Institute of Botany: current state and future activities

In commemoration of the 140th nniversary of the Bulgarian Academy of Sciences

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1. Areas of activity

For more than 60 years now the Institute of Botany has stood out as a comprehensive scientific research centre into the natural plant and fungal genofund in Bulgaria in the following fields of plant science: floristics, taxonomy (incl. cytotaxonomy and chemotaxonomy), phytocoenology and ecology; phytogeography, plant resources, mapping of the wild-growing medicinal plants, their introduction and use as a source for biotechnological industry; palaeobotany, palynology and plant history, and biomonitoring. Anatomical, embryological and genetic studies are closely connected mainly to two fundamental priorities: environmental studies and nature conservation, and biodiversity assessment and protection. Thus, they are carried out in the fields of evolutionary, ecological and experimental embryology and biosystematics of wild-growing representatives of the Bulgarian flora. Studies at IB-BAS cover almost the entire spectrum of the flora, vegetation and fungal diversity on individual, population, coenopopulation, ecosystem, and geohistorical level. This contributes to the indisputable advantage of the IB-BAS against the variety of biological units in the country.

Fundamental and applied scientific research and development are carried out at the Institute in the different branches of botanical science, with a view of studying the biodiversity of the natural flora, vegetation, habitats and fungi; invasion of alien species and their impact on the local ecosystems, establishment of the biological specificities, productivity, energy potential and turnover of elements in the plant communities; determination of the genetic potential, mechanisms and character of the speciation processes; discovery of new useful medicinal and aromatic plants as raw-material sources for natural curative and perfumery products; resource-oriented and rational use of plants and fungi with a view of their protection and safeguarding for the posterity; tracing out of the evolution of the plant world in the Bulgarian lands in the geological history and finding out the factors that have brought about the present status and the changes in it. Phytomonitoring and bioindication data are continuously collected in relation to the European biomonitoring initiative for water, soil and air pollution with toxic and heavy metal elements. Participation in the national law-making, protected areas, management plans, and national ecological network development (e.g. NATURA 2000, IPA etc.) are important nature conservation activities.

The mission of the Institute of Botany is to study the Bulgarian natural and semi-natural vegetation by variety of modern methods and approaches, to contribute to the European plant and vegetation survey, to enhance the knowledge about Nature and to place this information at public disposal to be used for education, health care, policy-making and further scientific development. Our goal is to support the national and EU policies aimed at community development on the basis of a dynamic and competitive knowledge-based economy.

2. Relations between the research areas, research policies and programmes approved by the General Assembly of BAS, and with the national and EU research priorities

Scientific research work carried out at IB-BAS is fundamental and applied. The objects and aims of the studies, methods and approaches follow the national and international priorities, such as: researches on Earth and its evolution; environmental studies and nature conservation; sustainable development and use of the natural resources; biodiversity assessment and conservation.

The scientific work of IB-BAS is in accordance with the main policies and programmes of BAS described in its strategic aims and priorities:

Policy 1: „Scientific service for the Bulgarian Government and society". Sustainable Development and Use of the Natural Resources in Bulgaria programme. Sustainable Development of the Scientific Potential programme. All scientific projects, implemented by IB-BAS are aimed at the assessment, monitoring and conservation of plant and fungal diversity.

One of the main priorities of the Development Strategy of IB-BAS is to provide facilities for successful studies of the young scientists, e.g. modern lab equipment, access to various information sources, etc.

Policy 2: "Development and integration of the scientific potential into the European research area." This policy comprises projects aimed at enhancing the technological capacity, mobilization and strengthening of the existing human potential, improvement and development of the strategic partnerships.

On national scale, the activities of the unit are in agreement with Priority 3 of the Environment 2007-2013 Operational Programme, namely "Biodiversity conservation and restoration". Our studies contribute to the knowledge about the contemporary status of plants, fungi, and vegetation, pastures and meadows as national forage resources. They also meet the requirements of the EU Action Plan up to 2010 and beyond for application of Rural Development measures in the next programming period (2007-2013), so as to optimise the long-term benefits of biodiversity, in particular for Natura 2000 areas and for other farm and forest areas of 'high nature value'. Biomonitoring studies and data accumulation is another aspect of the EU Action Plan implementation and they are in compliance with its target "Principal pollutant pressures on terrestrial and freshwater biodiversity substantially reduced by 2010". We provide monitoring, address complaints and thus contribute to the efforts for significant reduction of the pollutant pressures on terrestrial and freshwater ecosystems by strengthening the implementation of relevant Directives, notably on Integrated Pollution Prevention and Control. Our research contributes to the EU policy "Halting the loss of biodiversity by 2010 – and beyond – Sustaining the ecosystem services for human well-being" (COM/2006/0216) with studies and elaboration of action plans for conservation of the endangered species and plant communities.

