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ПРИМЕНЕНИЕ ГИС ТЕХНОЛОГИЙ В ИЗУЧЕНИИ ЛЕКАРСТВЕННЫХ РАСТЕНИЙ В КЫРГЫЗСТАНЕ

APPLICATION OF GIS TECHNOLOGY IN THE STUDY OF MEDICINAL PLANTS IN KYRGYZSTAN

Территория Кыргызстана представлена разнообразием растений, обладающих различными свойствами, среди которых важное место отводится лекарственных растений (200 видов). Среди них выделяются растения, которые широко используются при лечении сердечно-сосудистых заболеваний в народной и традиционной медицине. В статье рассматривается возможность использования геоинформационных технологий в изучении и сохранении лекарственных растений от сердечно-сосудистых заболеваний, таких как Redhaw Хоторн (боярышник кроваво-красный), Роза дикая (Роза Канина), валерианы Туркестана (валериана Dubia Bunge), крапива (Urtica двудомной), Туркестан пустырника туркестанского (пустырника turcestanicus), эфедры хвоща (эфедра equisetina Bunge). Использование геоинформационных технологий, принимая во внимание изучение и использование лекарственных растительных ресурсов, в том числе их защиты, предоставляет прекрасную возможность для размышлений и анализа текущего состояния, а не традиционных методов. Карта распространения этих лекарственных растений на территории Кыргызской Республики, позволяет вводить и отображать точное местонахождение конкретных популяций лекарственных растений, чтобы сформировать паспорт для каждого семейства сайтов сырья, чтобы разработать систему информационной поддержки по запасам ресурсов в стране. Применение ГИС-технологий значительно упрощает работу по мониторингу и охране лекарственных растений, последующие исследования ресурсов.

Ключевые слова: *лекарственные растения, геоинформационные технологии, сердечно-сосудистые заболевания.*

The territory of Kyrgyzstan is represented by a variety of plants with different properties, among which an important place is given to medicinal plants (200 species). Among them stand out the plants, which are widely used in the treatment of cardiovascular diseases in folk and traditional medicine. The article discusses the possibility of using geoinformation technologies in the study and conservation of medicinal plants from cardiovascular disease, such as Redhaw Hawthorn (Crataégus sanguínea), Rose wild (Rosa canina), Valerian Turkestan (Valeriana dubia Bunge), Stinging nettle (Urtica dioica), Turkestan motherwort (Leonurus turcestanicus), Ephedra horsetail (Ephedra equisetina bunge). The use of geo-information technologies, taking into account, the study and use of medicinal plant resources, including their protection, provides a great opportunity for reflection and analysis of the current state, rather than traditional methods. A map of the spread of these medicinal plants in the territory of the Kyrgyz Republic, allows you to enter and display the exact location of specific populations of medicinal plants, to form a passport for each site collection of raw materials, to develop a system of information support on reserves of resources in the country. Application of GIS technology greatly simplifies the work on monitoring and protection of medicinal plants, subsequent studies resources.

Keywords: medicinal plants, geoinformation technology, cardiovascular disease.

1. Introduction

The flora of Kyrgyzstan is presented in sufficient variety of honey, fodder, ether-oil, dyeing, tanning and other valuable plant species. Significant among these is given to plants with medicinal properties. On the territory of Kyrgyzstan there are more than 200 species of wild medicinal plants, 80 of which is used in scientific medicine.

Numerous and substantial facts about medical plants of Kyrgyzstan are published in the works of scientists as Altymyshev A.A. (1974), Vandysheva V.I. et all (1977), Alimbaeva P.K. et all (1990), The flora of Kyrgyz SSR (1950-1965), Atlas of areas and resources of medicinal plants of the USSR (1980) and others.

Despite the fact that the study of spreading of medicinal plants in the Kyrgyz Republic is a challenge, there are the diminishing stocks of medicinal plants of the country. Many species listed in the Red Book of the Republic. Economic efficiency of use plant resources, their protection and reproduction depend on the quality of applied technologies, monitoring and management. The main objectives of the study resources at this stage is not only the study of medicinal flora and search for industrial thickets, but also identify species in need of protection, as well as an assessment of their condition. Therefore, it became necessary to introduction to the study of medicinal plants of current research technology, in particular geographic information systems. In this regard, the purpose of this report is the possibility of using geoinformation technologies to study the distribution of medicinal plants on the territory of the Kyrgyz Republic.

