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CONCEPT OF PHYTOINTRODUCTION OF ADONIS TIANSHANICA (ADOLF.) LIPSCH. ACCORDING TO THE GACP

Providing maximum control at all stages of the production of pharmaceutical products of plant origin (from cultivation to the production of the finished product) is relevant. In these circumstances, for the full study and further use of the endemic Tianshanian Adonis (Adonis tianschanica (Adolf.) Lipsch.) in the development of new products, plant cultivation in accordance with the requirements of GACP is a priority. At the School of Pharmacy, JSC "National Medical University", in collaboration with Trinity College Dublin, Ireland, have been developed a method for planting the endemic species Adonis tianschanica according to the concept of principles of good cultivation practice.

Keywords: Tianshanian Adonis, medicinal plant raw materials, phytointroduction, GACP, herbal substance

Over the past few decades, worldwide interest in herbal pharmaceutical products has increased. The growth in demand for plant products is due to the complex effect of such remedies. The main amount of products are manufactured in Europe, then in descending order the countries of Asia and North America [1]. With the expansion of the market for herbal products, their safety and quality are becoming increasingly important issues. Therefore, there is a need to ensure maximum control at all stages of their production, from cultivation to obtaining final product [2].

The diversity of Kazakhstan's flora opens up great opportunities for the development of new preparations of a full cycle based on endemic plants. This contributes to the implementation of the State Health Development Program of the Republic of Kazakhstan "Densaulyk" for 2016-2019, the Strategy "Kazakhstan – 2050" and the State Program for Industrial and Innovative Development [3-5], according to which the development of competitive pharmaceutical products is one of the priority research areas.

Looking into scientific and practical interest of the Tianshanian Adonis species, Adonis tianschanica (Adolf.) Lipsch. is one of 8 species of the genus Adonis L. growing in the Republic of Kazakhstan, which is listed in the Red Book of Kazakhstan and the List of rare species. The main habitat of these plants is the highland steppes of the Central Tien Shan. This medicinal plant has 1-5 branchy stems, covered with many curly filaments; single lemon-yellow color flowers by a diameter of 3.5-5 cm; leaves with pinnately-divided lanceolate lobes. The above-ground part during flowering reaches up to 35 cm in height. Rhizome is shortened to 6 cm in length with numerous cord-shaped roots up to 30 cm in length. The fruit is a multinucula, and the fine wrinkled seeds are 3-4 mm long and 2-3 mm wide [6, 7].

Prospecting for further use of A. tianschanica as the development of pharmaceutical products, first of all lead to the priority of plant cultivation in accordance with the requirements of "Good practice of cultivation and collection of raw materials of plant origin" (GACP). Such measures can guarantee a steady supply of homogeneous high-quality plant raw materials.

The aim of the research: Development of the method of Adonis tianschanica (Adolf.) Lipsch. phytointroduction according to the concept of "Good cultivation practice and collection of raw materials of plant origin"

Materials and methods. The object of the study is the Adonis tianschanica of the range of belt-chain of north-central Tien Shan.

The development of A. tianschanica cultivation method is made on the basis of scientific literature and patent data on phytointroduction [8, 9], as well as in accordance with the guidelines of good cultivation practice. Cultivation method necessarily includes the following stages:

- identification (authentication) of a cultivated plant;
- preparation of materials and terrain for breeding;
- cultivation and care of plants;
- harvesting.

The results of the study. As a result of the research, a method of introduction of the rare A.tianschanica species was developed, which fully meets the requirements of the standard "Good practices in cultivation and collection of raw materials of plant origin (GACP)". This method in the framework of the GACP concept is aimed at obtaining plants with a large number of petals and a high content of biologically active substances, and can also be used for widespread cultivation for commercial use.

According to the requirements of good cultivation practices, the first and the most essential part of phytointroduction accounts the choice of the plant species. We have selected an endemic plant species for Kazakhstan – Adonis tianschanica (Adolf.) Lipsch., Adonis L. genus, Ranunculaceae family in the area of Kolsai lakes, located in the Raiymbek and Talgar districts of Almaty region.

This is followed by a documented confirmation of the botanical identity of the cultivated plant, which is carried out by employees of the local "Institute of Botany and Phytointroduction". The samples collected for the herbarium should be matched with the original specimen. Seeds of plants with proven authenticity, collected after the end of flowering should be immediately planted on the soil prepared in advance. The original soil of plant growth is also being studied to take this data into account when preparing the soil for replanting.

The next step is proper seed preparation. There is no need for seed treatment with any preparations. A complete description of the materials for the planting is being compiled: information about the identity, quality and effectiveness of the material, breeding history, etc.