3. Bilateral and multilateral cooperation

Institute of botany – BAS has already well established bilateral and multilateral relations with other institutions of BAS, e.g. the Institute of Zoology, National Natural History Museum, Central Laboratory of General Ecology, Institute of Forestry, Institute for Nuclear Research and Nuclear Energy (INRNE), Institute of Organic Chemistry with Phytochemistry Centre , Institute of Genetics, Institute of Geography, Institute of Geology, Institute of Molecular Biology, and Institute of Plant Physiology. It will continue to work as their patner on different fundamental and applied projects, e.g. the completion of the *Flora of R. Bulgaria*, elaboration of management plans for the protected areas and species, monitoring programmes, management of NATURA 2000 sites, *Red List* assessments, *Red Data Book* preparation, supervising of Masters' and PhD theses on various topics, etc.

Research projects at IB-BAS are relevant to the socio-economic and political needs of THE country, from governmental to municipal level. The support of the national environmental policy with scientifically sound data and expertises results in more effective monitoring, conservation and sustainable use of biodiversity. Experts from IB-BAS have participated in the elaboration of legal documents and national programmes in the field of biodiversity (e.g. National Strategy for Biodiversity Conservation, National Biodiversity Action Plans, Biodiversity Act, National Biodiversity Monitoring System, action plans for endangered species, Red List assessments, etc.), in the establishment of the National Ecological Network and

NATURA 2000 in Bulgaria (Fig. 1), the establishment of protected areas and in the preparation of their management plans. These activities are closely related to the basic policies of the Ministry of Environment and Waters, Bulgarian Executive Environmental Agency, Ministry of Education and Science, Ministry of Agriculture and Forestry, National Forestry Board, Ministry of Regional Development and Public Works, Ministry of Culture and Tourism, Ministry of Transport, Ministry of Internal Affairs, Ministry of Justice, etc.

Projects aimed at nature conservation and closely related to European legislation often are implemented in collaboration with NGOs: Wilderness Fund (member of IUCN), WWF-Danube-Carpathian programme, Borrowed Nature, Bulgarian Society for Protection of Birds, Bulgarian Biodiversity Foundation, Plantlife International, etc.

Fundamental and applied researches in the area of biotechnology, medicinal and aromatic plants cultivation, and identification of biologically active substances have gained special importance lasting recent years. Biological resources of Bulgaria and particularly the plants and fungi have been for long a profitable business for many companies in Bulgaria. IB-BAS tries to establish active partnership with these companies, providing well qualified experts and targeted research relevant to their business needs.

Knowledge-based consultancy and training are provided to the municipalities and their authorities regarding nature conservation, biodiversity and tourist development. The municipalities benefiting from such services are those of Sofia, Tzenovo, Kostinbrod, Treklyano, Primorsko, Malko Tarnovo, etc.

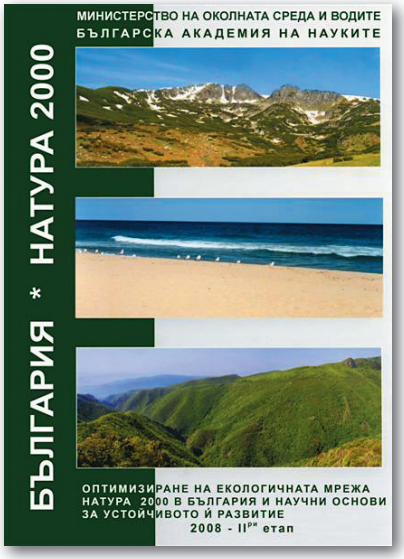

Fig. 1. NATURA 2000 (project funded by the Ministry of Environment and Waters).