2. A brief characteristics of medicinal plants

6 of medicinal plants were selected, which are widely used in the treatment of cardiovascular diseases in folk and traditional medicine.

Were selected six medicinal plants, which are widely applied for the treatment of cardiovascular diseases in national and traditional medicine. Initially gives data on the brief characteristics, the ecology and the application of the selected plants.

Crataégus sanguínea - Redhaw Hawthorn

Figure 1. Redhaw Hawthorn

Hawthorn has long been famous for its healing properties. In herbal medicine used in almost all parts of the plant - fruits, flowers and even bark (Fig1). Hawthorn is used for insomnia, cardiovascular diseases, atherosclerosis, neurosis. This herb has a cardiotonic effect, purifies the blood, helps with vertigo, reduces the cholesterol content in blood, dilates blood vessels [3].

The chemical composition. It contains retinol, phthiocol, cevitamic acid, α-tocoferol, polyneuramin vitamins; biologically active substances: saponins, flavonoids, starch, fructose, essential oils, organic acids, choline, sorbitol, pectin.

Also hawthorn contain ursolic acid, which has anti-inflammatory, antimicrobial, vasodilator action, has a slight diuretic effect, has antitumor, hepatoprotective properties and cardiostimulation. The same acid is also an essential component of the skin's collagen, so the use of

hawthorn fruit produces a rejuvenating effect, stimulates cell regeneration.

On the territory of the Kyrgyz Republic on common Redhaw Hawthorn are spread slopes Kungei Ala-Too on the right coast of the river Uzun-Su Ak-Tash-Koro, Tar-Suu, DzhangyzTal, among a spruce forest with an admixture of aspen, mixed grasses. In Chon-Kemin it can be collected in the floodplain of the rivers Boo Zhetpes, Chyli-Bulak and Torah-Aygyr, in the Inner Tien Shan - the basin rivers Atbashi, Naryn and its tributaries Kurtka, Kazhyrty, foothills Toguz Toro. In the foothills of the Kyrgyz Ala-Too is rare, so his fees are insignificant; by Chatkal ridge - lake Sary-Chelek, especially a lot of it in the gorge Kyz-Kol, on the way to the lake; in the valley of Talas - in basin river Kalba, Cholok-Bulak, Talas, combe Kashka-Suu, near the village of Ivanovo-Alekseyevka and the town of Talas [1].

Rosa canina L. - Rose wild

Rose wild cleans the circulatory system, improves metabolism and is rich in vitamins, used for anemia.

Rose wild cleanses the circulatory system, improves metabolism and is rich in vitamins, is used for anemia, scurvy, in diseases of the kidneys and bladder, liver. Rosehip used as a fortifying agent, tonic, weakens the development of atherosclerosis, increases resistance to infectious diseases, and as a vitamin remedy. The roots of Rose wild a lot of tannins, so they are used as binders. Rosehip seed oil is obtained, containing fatty acids and vitamins. It has anti-inflammatory and wound-healing features.

The chemical composition . Rosehip - is first of all a great source of vitamins vitamin C (up to 4800 mg /%), vitamins B_2, P, K, E, carotene, riboflavin. In the vegetable world hips have the highest vitamin activity. In addition to vitamins in fruits of wild rose are salts of potassium, calcium, magnesium, iron, phosphorus, citric and malic acids, sugars, phytoncides, essential oils, tannins.

Spread. In the Kyrgyz Republic in sufficient abundance of Rose wild grow the northern slopes of all Ridges, the river floodplains, in the forest belt of shrubs, in valleys of the rivers, forest dachas. For example, in Kemin - Kungei on Ala-Too ridge, in the area rivers of Uzun-Su, Ak-Tash-Koro, Tar-Suu, Dzhangyz-Tal, Kalmak-Su; in Talas - Talas in floodplains, on the Talas ridge, Besh-Tash, Kumyshtag, Shilbilisay; in the Susamyr valley along the river Karakol, Chychkan; in the gorges of the Kyrgyz ridge combe Kizil-Su to Taldy-Bulak and Chu River (Boom gorge); in Naryn region along the rivers Naryn, Kulanak, Kazhyrty, Kurtka, Atbashi, Alabuka, Kokomeren and in the basin of Lake Issyk-Kul - combes Grigorievka, Ak-Su, Ananjevo Tup, Karkyra, Jergalan, Jets-Oguz, Pokrovka, Chon-Kyzyl -Su, Sarah, Chon Dzhargylchak, Barskaun [1].

