

The Botanical Gardens of Russia and Her Neighbours

Igor A. Smirnov

Main Botanical Garden, Russian Academy of Sciences, Moscow, Russia

HISTORY

In 1706 a decree from Peter the Great established the first botanical garden in Moscow as a medicinal herb garden. At present, this first garden is a branch of the Botanical Garden of Moscow State University. The second oldest botanical garden, laid down in St. Petersburg in 1714, was called "the pharmaceutical garden". The Botanical Institute of the Russian Academy of Sciences was originally based on this pharmaceutical garden in St. Petersburg. From the time of the first garden until the beginning of this century, 20 botanical gardens have been established (Lapin 1984).

In the 1930s and 1940s large botanical gardens were created in many cities of the former Soviet Union including Omsk, Rostov on the Don, Almati, Baku, Dushanbe, Kiev, Minsk, Ekaterenburg, and Ufa. They played an important role in the conservation of native flora and the enrichment of cultivated plants. Before World War II, unique institutions were founded, such as the Polar-Alpine Botanical Garden (within the Arctic Circle) and the Pamirs Botanical Garden. After World War II, new botanical gardens were established in Tashkent, Moscow, Novosibirsk, Stavropol, Riga, and other cities. Close cooperation between the gardens resulted as they set up their seed and plant exchange programs. It quickly became apparent that it was necessary to form a committee to coordinate all the activities of these various botanical gardens. Initiated by the Main Botanical Garden in Moscow, the Council of the Botanical Gardens was established and registered in 1952.

From the beginning, the Council has given research direction to methods of plant introduction. All botanical gardens were encouraged to work on the problem of "introduction and acclimatization of plants". The variability and survival of plants introduced to new regions has been studied and great attention has been given to the problems of protecting plant species. To this end, explorations and collections have been made of rare and endangered plant species from all regions of the country and methods of propagation and cultivation.

To improve the effectiveness of the Council of the Botanical Gardens, Regional Councils for botanical gardens were formed in 1963. The Regional Councils coordinated the work of the botanical gardens in various geographical zones such as Siberia and the Far East, the Urals, the Baltic Sea area, and Kazakhstan (Lapin, 1984).

After the collapse of the Soviet Union in January 1992, representatives of the botanical gardens of Russia met at a conference and formed The Council of the Botanical Gardens of Russia. This Council embraces 50 botanical gardens and functions as the Council for Plant Introduction in the ranks of the Russian Academy of Sciences. The regional structure of the new Russian Council remains the same as before the breakup of the Soviet Union (Andreev, 1993).

During an organizational conference in 1992, the Russian Council of Botanical Gardens initiated the Euro-Asian Association of Botanical Gardens to retain and

further develop scientific relations among gardens of the former Soviet Union. The vast majority of these various botanical gardens have welcomed this step and in April 1992, representatives of the different botanical communities agreed to set up a new Botanical Association. Today, this large Association includes the Council of Botanical Gardens of Russia and its regional branches (Andreev, 1993).

INTERNAL STRUCTURE OF THE BOTANICAL GARDENS

Most gardens within the Botanical Association are generally similar in structure. They only differ in overall size and territory, in the number of staff members, in the emphasis on local and world flora collection, and in the particular direction of study. Each garden studies the adaptability of plants to new growing conditions; maintains collections of herbaceous plants, woody trees and shrubs; provides for seed exchange; and does research on rare and endangered species. The Main Botanical Garden, for example, seriously studies the introduction and acclimatization of plant species. There, selections of resistant species and varieties are based on a deep and thorough understanding of biology and ecology. Good collections from many regions of the country are maintained in St. Petersburg. With an excellent herbarium, St. Petersburg is a research center for plant taxonomy. In Siberia, the focus is on an interesting collection of medicinal and technical plants, whereas in Belarus, great attention is paid to ecological research. In Ukraine at Kiev, the breeding of ornamental plants is emphasized.

THE MAIN BOTANICAL GARDEN OF THE RUSSIAN ACADEMY OF SCIENCES (RAS)

The Main Botanical Garden was founded in Moscow in April 1945 to lead all other botanical gardens of the country in solving problems related to the use, enrichment, and protection of the plant kingdom.

The Main Botanical Garden covers 360 hectares and employs 850 staff, including 175 scientists. There are 10 departments: dendrology, native flora, tropical and subtropical plants, plant protection, crop and fruit trees, propagation, physiology, biochemistry, tissue culture, seed exchange, and exploration.

