

## **Botanic Gardens of Moscow State University: a Platform for education and innovation**

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### **Abstract**

In line with the Target 14 of GSPC, the Botanic Gardens of Moscow State University (MSU) have been tasked with creating an education system to serve the pre-school, basic, specialized, further education and vocational training sectors.

At the present time the Garden is the base on which scientists and students of different faculties can conduct studies and scientific researches. The Garden carries out programmes of professional skills improvement and professional retraining (80-hour skills enhancement course designed for local government staff; professional training programme for gardeners). Building on its existing programmes, in 2009-2010 the Garden significantly expanded its educational activities thanks to the project sponsored by the Association of Moscow Higher Educational Institutions. The purpose of the project was to create a modern teaching environment in the Garden, using up-to-date forms of interpretation (electronic guides, information displays, and multi-functional internet resources) and developing an innovative educational programme for training specialists within the "Secondary School – Higher Education - Labour Market" and "Higher Education – Business – Staff" streams. One of the project outcomes is the creation of new information and education materials, most of which are freely accessible via the internet and are already being used in Garden-based classes for schools and universities. There has also been progress on formal and public education. The Apothecary Garden's education programme is expanding into new areas with an initiative to pilot a school-garden collaboration scheme. The garden is prioritizing its work with young people, students and schoolchildren, introducing them not only to plant diversity and ethno-botanical traditions of plant use, but also to the latest developments in science and technology - including biotechnology and agricultural techniques - and the search for solutions to modern-day issues.

### **Keywords**

Basic education, botanic garden; education programme; formal education, professional training course; training for gardeners.

The Moscow University Gardens have been tasked with creating an education system to serve the pre-school, basic, specialized, further education and vocational training sectors. Put more precisely, the task is to create an education and innovation platform within the Garden to achieve a wide range of objectives. These include:

- improving the quality of student training in MSU's Biology Faculty and other higher educational institutions, with a focus on hands-on experience;
- drawing young people into science and providing early occupational guidance for schoolchildren;
- promoting nature and plant studies amongst secondary school pupils and expanding their understanding of biology, geography and associated disciplines;
- promoting environmental education and awareness across society;
- improving the skills of schoolteachers and local government specialists in various fields.

Building on its existing programmes, in 2009 the Garden significantly expanded its educational activities thanks to a project, sponsored by the Association of Moscow Higher Educational Institutions, entitled “MSU Botanic Garden: A Platform for Education and Innovation”.

The purpose of the project was to create a modern teaching environment in the Garden, using up-to-date forms of interpretation (electronic guides, information displays, and multi-functional internet resources) and developing an innovative educational programme for training specialists within the “Secondary School – Higher Education - Labour Market” and “Higher Education – Business – Staff” streams.

The project involved developing science-information and science-education materials for a multi-tier education system in the Garden, designed to improve training and provide early occupational guidance for secondary school pupils, to train students from pedagogical institutes, to enhance the skills of biology teachers and provide high-quality training to local government landscaping specialists.

Internet resources are becoming an ever more important part of the educational process at the expense of traditional materials and textbooks. Ease of access makes them highly effective. Although internet resources are now widespread in many countries, they are only now beginning to appear in Russia. It is therefore most important that they be developed by professionals – scientists and specialists in various fields. This task, together with the reorganization of the Botanic Garden’s existing website, is a vital aspect of the project.

The website resources will include teaching materials and tests for self-instruction by school pupils. Publication via the website will deliver major savings on printing costs and target the resources towards potential users, helping to make Garden-based teaching more effective and relevant – a matter of priority for all teachers today.

### **Professional training in the Botanic Garden**

The main part of MSU Botanic Garden (Garden on Moscow’s Sparrow Hills) is located in the grounds of the university campus close to most of the faculties, making it an ideal base for academic and research work.

The Garden has traditionally been close to the botany department of the Biology Faculty, but in recent years it has enjoyed an upsurge in interest from a range of departments in the Soil Science Faculty (5 graduation projects and 2 candidates of science dissertations on the Garden’s soils in the past 10 years). Following a 40-year break, ornithologists have resumed their research in the Garden and there are proposals for entomology studies. For many years now, the Garden has collaborated with the University’s Geography Faculty, number of Moscow colleges specializing in medicine, agriculture and landscape gardening.

We are currently inviting as many departments as possible to use the Garden as a field base for some of their class hours with students or as a venue for part of their summer fieldwork. Opening the Garden to the natural science faculties is an obvious step; less obvious, but no less interesting, is the potential for collaboration with the humanitarian faculties.