Valeriana dubia Bunge (V. turkestanica Summ.) - Valerian Turkestan

Valerian has a calming, improves the activity of the cardiovascular system and the gastrointestinal tract actions. He reduces the excitability of the central nervous system, relaxes the of smooth muscles spasms. It is used at a hysteria, convulsions, heart palpitations, pain in the heart.

Figure 2. Valerian Turkestan

Valerian helps expand blood vessels, lowers blood pressure, and relieves spasms of the veins. With the purpose of treatment is taking a decoction of the roots, infusion (diluted with water). You can chew the roots with water or use powdered valerian root (on the tip of a knife), washed down with water (Fig2).

Valerian helps expand of blood vessels, reduces pressure, relieves spasms of venous vessels. With purpose of treatment taking a decoction of the roots, a tincture (diluted with water). Can chew the rootlets washing down with water or use powdered valerian root (on a knife tip).

The chemical composition. Rhizomes of and roots of valerian contain a volatile oil, the main component of which is borneol-izovalerianat; isovalerianic acid, borneol, alkaloids, sugars and tannins, ester of formic, malic, acetic and butyric acids, stearic and palmitic acid, flavonoid compounds.

Valerian grows wild in forests, forest edges, along the coast of the rivers, lakes and on the marshy meadows, near swamps, on the slopes mountain, mainly on wet soils. But big does not form thickets.

Urtica dioica - Stinging nettle

Figure 3. Stinging nettle

Urtica dioica is widely used both in traditional and in national medicine. In spring nettle essential source of vitamins. Urtica dioica is recommended for the treatment of anemia, atherosclerosis, muscle and joint rheumatism.

Stinging nettle is recommended for the treatment of anemia, atherosclerosis, muscle and joint rheumatism, dropsy, eczema skin, for diseases of biliary paths and liver, gastric colic, digestive disorders [4].

The chemical composition. Nettle contains ascorbic acid, pantothenic acid, vitamins, iron, calcium and sodium salts and others.

Stinging nettle is very widespread in nature, it found everywhere as a weed, but it is not appropriate to gather, especially for industrial harvestings. It usually grows on small abandoned plots, fences, along the roads. For medical purposes are harvested leaves without stalks (Fig.3).

Urtica dioica can be found in all regions of Kyrgyzstan and, although it does not occupy large areas, it can be easily assembled in backyards and around the city of Bishkek, Karagachevoy grove, Chon-Aryk, Vorontsovka, Mountain Serafimovke, Issyk-Ata, Shamsi, Kyzyl-Suu, Orlovka, Jarl-Kaindy, Ortho-Kaindy, Taldy-Bulak, Kara-Balta, in the valleys of the rivers Susamyr, Chychkan, Bashi, Talas, Naryn, Chatkal among floodplain vegetation.

Stinging nettle can be found in all regions of Kyrgyzstan and, although it does not occupy extensive areas, it can easily be assembled in home gardens and around of the city Bishkek, the Karagache grove, village of Chon - Aryk, Vorontsovka, Gornaya Serafimovka, Issyk-Ata, Shamsi,

Kyzyl-Suu, Orlovka, Jarly-Kaindy, Ortho-Kaindy, Taldy-Bulak, town of Kara-Balta, among floodplain vegetation in the valleys of the rivers Susamyr, Chychkan, Atbashi, Talas, Naryn, Chatkal [1].

Leonurus turcestanicus - Turkestan motherwort

Figure 4. Turkestan motherwort

Has soothing properties, slows down cardiac contractions, reduces arterial pressure, therefore, used in cardiovascular neurosis, increased nervous excitability. By its soothing effect is superior to Valerian, included in the soothing tea.

The chemical composition. Turkestan motherwort contains alkaloids, sugars, flavonoids, causing a basic physiological effects preparations motherwort. It also has a small amount of saponins, tannins, and essential oils.

Motherwort grows absentmindedly near irrigation ditches, on waste grounds, along the edges of fields, near the housing, fences, among thickets of shrubs, in the floodplain a forest, on dry rubbly slopes of the of gorges, on the pastures, forming weeds of spots (Fig.4).

Motherwort can be collected in the Chui Valley, in the vicinity of Bishkek and in the foothills tall grass and forest zones of the Kyrgyz ridge, in basin Chon-Kemin river, in the basin of the lake Issyk-Kul - the northern slopes Terskey Ala-Too, in the forest belt among bushes and on the slopes of the forest zone of Talas, Kyrgyz, Fergana, Atbashi, Moldo-Too ridges [1].

