Urban horticulture on the verge of a new century
Insights of the International Symposium on Plant Health in Urban Horticulture held in Braunschweig, Germany, from May 22 to May 25, 2000

Urbaner Gartenbau an der Schwelle eines neuen Jahrhunderts
Erkenntnisse aus dem internationalen Symposium zur Pflanzengesundheit im urbanen Gartenbau in Braunschweig im Mai 2000

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Abstract
Today a large section of the world’s human population lives in urban and periurban areas. The way of living has increasingly changed from a nature-related one to an urbanistic one. Agricultural production and cultivation no longer determines the lifestyle of most inhabitants of industrial countries. It has been replaced by systems related to the design and development of high technology products, industrial productions, business in the service sectors, and the development of electronic communication systems. Increasing alienation from nature creates the need of urban dwellers for compensation as manifested by leisure activities and the desire for urban green areas, gardens and recreation parks. Publicly laid out and tended green areas and trees, private gardens, playgrounds, allotment-gardens, roof gardens, inner courtyards and balconies, urban and periurban centres of professional horticultural productions and services are the components which represent urban horticulture. They significantly characterize and determine urban and suburban life. The manyfold functions of urban horticulture have been described in detail in relevant publications. There are, however, still many questions to be answered. Too many stress factors still damage these components in different ways. Although scientific efforts made significant progress in recent years, lots of problems can be observed in practice. Integrated concepts for tending and preservation of urban green are badly missing. The International Symposium on Plant Health in Urban Horticulture was a suitable platform on a scientific level to discuss deficits in care and development of urban greenery and develop proposals for integrated concepts. It aimed at attempting to jointly prepare future needs for action for health preservation of urban green on an international level.

Key words: Horticulture, urban horticulture, plant protection, plant health, urban greenary, public green areas, integrated plant protection

Zusammenfassung


Stichwörter: Gartenbau, öffentliches Grün, Stadtgrün, Pflanzengesundheit, Pflanzenschutz, urbaner Gartenbau, integrierter Pflanzenschutz
1 Preface

The way of living of human beings has dramatically changed during the recent century. Especially in industrial countries a development from a rather nature-related and agrarian-oriented life-style and social structure to an urbanistic life-style can be observed. Around 1900 only approx. 10% of the world’s population lived in cities. Today about half of the world’s population already lives in urban centres and periurban areas (Back, 2000). Whereas a hundred years ago about 80% of the working population in Germany contributed directly or indirectly to the basic horticultural and agricultural production of foodstuffs (Kolbe et al., 1983), this number has drastically decreased until today in relation to the number of people working in other professions and thus have to be fed. Nowadays, agricultural productions and the related social and cultural systems are determining the life style of merely a minority of inhabitants of industrialised countries. Most of them have been replaced by systems related to industrial productions, to the development and design of high technology products, to business in the service sectors, and to the development of electronic communication systems. These are mainly located at the outskirts of cities or even within the city areas.

According to forecasts, up to two thirds of the human population will live and work in urban centres in only 20 to 50 years from now. In the EU today, already 80% of all EU-citizens are living in urban areas (Anonymous, 1999). However, increasing alienation from nature creates a stronger need for urban dwellers to compensate. This is manifested by leisure activities and the desire for urban green areas, gardens and recreation parks, and green periurban leisure areas (cf. e.g., Klaffke, 1995; Dettmar, 1997). As a result, agricultural production previously located on the outskirts of the cities is replaced by artificial landscape architecture and commercialisation of urban greenery (e.g. golf courses or sport facilities). Gardening as compensation for the stress of the daily work routine is particularly popular with the middle-class section of the population. Markl (2000) rightly demands the “garden attitude” to “complement for reasons of humanity, the calculating rationality of economic planning”, which forms the basis for solving many urban development problems.