The following discussion will consider only those departments concerned with plant propagation in open ground. Within the garden, the collections consist of 11,750 taxa which are planted in five principal exhibition complexes: native flora (3000 taxa); oak grove and dendrarium (2000+ taxa); cultivated plants (2900 taxa); ornamental plants (8000+ taxa); Japanese garden (about 130 taxa); and greenhouse (5500 taxa)(Andreev, 1993).

THE DEPARTMENT OF DENDROLOGY

The Department of Dendrology keeps the woody tree and shrub arboretum, which was created in a natural oak grove. The Oak Grove is an important feature of the garden and is unique because it is located near the northern limits of distribution of oak groves, with some trees over 150 years old. The principal tree in the grove is *Quercus robur*. This extremely valuable natural broadleaf forest is carefully protected in the central zone of the European part of Russia. This forest is preserved within the boundaries of a big city (population 9 million), unusual in the world practice of nature protection.

Almost all plants in this collection are planted in accordance with systematic principles. However, some groups of plants are exceptions and are placed together because of their specific ecology or cultural requirements. For example, all lianas are located in the same area (Lianarium) because of unique agrotechnique and vertical landscape methods. *Actinidia arguta*, *A. kolomikta*, *Aristolochia durior* [syn. *A. macrophylla*], *A. manshuriensis*, *Schisandra chinensis*, and other species can be found in the Lianarium.

During its 50 year history, more than 6000 taxa were tested and nearly 2200 were selected as tolerant to the Moscow climate.

The conifer collection is composed of trees from different ecological zones and from different countries. Examples of conifer species in the collection at Moscow include: *Abies balsamea*, *A. concolor*, *A. sibirica*, *Picea glauca*, *P. alba* [syn. *P. canadensis*], *P. pungens*, *Pinus strobus*, *P. mugo*, *Taxus baccata*, *T. canadensis*, and *T. cuspidata*.

Adapted to the warmer climate of Ukraine, the collection of *Catalpa* spp. is an interesting holding of southern plants able to survive in Moscow. During 1978, in the coldest winter recorded, *Catalpa* spp. withstood freezing temperatures which killed many other plants, because they had already reached a deep state of dormancy.

The very attractive collection of *Sorbus* has about 60 taxa, including species, varieties and cultivars. Within the collection, *×Sorbocotoneaster pozdnjakovii* is a rare species from north of Siberia, included in the *Red Data Book*.

The Japanese Garden is a relatively new area, constructed jointly by the Main Botanical Garden Academy of Sciences and two Japanese companies. The Japanese Garden was designed by the famous Japanese landscape architect, Mr. Ken Nakajima. He was well aware of differences in climate between Moscow and Japan. Nakajima included many Russian plants to produce an overall image of a Japanese landscape. The Japanese garden opened in 1987 and rapidly became very popular among visitors.

THE DEPARTMENT OF NATIVE FLORA

Over 3000 plant species, native to various regions of the former Soviet Union, have been collected by the Department of Native Flora. These collections are maintained in an area of about 80 ha. Many of these plants do very well in the Moscow climate.

At the Main Botanical Garden, several hundred of the 6000 species native to the Caucasus flora are represented on the "Caucasus Hills". The flora of Central Asia, which includes plants native to steppe and semi-desert steppe, is represented by many shrubs such as *Berberis turcomanica*, *Prunus* [*Cerasus*] spp., *Juniperus* spp., and a good collection of *Eremurus* spp. Also from Central Asia are many endemic *Allium* spp. and a large group of attractively blooming *Tamarix* spp. The European flora collection can be viewed in a large glade and adjacent forest, in which there are displays of plants native to the steppes. The Far East flora collection is now in a condition suitable for serious taxonomic and ecological research.

Besides maintaining the species collection, the Department of Native Flora studies the effects of moving certain plants north of their normal limits of distribution; for example, species of such genera as *Prunus armeniaca* [syn. *Armeniaca*], *Prunus* [*Cerasus*], and *Juglans*. It is also interested in selecting cultivars that are horticulturally successful in northern latitudes. Populations of

plants originally from different climatic conditions are grown together in a common area of the Botanical Garden and allowed to cross pollinate. From the progeny of these crosses, plants with good flavour, fruit shape, and other desirable qualities have been selected, including an excellent example of *Lonicera caerulea* [syn. *L. edulis*] with very sweet berries and an *Prunus armeniaca* [syn. *Armeniaca vulgaris*] which is tolerant to Moscow's cold climate.