Leonurus turcestanicus Krecz can be collected in the Chui Valley in the vicinity of Bishkek and in the foothills of tall and forest zones of the Kyrgyz ridge Chon-Kemin river basin, in the basin of the lake. Issyk-Kul - the northern slopes Terskey Ala-Too in the forest belt among the bushes and on the slopes of the forest zone of Talas, Kyrgyz, Fergana, Bashi, Moldo-Too ridges

Ephedra equisetina bunge - Ephedrine horsetail

Figure 5. Ephedrine horsetail

Ephedrine causes vasoconstriction, increasing the bronchi and pupils, raises blood pressure, inhibits intestinal peristalsis, increases blood sugar. Compared with adrenaline, it has a less sharply, but more prolonged effect. In addition, ephedrine stimulates the central nervous system, and increases the excitability of the respiratory center [3].]

The chemical composition. Raw materials Ephedrine of used to produce the alkaloid ephedrine, according to the pharmacological properties a close to adrenaline. The plant contains ephedrine in a mixture with its isomers, half of which is sometimes pseudoephedrine. Its pharmacological properties are similar ephedrine, but the activity is about 2 times less.

Grows absently, forming small clumps; single shrubs are rare (Fig.5). It grows in such unfavorable conditions where other plants cannot exist. Drought-resistant, sun-loving.

Ephedra horsetail grows on gravelly and rocky slopes of the mountains. Distributed in the Central Tien Shan, Basin of Lake Issyk-KulI, river basins Large and Small Kemin, Kyrgyz, Talas, Chatkal and Alai, Ferghana ridges.

In Kyrgyzstan, there are ephedrine wildernesses that, take up a small area. They grow on the stony for deserts and desert outcrops Inner Tien-Shan, in the western basin of Lake Issyk-Kul, on northern ridge of the Kyrgyz Ala-Too, in the Alai Valley. Ephedrine wildernesses formed by stony-rubble slopes of the mountains on talus, cliffs found small spots among other deserts. Ephedrine in

the basin of Lake Issyk-Kul creates a pure community, in which the coating fluctuates within of 50-70% [1].

3. Results.

It is very important not only to study the medicinal flora and search for industrial thickets, but also identify species in need of protection, as well as an assessment of their condition, so acutely raises the question of the introduction to the study of medicinal plants of modern technology, particularly geographic information systems. GIT is widely applied in the account, the study and use of natural resources, including protection of the environment. Since they have a great potential reflect, analysis and modeling of natural resources than a traditional methods. Unlike traditional paper maps, GIS e-map make available to the researchers plurality of layers of various general and thematic information [5].

Of great interest in the construction of such systems are medicinal plants that have territorial binding to specific landscapes, types of soils, phytocenoses that allows development information support system throughout the country. Until now, in the study of medicinal plants experience of creating of geographic information systems (GIS) within the Kyrgyz Republic almost was not.

Given features listed above of geo-information technologies, we have drawn up an electronic map the spread of the above medicinal plants on the territory of the Kyrgyz Republic with ArchGIS program. This map consists of several layers, which contain detailed data on Administrative Division, the location of rivers and mountain ridges, areas of spread populations of the studied medicinal plants within the KG. This map allows you to enter and display the points of specific populations of medicinal plants, to form a passport for every place collection of raw material, also to search according to different criteria. Fig. 1 shows the appearance of the electronic map populations of medicinal plants from cardiovascular disease in the territory of the Kyrgyz Republic.