2 What does the term “urban horticulture” actually mean?

Horticulture in its diversity has been an integral part of urban areas for a long time. Urban horticulture has many faces:

- Public parks and recreation areas are made for the use of everybody (Fig. 1). For example, Berlin has 2592 public parks, comprising an entire area of 5053 ha, not including allotments, cemeteries and roadside planting (Wekel, 2000). Families, for instance, benefit immensely from these parks. However, parks are difficult to protect against misuse and destruction because of their anonymity and size. The maintenance costs pose an increasing problem for many cities and municipalities. In many cases municipal offices, responsible for green areas, can only perform their tasks inadequately due to staff shortage and stringent economy measures. (Kellner, 1998)

- Roadside trees and trees on city squares form an essential part of urban greenery (Fig. 2). They regulate the climate and air quality in a city, they create architectonic intersections and represent, moreover, enormous monetary values for cities and municipalities. The total value of the approx. 400000 roadside

Fig. 1. Public parc with different elements: lawns, flowers, hedges and trees.

Fig. 2. Characteristic main street with road trees and heavy traffic.

trees in Berlin alone is currently estimated at over 2.18 bn. DM (SCHULZ and BALDER, 2000).

In addition, particularly private gardens find lively interest. Home gardens, allotments, greened roof gardens, inner courtyards and balconies are popular recreation areas amongst wide sections of the urban population. Germany alone has approximately 930,000 ha of allotment area (Fig. 3).

Architects, companies and authorities increasingly realise how beneficial suitable interiorscaping in offices and service busi-

Fig. 3. Allotment-garden with fruit trees, flowers and vegetables.

Fig. 4. Indoor plants in a private house.

nesses can be for the wellbeing of customers and staff, and subsequently for economic success (Fig. 4).

Furthermore, centres of professional horticulture have established in and around cities, offering their services (e.g., landscape gardening and garden maintenance, cemetery gardening, floristic) and cultivated products directly on local markets or trade them nationally (Fig. 5). The production of high-quality horticultural goods in city areas can also look back on a long-standing tradition in Germany, (cf. HAMM, 1872; SIPPEL-BOLAND, 1997; BACKHAUS, 1998) and is still of considerable importance today, for instance, in Hamburg’s ‘Vier- und Marschlanden’, where we find intensive production of vegetables and cut flowers.

All of these components – public parks and squares, playgrounds, amenity turf, allotments, private gardens, cemeteries, roadside trees, roof gardens, inner courtyards and balconies, together with urban horticultural production and services – represent what is summed up by the term urban horticulture (see also TUKEY, 1999). They form essential parts of the cities, they characterise the architecture of city districts, they are components of economical structures in city quarters and suburbs, and they substantially determine the city dwellers’ quality of life. City forests are also a part of urban greenery, they are, however, normally looked after by the forest management rather than by horticultural institutions.

3 Conservation of urban greenery

The manifold functions of parks, avenues, bedding plants, gardens or greened inner courtyards are fully described and acknowledged in specialist publications and scientific books (cf. KÜHN, 1961; MEYER, 1982; HÖSTER, 1993; SUKOPP and WITTING, 1993; KLAFKE, 1995; BALDER et al., 1997; BALDER, 1998; BACKHAUS et al., 2000; etc.). These functions are also increasingly acknowledged in public. Nobody today seriously doubts their significantly positive influence on the quality of life, on well-being and on the social structure of inhabitants of urban areas. What would consequently be more obvious than trying not only to preserve the structures and components of urban horticulture but to maintain them and to expand them purposefully. Above all, however, their health and sustainable function should be guaranteed for long periods of time.