Researchers from IB-BAS have participated in different international projects, including EU-funded ones, some of them aimed at bridging science and policy and structuring ERA, such as: "*European Initiative for Euro+Med PlantBase*", "*Periodic review of the Bulgarian Biosphere Reserves and Implementation of the Seville Strategy*", "*National Grassland Inventory Project*", "*Important Plant Areas*", "*BioPlatform*", "*BioCASE*", "*BioForum*". IB-BAS chairs the Bulgarian Man and Biosphere Committee which coordinates the scientific activities in the Bulgarian biosphere reserves that encompass some of the most representative and well-preserved ecosystems. The project "*Alternative approaches of bioproduction of alkaloids and active substances from Bulgarian rare and threatened medicinal plants*" funded by NATO Science for Peace Programme resulted in well-established partnership with the Bulgarian pharmaceutical industry (Sopharma AD). Mapping and monitoring of macromycetes in Europe, studies on fungi in Japan and Korea, conservation of bryophytes, contributions to the *Atlas of Europe*, partnership in such projects as "*Neogene Climate Evolution in Eurasia*", "*European Pollen Database*", "*Environments and Ecosystem Dynamics of the Eurasian Neogene*" (ESF), "*Ecosystem and climate evolution in the Neogene* of *Bulgaria*" (DFG), etc. make possible the development of scientific collaboration. Since 1995 experts from IB-BAS have participated in the European project "*UN/ECE ICP Vegetation – European Metals in Mosses Surveys*" and have contributed to data base enhancement on European scale.

The scientists of IB-BAS continuously work together with the neighbouring countries (Greece, Turkey, Romania) on the problems of trans-boundary pollution, plant diversity, vegetation dynamics. Last year botanists from IB-BAS have contributed to the implementation of the project "MIDCC (*Multifunctional Integrated Study Danube /Corridor and Catchment*)". Exchange visits, training courses and meetings for discussion of topics of current importance enhance the joint activities and collaboration.

Institute of botany – BAS also implements projects funded under the Academy's bilateral agreements. There is a well established cooperation with institutes, museums and universities from Germany, Austria, Spain, Italy, Slovakia, Czech Republic, Hungary, Poland, Estonia, Romania, Turkey, Greece, and Israel. Development of Balkan cooperation is of special importance for the intensive studies on the territory of East Europe and the Mediterranean.

International relations are evidenced by the membership in different research organizations (for example, the International Association for Vegetation Science, INTECOL, IAB, ECCB, OPTIMA, AMARSEC, International Association for Danube Research, International Humic Substances Society, Cenozoic Pollen Database and Climatic Values (C.P.C.). On the average, some 44 researchers participate annually in commissions, advisory councils, work groups, etc. Senior researchers have been invited as consultants to the European Environmental Agency (EUNIS classification, Map of High Nature Value Farmlands in Europe).

Fig. 2. The new molecular laboratory (project funded by the National Science Fund).

Fig. 3. Renovated herbarium hall (project funded by the Ministry of Education and Science).

The international collaboration corresponds to Objective 10 in the EU Action Plan: "to substantially strengthen the knowledge base for conservation and sustainable use of biodiversity in the EU and globally".

4. Capacity building

Considering the importance of inflow of young people at the Institute, we make them join the project teams and combine study with skills enhancement. Junior researchers are supervised by scientific advisers in their post-graduate education. Heads of Departments are responsible for the personal activities and development of all young researchers in the department.

Part of the efforts of IB have been directed towards the establishment and development of the research infrastructure, including acquisition and installation of new, and upgrading of the existing equipment for the following major projects: Alternative Approaches of Bioproduction of Alkaloids and Active Substances from Bulgarian Rare and Threatened Medicinal Plants; Bulgarian Plant, Habitat and Mycological Diversity Centre for Monitoring and Conservation (*PHYTO-Monitor*). Four new laboratories have been established (Molecular and Flow Cytometry laboratory (Fig. 2), Biotechnological Laboratory, GIS Laboratory, and Laboratory for Experimental Biology of Bryophytes. The Herbarium (SOM) (Fig. 3), Mycological Collection (SOMF), Cytotaxonomic Laboratory, and Palynological Laboratory were modernised.

5. Participation in different education activities

There is a traditional and regular collaboration with the Universities of Sofia and Plovdiv, and temporary arrangements with the Universities of Shumen, Stara Zagora, Burgas, Blagoevgrad, and Palermo (Italy). In recent

years, the implementation of projects "Flora of R Bulgaria" and "A database and information system for the Bulgarian higher flora" is an example of such collaboration.