THE DEPARTMENT OF CULTIVATED PLANTS

Cultivated plants are exhibited in almost all the botanical gardens of the former Soviet Union. In the Main Botanical Garden, the origin and evolution of certain cultivated plants are displayed. Collections of fruit trees, berries shrubs, vegetables, medicinal, and industrial plants are also kept by the Department of Cultivated Plants. A very good collection of plants with ethereal oils is represented by *Artemisia*, *Mentha*, *Melissa*, *Nepeta*, *Origanum*, and other genera. Although most of these plants are traditionally cultivated in southern areas, scientists in this department have selected cold resistant forms which are doing well in the Moscow climate. New shrubs that have value to industry are sought such as *Actinidia*, *Hippophaë*, *Lonicera*, *Schisandra*, *Vaccinium*, and *Viburnum*. Several genera are particularly well represented: *Fragaria*, 400 cultivars; *Malus*, 100 cultivars; *Pyrus*, 30 cultivars; *Prunus*, 25 cultivars; and *Vitis*, 50 cultivars. The collection of medicinal plants contains about 100 species, with the greatest focus on *Calendula* spp., *Rhodiola* spp., *Sanguisorba officinalis*, and *Valeriana* spp.

THE DEPARTMENT OF PLANT PROPAGATION

The main target of activity for the Department of Plant Propagation is to develop propagation techniques for various woody and herbaceous plants for use in floriculture and ornamental horticulture. Special attention is paid to the propagation and development of slow-growing plants, which are represented by nine families, 16 genera, and 46 species. The number of newly introduced plants is continually expanding; *Abelia coraena*, *Acer pseudoplatanus*, *Berberis julianae*, *Euonymus nanus*, *Hydrangea arborescens* ssp. *discolor* [syn. *H. cinerea*], *Tsuga canadensis* and others have recently been propagated. Scientists within this department have worked together on propagating 82 genera, 324 species or taxa. The assortment of propagated fruit and berries is enriched with non-traditional species such as *Actinidia kolomikta*, *A. arguta*, *Berberis* spp. *Prunus tomentosa* [syn. *Cerasus tomentosa*], *Chaenomeles japonica*, *Lonicera edulis*, and several taxa of *Sorbus*.

Propagation techniques are also being developed for winter hardy plants such as *Vaccinium uliginosum*, *Schisandra chinensis*, *Clematis*, *Spiraea* spp., conifers, and others. All together, propagation techniques for 41 genera, 93 species, 145 cultivars and forms are being explored.

THE LABORATORY OF BIOTECHNOLOGY

In the Laboratory of Biotechnology, methods of in vitro propagation of rare, endangered, and economically important species are developed. Thirty-three genera are targeted from families such as Bromeliaceae, Ericaceae, Liliaceae, Orchidaceae, and Rosaceae.

THE DEPARTMENT OF ORNAMENTAL PLANTS AND FLORICULTURE

Many different varieties and selections of plants are tested for use in parks and gardens by the Department of Ornamental Plants and Floriculture. The results of many years of selection work and the latest achievements of World Floriculture are displayed in their collections. The *Rosa* collection is the largest in this department with up to 2250 species, cultivars, and forms: hybrids tea, floribunda, climbers, perpetuals, and miniatures. From this collection, about 250 rose cultivars have been selected and studied. The most beautiful and hardy specimens are recommended for practical use in ornamental gardening. Besides roses, the collections of other flowering plants include: *Paeonia*, about 500 varieties; *Iris*, about 28 native species and 520 garden cultivars; *Gladiolus*, 549 cultivars; *Phlox*, *Dahlia*, and others. Members of the Department of Ornamental Plants and Floriculture have used native plants collected on field trips for further ornamental study and future selection for landscape gardening.

LABORATORY OF SEED EXCHANGE AND EXPLORATION

The Laboratory of Seed Exchange and Exploration exchanges seed with over 50 foreign countries. Seed lists include material collected from plants grown in the Main Botanical Garden, as well as, supplementary seed collected on field trips. Seed lists are sent to over 550 different botanical institutions throughout the world.

LITERATURE CITED

Lapin, P.I. 1984 Botanical Gardens of the USSR, Moscow, Colos Press, 216 p.

Andreev, L.N. Association of Euro-Asian Botanical Gardens and its International Links. Colloque International sur le Thème "Nature et Jardins Botaniques au XXI Siècle Genève, 2-4 June 1993, Boissiera 47:81-86, Glavniy Botanicheskiy Sad Im N.V.Tsitsina Rossiyskaya Acanemiya Nauk, 1993, 49 p.