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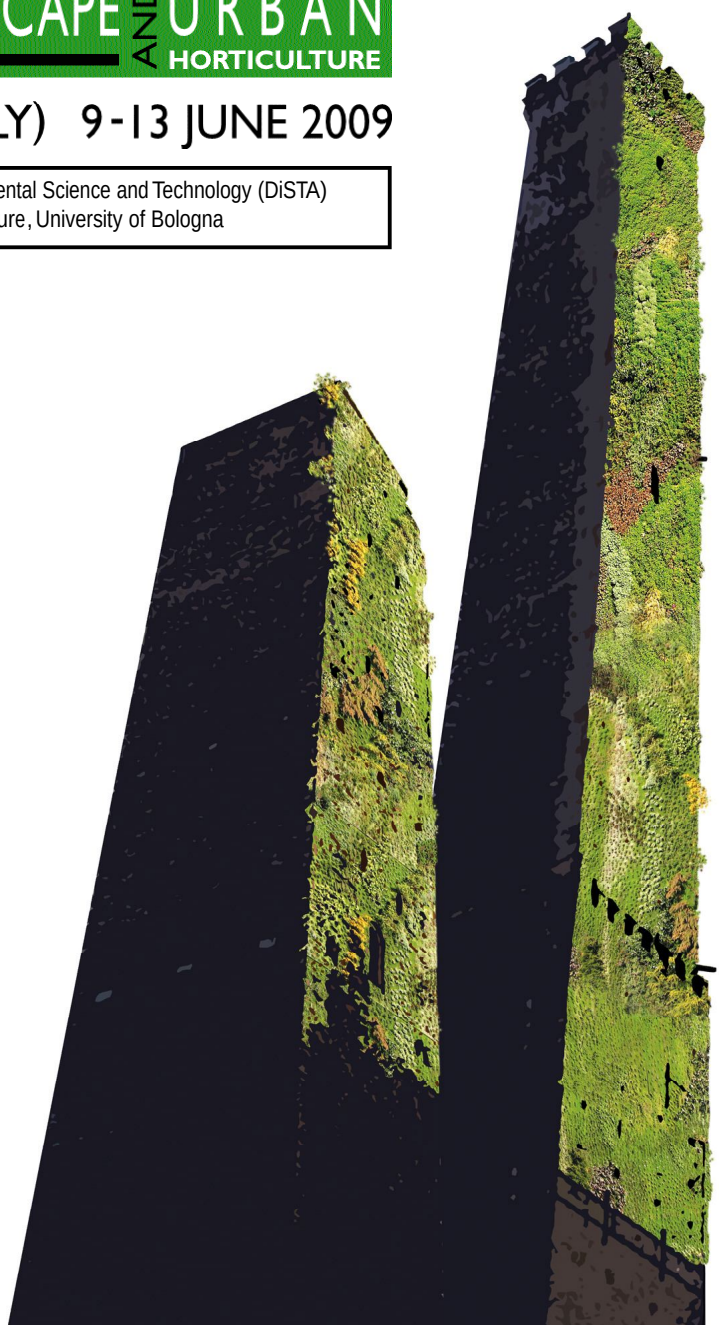

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PLENARY LECTURES

Urban Horticulture: Future Scenarios

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Abstract

Given the diversity of current urban landscapes and the diversity of influences acting on them it is not possible to make concise predictions about the future of urban horticulture. It is, though, possible – and hopefully useful – to explore these diversities and to develop a range of scenarios – possible outcomes – to guide our thinking on the role of horticulture in the urban landscape.

Of course towns and cities vary enormously throughout the world but the urban landscape has evolved in broadly similar ways, from the village to the market town to the industrial city to the commercial city and, in especially in the late 20th and 21st centuries, to the dispersed city and its suburbs. As the scale of the city increases so do the separation of its inhabitants from the farmed and natural landscape and the need for other ways of fostering this important contact with the green world. The value of plants and green landscape increases in proportion to their scarcity.

In simplistic terms the role of horticulture in the urban landscape depends on location. The archetypal city has a pyramidal structure with concentric zones from a high-rise commercial centre, through transition zones to largely residential suburban areas and an agricultural / natural hinterland, though in the case of the larger cities this structure is complicated by minor peaks which indicate the centres of settlements absorbed by urban expansion.

This classic picture of concentric rings is complicated by fault lines – rivers, canals, railways, major roads and other linear or random features with the potential to introduce vegetation into the city centre. In the past 40 years especially, the picture has also been complicated in much of the developed world by the collapse of heavy industry and the restoration of industrially derelict land. Large areas of old industrial cities are now occupied by swathes of green landscape of variable quality and use.

A mosaic of growth and decay has characterised the urban landscape for centuries and the city will doubtless continue to evolve. There are five key factors which will shape this evolution in the 21st century and which will determine the contributions to be made by urban horticulture.

1. Climate change is a relatively recent concern but an increasingly urgent one. Cities of concrete and steel, of hard surfaces and efficient drainage, of central heating and air conditioning, have a profound effect on carbon emissions although, paradoxically, compact cities make possible efficient mass-transport systems for people and food to offset our infatuation with the private car. Amelioration of and adaptation to climate change is engaging politicians, planners and architects worldwide but the horticultural ecologist has an important role to play in providing soft approaches to the problems, approaches which themselves often require new and sophisticated techniques.
2. Peak Oil is an even more recent a concern. The timescale for the peak and steady decline of oil production is fraught with uncertainties but is increasingly considered to be a matter of years or decades rather than centuries. Awareness of the implications of a global economy deprived of oil has led to the emergence of the idea of 'Transition Towns', urban areas in which people meet to discuss these implications and look for strategies to foster increasing self-reliance. These grass roots activities by a highly sophisticated neo-peasantry are in their very early formative stages but they centre on increasing local production and consumption of food and fuel using private gardens, allotments, wasteland and perhaps public parks.
3. Population growth on a global scale is the very large 'elephant in the room' that no-one talks about. It is increasingly obvious, though, that the world cannot sustain current levels of global population growth. If the population of the developing world continues to expand and if that population seeks to achieve even a tenth of the wealth of the rich countries of the developed world – an entirely reasonable ambition - the most draconian attempts to limit carbon emissions will be futile. As food shortages develop and each country looks to feed its own people, the long-established tradition, in Britain at least, of importing cheap food will fail. Home food production on farms and especially in gardens will become imperative.

4. The countervailing attractions of town and country will be a major determinant of urban form, influenced by private and political actions. The suburban idyll of a detached house and a garden, made possible on a vast scale in the 20th century by the car, is aspired to by the great majority of families with children. While families overwhelmingly prefer the suburbs, planners and architects prefer the visual delights and subtle spatial sequences of compact, urban and urbane developments arguing that high density (but not necessarily high rise) residential areas set in a green matrix offer more diversity and opportunity than the faceless suburbs. The balance between urbane and suburban will be determined ultimately by market forces but, if the population increases and land values rise, there will be greater pressure for more compact development and therefore more need for high quality green public spaces.

5. Social order or disorder is a matter of great concern in Britain and many other countries. The causes of social disorder are numerous and complex but the effects are manifest in a general disenfranchisement of a significant (even if a minor) proportion of young people who are growing up to become disenfranchised older people producing a new dysfunctional generation. It is here that urban horticulture may have its biggest role to play. The value of horticulture as a therapy has long been recognised. Its role in 'soft-engineering' of a sustainable urban environment is increasingly recognised. The social benefits of community cohesion are very evident where good examples exist but the challenge of engaging, motivating and creating self-esteem in what could otherwise become a lost generation still lies ahead.

Politically the most fruitful direction would be the emergence of a cadre of benevolent dictators and the abandonment of welfare benefits in favour of recruitment to a new army of environmental enhancers to cure social evils. Such a Utopia is not likely to emerge but it is a vision which we should have in mind when pursuing our own limited ambitions to improve the world by our practice and promotion of urban horticulture.

Dutch mountains Integration of architecture and landscape

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Abstract

As an architect I believe in the necessity of integration of architecture and landscape. Mecanoo is an international office, working in several different cultures and landscapes. We have been practicing landscape architecture for 25 years and have 6 dedicated landscape professionals. Architecture is a combination of various elements, like town and landscape planning and interior design. Mecanoo's work is characterized by the integration of these disciplines. Many of our sustainable design techniques are implemented in our landscape designs.

