the spring season, it is possible to collect the sap of trees, primarily hanging birch and American maple.

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ӨСІМДІКТЕР ҚАНТТЫҢ ЫҚТИМАЛ АЛМАСТЫРҒЫШТАРЫ РЕТІНДЕ

Бұл мақалада Қазақстанның солтүстік өңірінің, оның ішінде Павлодар облысының флористикалық әртүрлілігін зерттеу нәтижелері ұсынылған. Зерттелетін аймақ жайылмалы, дала және орман ландшафттарын біріктіретін бай және алуан түрлі табиғатпен ерекшеленеді. Павлодар облысында жабайы өсетін Жоғары өсімдіктердің 500-ден астам түрі өседі және олардың көбі тағамдық ретінде пайдаланылуы мүмкін. Өсімдіктер тікелей тамақ көзі ғана емес, сонымен қатар дәстүрлі тағамдарды өңдеудің технологиялық шикізаты – ерекше дәм мен максималды пайда алу үшін қызмет етеді. Жабайы өсімдіктердің көмегімен күнделікті көптеген мәселелерді шешуге болады-үйде де, далада да, тамақсыз ғана емес, аппараттық дүкенсіз де. Сонымен қатар, өсімдіктер өнер сүйер қауымға мамандандырылған дүкендерде табылмайтын көптеген сәндік материалдарды ұсына алады. Ал білім беру үдерісіне жабайы өсімдіктер туралы ғылыми және қолданбалы ақпаратты енгізе отырып, біз болашақта еліміздің «жасыл экономикасының» құрушысы болатын шығармашылықпен ойлайтын маманды тәрбиелей аламыз. Жоғарыда айтылғандарды негізге ала отырып, негізгі міндет Павлодар облысының жесуге жарамды жабайы өсімдіктерінің түрлік құрамын және оларды ықтимал пайдалану перспективаларын зерделеу, сондай-ақ оқу процесін ұйымдастыруға жабайы өсімдіктермен және өсімдік шикізатымен жұмысты енгізу болды.

Кілтті сөздер: жабайы өсімдіктер, технология, шикізат, енгізілген өсімдіктер, өсімдік шикізаты

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РАСТЕНИЯ КАК ПОТЕНЦИАЛЬНЫЕ ЗАМЕНИТЕЛИ САХАРА

В данной статье представлены результаты изучения флористического разнообразия Северного региона Казахстана, в том числе Павлодарской области. Исследуемый ареал отличается богатой и разнообразной природой, сочетающей пойменные, степные и лесные ландшафты. В Павлодарской области произрастают свыше 500 видов дикорастущих высших растений, и многие из них могут использоваться как пищевые. Растения служат не только непосредственным источником пищи, но и технологическим сырьем для переработки традиционных продуктов питания – для получения оригинальных вкусовых качеств и максимальной пользы. С помощью дикорастущих растений можно решить многие повседневные проблемы – как дома, так и в полевых условиях, не только без еды, но и без хозяйственного магазина. Кроме того, растения могут предоставить любителям художественного творчества такое количество декоративных материалов, которое невозможно найти в специализированных магазинах. А с внедрением в образовательный процесс научной и прикладной информации о дикорастущих растениях мы сможем воспитать творчески мыслящего специалиста, который в будущем станет создателем «зеленой экономики» страны. Исходя из вышесказанного, основной задачей было изучение видового состава съедобных дикорастущих растений Павлодарской области и перспектив их возможного использования, а также внедрение работы с дикорастущими растениями и растительным сырьем в организацию учебного процесса.

Ключевые слова: дикоросы, технология, сырье, интродуцированные растения, растительное сырье.

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