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175^e anniversaire du Jardin botanique de Genève

Colloque international sur le thème

Nature et Jardins botaniques au XXI^e siècle

Genève — 2-4 juin 1993

East-West co-operation, role of botanical gardens

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RÉSUMÉ

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Comptes-rendus du colloque "Nature et Jardins botaniques au XXI^e siècle", Genève, 2-4 juin 1993.
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Les jardins botaniques des régions tempérées jouent un rôle de conservation de la biodiversité en cultivant des endémiques, en se spécialisant dans certains groupes taxonomiques, en présentant des communautés naturelles de plantes, etc. Théoriquement, les 1600 jardins botaniques ont assez de place pour cultiver toutes les plantes à fleurs du monde. Mais la diversité de la flore n'est pas suivie par une diversité des jardins botaniques. La plupart des jardins tropicaux ont seulement été établis comme pépinière de cultures tropicales ou sont en train de décliner. Il est hautement souhaitable de changer cette situation. Les jardins botaniques tropicaux doivent être liés à la riche nature tropicale et doivent avoir un rôle dans la conservation de la biodiversité, dans l'éducation et dans la recherche et le développement de la biodiversité. Avec le changement climatique global, la stratégie de vie des plantes est un des sujets d'études importants. Le développement de travaux floristiques des contrées tropicales et subtropicales est un autre champ d'études à faire en coopération est-ouest. Nous devons ajuster la diversité des botanistes avec celle des plantes dans un réseau de centres de recherches.

ABSTRACT

BORHIDI, A. (1993). East-West co-operation, role of botanical gardens.
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Temperate botanical gardens have a role in the conservation of biological diversity in growing local endemics, specializing in taxonomical groups, presenting natural plant communities, etc. Theoretically, the 1600 botanical gardens have space enough to grow all the flowering plants of the world. But the diversity of the flora is not followed by the diversity of botanical gardens. Most of tropical gardens were only established as base nurseries for tropical crops, or have declined. It is highly desirable to change this situation. Tropical botanical gardens must be related to the rich tropical nature

and must have a role in conservation of biodiversity, education, research and development of biodiversity. With the global climatic change, life-strategy of plants is one of the major research fields. Developing of flora works of tropical and subtropical countries is another one to do in east-west co-operation. We have to fit the diversity of botanists to the diversity of plants in a network of research centers.

Mr. President,
Ladies and Gentlemen!

I am grateful having the opportunity to participate on this conference and to express my best wishes on behalf of the IABG, European-Mediterranean Division to the organizers and director of the Botanical Garden of Geneva on the occasion of its 175th Anniversary.

Botanical Gardens whether in the tropics or in the temperate zones of the world, are usually built on the model of the European botanical gardens of the 19th century. These gardens were created for keeping as many species and varieties as possible; the origin of the material was not regarded as important.

At the beginning of this century the importance of the origin of the plants became evident, with the development of experimental taxonomy — and after the middle of the 20th century conservation became a more and more repeated theme also in connection with botanical gardens, and this goal has been named in the last decade as the conservation of the biological diversity.

I shall try here to summarize what we have achieved in the temperate botanical gardens and how our experience has been or should become useful for gardens in the tropics and also in what ways botanical gardens in the tropics can become instruments for the conservation of diversity.

One of the most respected botanical gardens in the world, the Royal Botanic Gardens at Kew, contains 40,000 species of higher plants from all over the world, about 15% of all known species; Berlin-Dahlem harbours 20,000, and in the less known Botanical Garden of the Hungarian Academy of Sciences in Vácrátot 12,000 species and varieties are cultivated.

Most botanical gardens specialize in certain groups or in local endemics. We can mention as example the Botanic Garden Viera y Clavijo in Gran Canaria, where the major part of the Canary endemics are grown, and have been used as basis for re-establishing the threatened natural plant communities of the Canary Islands; communities highly endangered due to the explosive development of charter tourism since the 1960s. Many European botanical gardens conserve local endemics, and the same is true of many Gardens of the United States of America, South Africa, Japan and China. This is important, but we should not forget the importance at the same time of conserving the biodiversity of the widespread so called “common” species.

Special plant groups are favoured in many botanical gardens. In the Botanical Garden of Halle a great collection of *Achillea* can be found; in Aarhus about 700 species of *Alchemilla*, including 400 agamospecies are grown in the experimental fields, in Rancho Santa Ana of Claremont, California, fine collections of *Ceanothus* (Rhamnaceae) and *Arctostaphylos* are cultivated, and in the Main Botanic Garden of Moscow an outstanding collection of living Araceae is grown.

Many botanical gardens strive to present natural plant communities of original habitats. In the Botanical Garden of Geneva an excellent example is the complex of rock gardens which contains nice representatives of the endemic rock vegetation of Corsica and Sardinia. In the National Botanical Garden of Cuba, near to Havana, complete communities of coastal limestone thicket, cactus-

scrub and serpentine vegetation are built up for the public interest, for students, tourists and other people who have no opportunity or time to make long and tiring excursions to visit the original habitats of these communities.

It is estimated that we have 1600 botanical gardens, more than 530 only in Europe and even if I regard this number as highly overrated, we do still have hundreds of hectares of botanical gardens and thousands of square meters of glass houses, heated for astronomical sums of money. Theoretically, we have space enough to grow the 250-300,000 flowering plants of the world.

But the rigid truth is different. The first problem is, that the diversity of the flora is not followed by the diversity of Botanical Gardens. And most of the tropical gardens were established not to conserve the wild flora, but to act as base nurseries for tropical crops. Even the famous Atkins Garden of the Harvard University in Cienfuegos has been famous for its sugar-cane varieties and had almost nothing of the rich endemic flora of the Cuban savannas and definitely nothing of the montane endemics of the surrounding Sierra de Escambray.