The Netherlands is the most malleable country in the world; the land of water, wind and clouds. The Dutch landscape is not static, but it is changeable with contrasting ingredients: order and chaos, polders and lakes, canals and wetlands, dykes and river forelands, wet and dry. With the help of engineers you can build everywhere. There are no limits, the land is so malleable that you can destroy it too. Nature has an irreplaceable value and beauty, many colours, materials and textures. The wealth of water, skies, trees and leaves, grass, stones and rocks is an important source of inspiration in our works

Making and shaping landscape is in our DNA.

For us, buildings are the mountains of the flat Dutch landscape; Dutch Mountains. Beauty in architecture, urban development and landscape architecture is partly determined by compositions, sizes, relationships and proportions. Intensive land use and high-rise buildings are logically situated in places where they coincide with efficient public transport, forming the peaks in the landscape of Dutch Mountains. Each city in the Randstad can choose the height to suit its own identity. Rotterdam, of course, is the Mount Everest of the Dutch Mountains.

In this lecture I will explain how we integrate urban design, landscape design and even horticulture in our projects. We integrate the dutch landscape not only our dutch projects, but we implement our way of thinking in all our projects all over the world.

A selection of projects shown;

The Mekelpark, a transition of the Technical University Delft into a Campus park.

Studenthousing in Delft

The Library of the University in Delft

The Fifty-two degrees building for Philips, Nijmegen

Artists' Home Rosa Spierhuis in Laren

The new Entrance building for the Flower Exhibition Keukenhof.

The National Performing Arts Center , Kaohsiung, Taiwan.

SESSION 1

FOOD AND FLOWER PRODUCTION IN/FOR THE CITIES

ORAL PRESENTATIONS

Places for people, places for plants: evolving thoughts on continuous productive urban landscapes.

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Abstract

This paper reviews the role of urban agriculture within the context of the Continuous Productive Urban Landscape (CPUL) design concept. CPUL proposes a sustainable landscape strategy for the coherent introduction of urban agriculture, alongside other open urban space uses, into cities.

The authors contend that the case for CPUL has to be made by taking into consideration multi faceted and cross disciplinary arguments, collectively these provide a strong case in support of CPUL and urban agriculture, but frequently arguments are disaggregated and a strong case is weakened.

This paper will focus on urban agriculture as one of the major components of CPUL. Making reference to recent high profile international exhibitions, publications, conferences, the authors practice and that of other architects and artists the paper traces urban agriculture's shift from a fringe interest to one at the centre of a contemporary urban - architectural discourse.

Two types of urban agriculture are evident, one characterised by the integration of commercially viable urban market gardens and the other led by community and individual practice, exemplified respectively by, for example, the Cuban "organoponico" and the UK's allotment movement. Recent research related to each of these types is reviewed and demonstrates the complex and interconnected arguments related to urban agriculture.

The paper explores in some detail recent studies attempting to quantify the green house gas emissions associated with contemporary industrialized remote agriculture and food production. The paper will argue that a strong environmental case, with respect to food related green house gas emissions, can be made for the integration of urban agriculture if it is understood that this will require changes to current patterns of consumption and production.

These arguments will be contextualized in relation to the potential land available for CPUL implementation, CPUL design strategies and the need for commercially viable urban agriculture.

At another scale, that of the individual non commercial grower, evidence is emerging for behaviour change potential related to food growing. In the UK, the allotment has shown itself to be a catalyst for changes related to diet and health. Surveys within Cambridge and Middlesbrough, reveal the allotment's continuing influence across all socio-economic ranges. Most notable are a substantial increase in the quality and quantity of food being consumed by allotment gardeners during the growing-season, and decreased dependency on grocery stores as a source for fresh produce: 70% in growing-seasons and 24% during the off-season. Changes in 'food-miles' reduced personal carbon emissions by an average of 950 kg CO2/year, even while still predominantly utilizing grocery stores during off-season months and maintaining an overall dependence on fossil fuelled transport year round. Allotment tenants also surpass the recommended 30 minutes/day of daily activity, through time spent within the allotment itself and through active-commuting related to food procurement. Furthermore allotment holders who ate less than the recommended daily intake of fruit and vegetables before they had an allotment, increased their fruit and vegetable intake once they started growing food, and this increase was reflected in an increased proportion of fruit and vegetables purchased thought the year. If this trend is validated in further research, it will indicate the significant behaviour change impact that may be attributed to even relatively modest urban agriculture interventions.

In relation to how individuals practice urban agriculture at a small scale and the design and form of contemporary urban space the paper will present initial ideas informing research into the evident contradictions between the often opportunistic way people grow food in cities, and the formal layout and realization of urban design proposals. The idea of "desire-in-use" of the everyday life of people and the predetermined "embodied-desire" of planners will be introduced as concepts relating these two situations. Specifically, within the context of a lower carbon city, this paper argues that one of these desire-in-use strategies that needs to be encouraged is food gardening.

In 2008, a temporary transformation turned the roof of a multi-storey 'CAR-park' in Croydon (South of London), into a food producing 'car-PARK'. The roof space was effectively a blank canvas, and once permission was granted, the ability to express a different desire in-use from the preconceived embodied-desire of the architecture was subtly accomplished. The same principle could be applied to the myriad of small underutilized spaces that litter the UK city landscape. However, instigating food growing, either as policy or activism, would require consolidating residents current food consuming habits – predominately shopping – with the public performance of food growing and finally harvesting. Moreover, how could local food growing, either self grown or from market gardens and predominately vegetable and fruit based, intercept the dominate diet of meat-cereal-dairy?

The paper concludes that while urban agriculture is receiving a great deal of attention, and there are notable examples of its implementation, the theory underpinning its design and the rational for developing policy to support its practice, will require sophisticated cross disciplinary research if it is to reach its full potential as an element of essential infrastructure within future sustainable cities.

Community gardening: food production in the neighborhood

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Abstract
A number of factors have brought community gardening to the forefront as an effective strategy for creating community, improving health through better nutrition and exercise, increasing local food security through providing locally grown produce, and enhancing environmental stewardship. NC State University Cooperative Extension has implemented and integrated strategy involving professionals in Family Consumer Science, Community Development, Horticulture, 4-H Youth Development, and Environmental Resource Management to support community gardening programs throughout the state. In partnership with the NC Department of Public Health and a myriad of others, training programs, community garden management tools, a website, a listserve and a state advisory board have been formed.

"Industrialized agriculture" on mini-plots within cities / conurbations

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Abstract

"Industrialized agricultural practices" on mini-plots also in the immediate vicinity to living houses and residential areas can sometimes stay under tension between 1) fabulous gardens, crop fields, vineyards (landscape/townscape aesthetics, recreational functions) on the one hand side, and - contrarily – 2) environmental risks on the other hand side.
This is shown by an example of vineyards within the conurbation "Upper Elbe" between Pillnitz south of Dresden and Seußlitz north of Meißen (50 km).
To 1): Photos of the wonderful historic castles and vineyard farm houses on predominantly right-hand Elbe river slopes (exposed to south and west) show the surrounding old vineyards ("Weingärten"). Since the Middle Ages the wine rows were planted parallel to contour lines. On extreme steep slopes (slope inclination more than 15 to 20° up to more than 45°) the well-known stone walls were constructed, forming narrow vineyard terraces. The region harbored a large variety of – now – rare, species. (A plant list is given, containing indigenous, archaeophyte and neophyte species, now extremely rare, disappeared or endangered).
To 2): These former slope vineyards are now managed as urban "industrialized agriculture" areas, mostly by nearly 3650 hobby-mini-winegrowers in the conurbation "Upper Elbe". The old contour-line-following wine-rows were mostly replaced by such ones following the slope curves / altitude gradients; old terrace walls were, if at all possible, removed (except on very steep slopes with large terrace walls many above the others). The slope-up tillage with cable winch machines or special tractors is often causing enormous "desert storms", wind and water erosion. Also the spread of pesticides with the most powerful engines causes pesticide drifting into living areas. The biodiversity is strongly reduced.