Special attention is paid to PhD and young researchers' training and education. Courses and seminars have been and will be carried out within the frame of the project BG051PO001/07/3.3-02 /70/17.06.2008 "*Enhancement of the capacity of young researchers for study, conservation and sustainable use of plant and fungal biodiversity in Bulgaria*" supported by the European Social Fund of the European Union, with co-financing from the Bulgarian Ministry of Education and Sciences via the operational programme *Human Resources Development*: *Biostatistics*, Nov. 08-Feb. 09., *Informational Technologies*, Nov. 2008, *Statistical Methods in Ecology*, Dec. 08-Jan 09. Good opportunities are provided by courses organized by the Training and Development Centre, BAS (*English courses, Informational Technologies, Statistical Analysis, thematic courses*). The young scientists have participated also in courses held in nine European countries: the Czech Republic, Italy, Sweden, Iceland, Slovenia, Greece, France, Belgium, UK, e.g. "*Analysis of Phytosociological Data Using the JUICE Programme*" Brno, Czech Republic, "*Biodiversity Indicators in Forests and Wooded Pastures*", Lund University, Sweden, "*Histology of in vitro Micropropagated Plants*", University of Reims, France, etc.

6. Services of specific national importance

The scientific programme of IB-BAS is closely related to the priority activities and policy of the Ministry of Environment and Waters, Bulgarian Executive Environmental Agency, Ministry of Education and Science, Ministry of Agriculture and Forestry, National Forestry Board, Ministry of Regional Development and Public Works, Ministry of Culture and Tourism.

Members of the IB-BAS staff chair (chairperson and secretary) the National Committee of the UNESCO Man and Biosphere (MAB) Programme. Bulgaria joined the Programme in the 1970s and currently has 16 Biosphere Reserves of the first generation. The efforts over the past five years include various activities (organization of over 10 international, national and local meetings, workshops and training seminars, participation in international meetings, e.g. EuroMAB meetings in 2002, 2005, 2007, and initiatives related to MAB issues, publication of leaflets, creation of a web-site: http://www.bgmab.com, translation of the basic programme documents into Bulgarian – the Statutory Framework and Seville Strategy) aimed at popularization of the modern concept for biosphere reserves among the relevant government authorities and local population, as well as at sharing experience and knowledge with other countries. The activities are devised in support of governmental organizations, local population and NGOs to reconcile biodiversity conservation and sustainable development.

Although the scientists of IB do not deal directly with industry and advanced technology, they contribute to the national economy with:

- Expertise and advice in agricultural and rural development.
- Provision of information on primary production of meadows and pastures, or the succession processes on abandoned agricultural lands as a basis for official management of natural resources. Mention deserves the fact that the unit is open to any possibilities for contributing to the national agro-environmental activities.
- Development of regulations for effective utilisation of natural resources.
- Identification of biologically active plant substances of special importance to pharmacy and home healthcare in Bulgaria. The biological resources of Bulgaria and in particular the plants and fungi have been for long a profitable business for many companies in Bulgaria. IB-BAS establishes active partnership with these companies (e.g. Sopharma, Bulkem, etc.) and provides well qualified experts and targeted research relevant to the business needs.
- Development of methods for community based cultivation of commercially used medicinal plants in rural areas (Fig. 4).

7. Overall achievements of the IB during the period 2004–2008

The most important scientific achievements in the different areas could be summarized as follows:

Systematics and taxonomic diversity

An important contribution to the higher plants diversity research in Bulgaria and other countries: publication

Fig. 4. Cultivated *Rhodiola rosea* has high quality bioactive substances.

of seven new for science species and subspecies, one new nomenclature combination, 23 new for the countries floristic records (for *Bulgaria* – 17 species; *Montenegro* – 2; *Serbia* – 1; *Turkey* – 2; *Uruguay* – 1), new for science chromosome numbers for 16 species and subspecies, new chromosome numbers from Bulgarian and other countries' accessions for 86 species and subspecies (Bulgaria – 78 species; Turkey – 8), genome size measurements (*C-values*) for 40 species and subspecies. In the area of mycology: volumes 5 and 6 of the monographic series *Fungi in Bulgaria* are in press. Checklists were created of the myxomycetes, larger ascomycetes, and larger basidiomycetes in Turkey; new data were published for the micota of Japan and Korea.

