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ABSTRACT

"Assessment of the current state of populations of the rare endemic plant *Rosa potentilliflora* Chrshan. et M.Pop. in the Zailiyskiy Alatau"

General characteristics of the work: The dissertation work is intended to comprehensively study the current state of the endemic and rare *R. potentilliflora* plant populations in the Toraigyr and Sogety low mountain ranges in the east of the Ili Alatau and the forest belt of the Turgen Gorge in its central part, from a biological, ecological and geobotanical perspective.

Relevance of the topic: Currently, the intensification of anthropogenic factors worsens the state of the biosphere, leads to a decrease in the productivity of plant cover in the natural environment, and a decrease in the number of species in the flora. In addition, stocks of endemic medicinal plants used in various sectors of the economy, which are especially in demand today, are dwindling and are even in danger of complete extinction. The impact of humans on nature is increasing every year, and therefore issues of conservation of biological diversity are in the focus of attention of international organizations. The extinction of biological species is an irreversible and irretrievable process. In this regard, the protection of rare endemic and relict plant species and the prevention of their extinction have become one of the priorities of world-class botanists and ecologists. Currently, measures for the protection and conservation of flora in Kazakhstan are being implemented within the framework of the Convention on Biological Diversity and the Global Strategy for Plant Conservation. Today, the conservation and rational use of the plant gene pool, primarily rare, endemic and relict species with a limited range, is of particular importance. There are 760 endemic and 116 relict plant species with a limited range in the flora of Kazakhstan. One of these species is *Rosa potentilliflora*, which is not only a rare endemic, but also a valuable vitamin, medicinal and ornamental plant. In this regard, the identification of natural populations of this species, the scientific assessment of their current state and the development of specific recommendations for protection are a very urgent task.

Object of research: The object of research is three natural populations of the rare endemic plant *R. potentilliflora*: the first population is the eastern part of the Zailiyskiy Alatau, the low-mountain range of Toraigyr; the second population is the low-mountain range of Sogety; the third population is the forest belt of the Turgen Gorge.

The purpose of the study: Rare, endemic in the flora of Kazakhstan *R. a* comprehensive study of *potentilliflora* plant populations, determination of the structural features and flora composition of plant communities, assessment of the current state of this species, as well as its introduction into the conditions of

the Almaty Botanical Garden. Along with this, the aim of the study is to analyze the morpho-anatomical and phytochemical parameters of vegetative (stem, leaf, root) and generative (flower, fruit, seed) organs of *R. potentilliflora* at the population level, as well as the agrochemical composition of the soil and the determination of quantitative indicators of rhizospheric microorganisms.

Research objectives:

1. Rare species endemic to the Zailiyskiy Alatau. to identify populations of *potentilliflora* plants, to study the age structure of their cenopopulations and to give a geobotanical characterization;
2. To determine and analyze the floral composition of plant communities with the participation of *R. potentilliflora*;
3. To study morpho-anatomical features of the structure and biometric parameters of vegetative and generative organs of *R. potentilliflora* plants;
4. To investigate the phytochemical composition of leaves, flowers and fruits, with special emphasis on the content of vitamin C and essential oils;
5. To introduce *R. potentilliflora* in the conditions of the Almaty Main Botanical Garden;
6. Analyze the agrochemical composition of the soil and determine the quantitative indicators of rhizospheric microorganisms.

Research methods: In the course of the work, methods of herbarization and plant identification, geobotanical research methods, morpho-anatomical and phytochemical methods, methods of introduction, analysis of soil samples and determination of microorganisms of the rhizosphere were used.

Scientific novelty of the study: For the first time, the low mountain ranges of Toraigyr and Sogeti in the east of the Zailiyskiy Alatau and in the forest belt of the Turgen gorge in the central part are rare and endemic *R. a* geobotanical description of the *potentilliflora* plant was given and an analysis of the flora composition of plant communities was carried out. Also for the first time *R.* the features of the Morpho-anatomical structure of the vegetative organs (leaves, stems) of the *potentilliflora* plant were studied. Also, the content of biologically active substances in its flowers, leaves and fruits was determined.

For the first time, plants of *R. potentilliflora* were introduced at the collection site of wild fruit plants of the Laboratory of Introduction and conservation of the gene pool of fruit plants named after Academician A.Zhangaliev of the Scientific Research Institute of Botany and Phytointroduction of Almaty. The agrochemical composition of the soil and quantitative indicators of rhizospheric microorganisms were also determined for the first time.

As a result of the conducted research, *R.* new previously unknown scientific data on the biological and environmental features of the *potentilliflora* plant have been obtained. These data were studied in *R.* allows you to assess the current state of *potentilliflora* populations and develop specific recommendations aimed at protecting them.

Scientific and practical significance of the work:

The scientific and practical significance of the thesis includes the following. First, a geobotanical description was carried out and the floral composition of populations of a rare endemic plant in the flora of Kazakhstan, *R.potentilliflora*, which has a limited range and grows in the Toraigyr and Sogety-Alas mountain ranges, as well as in the Turgen gorge in the central part of the Trans-Ili Alatau, was analyzed. As a result of these studies, a scientific assessment of the current state of the populations of the *R.potentilliflora* plant was carried out and specific recommendations for their protection were developed. Secondly, *R.potentilliflora* is a vitamin and medicinal plant, and therefore the photochemical composition of its fruits, flowers and leaves has been studied, as well as the biologically active substances contained in them. In particular, the content of vitamin C and essential oils used in medicine was determined. Thirdly, the *R.potentilliflora* plant was planted in the Main Botanical Garden of Almaty. This is one of the effective measures taken to protect this species. Fourth, *R.potentilliflora* is an ornamental plant, so its domesticated forms can be used as mother plants when hybridizing with cultivated varieties of roses, thus creating new Kazakhstani ornamental varieties. Fifth, if there is demand and financial support from the vitamin industry in Kazakhstan, there is a great opportunity to grow an artificial plantation of *R.potentilliflora* and provide the aforementioned industry with natural and inexpensive raw materials.