Urban design for food-security: Thinking globally designing locally

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Abstract

Food-insecurity does not affect only countries in the South; the North is not immune to it. In affluent Montréal, Canada's second largest city, one citizen in six is food insecure, and it is mainly the poor, young and those in age to be parents who frequent food-banks. In the province of Québec, children represent 38% of food-bank clients. In 1998, it was estimated that 21% of those 15 years or older faced food insecurity in the Montreal region. Further, food security-related studies often overlook the disabled. Data for Montréal is not available, but in Toronto 48% of food-bank clients are disabled. To make cities where a majority of humanity now lives more livable, it is vital to address food insecurity and promote designs inclusive of all its citizens.
In 2008, the *Minimum Cost Housing Group*, a research unit of McGill School of Architecture, partnered with *Nutri-Centre,* a community development organization, to re-think and upgrade a collective garden in Lasalle, one of Montreal's poorest boroughs. We interlinked sustainability, food security and environmental quality through innovative urban design to enhance food production in the city. The intervention included: a *redesigned garden*, with a doubled planting area and new fruit-bearing bushes and trees; the introduction of an *outdoor community-kitchen* within the gardening space; a *rest area*; a *meeting space*; a *planting area* specially reserved *for children*; and the better *integration of mobility-impaired* clients; As a result, a challenging urban setting was transformed. This paper presents the context and the outcomes of this action-research project.

Assessment of periurban vegetable production in France

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Abstract
"Green belts" were traditionally developed around cities in order to provide fresh vegetables to urban population. The situation has changed a lot with the development of exchange and transportation means, and also with the urban development. Periurban vegetable production in France is nowadays at crossing-roads between risks of disappearing and a need for a new recognition and new functions. In order to assess the various situations existing in France and the proposed strategies to insure the future of periurban vegetable production, the case of medium-size cities was studied. Vegetable growers, land managers, commercialization managers, city planners were interviewed in Lille, Orléans, Bordeaux, Toulouse, Perpignan and Lyon. These cities have in common an important history of periurban production. However, the status of the periurban vegetable area is very different from one city to another. The studied cases presented various degrees of urban pressure on periurban vegetable units, with natural constraints such as flooding risks as the only insurance against future urbanization of some areas. Depending both on the city's interest and growers' dynamism, different strategies were developed in order to maintain and possibly increase the vegetable production in periurban areas. Due to the food aspect of the product and the intensive production process, especially regarding labour and economic viability on a limited area, vegetable production was often considered as important to be maintained in periurban areas. The possible strategies (production and commercialization) and the future of the periurban vegetable production in France will be presented.

Allotment gardens for senior citizens in Italy: current status and technical proposals

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Abstract
Allotments gardens have several socio-cultural and economic functions mainly for the senior citizens for whom they are a place where to establish contacts and overcome loneliness, a supply of fresh vegetables at minimum cost and an opportunity of self-fulfillment during the period of retirement.
The aim of this research was to study the situation of allotment gardens in Italy and to examine criteria and possible solutions for planning small garden areas in the urban environment.
A survey was carried out in 2001 throughout Italy by a questionnaire sent to all municipal administrations of Province towns and other municipalities, and by interviews with municipality technicians and representatives of the allotment garden associations.
Municipalities with allotment gardens were 111 (90% in Northern Italy and 9% in Central Italy) with a total of 18709 plots: Emilia Romagna Region plays a leading role with 77 municipalities and about 14000 plots. Most of gardens were developed after 1975 and especially in the last 10 years. The number of gardens per town and the size (from few to hundreds square meters, in most cases 30-70 m^2) vary with the town as a result of land use planning, size and arrangement of urban land areas, local authorities' sensitiveness, presence of complementary/alternative services and facilities for citizens. In most cases the allotment and use of a garden follow a regulation for administrative aspects (ranking in the list of applicant, conditions of the contract, duration, lease rate, consumption rates, insurance) and technical aspects (way of use, keeping, fencing, use of chemicals and water), while agronomical aspects are often neglected. Suggestions and proposals for allotment gardens planning and for specific agronomical management were discussed.

Cities farming for the future: multi stakeholder policy formulation and action planning on urban agriculture in developing countries

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Abstract
The RUAF Foundation is an International network of Resource centres on Urban Agriculture and Food security that share a common vision on urban development and poverty reduction, and together implement international programmes focused on urban agriculture and food security.
The RUAF undertakes activities at global level and at regional and local level, through programmes like "Cities farming for the Future" and "From Seed to Table". RUAF facilitates and supports the formulation and implementation of adequate policies and programmes on urban agriculture amongst others by the organisation of policy awareness seminars, staff training activities and especially by supporting local stakeholders (local authorities, urban producer groups, community based organisations, NGO's, universities) to create a Multi stakeholder Platform on Urban Agriculture and to develop a City Strategic Agenda on Urban Agriculture and Food Security and to design and implement local urban food production, processing and marketing projects ("From Seed to Table").

Learning the value of gardening: results from an experience of community based simplified hydroponics in north-east Brazil.

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Abstract
In the suburbs of main cities the introduction of gardening activities may be a sustainable tool to reduce poverty and improve food security. However, due to low access to fertile land horticultural production is constrained. The introduction of low cost hydroponic gardens may be a sustainable way to launch horticultural production in roof, terraces and courtyard.
The present work will examine the results survey based on a questionnaire proposed to the beneficiaries of a food security project in north-east Brazil after four years of activity. Project involves 10 clubs of mother ("*clubes de maes*") where women were trained on: hydroponics and plant nutrition, technical management of simplified hydroponics system, basic economical aspects of vegetables production, human nutrition, associative work and therefore those were the aspects assessed by the survey. Results shown that technical and practical aspects are the easiest to assimilate for the groups, whilst economical aspects and knowledge about human nutrition were not well known even if, mostly the latter one, they were explained clearly by the team of the project. Moreover rural and peri-urban community behaves similarly, even if peri-urban population seemed to be faster in learning a not usual production technique as hydroponics.

Organic vegetable production on the peri-urban interface: helping low income producers access high value markets in Lima, Peru through technical, organizational and marketing innovation

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Abstract
Strategies and methods have been developed in Lima, Peru to enable urban agricultural producers to take fuller advantage of the nearby location of a wide range of high quality fresh and processed food markets. Horticultural producers in the poor eastern fringe of Lima are currently constrained by a lack of technical and entrepreneurial skills and the capacity for jointly identifying and meeting demand. Through building a collaborative research and development platform among local producers, the watershed irrigation committee and the District Municipality staff, Urban Harvest has implemented four main research and development interventions to make local horticulture more sustainable and profitable: 1) *Implementation of "Farmer Field Schools" to stimulate innovation and learning in ecological production in an urban setting.* This included improvements in productivity that also addressed environmental health issues. Its method resulted in farmers able to produce high quality, safe vegetables and with interest to produce and market organic foodstuffs,. 2) *The integration of agriculture within local government administration to enhance municipal support for safe and healthy horticultural production and marketing.* The municipality established a Sub-Division Office on Urban Agriculture which is supporting diverse marketing strategies, certification of healthy products, promotion of green markets and elaboration of new legislation and planning proposals to secure different types of local agriculture. 3) *Design and implementation of a "School for Urban Farmers" to strengthen and empower the producer organizations and establish new marketing opportunities.* As a result of the school, producers have established small-scale agro-enterprises and identified a wide range of markets involving direct and indirect sales of high quality, organic products. 4) *Testing of a micro-credit scheme to enable producers to access new technology*. Part run by the Municipality and the producer-based irrigation authority, the scheme links the provision of small loans to capacity-building activities and collective responsibility among beneficiaries in healthy vegetable and livestock production.

Community-based vegetable production systems: an answer to the food and sanitation crisis of urban poor in the Philippines?

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Abstract
The Philippines is classified among the world's fastest urbanizing countries. Among the many challenges of this rapid urbanization process is food security. 20 % of Filipinos are regularly suffering from hunger and about one third of all children are underweight with iron deficiency anaemia and low vitamin A levels. Average per capita vegetable consumption is very low with 36 kg per year. Further, two thirds of all children suffer from intestinal worms due to lack of water and appropriate sanitation facilities at home and in schools. More than 90 % of the waste water is untreated and pollutes the water bodies.
As a response, several community-based vegetable production projects were established in Cagayan de Oro City, Southern Philippines following the completion of agronomic, health and socio-economic studies. To date, more than 100 poor families are growing vegetables in several community and school-based allotment gardens of the city on family parcels of a size of 300 m^2 each. About 75 % of the produce is being sold to outside customers while the remaining 25 % are used for own consumption or school-feeding programs. This enabled the participating families to increase their monthly income by 20 to 40 %. Each garden is equipped with a compost heap where biodegradable wastes are composted, thus contributing to the local government's integrated solid waste management program. Further, all gardens are equipped with urine-diverting dehydration toilets which improve the sanitary conditions of the area. They also contribute to close the loop in the nutrient cycle that cities have broken by reusing the treated human excreta for production of ornamentals and fruit crops. The allotment gardens also foster community strengthening by providing a place where people can meet and enjoy spending quality time with their families and friends in a clean and quiet natural environment.