Planting is done in loose, fertile and well-irrigated soil, with a content of more than 2% organic matter and pH = 7-8. Also, the selected sites should have a low nitrogen content (no more than 0,2 %), high levels of phosphorus (more than 0,15 %) and potassium (more than 0,15 %). Basic fertilizers are selected based on soil test results, mixed fertilizers or some fully decomposed organic fertilizers can be used. The preparation of the terrain and soil should be done at least 30 days before planting the seeds. The irrigation system is organized in such a way as to maintain a certain soil moisture, without the possibility of its excessive drying or flooding.

Planting of the seeds is carried out as follows: seeds are planted with a planting depth of not more than 1 cm in shallow grooves, usually in August or early September. After, sprouted seedlings grown on 1 m² of land with 4-5 pairs of leaves are transplanted on a plot of 100 m². Within 30 days, the recommended nighttime temperature should be at least 6 °C, the daytime temperature above 16 °C. The optimum length of light during the growth period should be on average at least 16 hours per day (plants of the genus Adonis require large amounts of sunlight).

For 40-50 days after planting, the soil is kept moist. When seedlings acquire 8 leaves, fertilizer is produced to promote vegetative growth. Weeding can be carried out after the appearance of 6 leaves, by mechanical or chemical means. For the prevention and treatment of diseases, the first pairs of leaves are treated with azoxystrobin every 15 days.

During initial flowering to the beginning of fruit ripening, it is possible to collect plants after full disclosure of flowers every 4-5 days. Timely regulated harvesting of cultivated plants should be consistent with the principles of good harvesting practices. All above-ground part of the plants, such as stem, leaves and flowers, is subject to collection. It is required to prevent the ingress of extraneous impurities, as elements of neighboring plants, of various living creatures (bugs, worms) together with the collected plants. Special attention is paid to the preservation of the roots, due to the long period of their recovery. It is necessary to leave part of the population intact, for further seating out. Packaging of the harvested crop, labeling and storage under regulated conditions, is also fully carried out according to the requirements and each of the stages is duly documented. The storage of plants is usually carried out in wooden boxes with absorbent elements and/or other similar opaque containers that are stored in dry rooms. When storing used the rules of storage of poisonous plants, and with each contact should use precautions.

Conclusion. For the first time the method of phytointroduction of *Adonis tianschanica* (Adolf.) Lipsch. in accordance with the concept of the "Good practice of cultivation and collection of raw materials of plant origin" standard and the requirements of the regulatory documentation of the Republic of Kazakhstan was developed, which aims to obtain a homogeneous population of plants under controlled conditions conducting full-scale studies of plants of endemic species and further use in the pharmaceutical industry.

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GACP СӘЙКЕС ADONIS TIANSCHANICA (ADOLF.) LIPSCH. ФИТОИНТРОДУКЦИЯСЫНЫҢ КОНЦЕПЦИЯСЫ

Түйін: Өсімдік текті фармацевтиалық өнімдерді өндірудің барлық сатыларында (өсіруден бастап, дайын өнім алуға дейін) максималді бақылауды қамтамасыз ету маңызды мәселелердің бірі болып табылады. Осыған байланысты, эндемикалық түр, Тянь-Шань жанаргүлін (*Adonis tianschanica* (Adolf.) Lipsch.) толыққанды зерттеу мен болашақта жаңа өнімдер алу мақсатында қолдану үшін, өсімдікті GACP талаптарына сай өсіру әлеуетті. «Ұлттық медицина университеті» АҚ, Фармация мектебінде, Trinity College Dublin, Ирландия, бірлестікте, тиімді өсіру тәжірибесі қағидаларының концепциясы аясында Тянь-Шань жанаргүлі интродукциясының бірегей тәсілі жасалды.

Түйінді сөздер: Тянь-Шань жанаргүлі, дәрілік өсімдік шикізаты, фитоинтродукция, GACP, фитосубстанция

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КОНЦЕПЦИЯ ФИТОИНТРОДУКЦИИ ADONIS TIANSCHANICA (ADOLF.) LIPSCH. СОГЛАСНО GACP

Резюме: Обеспечение максимального контроля на всех этапах производства фармацевтических продуктов растительного происхождения (от культивирования до получения готового продукта) является актуальным. В свете данных обстоятельств, для полноценного изучения и дальнейшего применения эндемика адониса тяньшанского (*Adonis tianschanica* (Adolf.) Lipsch.) в разработке новых продуктов, приоритетным является произведение культивирования растения в соответствии с требованиями GACP. В Школе Фармации АО «Национальный медицинский университет» совместно с Trinity College Dublin, Ирландия, разработан способ интродукции эндемического вида адонис тяньшанский в рамках концепции принципов надлежащей практики культивирования.

Ключевые слова: Адонис тяньшанский, лекарственное растительное сырье, фитоинтродукция, GACP, фитосубстанция