Biomonitoring and nature protection

- ✓ Assessment of the conservation status of plants and fungi in Bulgaria using the IUCN criteria and categories (total number of evaluated species – 215 fungi; 704 mosses; 904 vascular plants), as well as preparation of the *Red Data Book of R Bulgaria. Vol. 1 Plants and Fungi* (containing 816 articles: six general, six for algae; 102 for mosses; seven for pteridophytes; four for gymnosperms, 542 for angiosperms, and 149 for fungi) and *Vol. 3. Habitats* were directly related to the implementation of the Convention on Biological Diversity, Bern Convention, the National Biodiversity Act, Habitats Directive, and the IUCN Red Listing initiative.
- ✓ Alien plant and fungi species were assessed and measures were proposed to restrict their impact on native ecosystems and species. A national strategy for invasive species was developed which underlies the national policy for decreasing and restricting the impact of such species. One hundred and sixty plant and 20 fungi species were evaluated and classified in accordance to the IUCN threat criteria.
- ✓ Within the framework of the project "*Identification of important plant areas in Bulgaria*", supported by Plantlife International, areas of high botanical significance were proposed. The results of this project contribute to the European activities in the field of plants and habitats conservation.
- ✓ Scientists from IB-BAS, with collaborators from MoEW, participated in the development of methods for identification of a favourable conservation status of plants and habitats and methods for monitoring of plant species, which are used at present in the National System for Biodiversity Monitoring.
- ✓ Within the framework of the EU programme for biomonitoring, a network for collecting moss samples was developed at IB-BAS and since 1995 Bulgaria has contributed for the implementation of this programme.
- ✓ Stimulation and coordination of the evaluation of the 10-year (1994–2004) National Biodiversity Strategy and support of the elaboration of the *National Biodiversity Action Plan* (2005–2010) in a direct response to the requirements of the Convention on Biological Diversity, the National Biodiversity Act, and the 2010 Biodiversity Target. The work was also relevant to the implementation of the Habitats and Birds Directives at national level.
- ✓ Development of the framework of the National Biodiversity and Protected Areas Monitoring System and the methodological manuals for vascular plants and bryophytes in relation to the Convention on Biological Diversity, Bern Convention, Biodiversity Act and the 2010 Biodiversity Target.
- ✓ Selection and designation of *NATURA 2000 sites*, other protected areas and Important Plant Areas in Bulgaria; elaboration of management plans for the protected areas (three Nature Parks; one Protected Site and one NATURA 2000 zone) and action plans for four endangered species; assessment of the favourable conservation status for 18 NATURA 2000 vascular plants. The work was directly related to the implementation of the Habitats Directive in Bulgaria and the national Biodiversity Act and Protected Areas Act.
- ✓ Seeds and herbarium specimens of indigenous Bulgarian plants selected according to their conservation importance and economic value were collected annually. These samples were sent for long-term deposition in the *Millenium Seed Bank*, UK, for scientific and educational purposes.

- ✓ Action plans were developed for priority threatened species. This activity was supported by the Ministry of Environment and Waters. The ecological status of these species was evaluated and threats were identified, together with the needed conservation measures at national level. Activities were proposed for maintenance, restoration and sustainable use of populations. Four natural areas were selected and proposed as protected areas.

Geohistorical development of the flora

Regional and temporal vegetation and palaeoclimate reconstructions provided important information on climate changes and ecosystem dynamics throughout the Neogene in SE Europe. These data showed that a different climate system existed in Europe during the Neogene, with less expressed latitudinal temperature gradient. A model of Late Eocene to Early Miocene and Middle to Late Miocene climate dynamics was also proposed. Tracing out the vegetation dynamics in the Holocene in different regions of Bulgaria provided new details both on climate-driven vegetation changes and on human impact in the lowlands and mountain areas (e.g. Middle Danube Plain, Mt Osogovo, Mt Plana, etc.).

Palaeofloristic data obtained in the period 1929-2004 were organized in a monograph *Catalog of the Cenozoic Flora of Bulgaria*, which included information on stratigraphic and geographic distribution, and taxonomic revision of 860 fossil taxa. In addition, new paleofloristic data were presented for a number of Neogene sites.

Phytochemistry, chemotaxonomy and biotechnology

- ✓ Chemotaxonomic significance of phytochemical substances was proved, e.g. lactones, diterpenoids, flavonoids, saponins, isozyme markers, etc. Medicinal properties of natural plant populations were studied, along with the content of biologically active substances and aromatic compounds. The assessment of saponins content in *Tribulus terrestris*, a species of interest to pharmacy, resulted in identification of two chemotypes with different medicinal properties.
- ✓ A biotechnological method was developed for biosynthesis of galanthamine in liquid medium by using *Leucojum aestivum* shoot-clumps for pharmaceutical purposes (Sopharma AD). The most appropriate natural populations were selected for long-term *in vitro* storage.
- ✓ Methods were elaborated for *in vitro* micro-propagation of valuable and threatened medicinal plants (*Ruscus aculeatus, Tulipa urumoffii, Pancratium maritimum*), incl. possibilities for reintroduction to their natural habitats.