New trends in Mediterranean urban vegetable gardening

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Abstract

After a short review of the reasons that promoted vegetable gardening in urban open spaces, the present paper focuses on the main characteristics of traditional urban vegetable growing. In the past, these characteristics mainly regarded the direct utilization of the products, the use of plants also for ornamental purposes, the high number of species and cultivars grown, the specific techniques and production means adopted, the home production of propagation materials.

During the last decades, due to the change of socio-economical features of the society, some modifications occurred in the traditional characteristics of vegetable production. The target switched, from the simple vegetable production for home consume, to new tasks of vegetable gardening which are nowadays exploited to meet requirements related with life quality. Recreational (gardening for fun), socialization (for old or lone people), therapeutical (garden therapy for psychological and physical health), quality or safety of veggies (organic production, pot cultivations, roof gardening), historical documentation (about species, cultivars, methods and techniques used in the past), etc. are nowadays considered to be new aims for urban and sub-urban vegetable gardening. In this frame the authors aim to highlight the scientific and operative questions linked to genetic resources threatened by the reduction of areas committed to vegetable gardening and the increasing use of commercial seed. Genetic resources preservation should also be considered in relation to valorise landscape, to exploit old varieties and to a more generic extent for the didactic and cultural values of the urban vegetable gardening.

Assessment of irrigation systems for dry season vegetable production in urban and peri-urban Southwestern Nigeria

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Abstract

Irrigation is necessary for dry season vegetable production in Nigeria. Vegetables grown during the dry season are of higher quality and profit due compared to vegetables grown under rain fed conditions. Different irrigation systems were evaluated in terms of cost, benefits, and problems encountered across southwestern Nigeria. Producers lack adequate start up capital and are frequently faced with low stream flow, conveyance of water from source to farm site, and sources of water drying up. There are high labor requirements and competition for limited lands around perennial surface water. The majority of producers lack basic knowledge of water requirements, irrigation scheduling and skills in maintaining and operating the irrigation equipment. Crops are either over- or under-irrigated, and water is used inefficiently. Based on our findings we recommend the use of micro- and macro-trickle irrigation systems which reduce cost of pumping, water loss to evaporation and use water efficiently.

SESSION 1

FOOD AND FLOWER PRODUCTION IN/FOR THE CITIES

POSTER PRESENTATIONS

The ornamental edible plants in the urban horticulture

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Abstract
The very small sizes devoted to plant cultivation in proximity of house in the urban area has increased the interest to have plants characterized both by ornamental traits and edible organs. The edible landscaping offers an alternative to conventional residential landscapes, designed mainly for ornamental purposes. Edible landscaping is the use of food-producing plants in the structured landscape, principally the residential landscape. It combines fruit and nut trees, berry bushes, vegetables, herbs, edible flowers and ornamental plants into aesthetical designs. These designs can incorporate every garden style and include a variable number of edible species. In this view it is interesting the possibility to individuate plants suitable to use in this particular landscape. A specific trial was carried out with the aim to obtain preliminary information about plant choice. In particular 56 cultivars of 6 different vegetables (tomato, eggplant, cucurbit, basil, mangold, persil) and 10 edible flowers were analysed. For each cultivar the following functional parameters, evaluating with a 1-5 grading scale (1 = poor; 5 = good), were determined: shape, size, compactness, maintenance need, foliage density, colour, shape and size of leaf, flower and fruit, defect absence, product innovation and overall quality. In this way it was possible to determine, in holistic point of view, an objective grading of the suitability to specific use.

Investigation the possibility of planting medicinal plants in landscape for medicinal-ornamental uses (Medicinal landscaping)

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Abstract
The orientation of different societies to the subject of medicinal plants has lead to the domestication and production of these plants. But beside the commercial production in field levels, with regard to the abundant beauties existing in many of medicinal plants, we can use them as plants which have medicinal and ornamental uses. We can also use the active substances of these plants at end of the growing season after harvest. Of course, there are some problems on the way. In this research for three years (2004-07), 130 species of medicinal and aromatic plants were planted in the ecological garden of medicinal and aromatic plant in Ferdowsi University. In the morphological investigations, characteristics such as beauty and the general form of the plant, color of flowers, color of leaves, beauty and color of fruit, stability of flower, duration of flowering, intensity of inflorescence, duration of freshness of plant (in annual plants), water need of plant, sturdiness of stem and compatibility with environmental shocks (such as lack of water, touching with hand, water logged and etc.) were studied. Observations, comparisons and nothings were done by some charts and with regard to the mentioned criteria scoring operations were done. Observations, comparisons and nothings of almost 130 species of plants regarded to 22 species indicated suitable potential for Two purpose

planting which are listed as below: Purple Coneflower (Echinacea purpurea), Wild Marjoram (Origanum vulgar), Winter Cherry (Physalis alkekengi), Purple Foxglove (Digitalis purpurea), Garden Sage (Salvia officinalis), Marigold (Calendula officinalis), Hollyhock (Althaea rosea), Rosemary (Rosmarinus officinalis), Hyssop (Hyssopus officinalis), Lavender (Lavandula officinalis), Castor Oil Plant (Ricinus communis), Damask Rose (Rosa damascena), Dog Rose (Rosa canina), Verbena Lemon (Lippia citriodora), Barberry (Berberis vulgaris), Jujube (Ziziphus jujuba), Eucalyptus (Eucalyptus globculus), Ginkgo (Ginkgo biloba), Pussy Willow(Salix aegyptica), Olive (Olea europaea), Chaste tree (Vitex agnus-castus), Myrtle (Myrtus communis).

In Vitro Flowering of Selected Ornamental Plants

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Abstract
In Vitro flowering of three selected ornamental species from Malaysia was studied. *Oxalis triangularis*, *Celosia cristata* and *Begonia x hiemalis* were found to be able to flower on MS (Murashige and Skoog, 1962) medium supplemented with various hormones, such as Benzyl aminopurine (BAP), Naphthalene acetic acid (NAA), etc at different concentrations. In tissue culture, *in vitro* flowering is normally induced for many reasons. One of the most important ones being to shorten the life cycles of plants, other aims include to gather knowledge on *in vitro* flowered plantlets for the formation of fruits and seeds, to overcome problems associated with premature fruit drop or poor seed set. In the present work, we focused on the effect of different hormones and concentrations, on *in vitro* flowering of the three selected species. The effect of Adenine and sucrose at different concentrations were also tested for *Begonia x hiemalis*.

Horticulture, and city supply in Africa: evidence from South-West Cameroon.

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Abstract
This article documents change in periurban horticulture and structural changes of local trade and livelihoods in a market town in the South West Province of Cameroon using two panel surveys conducted in 1995 and 2004. Real household incomes increased by 14%, with a large shift from farm to nonfarm income. Within agriculture, activity shifted from staple crops to horticulture, both for sale and in home consumption. In 1995, there were large remittances from farmers involved in periurban horticulture to their village of origin; in 2004 remittances continued and horticultural farmers were also heavily involved in informal financial associations. Periurban horticulture is disproportionately practiced by women and older workers, and plays an important and growing role in African livelihoods.
Results also revealed a 40% fall in market turnover and a substitution effect between farm and non-farm incomes. Price analysis revealed that most farm gate prices did not change significantly which means that there are no constraints as yet on the supply side despite reduced land area. However, the results also revealed that most of the turnover went to middlemen from other provinces which could be a more global sign of specialization in wholesale trading at an upper scale. City supply and periurban trade has gained in importance: exports to Douala increased from 22 to 63% of the market's turnover. Improved roads have proved to be efficient in increasing regional trade but more attention should be devoted to the monitoring of intensification in agriculture.

