

Russian botanical gardens and the Global Strategy for Plant Conservation

Yu.N. Gorbunov¹ and I.A. Smirnov²

¹Main Botanical Garden, Council of Russian Botanical Gardens,

²Moscow, Russia; Russian Division of BGCI, Moscow, Russia

Abstract

The work of 90 Russian botanical gardens on the conservation of plant diversity is coordinated by the Council of Botanic Gardens of Russia and the Russian Division of Botanic Gardens Conservation International (BGCI). The Global Strategy for Plant Conservation (GSPC) has served as a considerable stimulus for strengthening this work. The botanical gardens of Russia have contributed considerably to the achievement of the targets of GSPC. They play an active role in programmes for the conservation of plants *ex situ* and *in situ*. About 64% of species included in the Russian Red List are contained in the living collections of botanical gardens.

Keywords

Ex situ and *in situ* plant conservation, Global Strategy for Plant Conservation, rare plants, Russian botanical gardens.

Over recent decades, botanic gardens have become increasingly involved in plant conservation. These activities have been raised to a new level and were stimulated by the adoption of the GSPC. According to the text of the Strategy the countries which have signed this document, including Russia, have to develop national strategies for plant conservation.

In 2003, "The Strategy of the botanical gardens of Russia for the conservation of plant diversity" was prepared and published. There are 90 botanic gardens in Russia; their work on plant conservation is coordinated by the Commission on Rare Plant Species of the Council of Botanic Gardens of Russia and the Russian Division of BGCI. Russian botanic gardens have contributed significantly to the achievement of the GSPC targets.

Target 1. A widely accessible working list of known plant species, as a step towards a complete world flora. In accordance with this target a number of specialists from botanic gardens have contributed to such publications as "Flora of Eastern Europe", "Siberian Flora", "Summary of Siberian Flora", "Vascular plants of the Soviet Far East" etc. At the present time many efforts are concentrated on studying the flora of various regions in Russia (North-West, Altay region, centre of the European territory, Russian Caucasus, Western Siberia etc.).

Target 2. A preliminary assessment of the conservation status of all known plant species, at national, regional and international levels. The new Red Data list of plants has been affirmed in 2005 by the Ministry of Natural Resources of the Russian Federation. This document provides a legislative base for plant conservation and protection in our country. In 2008 the new "Red Data Book of the Russian Federation: Plants and Fungi" was published. A major role in the preparation of the updated list was played by specialists from botanic gardens. The list numbers 676 species of plants and fungi. An important new feature of the list is the inclusion of algae (30 taxa of sea algae and 5 taxa of freshwater algae). At the same time 48 plant and fungi species were excluded from the national Red Data Book. Botanic gardens also initiated and played a leading role in the preparation of a number of regional Red Data books: Altay, Murmansk, Tver, Rostov, Volgograd, Sakhalin and other regions.

Target 3. Development of models with protocols for plant conservation and sustainable use, based on research and practical experience. Many botanical gardens in Russia have developed advanced methods for the maintenance of living collections which make genepool conservation effective and secure. Such methods include:

1. Creation of modeled artificial communities as a way of endangered species conservation on the basis of florogenetic and phytocenoetic principles. This is widely applied in the following gardens: Main Botanical Garden, Central Siberian Botanical Garden, Botanic Garden of the Urals State University, Botanic Garden of the Urals Branch of RAS etc.

2. Introduction of endangered species into natural vegetation. Developed in the Polar-Alpine BG this method includes creation of plots with endangered species among natural vegetation being conserved on the territory of a garden or park. No special care is needed as a micropopulation of endangered species is created. Similar work has been done in other botanic gardens with protected areas of natural vegetation – Main Botanical Garden, Yakutsk Botanic Garden, and the Botanic Garden of the Urals State University.

3. Introduction and recovery of plant communities. This method developed in Stavropol Botanic Garden combines *ex situ* and *in situ* conservation approaches: multispecies mixtures of seeds collected mechanically in natural grassy ecosystems of steppe and semi-desert areas are sowed into cultivated soil; recovered grassy communities are used as the basic ecosystems for introduction of certain endangered species in the form of seeds, tubers, bulbs or rhizomes. On the basis of experimental studies the Stavropol Botanic Garden has developed the full technological line for the rapid recovery of steppe ecosystems on the basis of widely available agricultural equipment. This technology received a positive response on being approved by the creation of agrostepes similar in floristic diversity and structure to zonal ecosystems used as hayfields or pastures.

Target 5. Protection of 50 per cent of the most important areas for plant diversity assured. The most important areas for plant biodiversity conservation, so called “hot spots” or “key botanical territories” should be selected in accordance with such criteria as the level of endemism, species diversity, uniqueness of habitats, and relict features of ecosystems. In 2004 the first issue of “Key botanical territories of North Eurasia” discussing conservation in Belorussia, Russia and Ukraine was published. There are 101 state preserves and 35 national parks in Russia. Specially protected natural territories of federal, regional and local levels cover 11.7% of the whole territory of Russia. These numbers are rather impressive. However, the plant diversity on protected areas is a long way from being representative. Only half of the species listed in the Russian Red Data Book occur in the territory of reserves. Thus, a major number of species with federal protection level are not conserved *in situ*.

