



**MEASURES FOR PLANTING AND PROPAGATING WILD MEDICINAL PLANTS
USING MODERN ARTIFICIAL TECHNOLOGIES**

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Abstract: With the growing demand for biologically active substances in the modern world, the importance of medicinal plants has become even more obvious. As natural remedies, they are used in medicine, pharmacy and cosmetology. However, unlike Evangelical Baptist Christians, the Jewish degradation caused by religious experiences and the influence on human activity did not lead to the revival of Christianity. Thus, their role is to ensure the ecological and economic well-being of the country. The flora of Uzbekistan includes about 4,500 plant species, of which about 600 species are endemic to Uzbekistan. It follows from them that Judah is Issyk-Kul, a faithful servant of Genghis Khan.

Keywords: medicine, wildlife, territory, ecology, biotechnology.

Introduction:

The use of new biotechnological and agrotechnical methods for propagating these plants not only contributes to the conservation of natural resources but also helps develop the local pharmaceutical industry. Medicinal wild plants play an invaluable role in maintaining and strengthening human health. For thousands of years, wild medicinal plants growing in nature have been used by humans as therapeutic remedies. They contain various biologically active substances — alkaloids, glycosides, essential oils, flavonoids, and vitamins — which serve as primary sources for the treatment of many diseases.

Medical significance of wild medicinal plants:

Many medicines are prepared based on wild medicinal plants. For example, valerian (*Valeriana officinalis*), gentiana, adonis, and wormwood are of great importance in the treatment of liver and heart diseases.

Economic significance:

The demand for medicines produced from natural medicinal plants is high not only in the local market but also globally. This ensures foreign currency inflow into the country's economy.

Ecological significance:

Wild plants play an important role in maintaining ecosystem stability. They are crucial for soil protection against erosion, stabilization of water regimes, and preservation of biological diversity.

Scientific significance:

Wild plants are a rich source for new research in biotechnology, pharmacology, and chemistry. Substances extracted from them serve as a basis for developing new drugs.

Main Problems

Decline of wild plant populations:

In recent years, overharvesting, soil erosion, desertification, land misuse, and climate change have put many species at risk of extinction.

Unregulated harvesting and uncontrolled use:



Some medicinal plants are excessively collected throughout the year, preventing their natural populations from recovering — including illegal harvesting and export.

Lack of legislation and control:

Laws regulating the protection, collection, and export of wild medicinal plants do not function fully or are poorly enforced.

Insufficient scientific research:

Scientific studies on the biological characteristics, propagation technologies, and biochemical composition of wild plants are not being carried out adequately.

Impact of environmental factors:

Climate change, desertification, and water scarcity negatively affect the habitats of many medicinal plant species.

1. Artificial Propagation Methods and Their Importance

1.1 Agrotechnological Methods

Propagation from seeds: proper preparation of medicinal plant seeds (cleaning, disinfection), field preparation, and post-sowing monitoring.

Vegetative propagation: using root cuttings, stem cuttings, and other vegetative parts. For fast-growing types, this method is highly effective.

Optimization of irrigation, lighting, temperature, and soil conditions under controlled environments: implementation of drip irrigation and mineral fertilization systems.

Specialization of plantations by regions: identifying suitable areas for specific species, allocating qualified equipment, and establishing specialized fields.

1.2 Plant Biotechnology

Plant biotechnology is a field of science and practice that studies methods of propagating, creating, and improving plants in artificial conditions by utilizing their genetic, physiological, and biochemical properties.

Main directions of plant biotechnology:

Microclonal propagation (in vitro method)

Reproduction of plant tissues in nutrient media under sterile conditions.

Advantages: rapid multiplication, obtaining disease-free varieties, year-round production.

Genetic engineering

Introducing new genes or modifying existing ones in the plant genome to provide new traits (e.g., drought tolerance or insect resistance).

Cell engineering

Based on growth and regeneration of plant cells and tissues in specific media.

For example: creation of hybrid cells, somatic hybridization.