Easy home hydroponic production of leafy greens

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Abstract
The floating panel is an inexpensive and easy hydroponic cultivation method for leaf vegetables and herbs, consisting mainly in growing plants into shallow basins containing a nutrient solution, with potential for improving plant disease control and produce quality. A small scale implementation is possible for home growing greens, which could suit every type of housing premises, even flats in urban tower blocks, with few square meters of balcony.
We experimented with small commercially available basins, fish tank oxygenators and polystyrene trays (0.6 x 0.4 m), to set up a growing system for leafy greens, mainly baby leaf salads of several species, as rocket-salad (*Diplotaxis tenuifolia*), corn-salad (*Valerianella locusta*), tatsoi (*Brassica rapa var. rosularis)* and mizuna (*Brassica rapa* var. *nipossinica*). A standard hydroponic nutrient solution was used at the rate of 45 litres per basin. To find optimal levels for some influential factors of the cultivation system, as seeding density, water oxygenation and shading, a series of experiments was conducted in a thermo regulated glasshouse, collecting data on environmental variables, yield, nitrate content, visual quality and microbial load.
Experimental results show that with cheap devices it could be possible to produce at home almost continuously, for at least six months per year in the Mediterranean environment, high quality fresh greens from several successive crops.

Simplified hydroponic floating systems for vegetable production in Trujillo, Peru.

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Abstract
Simplified hydroponic systems are a sustainable way for fruit and vegetable production in/for the cities. Small scale farming, both on a family and a community basis, may allow to achieve the goals of both improve nutrition and reduce poverty. A project for the development of soilless cultivation in mother groups was carried out between 2002 and 2004 in Trujillo, northern Peru.
In this work we will present some results of a simplified soilless floating system, adopted for the cultivation of radish, lettuce, baby leaf lettuce, leaf beet and garden beet. The growing system, composed by a 1 square meter wooden structure, made waterproof through the application of a plastic film, and filled with nutrient solution hosted the floating alveolate polystyrene panels where plants were grown. The growing substrate was rice hulls. Yield of cropped species was about 3.2 kg m^{-2} $cycle^{-1}$ (radish), 10.7 kg m^{-2} $cycle^{-1}$ (lettuce), 6.3 kg m^{-2} $cycle^{-1}$ (baby leaf lettuce), 5.4 kg m^{-2} $cycle^{-1}$ (leaf beet), 3.6 kg m^{-2} $cycle^{-1}$ (garden beet). An analysis of the economic value of gardening is also provided.

Simplified substrate soilless culture for vegetable production in Trujillo, Peru.

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Abstract
Simplified hydroponic systems are a sustainable way for fruit and vegetable production in/for the cities. Small scale farming, both on a family and a community basis, may allow to achieve the goals of both improve nutrition and reduce poverty. A project for the development of soilless cultivation in mother groups was carried out between 2002 and 2004 in Trujillo, northern Peru.
In this work we will present some results of a simplified soilless system on organic substrate (rice hulls), adopted for the cultivation of tomato, carrot and radish. The growing system, composed by a 1 square meter wooden structure, made waterproof through the application of a plastic film provided of a drainage, was filled with the growing substrate on which plants were directly sown. Tomato yield was about 15.8 kg m^{-2} $cycle^{-1}$, whereas carrot yielded 10.1 m^{-2} $cycle^{-1}$, and radish about 3.2 m^{-2} $cycle^{-1}$. An analysis of the economic value of gardening is also included.

Women and simplified hydroponics: community gardening as a way of emancipation in Trujillo, Peru.

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Abstract
In the suburbs of Latin American cities, living conditions are affected by severe poverty and malnutrition. Slums are inhabited by immigrants from rural areas, and the presence of social network is extremely limited, which leaves families or individuals on their own to struggle for life. In these conditions, most disadvantaged people are therefore women, children and elder. The formation of women groups, both on a volunteer basis than with the help of governmental institutions and/or NGOs, is a phenomena widely spread in Peru, both with the aims of improving child nutrition (by reducing the cost of the meal) than providing the service of a nursery for the mothers that work during the day. In Trujillo, in the northern Peru, this associations, called *Clubes de Madres*, are present in the suburbs of the cities and, between 2002 and 2004 five *Clubes* have participated in an horticultural project aimed at introducing soilless farming both for the improvement of the child diet than for the creation of income (both by the selling of the products and by the reduction of the meal costs). In this study, the results of a survey carried out in 2004 are shown, with a description of the results of gardening for the beneficiaries.

Hydroponic gardens: undertaking malnutrition and poverty through vegetable production in the suburbs of Lima, Peru

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Abstract
Most of cities of Latin America are surrounded by slums where the population migrating from rural areas settles in search of wealth and better living conditions. In Peru, about 25% of the country population is concentrated in the suburbs of Lima, where people live in extreme poverty. In these contexts, expectations are unattended and the poorest have to struggle to satisfy their basic needs, and the matter of feeding the population becomes of great importance. Urban agriculture, and particularly the small scale production of fruit and vegetables may play a crucial role on the livelihood improvement, through the three steps of 1) improving nutrition, 2) generating income and 3) creating social networks. This as a consequence of both the high nutritional value and the high labour content (which translates into highest prices at the market) of fruits and vegetables. Moreover, through the creation of farming and/or marketing associations, new communitarian connections may be established.
In this work we will present a preliminary study for the implementation of small scale hydroponic gardens in the Huachipa district, in the periurban area of the city of Lima, in Peru.
The work combines the results of field visits, participatory meetings, farmers interviews, discussion with local university staff and researchers, and a market survey, thus allowing the description of many social, economic, agronomic and climatic parameters.

Contribution of backyard gardens to the conservation of biological and cultural diversity and to human well-being

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Abstract
Backyard or home gardens have been recognized as important repositories of biological diversity and are generally characterized by great structural complexity and multifunctionality. Whether in the countryside or in town, such gardens represent distinct microenvironments within a larger landscape, in which they are well integrated. It has been found that gardens provide different benefits to ecosystems and people. They offer refuge to wild flora and fauna and conserve high levels of inter- and intra-specific plant genetic diversity by preserving local or traditional (heritage) species. They therefore become an important social and cultural space where knowledge related to plants and agricultural practices is kept and transmitted, at the same time providing recreational opportunities. In poorer countries these gardens also generate household income by producing food for subsistence or small-scale marketing. Since they are usually managed non intensively, they become a valid example of sustainable land-use systems. Numerous projects have been initiated to provide schools or pensioners or marginal communities with their own garden, improving livelihoods, providing educational opportunities, encouraging recycling of waste, protecting biodiversity and offering an additional instrument in urban planning. Anyhow, further research into specific biological and social benefits of home gardens is needed and greater importance should be devoted to their promotion as multifunctional and sustainable solutions for the conservation of biodiversity in man-made environments.

Low cost hydroponics: a model for small scale urban agriculture in the tropics and a sustainable way to improve women groups livelihood.

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Abstract
The suburbs of main cities of developing countries are characterized by a spread poverty and high rate of unemployment. The promotion of home and community gardens allows to produce fresh vegetables, in order to reach the goal of both improving people health, by diversifying diet, and creating employ opportunities. Often, in peri-urban areas, soils are not suitable for crop production or access to land is scarce. The adoption of soilless garden should allow to overtake this constrain. To assure soilless systems' sustainability at stakeholder level, all materials have to be inexpensive and easy to find locally, and garden management must be simple.

Rapid Production of *Bellevalia tauri* Feinbrun for Gardening Design

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Abstract
Geophytes which have an important commercial value especially in ornamental, food and medicinal industries are perennial plant species. *Bellevalia tauri* Feinbrun which has got beautiful flowers is an endemic geophyte belongs to the Liliaceae family. Because of this proprety it can be used as an ornamental plant in garden design. The rate of propagation of many geophytes is very slow in nature so in this study *in vitro* micropropagation techniques were used for rapid production of this plant. Fresh bulbs and immature embryos were used as an explant sources. Surface sterilization was made with commercial bleach and ethanol. After surface sterilization, immature embryo and bulb scale explants were cultured on Murashige-Skoog (MS) medium supplemented with various combinations of 6-benzylaminopurine (BA) and ? naphtalenacetic acid (NAA). Regenerated bulblets were transferred subsequently to the rooting medium and potted soil.

Hydroponic gardens: undertaking malnutrition through vegetable production at Treicheville, Ivory Coast

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Abstract
Most of African cities are surrounded by slums were the population migrating from rural areas settles in search of wealth and better living conditions. In Ivory Coast, this phenomena dramatically affects metropolitan centres, as a consequence of both the high immigration rate becoming from Burkina Faso, Mali, Nigeria, Guinea Bissau and Lebanon, and the national migrating fluxes as a consequence of the internal clashes in 2002.
In these contexts, expectations are unattended and the poorest have to struggle to satisfy their basic needs, and the matter of feeding the population becomes of great importance. Urban agriculture, and particularly the small scale production of fruit and vegetables may play a crucial role on the livelihood improvement, both by improving nutrition and generating income, as a consequence of the high nutritional value and the high labour content (which translates into highest prices at the market) respectively of fruits and vegetables.
In this work we will present a preliminary study for the implementation of family hydroponic gardens in the Mairie de Treicheville, in the periurban area of the district of Abidjan, in Ivory Coast. Many social, economic, agronomic and climatic parameters will be described altogether with the results of a participatory survey conducted in 2008.