The main provisions submitted for protection: *R.* the state of the *potentilliflora* plant is closely related to the limited area of its distribution and the specificity of its ecologo - cenotic requirements. These factors indicate the relevance of assessing the population level of this species on a scientific basis. To solve this problem, the following principles are proposed:

1. In the Zailiyskiy Alatau region, 3 populations of the rare endemic plant *R. potentilliflora* were identified, the age composition of their cenopopulations was determined, geobotanical characteristics were given, transects were constructed, and the age spectrum of individuals of this species (sprout, juvenile, virginal, immature, young generative, mature generative, subsenile, senile) was determined. These 3 regions were studied at the population level and a scientific assessment of their current state was given. In general, there is every reason to believe that there is no immediate threat to the plant. There is no *potentilliflora* in these 3 populations. The plant blooms and bears fruit every year. However, we have seen that this species is very rare and occupies a small territory.
2. The floral composition of the plant communities where the rare endemic species *R. potentilliflora* grows was determined and analyzed. As a result, in the Toraigyr lowland, we identified 63 species of higher plants belonging to 2 divisions, 3 classes, 22 families and 49 births. In the Sogety lowlands, we identified 59 species of seed plants belonging to 2 divisions, 3 classes, 21 families, and 53 births. 79 species of higher vascular plants belonging to 2

divisions, 3 classes, 30 families and 67 births were discovered, identified and registered in the forest belt of the Turgen Gorge, and a herbarium was collected. In total, we identified and registered 201 species of higher plants in 3 populations.

3. As a result of studying the morphoanatomical features of the vegetative and generative organs of *R. potentilliflora* based on morphometric data, when comparing 3 populations, it was concluded that the anatomical structure of the leaves, stems and roots of the 1st population is characterized by xeromesophytic features; the anatomical structure of the 2nd population is characterized by xerophytic features, and the anatomical structure of the 3rd population - mesophytic features.

4. The results of phytochemical studies of fruits, flowers and leaves of *R. potentilliflora* collected from three populations were obtained. Along with various important biologically active substances, the amount of vitamin ascorbic acid, which increases immunity, was also determined in the fruits of *R. potentilliflora*. The accumulation of ascorbic acid was determined in leaves and fruits in a comparative order. The results of the study showed that ascorbic acid accumulates in the fruits of *R. potentilliflora* in greater quantities than in the leaves. The level of its accumulation was low in the second and third populations. It turned out to be high in the first population. In particular, the fruits of *R. potentilliflora* are of particular value as a source of natural multivitamin raw materials, and their high content of biologically active substances allows them to be widely used for preventive and nutritional purposes.

5. Results of the experience of introducing *R. potentilliflora* into the soil. This is the only effective way to protect this rare endemic species, *R. potentilliflora*.

6. Results of studies of the agrochemical composition of the soil of *R. potentilliflora* and quantitative indicators of rhizospheric microorganisms. The conducted studies allow us to determine the close relationship between the soil condition and the microbial communities of the rhizosphere of *R. potentilliflora* in mountain ecosystems or Zailiyskiy Alatau.

Personal contribution of the author: During the dissertation work, the author personally participated in all field research and collection of materials. and, he carried out the processing and analysis of the data obtained, formulated conclusions and fully participated in the writing and design of the dissertation. He fully mastered the methods of conducting laboratory tests conducted in the laboratory and was able to obtain specific results. Most importantly, he was able to analyze the results. All his conclusions were based on the results of his own research. In the course of fulfilling the goals and objectives of the research work, he conducted a literature review, carried out field and laboratory research using methods borrowed from the research object, summarized and processed

the results obtained, and also made a full-fledged contribution to the writing and preparation of the dissertation.

Approbation of the work: The main results and provisions of the dissertation were presented and discussed at international scientific conferences: "Zailiyskiy Alatauyn Turgen shatkalynda sirek kezdesetin, endemic to *R. potentilliflora* Chrshan. et M.Pop. asimdigine biomorphologiyalyk sipattama" Proceedings of the international scientific conference of students and young scientists "FARABI ALEMI", Almaty, Kazakhstan, April 6-8, 2023, "Toraigyralasa tau zhotasynda sirek kezdesetin, endemic *Rosa potentilliflora* Chrshan. et M. Pop. populationsin kazirgi kezdegi jagdayy" International scientific and practical conference "Problems of desertification of the territory of the Republic of Kazakhstan and ways to solve them", dedicated to the 80th anniversary of Abibulla Ametov (Almaty, September 2023). – Almaty, 2023 – pp. 195-197. "Toraigyralasa tau zhotasynda sirek kezdesetin, endemic to *R. potentilliflora* Chrshan. et M.Pop. osimdigi katysatyn osimdikter kauymdastygyn yerekshelikter" Materials of the International Scientific Conference of Students and Young Scientists "FARABI ALEMI", Almaty, Kazakhstan, April 4-6, 2024

Publications. According to the results of the research, 9 scientific papers have been published, including 2 article in journals indexed in the Web of Science and Scopus, 3 articles in national scientific journals recommended by the Committee for Quality Assurance in Science and Higher Education of the Republic of Kazakhstan, 1 author's certificate and 3 publications in collections of materials from international conferences.

The structure and scope of the dissertation: The dissertation consists of 170 pages, includes an introduction, a review of Russian and foreign literature, a description of the objects and methods of research, the results and their discussion, and a conclusion. The work contains 34 tables and 28 figures. The list of references includes 295 sources and 2 appendices.