Upon close examination of dealing with these individual compartments of urban greenery in practice, however, apparent shortcomings are the order of the day. Trees and other plants are
exposed to manifold stress factors which are often of human origin. Stress factors are generally divided into stress caused biotically, that is damage to plants caused by pathogens and pests (Fig. 6), and abiotic stress. Among the latter we find a great range of damaging harmful chemicals in the air (sulphur compounds, dust, exhaust fumes, etc.) and in the soil (salt, natural gas, heavy metals, urine of dogs), damages to trunk and roots caused by traffic or construction, wrong pruning and tending measures, incorrect soil preparation before planting, transport damages, etc. (cf. SCHÖNHARD and LAAR, 1990; LEH, 1991; BALDER et al., 1995; 1997; BALDER, 1998; PESTEMER, 2000; etc.). There are significant interactions between abiotic and biotic stressors. Abiotically pre-damaged plants are often clearly more susceptible to the infestation of certain pests and diseases. Some pests, like bark beetles, are simply attracted by weakened maiden trees (JOHNSON and LYON, 1988; OHNESORGE, 1991). Mechanical injuries form the portal of entry for wood-destroying fungi. On the other hand, there are many harmful organisms and virulent pathogens, severely harming plants which are not pre-damaged, even leading to their dying-off (BALDER, 1993; BUTIN, 1996; NIENHAUS and KIEWNICK, 1998; etc.).

For these reasons, the causes for damages to elements of urban greenery cannot be easily diagnosed or pinpointed or even eliminated by simple countermeasures alone. On the contrary, an extensive and foresighted way of planning and designing the entire environmental conditions is required, comprising also the general assessment of suitable locations for a certain plant species. In case of new plantings this foresight must go beyond the mere question of location. Production-associated conditions come into the picture, like, for instance:

- Of which quality are the delivered plants?
- Does the soil of the place of production match the soil of the intended planting site?
- Can proof be furnished that the supplied plants are horticultural quality production?
- Which plant protection products were used for treatment of the plants before they are planted out at their final location?
- How high is the rate of infestation with harmful organisms, with beneficial organisms or symbionts on the plants?

When carrying out tending and pruning measures in already existing plantations, it is necessary to implement a basic knowledge of plant physiology, wood biology and phytopathology.

A good many of the damages which can be observed in urban greenery result from lacking experience or scientific knowledge of the staff involved and/or from failing implementation of this knowledge. Missing or even wrong protection measures resulting from these omissions, even if they are well meant, should not be readily accepted. This poses a severe problem particularly for trees as for instance, the symptoms of damage caused by construction work often become visible not until years later. When studying existing technical literature it is remarkable to learn about the knowledge gardeners already disposed of in the 19th century (cf. POLCZYNSKI and BALDER, 1995; BACKHAUS, 1998). Unfortunately, this knowledge fell into oblivion or is nowadays completely unknown to those involved in laying out or tending public greens.

4 Bringing different disciplines together on a scientific level

Upon examination of the actual situation of urban greenery at the threshold of a new century, it becomes obvious that the pressing questions of how to preserve the health of urban greenery can never be tackled by one party alone but only interdisciplinarily. The health of the individual components of urban green, and subsequently also the success of urban service providers depend on matching creative ideas with what is locally feasible and sensible, and that means already in the planning stage. This should be basically also applied to tending, cutting and wound treatment measures as well as to specific plant protection measures to be taken in case of pest and disease infestations.

Intensive communication is required between town planners/greenery planners, landscapers, people engaged in phytonomedicine, and plant producers (i.e. nurseries) to incorporate each party’s expert knowledge in the final projects. Every party must be willing to learn from the others and to disclose information. Administrations have to revise their thinking. Instead of, for instance, placing their orders with laymen for purely monetary reasons, they should choose competent experts when putting necessary measures, like laying out or taking care of public greens, out for tender. Moreover, pre-planning financial years has already been described to be a problem over a hundred years ago (HAMPHEL, 1893).