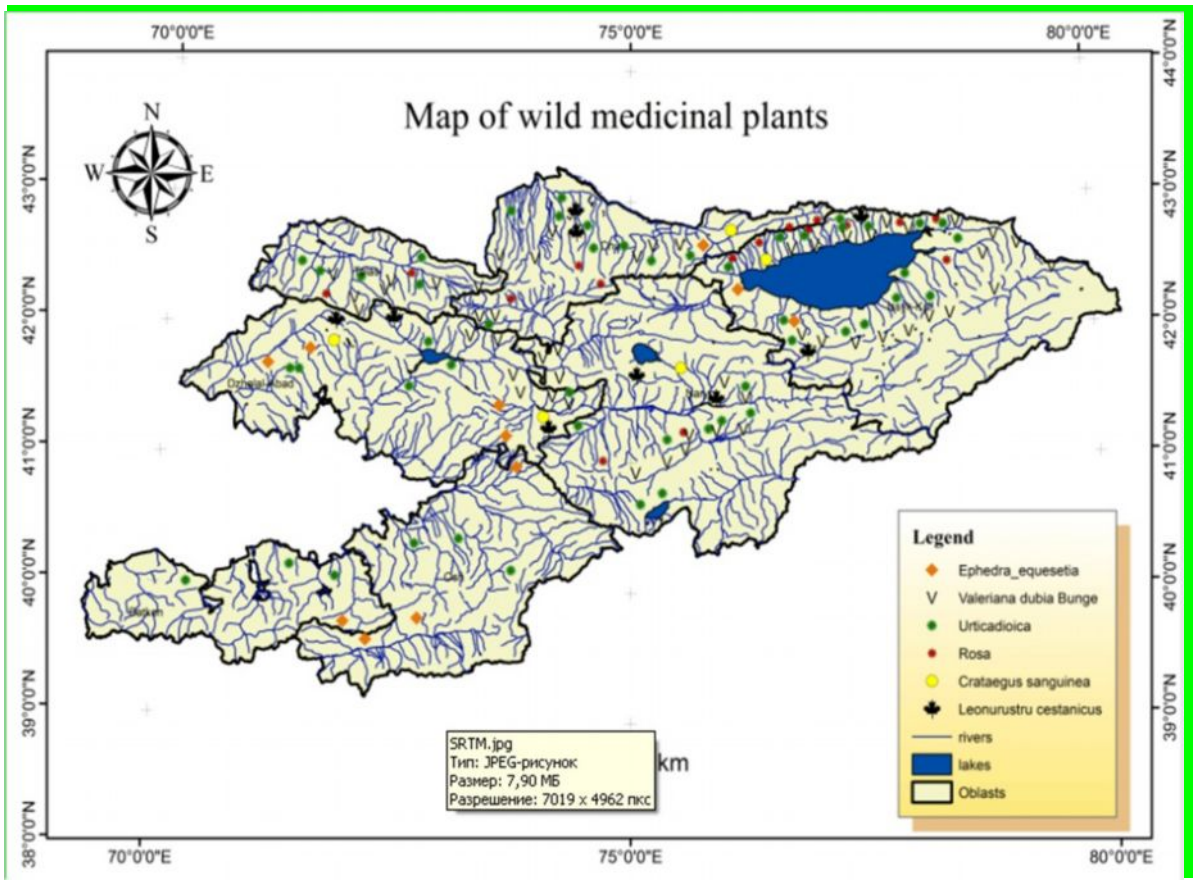

Figure 6. Map of wild medical plants in Kyrgyzstan

Through the use of GIS technology has become possible to display on an electronic map the exact location specific thickets, as well as to form "Passport raw gathering place", which shows the basic resource characteristics and protection and recommendations of exploitation of medicinal plants.

Passport raw gathering place must contain the map of the area, a photo, a systematic characterization, data location, the area of thickets, stocks of raw materials and the possible annual harvesting of medicinal plants studied.

Passport raw material collection point must contain a map, photo, systematic characterization, data location, area of the thickets, inventories of raw materials and the possible annual harvesting content of medicinal plants studied.

4. Conclusion

Thus, the integration of geographic information technologies allows to create an electronic database of wild medicinal plants, which includes data on reserves, distribution, economic and environmental indicators of raw materials. Application of GIS technology greatly simplifies the work on monitoring and protection medicinal plants. In addition it can be useful potential preparers of medicinal plants, as greatly simplifies the search for thickets, it is very quick and easy to update existing data.

Reference

1. Alimbaeva P., Nuralieva J., Arbaeva E. (1990). Medicinal Plants of Kyrgyzstan. – Frunze. Kyrgyz republic - 128 p.
2. Altymyshev A.A. (1974).Medicinal wealth (of natural origin). – Frunze. Kyrgyz republic
3. Atlas of areas and resources of medicinal plants of the USSR. 1980. - Moscow. USSR -341 p.
4. Vandysheva V.I. Yusupov A.A., Alimbaeva P.K., Nuralieva G. (1977). Medicinal

Plants of Kyrgyzstan and prospects of their use. – Frunze. Kyrgyz republic

1. Turishev A.Y. (2007). Geoinformation technologies in the study of wild medicinal plants of Perm Region: Author. Diss. cand. farm.n. – Perm. Russia