### **Skills Enhancement and Vocational Retraining**

There are several advantages to running further education and skills enhancement programmes in the Botanical Garden rather than in other educational facilities:

1. Being the oldest botanical garden in Russia, MSU's garden has one of Moscow's most extensive collections of outdoor plants, which can be studied without leaving the city;
2. The Garden has a unique landscaped environment - a vivid example of sustainable development management;
3. The Garden has a wealth of experience in running education programmes, including international workshops; it is Russia's leading botanical garden in the field of Education for Sustainable Development;
4. It is a showcase for the work of Moscow's best gardeners;
5. With an extensive network of creative and scientific contacts, the Garden is able to pull in colleagues from other educational centres and the Moscow city government.

In 2008, we launched an 80-hour skills enhancement course designed for local government staff with responsibility for urban landscaping. Since then, the course has been completed by over 200 people, and has resulted in changes to the way Moscow regulates landscaping issues.

In 2009, we launched a professional training programme for gardeners. This aims to provide students with a basic understanding of biology, soil science and ecology (taught by research staff from the University's Biology and Soil Science faculties) and a minimum level of practical skills (taught by Garden staff) to begin a new career and equip themselves for future development.

The programme consists of 4 modules:

- Botany module. The first semester begins with the rudiments of plant morphology and anatomy, and plant classification. This is followed by a course on the basics of plant physiology, and at the end of the second semester, the students go to the University's S.N.Skadovskiy biostation in Zvenigorod for geo-botanical field practice.
- Soil science module. Basics of soil science, soil agrophysics, soil biology, soil agrochemistry, agronomy and plant breeding.
- Ecology module. Basics of topographic science, plant ecology and plant protection. Within the context of these disciplines we demonstrate the need for an integrated, interdisciplinary approach to the study of ecosystems.
- Landscape gardening module: the basics of landscape gardening and design, garden architecture, flower layout, lawns and decorative dendrology.

The curriculum for each discipline includes both classroom and practical sessions (30-70% of total).

### **Formal basic education**

There has also been progress on formal education, as the botanic gardens become more involved. The Apothecary Garden's (historic garden of Moscow University) education programme is expanding into new areas with an initiative to pilot a school-garden collaboration scheme.

The educational programme aims:

- to teach about the biodiversity of the plant kingdom and the economic and cultural importance of plants;
- to stimulate children to learn more about plants and nature;
- to involve schoolchildren and teachers in an environmental educational programme and practical nature conservation activities.

Schools are also making much more use of the Garden: in addition to the “Lessons in the Botanic Garden” cycle, they are working with Garden staff to develop a school curriculum in fields such as ethno-botanic and local flora, and setting up “local flora corners” and “apothecary gardens” within their own school grounds.

The school lessons include plant identification, microscope studies, observation of pollination, phenology etc., and engaging school children in research activities.

We are building a “biosphere ideology”, focused on global problems:

- organization of the biosphere in space and time
- circulation of matter and energy in ecosystems
- climate change, depletion of the ozone layer, soil degradation and environmental pollution
- role of plants in ecosystems
- plants and people

Nowadays, one of the education tasks is to introduce visitors not only to the variety of the plant world, but also to examples of man’s indirect impact (via changes in ecological conditions) on plants, and to the ways in which plants adapt to their environment. With the schoolchildren we look at the condition of buds, study seed maturation and assess their germination capacity. These observations demonstrate anomalies in the development process – even at the qualitative level.

Successful development of Educational programmes is impossible without creating new educational resources such as manuals, textbooks and reference books. And our greatest achievement in this area has been the publication, this year, of Endangered-species Lists for Moscow Region and Russia as a whole, and books on Moscow and Caucasus flora. The editorial work on these vital publications was led by Moscow University’s Botanic Garden, though unfortunately, due to financial constraints, the print-runs were very limited. And this is another big problem – finding the resources to publish and distribute these important books and publications in sufficient quantities, as well as providing access to them via the Internet.

Another step forward in formal schools education is the Garden’s role in running classes and giving lectures to teaching staff under a city-sponsored skills enhancement scheme, together with pilot developments of educational programmes and textbooks. The Garden is also used to teaching students from pedagogical institutes – future teachers. We regard our lectures for teachers and teacher trainers as an important step in promoting Plant-Based Education. One of the aims of these lectures is to introduce teachers to actual topical issues such as climate change or invasion. Invasion has become a global issue. As international tourism continues to expand the danger of invasive flora penetrating natural communities is increasing fast. As a result, invasion not only needs to be studied, but the public needs to be made aware of the dangers and possible consequences of attempting to grow exotic plants at home. This is an issue that also needs to be addressed in school biology lessons.

**It is now time for gardens to play an active role in formal education system, both in the universities and in schools, developing resources to deliver regional components of the national educational programme now being created in Russia.**

## Figures



Fig. 1. Course for local city staff managers and ecologists- 2008-2009



Fig. 2. Workshops for the teachers in plant science education in BG



Fig. 3. University students, studying the local flora and collecting plants for the Garden (Oka region)



Fig. 4. Schoolchildren during the Lessons in the Botanic Garden (“Apothecary garden”)