Azaleas in Borgo a Mozzano: history, cultivation and PGI certification scheme

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Abstract
In 1954 Borgo a Mozzano, a nice village located in the Tuscany countryside, became the seat of Shell's Centre for Agriculture, a filiation of the well-known oil company.
Shell's Centre activity improved local farmers knowledge and finance. At that time azaleas where often planted in the courtyard around farmers' houses; their wonderful flowering suggested Borgo a Mozzano to be the ideal place for azaleas growing. Azaleas development Program was delivered by Shell Centre assuring technical assistance to farmers and promoting public events as Azaleas Fair in 1970. The Azaleas Fair was successful and increased its importance becoming in 1975 Azaleas Market Fair, hold every two years. Azaleas are grown under plastic tunnels and greenhouses to prevent cold injury and are shaded in summer to avoid light and temperature stresses. Propagation method is by soft cuttings taken in the period between July and September and rooted in a peat-perlite mix. Overhead irrigation is usually preferred both for its low cost both for positive effect on lowering temperature. Fertilization is carried out with a NPK fertilizer plus MgO, adding N fertilizer during summer if necessary. Azaleas in Borgo a Mozzano are never forced, heating systems being used only to avoid frost injury when temperature falls under 0 °C; flowering normally starts in March. Mechanical or manual pruning is carried out to give plant one of the two typical shapes, small tree or bush (round shaped).
PGI (Protected Geographical Indication) certification scheme includes growing techniques, historical notes and descriptive card for local cultivar. Descriptive cards trace out the scheme requested by CPVO (Community Plant Variety Office) for new variety patent granting.

Agricultural products for the city: "pilot-cultivations" in the territory of Palermo (Italy)

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Abstract
For a long time the crisis of the Italian citrus sector has caused, in most districts of Sicily, a conversion of citrus cultivations mainly into vegetables and others fruits. On the contrary the territory of Bagheria, near Palermo, once centre of the citrus cultivations of the "Conca d'oro", has been marked by unsuccessful or slow conversions. These cultivations currently remain abandoned, causing serious repercussions not only on the local rural economy but on the territory and the landscape as well. In fact, as the decades have passed, the loss of interest in agricultural income, along with the pressure of urbanization, has produced, in the territory of Bagheria, a progressive fragmentation of landed property.
Given the current structural situation, the local agricultural compartment needs to be reprojected by introducing profitable innovative products or processes. The C.R.A.-SFM of Bagheria, confiding on recent technical-scientific results and with the contribution of the Regional Province of Palermo, has proposed alternatives to the citrus with "pilot-cultivations" in model-farms of the territory of Palermo.

Allotment gardens for senior citizens in Perugia (Central Italy): a case study

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Abstract

Allotments gardens for the senior citizens were established in Perugia in 1976 in two different urban areas with a total of 340 plots of about 150 m^2 each. Allotments are owned by the Province of Perugia and allotted free of charge to old-age pensioners only on the basis of application date and income. Allotment is automatically renewed each year. Plotholders can grow vegetables and flowers but not vineyards and tall trees. Plasticulture, pet entry and animal breeding are forbidden. Fencing and plot maintenance are ruled. A survey on demographic, socio-cultural and technical aspects (i.e. crop rotation; irrigation, fertilisation and pest management...) was carried out in 2008 to collect information useful to elaborate a collaborative project between the Provincia di Perugia and the Faculty of Agriculture of the University of Perugia.

The project is aimed to: built a community room for social activities; install new fences, tool sheds and composting kits for the biodegradable wastes; improve irrigation water availability; organise training course on environmentally sound (sustainable) cultural practices; announce a competition " Allotment of the Year" in order to stimulate plot care and maintenance.

SESSION 2

URBAN LANDSCAPE HORTICULTURE

ORAL PRESENTATIONS

Applying an ecological perspective; the future of urban horticulture?

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Abstract
Over the past 30 years there has been an increase in the application of science to urban horticulture, particularly amongst researchers and educators in the field, but also to practice. This has in some cases lead to better management of planted vegetation, as in the case, for example, of cavitation prevention and management in urban trees and the provision of appropriate root zone conditions in urban street tree plantings. Much of this science, in the authors experience is primarily informed by what might be called a plant physiology, rather than an ecological perspective. This is not surprising as physiology often deals with the organism as an individual, removed from it's broader environment, in much the same way that traditional horticulture tends to see plants largely as specimens. This perspective is most strongly founded with trees, but is deeply seated in the attitudes of horticulturists to many cultivated plants. The author would argue that there is real value in increasing ecologically founded thinking in urban horticulture, recognising how the ecological context of the plant in its original wild habit in relation to the ecological context of the planting site is key to successful cultivation, as indeed is the plants ecological relationships with competing species (spontaneous and planted) at the planting site. It is desirable to move away from always wanting to grow plants as well as is possible (i.e. meeting some notional physiological optima) to as well as is necessary in a given cultural or ecological context. Linked in with this is the need to move away from seeing plant stress as always being a problem but rather to recognise stress as an inevitability in many urban contexts that can sometimes be used to advantage, and especially in designed plant communities of many species which have to compete for the same finite resources.The paper will explore these ideas with reference to the authors work on naturalistic designed vegetation.

Urban Residential Landscapes for Sustainable Living

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Abstract
Homeowners can incorporate a variety of strategies to minimize the environmental impacts of residential landscapes. With goals ranging from energy and water conservation to wildlife habitat restoration to minimizing greenwaste, increased attention must be placed on plant selection, placement and management strategies.
Homeowners can incorporate both passive and active water harvesting to help mitigate drought as well as other strategies for minimizing storm water run off and the contamination of storm water run off. More edible plants are being incorporated in residential designs as concern over local and organic food production increases. An array of specific strategies for decreasing the environmental impact of residential landscapes will be presented.

Use of ornamental vegetables and aromatic-medical plants in urban landscape design

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Abstract

Ornamental vegetables, medical and aromatic plant species with their groundcovering properties, various leave forms, color and texture characteristics, and attractive fruit forms and colors contribute to the planting design through their aesthetic and functional quality and they have a rich collection in Turkish natural flora.

Turkey has a rich plant resource as a result of its geomorphological structure and rich variety of ecological conditions. This makes Turkey one of the most important plant species resource in The World. Turkey has about 9000 fern and seedy plant species and is one of the richest countries in terms of flora. Europe's flora has about 12000 species and that shows how rich in flora Turkey is. Total of endemic plant species in all European countries is 2750 while Turkey has 3000 endemic species alone. Urban landscape areas can be designed in order to produce, grow, and introduce endemic or endangered plant species, especially ornamental vegetables, medical-aromatic plants.

Ornamental vegetables and medical-aromatic plants, planted either solitary or in groups, have a wide range of use in collection gardens, flower beds, villa gardens, plant boxes and roof gardens; as well as their aesthetic characteristics, they can be used for their economic values.

In this study, after the presentation of a general information of the species selected plants, their areas of use and design criterias will be specified, and lastly, their aesthetic and functional purposes as well as economical contributions will be defined.

Sustainable management of urban landscapes with wildflowers

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Abstract

Urban derelict soils are characterized by low content of nutrients and organic matter. They also lack in structure and water holding capacity. These problems are very serious when growing traditional kind of ornamentals: horticultural plants such as flowering shrubs, borders of annuals and so on, that require nitrogen and high soil. On the other hand, wild herbaceous flowers sown on these soils create beautiful vegetal communities and improve biodiversity, with little maintenance. In Italy this practice is not widespread. The projects carried out in Tuscany (Italy) for the last eight years are reviewed. The work focused on adapting wildflower cultivation techniques to the Mediterranean pedo-climatic conditions. More than 20 species (annuals and perennials) which showed good performance and most suited to this area were selected. Local Councils were involved and public green spaces were successfully cultivated with wildflowers. Matter of the study was also related to the seed production of these plants at large scale.