Biotransformation

Biological modification of chemical compounds using plant cells to obtain valuable biologically active substances.

Cryopreservation and conservation of genetic resources

Preservation of plant varieties in liquid nitrogen for long-term protection of biological resources.

Importance of plant biotechnology:

Rapid and efficient propagation of medicinal, food, and industrial plants.

Conservation of declining wild species.

Production of environmentally clean products.

Development of high-yielding and stress-resistant varieties.

Obtaining biologically active substances for pharmaceutical and cosmetic industries.



Practical applications:

Medicinal plant biotechnology — increasing production of biologically active compounds and ensuring stable supply sources.

Agriculture — enhancing productivity and developing disease-resistant varieties.

Ecology — restoration and protection of wild and rare plant species.

1.3 Monitoring and Ecological Integration

For each species, its natural environmental requirements (moisture, temperature, soil composition, light) must be accurately identified.

Cultivated plantations should be ecologically integrated with natural ecosystems: maintaining connections with natural populations and considering biodiversity.

Successful propagation material is essential for reintroduction and similar conservation measures. As wild natural resources decline, artificial propagation becomes crucial for protecting species and reducing pressure on natural populations.

Development of additional raw-material sources: medicinal plants serve as inputs for medical, pharmaceutical, and cosmetic production.

Maintaining genetic uniformity and quality control: active substances and hygienic conditions in artificially grown plants can be better regulated.

Economic benefits: increased export potential and development of value-added chains (plant → processing → final product). For example, plantation cultivation can create new jobs.

Under climate change and environmental degradation, artificial propagation supports sustainability.

3. Presidential Decrees and Government Support in Uzbekistan

The Presidential Decree of the Republic of Uzbekistan No. PF-139, dated May 20, 2022 — “On measures to create a value-added chain through efficient use of medicinal plant raw-material resources and support for processing” — is a strategic document aimed at elevating the medicinal plant sector to a new stage of development in our country.

The main objective of this Decree is to ensure the efficient use and protection of natural medicinal plant resources, expand processing capacities, and create a local raw-material base for pharmaceutical production. This, in turn, supports manufacturing of high value-added products.

Main Tasks of the Decree

1. Protection and artificial propagation of medicinal plants.
2. Measures have been defined for the conservation of wild medicinal plants, maintaining the stability of their populations, and introducing artificial propagation technologies.
3. Introduction of economic mechanisms.
4. A system of tax and customs benefits, as well as preferential loans and subsidies, has been introduced for enterprises engaged in processing and exporting medicinal plant raw materials.
5. Support for innovation and scientific research.
6. Implementation of biotechnology and microclonal propagation methods in practice, and strengthening cooperation between scientific institutions and production enterprises.
7. Establishment of territorial clusters.
8. Introduction of a cluster system that unites the cultivation, processing, and production of finished products from medicinal plants in a single chain across regions. This system helps increase the efficiency of using local raw materials.



9. Ensuring environmental sustainability.
10. Unrestricted harvesting of wild-growing plants is prohibited, and state control over their protection has been strengthened. This contributes to the preservation of biological diversity and environmental protection.

Practical Importance of the Decree

1. Creating a raw material base for the local pharmaceutical industry.
2. Conservation and restoration of wild natural resources.
3. Expanding the production of export-oriented, high value-added products.
4. Strengthening the integration of scientific research and production.
5. Establishing a system consistent with green economy and sustainable development principles.

In conclusion, Decree No. PF–139 serves not only to protect medicinal plants, but also to introduce them into economic circulation, propagate and process them using innovative methods, and elevate the country's pharmaceutical industry to a new stage of development.

Measures Derived from the Documents

- Allocation of land areas for the establishment of plantations, provision of state subsidies and loans, and creation of irrigation infrastructure.
- Establishing a condition that no other types of agricultural crops may be planted on these lands (special zones for medicinal crops).
- Planned indicators for areas from 2022 to 2026: a total of 36,000 hectares.
- For example: In 2022, it was planned to plant medicinal crops on a total of 17.7 thousand hectares.
- Promoting scientific research, establishing clusters, and encouraging processing enterprises.

