



"THE WORLD" FLORA UNIQUE BEAUTY: THE RAREST PLANTS ON EARTH"

Rakhmatova Muhsina

Denov Institute of Entrepreneurship and Pedagogy

Faculty of Exact and Natural Sciences

Biology major, 1st year,

13-"b" Group student

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Annotation: This article provides a scientific analysis of the world's rare and endangered plant species, their role in biological diversity, and their ecological significance. The study thoroughly examines the evolutionary formation processes of rare plants, their functional roles in natural ecosystems, their value as genetic resources, and modern approaches to their conservation. Furthermore, the article highlights the current status of plant species threatened by anthropogenic factors, the ecological risks endangering their survival, and the protection mechanisms established by international organizations. The research findings contribute to strengthening the scientific basis for developing effective measures aimed at preserving rare flora species in the context of today's global environmental challenges.

Keywords: rare plants, biodiversity, endangered species, ecological stability, endemic plants, anthropogenic factors, climate change, ecological monitoring.

On our planet biological diversity of humanity ecological stability and natural resources system basis to be , to be important part unique plants organization . These plants have been formed over millions of years of evolutionary processes, and their genetic, ecological and chemical properties are of invaluable scientific importance to humanity. Today , due to global climate change, urbanization, deforestation, illegal plant collection and other anthropogenic factors, many of the world's rare plants are under threat of extinction. According to the Red List compiled by the International Union for Conservation of Nature (IUCN), approximately 40% of the Earth's plants are at risk of extinction to varying degrees. Therefore, the study of rare plants, the analysis of their biological properties and the development of conservation strategies are one of the priority areas of global ecological science. Few occurring types — geographical limited, ecological are organisms that have declined significantly due to either natural or anthropogenic pressures. Each of them exhibits special characteristics and adaptations that have evolved over time, which are important for maintaining biodiversity. Unique plants study through we ecological We learn about the delicate interrelationships of chains, the origin of regional endemisms, and the history of the natural environment. Located in Uzbekistan and Central Asia desert and mountain biomes high endemism with separated stands, she is Identifying, protecting, and determining the taxonomic position of rare species on Earth are urgent tasks. Research helps to formulate conservation strategies, establish regional ecological monitoring, and raise environmental awareness among the population. This article provides a general introduction to the world's rare flora, their ecological and biological characteristics, and general principles of conservation.

Endemic types examples, their natural spread, and ecological properties are analyzed. The populations of some species are declining due to habitat fragmentation, climate change, and the introduction of invasive alien species. Possibilities for conserving these

species through genetic analyses and monitoring are being considered. Also, collaboration with local communities, environmental education, and improved legislation are necessary to increase conservation effectiveness. The rarest plants are species with very limited populations in their natural environment, often endemic or critically endangered. Their uniqueness is largely due to the complex interaction of ecological and geographical factors.

There are main factors that determine the classification of the rarest plants:

The first factor is substrate dependence. Many rare species are adapted to specific mineral composition, salinity, or climate. Special edaphic conditions, such as xerophyte layers, serpentine areas or salty in the desert plaques provide habitat for endemic species, limiting competitors. In this case, the micromorphology and physiology of the plant, such as the root system or ion-limiting mechanisms, play an important role.

Second important factor — microclimate and addressed ecology. Frequently Rare species are concentrated in microhabitats such as mountain slopes, marshy peaks, or northern-exposed cliffs. In these areas Small changes in humidity, temperature, and daylight have a direct impact on the life cycle and phenology. For example, high mountain ranges provide low cloud cover during dark days and cold nights, allowing only specially adapted species to grow.

Third factor — biotic relationship. Pollination and seed The presence or absence of specific mutualistic partners for dispersal often determines the number of species defines. If one plant only one kind of insect or If a plant is pollinated by a bird, the loss of that partner would put the plant at risk of extinction. Plants and microscopic symbionts, such as mycorrhizae, also play a role. or bacterial cooperation also his/her location and growth defines.

The fourth factor is reproductive strategy and genetic limitations. Species that rely on vegetative reproduction have low gene pool stability and are less resistant to sudden environmental changes. Conversely, small populations that are not genetically distinct are weakened by inbreeding and genetic drift, which reduces the adaptive response.

The fifth factor is geographical isolation and historical factors. Paleoclimatic changes, such as cooling or warming phases during the Pleistocene, created refugia in many areas. Isolated populations from these refugia evolved into new endemic species. In addition, islands, mountain ranges or desert distances increased genetic isolation, leading to the emergence of rare plants.

More precisely, this factors often together works: for example, mountainous Isolation and a unique soil composition allow a species to live only in a limited space. This requires choosing appropriate methods in conservation practice - it is necessary to preserve nature, protect mutualistic partners, and conduct genetic monitoring. At the same time, anthropogenic impacts, in particular landscape fragmentation and introductions, easily disrupt the existing delicate balance. Rare plants are of great scientific importance, first of all, as the genetic wealth of natural ecosystems. Their unique metabolites, adaptation mechanisms, phenological variability and ecological stability factors are an invaluable source for scientific research. For example, some plants have the ability to survive in extreme conditions - high temperatures, water scarcity, salinity or high mountain conditions - and studying the mechanisms of ecological adaptation will serve to create future drought-resistant crop varieties.