Bioretention swales as multifunctional landscapes and their response to Australian urban biodiversity

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Abstract

Water Sensitive Urban Design (WSUD) is a relatively new and sustainable approach for water management in Australian urban environments. In Europe, a comparable concept is that of Sustainable Urban Drainage Systems (SUDS). Both WSUD and SUDS propose changes in urban water infrastructure from conventional hard engineered systems to softer and more ecologically based vegetated systems such as ponds, wetlands and bioretention basins and swales. Bioretention swales are relatively small vegetated WSUD systems with the capacity to harvest and filtrate storm water through filter media and convey it either for reuse or for environmental discharges into receiving waters. These systems are now acting as newly defined multifunctional urban landscape structures.

While there have been some attempts to quantify and enhance the biodiversity values of large-scale systems such as wetlands and ponds, there has been little research into the biodiversity and habitat values of relatively small-scale WSUD installations such as bioretention swales. Consequently, information is required on methods for enhancing their biodiversity and ecological performance in urban environments.

Using ecological field parameters and terrestrial invertebrates as biodiversity indicators, this research investigated the biodiversity and habitat values of some bioretention swales in the Melbourne metropolitan area. The distribution patterns and assemblages of the invertebrate taxa in a summer sample were assessed. The study also examined the relationship between environmental or habitat factors and invertebrate assemblages within the bioretention swales.

Knowing habitat features that improve biodiversity in bioretention swales will guide landscape planners, engineers and catchment managers on the ecological potential of these landscape features. These outcomes will also lead to the future design and management of more ecologically sustainable bioretention swales that incorporate wildlife habitat enhancement in urban environments.

Exploitation of Potential Use of Wild Flowers In Urban Landscape

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Abstract
Wildflowers and native plants can be a unique and interesting addition to the urban landscape. While wildflowers are relatively easy to care for and they require least maintenance, the idea of lazy gardening is going to popular around the world. When selecting wildflowers for a landscape, it is important to understand the conditions required by the plant when growing in the wild and to purchase plants from a reputable nursery. A lot of work is going on for the selection & development of native wildflowers for use in landscape. The present study was conducted to explore the possibilities of using wild plants for sustainable establishment of landscape in accordance with the perception of the people's and local conditions. The data was analyzed statistically by using the computer software Statistical Package for Social Sciences (SPSS). Planting design was made considering soil condition, local environment and people's choice. The idea received a quick response from the community and had great impact on the city environment. All the wasteland in the interior city has been greatly improved and it helped to curb pollution, enhance biodiversity and beautify the city at the same time.

Urban landscape management and implications: For greening of urban areas and controlling pollution in context to Indian conditions

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Abstract
In the last decade many of the developing countries in Asia have witnessed rapid growth of industrialization and have emerged as economic power house. This express growth in industrialization has lead to unplanned expansion of urban areas by large scale cutting of trees, converting agricultural land for human habitation. This has affected adversely on general environment and maintaining ecological balance. Moreover, in this blind race of growth and development indiscriminative "mining" is also identified as another potential threat to environment. Rapid migration and increase in population in the urban areas has also lead to large scale spreading of air & water pollution, garbage etc., and also impairing aesthetic value of area / land.
Now, it is well accepted that urban greening plays an important role in the social and natural sustainability of a city. An increase of vegetated surfaces in the urban landscape, provide ecological diversity etc. - can help mitigate several negative effects of urbanization on climate, air pollution, since they contribute to the reduction of the structural differences between the urban area and its rural surrounding. This study aims at: *Initiating eco-restoration efforts; Rehabilitation of mined out areas; Identification and selection of the suitable plant species for afforestation; Creating Environmental awareness; Standardization of horticultural practices with relevance to urban landscape management.*
Excellent valued green space enhances the quality of urban life and contributes to wider Government objectives such as improved health, more sustainable, pollution free neighbourhood

renewal and better community cohesion, especially in more deprived communities. Neglected parks attract anti-social behaviour and have the potential to undermine regeneration of deprived neighbourhoods. Urban green spaces provide a wide range of outputs, however, due to their multi-functional characteristics, the development and management of parks and green spaces is becoming a more and more complex planning issue that needs careful consideration, if green spaces are to be successfully acknowledged and appreciated by citizens.

Evaluation of shrubs to slope consolidation in urban landscape

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Abstract

Shrubs are often used to consolidate slope in urban landscape. Only few species are commonly used in the city environment (i.e *Pyracantha* or *Cotoneaster*) bestowing on the city a monotonous appearance. Poor information are currently available about other species. The aim of this trial, set up at Minoprio Foundation (Vertemate con Minoprio, Como, Italy; 45°44' N, 9°04' E), was to collect data about the performance of 25 shrub species or cultivars grown in a slope during two seasons. Moreover, in order to evaluate weeds influence on both management cost and plant growth, two mulches (a biodegradable textile and a polypropylene sheet) were used in comparison with a no mulched test. The experimental design was a randomized block design with 3 replicates. Each block was constituted by 75 experimental plots (25 per mulching treatment) of 8 m^2 area. Shrubs were planted in late spring of 2007. In order to simulate urban conditions no pruning and disease control were applied. Irrigation was carried out only in the first growing season. Plant height and covering area percentage were measured every 2 months. Plant phenology and health state were recorded weekly. Weeds were removed twice in the first year and three times in second year. Time for weed removal was recorded for each experimental plot. Results show that the highest growth was detected in mulched plots probably due to both limited weed competition for water and nutrients and lower water loss by evaporation. Among shrubs differences in growth and ground covering were observed.

Response of eight cultivars of *Acer* x *freemanii* and *Acer rubrum* to soil compaction and production fertilizer treatments.

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Abstract
Compaction in urban and suburban planting sites often poses growth limitations on trees. Urban horticulture practitioners are also concerned that trees receiving high levels of fertilizer during production will be ill-suited for these poor quality sites. To assess the effects of compaction and production fertilizer rates on tree establishment and growth, field soils were compacted to an average bulk density of 1.6 gcm^{-3}. Considered restrictive to tree growth by many researchers, the high bulk density also resulted in a 72-85% decrease in hydraulic conductivity. During production, half the containerized maples were randomly assigned to a fertilization treatment of either 25.3 g L^{-1} N or 101.1 g L^{-1} N. Trees growing in high bulk density soils showed a significant decrease in many biomass measures, particularly caliper. Cultivar type had a consistently significant effect on tree growth ($P < 0.0001$), despite the biomass measurement. Limited root growth and the reduction in hydraulic conductivity may be factors in reduction of tree growth. When averaged across all cultivars, trees treated with the high fertilizer rate had larger biomass measures than those receiving the low rate. Cultivars responded differently to fertilizer treatment. There was no interaction between fertilizer and compaction treatments, indicating that production fertilizer rates do not purport a detriment to trees growing in compacted soils. Results may guide the selection of compaction tolerant cultivars for urban and suburban planting sites.

Clonal selection of herbaceous perennials for northern urban areas: healthy and hardy with high ornamental value

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Abstract
In Finland, urban landscaping has mostly used woody plants in public areas. Along the extension of urban environment, the demand for more ample choice of species is increasing. At Agrifood Research Finland MTT, a project aiming at an increasing use of perennials in urban landscaping was started in 2005. To investigate the diversity of several perennial herbaceous plants in Finland, clones of several species were collected from nursery, botanical and private gardens for field trials. The field trials were set up in 2005 and 2006 in Piikkiö, Southern Finland and in Ruukki, Northern Finland, and will continue until 2010. They consist of about 350 clones of *Aconitum, Aconogonon, Asarum, Aster, Astilbe, Astrantia, Campanula glomerata, Delphinium elatum, Dicentra, Doronicum, Eupatorium, Fallopia, Geum coccineum, Iris, Monarda didyma, Nepeta, Salvia* and *Thymus*. The species were selected because of their potential in landscaping and because of confusions in their nomenclature in nurseries. The clonal selection of perennials aims at finding the most healthy and hardy clones for use in Finland and other northern areas. The selection of the clones with the highest quality is done by intensive monitoring of health, pests, covering, growth, phenology, over-wintering, flowering and ornamental value. One of the main aims of the project is also to taxonomically identify clones within a species and to clarify the nomenclature. For this purpose, DNA-fingerprinting has been introduced in the perennial research and will be applied in the near future.