On the scientific level, an attempt was made during the International Symposium for Plant Health in Urban Horticulture which took place from 22nd to 25th May 2000 in Braunschweig, to point out, discuss and formulate approaches to solve plant...
health problems in urban horticulture, comprehending various fields in an international context (Fig. 7). Scientists from around 30 countries participated in the different sections, where scientific contributions illuminated the different aspects of plant health in urban horticulture (Fig. 8). The international meeting was jointly organised by the Institute for Plant Protection in Horticulture of the Federal Biological Research Centre for Agriculture and Forestry, and the Official Bureau of Plant Protection Berlin in co-operation with the German Phytophical Society. It was rounded off by an excursion to the historic park of Potsdam-Sanssouci and the city of Berlin (Fig. 9).

The meeting was opened by a welcome address of the President of the Federal Biological Research Centre for Agriculture and Forestry, Prof. Dr. F. Klingauf, and the representative of the Federal Ministry for Food, Agriculture and Forestry, Dr. R. Petzold. Invited speakers (J. Wekel, Head of the Department for Urban and Area Planning of the Administration for Urban Development of the Federal State Berlin; Prof. Dr. V. Zinkernagel, first chairman of the German Phytophical Society; Dr. D. Duesieken, EU-COST-Action E12 „Urban Forests and Urban Trees“) outlined the complex of problems at the beginning of the conference from a higher point of view.

The specific sections were related to certain groups of topics which may at the same time be regarded as key factors of urban greenery.

Section 1: Urban ecology and biodiversity, with presentations on tree species and their suitability for urban greenery (Dumke and Pauleit, Germany; Minelli and Chiusoli, Italy), the significance of certain cardinal pests and principal plants for the biodiversity of vegetation in residential areas (Raupp and Shrewsbury, USA), populations of beneficial organisms on trees in the city (Balder et al., Germany), lignicolous macrofungi at urban trees in Slovakia (Gaper and Galis, Slovakia), Polyporaceae in urban areas of Croatia (Galis, Croatia), Stenocarpellus pumilus as antagonist of spider mites on urban trees (Jäckel et al., Germany), analysis of the arthropod fauna on urban vegetation (Lozza et al., Italy), polyphagous predators of the cotton aphid (Aphis gossypii) on Catalpa (Milevoi, Slovenia), importance of (VAM)-mycorrhiza for deciduous shrubs (Brandt et al., Germany), and the state of health of plants in urban private gardens in Scotland (Helfer, Scotland).

Section 2: Biotic disease factors of urban plants, with surveys on diseases and pests on urban plants in England (Alford, England) and Croatia (Hrasovec and Diminc, Croatia), and specific talks on virus diseases (Salomon, Israel), Phytophthora- species on trees (Weerres and Hahn, Germany), interactions between timber-inhabiting higher fungi, wood structure and stability of trees (Schwarze, Germany; Minelli and Chiusoli, Italy; Keer et al., Germany; Moricca and Panconesi, Italy), development factors of the linden spider mite (Schneider et al., Germany), phytopathological problems with ferns (Grimm and Vogeli, Switzerland), virus diseases of urban trees (Bandete et al., Germany), spreading of Sphaeropsis sapinea (Engesser and Meier, Switzerland), scale-insects on urban trees (Hippe, Switzerland), Phyllosticta crataegicola and Entomosporium mespili at Crataegus in public gardens (Ottendorfer and Blplan, Austria), Cercospora microsora at Tilia spp. (Plenk, Austria).

Section 3: Abiotic disease factors of urban plants, with contributions on the influence of air pollutants (Peiter, Germany; Vratisla, Yugoslavia), soil chemistry parameters (Koolen et al., Netherlands; Krier and Malkus, Germany), the climatic change (Bellett-Travers, England), and long-term stress factors (Gleissner, Germany) on the survival ability and development of urban trees. Further presentations illustrated the influence of ozone on virus infections of Betula pendula (Schraudner et al., Germany).