8. Strategy and policies for future development

The main strategic goal of IB-BAS is to ensure and maintain scientific and applied scientific researches on high scientific level, in accordance with the modern European and world tendencies in the research, assessment, conservation and sustainable use of biological diversity and in close relation to the needs of the Bulgarian society and Government.

Fundamental and applied research in various fields of botany will continue, such as biodiversity, protection of the natural flora, vegetation and fungi; genetic potential, mechanisms and trends of the speciation processes; search for new useful plants and natural plant resources; rational use of plants and fungi as natural resources; environmentally induced changes in the generative sphere and embryology of plants; shedding light on the evolution of the plant kingdom on the Balkans throughout the geological periods and finding out of new facts about its present status and on-going changes. In a long-term perspective, collaboration with researchers from neighbouring countries is envisaged, in order to enhance the studies of plant, fungi and vegetation at regional level. Large data set analyses will be encouraged. For the Bulgarian biodiversity conservation, it is very important to rely on a high-quality scientific basis. In this respect, development management plans for Natura 2000 sites, protected areas, threatened plants and habitats, and evaluation of high nature value farmlands would require our services. A good practice in implementation of the case studies on climate change in the region should be developed. In this respect interdisciplinary collaboration, namely with climatologists, will be required. Certain emphasis will go to the vegetation-climate change and vegetation-land use interactions. Special attention should be paid to particular ecological factors controlling the processes in the plant communities. Biomonitoring of heavy metals and toxic pollution will remain a major activity focused on applied science. Further studies into medicinal and aromatic plants, biologically active substances, and application of biotechnological methods in cultivating are milestones in the applied researches in the immediate future.

Prerequisites for the implementation of the abovementioned scientific plans are:

- Improvement of the research infrastructure and equipment of IB-BAS so as to ensure high quality, effectiveness and attractiveness of the scientific research work.
- Development of researches directed at gaining new knowledge in the traditionally strong for the Bulgarian Botany directions (cytotaxanomy, phytochemistry, conservation, etc), as well as training and prequalification of the human resources in relation to the modern tendencies in the development of natural sciences and informational technologies.
- Improvement of the transfer of knowledge, innovative techniques and experience among IB-BAS and other similar national and international scientific centres, public and non-governmental organizations.
- Enhancement of the forms of collaboration with the universities and scientific organizations in Bulgaria, as well as abroad, especially with the Balkan countries.
- Improvement of the relationships between IB-BAS and the interested parties in the field of biological diversity in Bulgaria, aimed at harmonization of the research work with the political and socio-economic needs of Bulgaria.
- Creation of new competitive scientific products and biotechnologies for the needs of pharmaceutical industry, medicine and other fields of the public life and economy.
- Development and implementation of computer, communication and informational systems and technologies and of the geographical information systems during the research, monitoring and conservation of the vegetation, fungi and habitat diversity.

The human resources policy aims to involve young people (Fig. 5) in the research process and to increase the scientific capacity of the staff. Scientific advice and supervision of the thesis work for Master Degree is a regular practice. PhD students undertake the next step of education and most important for their success is an appropriate individual research plan and study object. PhD students work on their personal capacity under the supervision of scientific advisors. A good practice is to involve the students in preparation of project proposals and subsequently in project implementation. PhD students are encouraged to present their results on national and international scientific forums and thus to share experience and to establish contacts with kindred experts. They are encouraged also to apply for short-time training at other institutions. An example of the efforts made for the benefit of the young colleagues is the ongoing project, targeted on building the capacity of young researchers at the Institute funded by European Structural Funds.

Fig. 5. The young generation.

9. Concisely on the prospects of the unit

In the foreseeable future, the Institute of Botany will proceed to consolidate its position as an all-round national scientific centre. This relies on: **1)** Consolidation of management, human and technological capacity. IB-BAS has the following equipped and well functioning laboratories and units: Laboratories – Analytical, Izoenzyme, Cytotaxonomic, Palynological, Biotechnological, Phytochemical, Laboratory for Genetic Researches, Laboratory for Anatomy and Embryology of Plants. There is a capacity at IB for GIS and GPS technology application in biodiversity assessment, monitoring and conservation; **2)** Young scientists whose number has increased lasting recent years; **3)** Shared knowledge, techniques and experience with similar European centres and a common background for joint research work; **4)** Researchers relevant to the socio-economic needs of the country.

Acknowledgements. The management of the Institute of Botany is very grateful to the management of the Bulgarian Academy of Sciences for the extended support, as well as to the entire IB staff for the comprehensive studies and successful implementation of the scientific programmes.