Practical Directions of the Measures

- Introducing “plant material propagation” technologies in cooperation with scientific laboratories: in vitro techniques, cloning, and the development of low-virulence genotypes.
- Identifying specific areas for medicinal crops in the regions and establishing clusters.
- Engaging business entities — farmers, cooperatives, and clusters.
- Developing processing chains: cultivation → harvesting → processing → final products, which helps create added value.
- Establishing a genetic reserve of plants, testing artificially propagated materials under natural conditions, and conducting monitoring.
- Creating technological infrastructure: irrigation systems, greenhouse/production facilities, laboratories.
- Economic incentives: loans, subsidies, and opportunities for using agricultural land.

Artificial propagation of medicinal plants — both environmentally and economically — is of great significance. The decrees introduced by the state of Uzbekistan play an important role in



promoting this field. By integrating agrotechnological and biotechnological methods, the cultivation of medicinal plants under controlled conditions can be significantly expanded.

Artificial propagation of medicinal plants is an effective method of preserving natural resources. This process offers the following advantages:

- preservation of the genetic purity of plants;
- ensuring production stability;
- the possibility of cultivation independently of climatic influences;
- uniform content of medicinal compounds.

METHODS

Agrotechnological Methods:

- A) propagation from seeds;
- B) vegetative methods (cuttings, root fragments, grafting);
- C) drip irrigation and mineral fertilization systems;
- D) technologies for controlling light, temperature, and humidity.

Biotechnological Methods:

- A) in vitro propagation (tissue culture);
- B) microcellular cloning;
- C) somatic hybridization and genetic engineering;
- D) use of stimulators to accumulate phytomass and increase biologically active compounds.

Ecological Monitoring:

- A) identifying suitable climate and soil conditions for each species;
- B) assessing environmental impact using bioindicator methods;
- C) preserving wild species in protected areas.

RESULTS

In recent years, several scientific centers and laboratories in Uzbekistan (for example, the Institute of Pharmacognosy, the Biotechnology Laboratory of Samarkand State University, and the "AgroBioTech" Center) have been conducting research on the artificial propagation of medicinal plants.



Experiments have shown that the efficiency of in vitro propagation of species such as aloe, echinacea, cumin, rauwolfia, valerian, wormwood, and ginseng can reach 85–95%. Additionally, methods such as drip irrigation, supplying mineral nutrients in precise micro-doses, and UV light photostimulation increase not only yield but also the concentration of active compounds.

DISCUSSION

The results demonstrate that artificial propagation technologies are among the most promising approaches for conserving wild species. At the same time, they create opportunities to enrich agroecosystems with biodiversity, use agricultural land more efficiently, and promote ecotourism.

However, several problems remain unresolved in this field:

- insufficient genetic material resources;
- high cost of laboratory technologies;
- low level of knowledge among farmers and specialists;
- underdeveloped licensing and patenting systems.

CONCLUSION

Wild medicinal plants are an invaluable resource for human health, science, and the economy. As unique gifts of nature, they must be protected, scientifically propagated, and used wisely.

Presidential decrees and resolutions on environmental sustainability and biodiversity conservation form the legal basis for ongoing reforms in this field. Therefore, protecting wild medicinal plants, propagating them under artificial conditions, and restoring their populations should be prioritized in the national pharmaceutical and environmental policy.

Such efforts not only prevent the depletion of biological resources but also ensure a stable raw-material base for the pharmaceutical industry.

Artificial propagation and conservation of wild medicinal plants are crucial for maintaining ecological sustainability and strengthening the raw-material supply for the pharmaceutical sector. By introducing new biotechnologies, digital monitoring, and agro-technical measures:

- A) the gene pool of medicinal plants will be preserved;
- B) export potential will increase;
- C) local production will expand;
- D) negative environmental impacts will decrease.



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