A number of Russian botanical gardens work actively and successfully with conservation in the wild. They officially propose certain areas and vegetation sites to be selected as territories with various levels of state protection, study flora and vegetation on already protected areas, reveal and study populations of rare plants. In our opinion, a common action plan for the conservation of rare and endangered species in the wild should be developed including a selection of “key botanical territories” with species from the Red Data Book.

Target 8. 60 per cent of threatened plant species in accessible ex situ collections, preferably in the country of origin, and 10 per cent of them included in recovery and restoration programmes. In 2002-2005, an inventory of botanic garden collections was carried out to identify rare plants in cultivation in botanic gardens. In 2005, the reference book «Plants of the Red Book of the Russian Federation, growing in botanical gardens» was published. In 2005, in the botanic gardens of Russia, 249 of the 461 species of higher plants included in the Russian Red Book were cultivated in botanic garden collections, making 54 % of threatened plants. Of these, 34 species were classified in category 1 (E), making 48 % from the general number of species of this category. 20 species were represented in collections of three and more botanic gardens (i.e. they had a sufficient numbers in cultivation to provide an insurance fund for the future).

Now we are working on the creation of a new database on rare plants. A preliminary comparative analysis of two databases was developed by the Commission in 2005 and in 2010 was carried out. Results of the analysis show that for the period between 2005 and 2010 there has been a growth in the number of the botanic gardens in Russia maintaining collections of

rare species, as well as a marked increase in the overall number of conserved species and samples. According to preliminary data, the living collections of botanic gardens now contain about 64 % of rare species of the Russian flora. A further 73 species of the Red Data book of Russia are contained in *in-vitro* culture at five botanic gardens. The largest tissue culture collections are available in the Main Botanical Garden and the Volgograd Regional Botanical Garden. Thus, Russian botanic gardens have already achieved their main goal at the national level as stated by Target 8.

As for plants included in recovery and restoration programmes, until recently we did not have enough information. In 2007 the Commission on Rare Species of the Russian Botanic Gardens, together with the Russian Division of BGCI conducted a questionnaire regarding the reintroduction of plants conserved in botanic gardens. Fifteen institutions provided information. The list of species reintroduced by botanic gardens in recent years comprises about 100 species. However, only 28 of these species are listed in the National Red List that makes 4 % of the total number of threatened species. Other species are referred to regional levels of protection. In the near future various botanic gardens in Russia are going to develop reintroduction projects for further rare species. However the lack of a general methodology on reintroduction was a major impediment in the success of these activities. In order to stimulate recovery and restoration programmes "Methodological recommendations for botanic gardens on the reintroduction of rare and threatened plants" was prepared and published in 2008 in English and Russian.

Target 14. The importance of plant diversity and the need for its conservation incorporated into communication, educational and public-awareness programmes. It is evident, that this target coincides with the main functions of botanical gardens – being educational centres. The GSPC is widely used among Russian botanical gardens in implementation of educational programmes. The most active in developing original educational programmes are the botanical gardens of Tver and Moscow State Universities.

Conclusion

We would like to make several comments on the new GSPC project for the period of 2010-2020.

1. In order to facilitate the development of National and Regional SPCs in countries still lacking such strategies we need to prepare (on the basis of already existing strategies) "Model or standard national (regional) strategy" or recommendations on compilation of such strategies.

2. Target 2. Coordination between Russian botanical institutions and international ones should be strengthened. For example, only a small number of Russian Red Data Book species, including endemics, are listed in the European list and IUCN Red List. Suggested projects such as the "Rapid list" make evaluation of species status less time consuming, but does not really solve the problem of compilation of the global endangered species list.

3. Target 3. Methodological recommendation for botanical gardens should be developed, for example general methodological principles of rare species conservation *ex situ*. This particularly concerns the procedures for material collection for conservation and evaluation of genetic diversity of conserved material. International experience on reintroduction and recovery of rare species populations should be examined and summarized in a general manual on plant reintroduction (on the basis of already published manuals in the UK (BGCI), Australia, Russia).

4. In Russia, most problems in plant diversity conservation are experienced in steppes and mountainous regions. In steppe reserves the science based regime of vegetation maintenance should be developed. In mountainous regions there are a small number of reserves. We need more close international cooperation to develop general methodological approaches to plant diversity conservation in this ecological region.

5. Target 5. It is not always possible that botanically important territories are protected by government on national and regional levels. As for Russia it is much easier to obtain protection status for zoological objects. Thus it is increasingly important that “key botanical territories” receive international conservation status. In this situation it will be much easier to engage local conservation institutions and people in the protection of selected territories. It could activate the work on Target 14 as well. We suggest that a special protocol on registration of “key botanical territories” should be developed under the IUCN umbrella.

6. It is necessary to include the Russian botanical gardens network, coordinated by the Russian Botanic Gardens Council and BGCI, into the Global Partnership for Plant Conservation. Botanical gardens have sufficient resources and highly professional staff for implementation of work directly correlated with the GSPC’s targets on plant conservation *ex situ* and *in situ*. The Russian Botanic Gardens Council can play a coordinating role in implementing the GSPC.