In addition, the pharmacological value of rare plants is also very high. For example, **the Madagascar periwinkle** is relevant as a source of vincristine and vinblastine, which are used in the treatment of cancer. It has also been found that many tropical plants contain biologically active components with antibiotic, antiviral and anti-inflammatory effects.

Another important function of rare plants within the ecosystem is that they enrich habitats and act as a key link in the food chain for pollinating insects, birds, and small mammals. Their disappearance can lead to disruptions in the entire ecosystem chain. Several other species can be cited as examples.

1) *Wollemia nobilis* — “Living Fossil” This tree species, discovered by chance in the wild forests of New South Wales, Australia in 1994, is one of the rarest plants in the world. It is believed to be a member of the Mesozoic flora of 200 million years ago, and only 100–120 natural specimens exist today. Because *Wollemia* is highly genetically uniform, it is very sensitive to diseases and climate change. Special botanical gardens and genetic clones are being created to preserve this plant.

2. *Rafflesia arnoldii* — the largest flowering plant in the world. The flowers of this plant, which grows in the forests of Indonesia, can reach a diameter of 1 meter and weigh 8–10 kg. It is a parasitic plant and does not photosynthesize. Its disappearance in the wild is associated with the reduction of tropical forests. The reproduction process is very difficult due to the fact that each flower lives only a few days and the complex pollination system.

3. *Amorphophallus titanum* — Titan aron This plant is one of the tallest flowering plants in the world, sometimes reaching a height of 3 meters. It is found in Indonesia and is known for its unpleasant odor. Titan aron does not bloom every year — in some cases, the flowering interval is 7–10 years. Its decline in the ecosystem is accelerated by urbanization and illegal collection.

4. African cycad This plant is preserved on earth only by male specimens, that is, there are only a few male trees in the natural environment. Due to the lack of female plants, natural reproduction is not possible. Conservation efforts are underway through genetic cloning.

5. *Taupo silene* — A New Zealand relict, this plant was thought to have become extinct in the early 20th century but was rediscovered in the 1990s. Its population is very small, with only 20–50 individual plants in the wild. Ecosystem changes, competition from weeds, and soil erosion threaten its survival.

The issue of preserving rare and endangered plants is one of the most urgent areas of global ecological science, requiring an integrated approach. In order to preserve the genetic diversity, ecological functions and evolutionary significance of such plants, it is necessary to simultaneously protect their natural habitats, limit anthropogenic impacts, strengthen scientific research and carry out systematic work on their reproduction in artificial conditions. First of all, since rare plants are an integral part of natural ecosystems, their preservation in their natural conditions is considered a priority. Preservation of the natural environment helps to ensure genetic stability in their natural populations without disrupting the mechanisms of ecological adaptation of plants. In this regard, territories such as reserves, national parks, biosphere reserves are created, where minimizing human impact creates conditions for the restoration of plants.

However, in many regions, anthropogenic factors - urbanization, deforestation, expansion of agricultural areas, overuse of natural resources - are irreversibly changing the natural environment, so preserving rare plants in situ, that is, in their natural conditions, is no longer

enough. Therefore, ex-situ methods, that is, methods of preserving and propagating plants outside their natural environment, in specially created conditions, are of great scientific and practical importance. Modern botanical gardens, greenhouses, seed banks, tissue culture laboratories are considered the most effective means of long-term preservation of the gene pool of rare plants. In seed banks, the genetic material of plants is stored at low temperatures, and they can remain biologically active for decades. The development of biotechnology, in particular, methods such as microcloning and somatic embryogenesis, make it possible to propagate plant species that are difficult to reproduce in the natural environment in laboratory conditions.

The role of ecological monitoring in the conservation of rare plants is invaluable, and the number of populations, their phenological state, the ecological stability of the territory and the pressure of external factors are regularly studied. Based on the results of monitoring, ecological indices are developed to assess the state of plants, the level of risk is determined, and conservation strategies are updated. Such scientific observations make it possible to determine the characteristics of adaptation of plants to the natural environment, the level of genetic variability, and restrictions on the reproduction process. Also, the process of conserving rare plants is not only scientific, but also social consciousness, and the nature conservation system cannot be sufficiently effective in conditions where the ecological literacy of the population is not high. Therefore, it is an urgent task to increase the ecological culture of the population through the media, educational institutions, and nature conservation organizations, to raise awareness about the importance of rare plants and the consequences of their loss. Involving local communities in the conservation process and offering them ecological compensation programs also significantly increases the effectiveness of conservation.

In general, the conservation of rare plants is a multifaceted, science-based, and strategic process that ensures the sustainability of ecological systems. This process relies on public policy, international cooperation, scientific research, and public participation. This is the only way to preserve the genetic wealth of our planet for future generations.

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