In some cases, directors of tropical gardens developed true replicas of the European botanical gardens, and in this way the Gardens of Calcutta, Singapore, Rio de Janeiro and Bogor became famous.

But those glorious days are far gone — as it was stated by Kai Larsen. Due to lack of funds the great, classical tropical botanic gardens have all declined, and even if still quite a number of trees and shrubs are labelled, they are mainly directed as public parks. The famous tropical garden of Adolph Engler in Amani now serves as an abandoned environment of a Malaria Research Institute, which has nothing to do with the Botanical Garden. Although you can find the labels on many 200-300 years old trees, some of them are the living type specimens of species described a hundred years or more ago, the Botanical Garden itself has vanished for ever.

It is highly desirable that this situation should be changed. Now botanical gardens should never become a goal in themselves, particularly not in the tropics. They must be related to the rich tropical nature with its tenth of thousands of useful plant species — the extremely complex tropical biodiversity harbouring 2/3 of all the species of our planet and which is much more endangered today than are the plant communities of the temperate zone.

In relation to conservation tasks, botanical gardens have to face with several problems. Botanical gardens can help in conserving some species or eventually fragments of rain forests or monsoon forests but it is completely hopeless to build up a rain forest with its giant trees, lianas, epiphytes, understories with its zoological components as a functioning ecosystem. This kind of task will be always out of the capacity of a botanical garden. The only way is to conserve them in situ, as much as possible. Fewer and larger reserves are better than many small pieces, as these will eventually lose their diversity. Another problem is the size of the protected population. Usually botanical gardens have not space enough for keeping so big a population of the protected plants and endemics as to sufficiently avoid its genetic erosion.

Other problems are the narrowing financial conditions which are threatening the existence and survival of many botanical gardens. What are the purposes of the Botanical Gardens to raise funds for:

- Conservation of biodiversity
- Education
- Research and development of biodiversity.

We have seen that botanical gardens have an important role in conservation, but their possibility is limited.

Education is also important to give an idea about the richness, beauty, functioning and strategy of nature. We are at the 24th hour to understand and make understand nature. For this purpose the society should raise funds through the education, health tourism and other profit-oriented activities related to nature.

Research and development of biodiversity

Research has always been an important activity of the botanical gardens, and it is still one of the more important sources of obtaining financial support. The 21st century botanical garden should also be an institute of research activities which are closely related to the actual problems of biodiversity and ecology.

I can imagine as a model of a 21st century botanic garden, Rancho Santa Ana in Claremont, California, with an experimental field and well equipped laboratories, where classic gardener selecting methods are combined with highly sophisticated molecular genetic practices. The garden has developed a magnificent set of garden varieties in *Mimulus guttatus*, the endemic *Keckiella cordifolia* and a series of colour variations of *Fremontodendron californicum*, a relict Sterculiaceae-tree of the San Bernardino Mountains. The garden has an intensive exchange and research contact with eastern (Russian, Grouzian Kazakh) botanical gardens. An important result of this collaboration is the development of *Chitalpa tashkentensis*, a beautiful intergeneric hybrid tree of Bignoniaceae.

In the Botanical Garden and genetic institute of the Frige University of Amsterdam the genetic manipulation of the malvidin synthesis is thoroughly studied for elaborating a method of controlling the colour of ornamental flowers.

Ecology as a promising field

The threatening ecological challenge of our near future is the global climatic change. The increasing temperature and drought in vast areas will provoke a dramatic change in vegetation. Plant communities will be desorganized and new ones will develop. Successful life-strategies will turn out to be useless and others will be successful. Ecological and sociological behaviour of many plants will change. But we do not know the functional types of the higher plants. Professor Grime and collaborators learned the life-strategy of about 600 species, roughly 40% of the British flora and this monumental work took almost 15 years. We have perhaps not even 15 years for understanding the ecological character of the remaining 249,000 species. It is very important to know the complete life history of as many species as possible. For this kind of studies, botanical gardens are the most convenient places. And these studies are more time consuming than expensive.

I consider these two research fields as perspective activities for both western and eastern botanical gardens.

Another important field of collaboration is the developing of flora works, first of all, for the floristically rich tropical and subtropical countries. There are a lot of successful flora-projects, such as the East-African Flora of Kew, the Flora of Paraguay of the Botanical Garden of Geneva, Flora Iranica of Munich, Flora of Togo of Berlin-Dahlem, Flora of Panama of Missouri, etc. But the time is urging. It is not an uncommon case that we are describing extinct genera and species.

It is highly desirable to increase the active scientific participation of the indigenous botanists in the flora works, and the co-operation should include the development of a herbarium or herbaria in the tropical countries and the botanical-taxonomical training of the tropical scientists in the western tropical gardens and universities. For this kind of co-operation the new Flora of Cuba project can be mentioned as a positive example, where more than half of the participant authors are Cuban botanists. Unfortunately, combining development of Flora projects with training and education of indigenous botanical experts and staff is a long and time-consuming work, while we need flora works as early as possible.

However, we have to make all possible efforts to fit the diversity of botanists to the diversity of plants.

You can ask, why are these co-operations named as east-west ones — when we really speak about the co-operation of rich and poor or more politely said prosperous and less prosperous countries, and botanical institutions. You are right if you think, that these terms may be misleading and out of date. For instance in the far east we can find rich countries and highly developed botanical gardens, while in the West Indies we know a country considered publically to be the easternmost one, but with a well organized botanical garden. In the last few years terms west and east has changed dramatically in many respects. What remain, is the need of understanding, the need of mutual help, the need of co-operation and the hope, that the botanical gardens of the 21st century will form a more randomized network of research centers, provided by six times as many taxonomists as today and supported by a prosperous, nature respecting and protecting society.