Section 4: Diagnosis and monitoring procedures, with contributions on how to determine the anchorage and stability of trees (Wessolly, Germany; Sandoz et al., Switzerland), molecular-biological methods for diagnosis of phytoplasma diseases (Wang and Hiruki, Canada), the assessment of tree stability by low frequency currents tomography (Comino et al., Italy) and ultra sonic tomography (Comino et al., Italy), molecular identification techniques for wood decay fungi (Civelli et al., Italy), radar-examinations of wood-destruction (Godio et al., Italy), pest monitoring in urban green space (Queyrel, France), sonography for non-destructive wood examination (Rust and Gocke, Germany), image digitisation – a digital data base for pests (Zunke, Germany, and Eisenback, USA).

Section 5: Tree biology and tree care, with contributions on controlled pruning of trees (Balder, Germany; Hein, Germany; Pristerer, Germany), tree protection during transplanting operations (Chiusoli and Minelli, Italy), the significance of twig abscission as decline symptom (Rust et al., Germany), the relation between pruning measures, wound treatment and wood decay fungi (Civelli et al., Italy), optimising plantings of perennials for public green areas (Bitter et al., Switzerland), the...
Section 6: Methods and procedures of urban plant protection, with general contributions on implementation of integrated procedures of plant protection in urban green (Quevrel, France; Siwecki et al., Poland; Srewsbury and Raup, USA), and with specific contributions on controlling cyrus canker (Morecca and Radh, Italy), on biological control of Botrytis cinerea (Helbig, Germany), on the effect of soil amelioration on trees (Flockiger and Braun, Switzerland), on the mycorrhization of urban trees (Garbaye et al., France; Feldmann et al., Germany; Brandt and Joine, Germany), on the control of the horse chestnut leaf-miner (Lethmayer, Austria), on phytosanitary aspects regarding oak species in urban forests (Ragazzi et al., Italy), on the significance of high-quality nursery stock to ensure the health of roadside trees (Vratusha and Anastasievic, Yugoslavia), safeguarding seedling health of Avicennia marina (Abdellmonem and Rasmy, Egypt), survey on the significance of plant protection in urban areas (Balder and Backhaus, Germany), Good Horticultural Practice in tree care (Balder et al., Germany), biological control of Hyphantria cunea in urban horticulture in the Black Sea region (Chihubiasishvili, Georgia), control of woody plants as weeds (Feilhaber and Balder, Germany), authorisation requirements for the registration of plant protection products for non professional use in home and garden (Hommes, Germany), biological control of Lilioceris lilii (Kenis et al., USA), use of Neem-plant protection products in public green (Lehmann, Germany), integrated methods for healing of urban trees (Siwecki, Poland), biological plant protection in indoor areas (JACKEL, Germany).

The proceedings of the conference contain all contributions to the symposium in detail (see Backhaus et al., 2000).
It has to be made very clear that health preservation of urban horticulture and its structures is not just a voluntary task left to cities and municipalities. On the contrary, health preservation should be regarded as an obligation to safeguard urban environmental structures for the future. Ultimately, it presents an inevitable component of the future development of urban social and communicative structures. This fact has to be made transparent also on a higher political level.

- Integrated concepts for health preservation of plants and greenery in cities are missing everywhere. Particularly the sector phytomedicine and plant protection have to make a greater contribution to the development and implementation of a concept than in the past. Moreover, they should now take a leading role.

- The research sector ought to embrace all other disciplines and be focussed at the same time, aiming at structural improvement. The Government’s input in research should comply with the actual importance of urban horticulture for the society. Phytomedicine should understand itself in this context as an essential element when it comes to researching into problems of urban greenery.

- Scientists themselves should try to establish contact with the practical side of things and the affected sections of the population to avoid abortive development.

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Literature


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Fig. 1–3, 5, 6, 10, H. Balder, Official Bureau of Plant Protection, Berlin

Fig. 4. Barbara Jäckel, Official Bureau of Plant Protection, Berlin

Fig. 7, 9, G. F. Backhaus, Federal Biological Research Centre for Agriculture and Forestry

Fig. 8. Cordula Gattermann and G. F. Backhaus, Federal Biological Research Centre for Agriculture and Forestry.