New perspectives for the use of elms as street trees

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Abstract

In the past centuries elms (*Ulmus spp*) became a very important part of the landscape in large areas of the Netherlands. Because of its combination of highly valued characteristics elms, and especially *U. hollandica* varieties, were the dominant tree in the coastal areas as well as in the large cities in the western part of the country. The occurrence of Dutch Elm Disease (DED) in the 20th century however resulted in millions of trees being lost. Breeding programmes for developing resistant varieties were started in the Netherlands as well as in other countries. As a result nowadays many new varieties that are (much) less susceptible to DED are available. However, the continuing problems with DED in the old elm varieties have made many policy makers and managers of urban green very reluctant in using these new varieties. In order to restore confidence in the elm in 2006 a research project was started focusing on the new elm varieties. Three aspects are being investigated: 1. the relative levels of resistance, 2. the best way to propagate (root-stock, own-rooted), and 3. growth characteristics in the urban environment. To test and compare resistance of recent varieties against DED under Dutch conditions a large field experiment with about 1200 trees of 30 varieties from the Netherlands as well as from the USA has been planted in the spring of 2006. In 2007 another field experiment comparing growth and development of 11 varieties on two different root-stocks as well as on their own roots will be planted. Finally potential of 18 recent varieties for use as street tree is being evaluated in two large scale plantings in the city of Amsterdam. The first results of these experiments will be presented.

Herbaceous perennials for urban areas in Finland

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Abstract

In Finland, woody plants are widely used in landscaping. Herbaceous perennials could offer more variation than woody ornamentals and an economic and ecologic choice for annuals or lawn in parks and cemeteries. At MTT, Agrifood Research Finland, a project aiming at an increasing use of perennials in urban landscaping was started in 2005 and it continues until 2010. This project aims at finding suitable species and combinations of species for different purposes and creating guiding practices for low maintenance techniques based on plant ecology and sociology.

Knowledge of the basic features of the species, ecology and competition is collected from field trials at MTT and from trials set up in landscaping areas in six towns and three cemeteries in different climatic zones. The emphasis is, on one hand, on large species suitable for broad plantations and, on the other hand, on low ground covering species. The plant material originates from Finnish nurseries and botanical collections. A soil free from weeds is used. Detailed care of plants is avoided and treatments take place only a few times during the growing season. For traffic areas, ideal perennials with drought, heat and exhaust tolerance and the low growth habit, can be planted either as pot plants or mats. For cemeteries, perennials are looked for replacing annual flowers and grass on the graves. For northern areas, the most suitable large species and combinations of species for extensive perennial areas are looked for. Based on the results, guidelines are prepared for the use of the 50-100 most important perennials.

Study on the ornamental ground cover used in urban parks

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Abstract
The ornamental ground cover has long played a significant role in the urban environment. They help mitigate the loss of "natural" vegetation in modern city, often have scenic qualities, provide for recreation, beautification, education. This article explores the ornamental ground cover used in urban parks, and the investigation region is Nanjing city. By investigated eight Nanjing's urban parks and conducted a series of interviews-questionnaires with several horticulturists, who worked for those parks many years, this article observed the disadvantages and advantages of the ornamental ground cover used in those parks. Then found two important aspects affected the landscaping and situation of the ornamental ground cover. First, the human disturbance is the main reason for the degeneration of the vegetation landscape, and second, adaptive management should pay more attention to the ecotype construction of the vegetation. From the two factors, this article tried to discuss the feasible design and management way to instruct future urban park's ornamental ground cover constructions. In conclusion, the article identified a step-by-step procedure for the development trends of the ornamental ground cover used in urban parks in southeast of China.

An Analysis on Planting Design in Urban Open Space in Nanjing

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Abstract
Urban open space is an important component of urban space system. It provides the place and environment for people to take part in all kinds of public activities and social lives.
Plant served as both spatial structural element and ornamental element is indispensable for urban open space and planting design is also important to the quality of urban open space.
Nanjing is an important city in the east of China. In recent years, the development of gardening in Nanjing has made remarkable progress. For example, the green space ratio in built-up area had reached 41.3%, green coverage rate 45.5% and public green space per capita 13m^2 by 2007. However, there are many problems in planting design in urban open space. These problems include: 1) some functions of open space have been hindered by unreasonable planting design; 2) plant view is monotonous and similar in many open spaces; 3) the original vegetation is damaged sometimes because of the construction of urban open space.
These problems are universal in most cities in China. Taking Nanjing as an example, this paper illustrates the present situation of planting design in urban open space in China and analyzes the problems above. In the end, a series of relevant suggestions are put forward.

Evergreen Plants in Urban Parks and Their Importance Regarding Landscape Architecture, a Sample of Trabzon City

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Abstract

In botany, basically, an evergreen plant is a plant having leaves all year round. In fact, deciduous trees shed their leaves usually as an adaptation to a cold or a dry season, which means there might be no reason regarding climate for being deciduous in some parts of the world. However, low nitrogen concentration in soil might also be a major reason for being deciduous in such places.

Although the term evergreen firstly means pine, fir, spruce and some more woody trees to many people, it is quite possible to talk about many different evergreen plant taxa in different sizes, shapes, colors and textures. This variety and their attention getting characteristics make them very popular. Many landscape designers and amateur users often prefer evergreen species for landscape designs or plantations owing to their influential and conspicuous appearances through the year. In addition, when a functionally plantation is done, evergreen plants can mean a stronger effect while deciduous ones could hardly be recognized in winter.

In this study, four well known and heavily used urban parks of Trabzon city were chosen as the research areas. These areas were analyzed by using GIS techniques and field surveys so that their floral structures and user profiles could be determined. Then, evergreen species in the research areas were identified. After their ratios among all the woody species in the parks and their contribution to biodiversity were defined, a questionnaire was used to be able to get some social and cultural approaches of the users to evergreen plants. Finally, some visualization was shown to the users in order to appoint what the importance of evergreen plants for them in giving a character to a park was.

A Study on Rockery Art in Traditional Chinese Gardens

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Abstract

For thousands years, the Chinese have a tradition of mountain worship. Some mountains in gardens are real ones, however, most "mountains" in Chinese traditional gardens are artificial rockwork. Rockery has taken a very prominent place in traditional Chinese garden design.

The rockery has originated and developed together with Chinese garden. In late Yin dynasty and early Zhou dynasty, the rudiment of rockery appeared, namely, "tai" in imperial gardens. In Qin and Han dynasties, the rockery was in the form of earth piled hill or earth and stone piled hill from a far-range view. In Wei, Jin, Northern and Southern dynasties, rockery had gradually established its dominant position in Chinese traditional gardens, and started to transform into a realistic style in a close-range view. In Sui and Tang dynasties, though rockery itself was not quite popular, the aesthetic value of it was highly recognized and was usually appreciated in the form of garden rockery and bonsai. In Song dynasty, the rockery art which imitated the nature had achieved its highest level and best state and started to pile the rockery by natural stones. Furthermore, a group of craftsman specified in rockwork appeared. In Ming and Qing dynasties, lots of great masters had developed the rockery art into a freehand style on the basis of Song. They perfected the rockery art from both theory and practice.

Due to generations of creation and thousands years of experience, rockery has become an artistic image with the best expressive force and characteristics. It had come down in one continuous line and still popular today. The "rockery fever" in modern garden and landscape art design vividly shows its profound cultural foundation and people's aesthetic taste in China. The same as sculpture's position in western garden, rockery takes a crucial place in Chinese traditional garden. "Derived from the nature and superior to the nature", if it is the main characteristic of traditional Chinese garden, then, it is the high-level rockwork art which makes it true.

The role of agriculture in the plain of Assisi.

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Abstract
This paper focuses on the role of the farmers to maintain the rural landscape in the Assisi plane. The agriculture has taken on greater importance in Assisi Municipality because the whole municipality area (including the rural area) has been recognized by UNESCO as World Heritage. In 2000 Unesco justified the inclusion of the Assisi town to the List of Intangible Cultural Heritage of Humanity by saying that "Assisi represents a unique example of continuity of a city-sanctuary within its environmental setting…". This nomination has raised some projects for the protection and management of the site in order to preserve the architectural heritage and landscape. The aim is retain the current characteristics that have contributed to its recognition as World Heritage. To ensure the maintenance of environmental setting, as the rural landscape the key is understand: Who are the farmers who maintain the rural landscape and which are the characteristics of the farms.
The purpose of our study was to understand who produce the rural landscape and which tools propose to ensure the maintenance of agriculture. The research was done through the collection of technical economic data relating farms and semi-structured interviews.
Regarding the current situation most farmers have more than 60 years and lead companies below 10 ha so unchanged for at least 30 years. Most companies produce cereals and production of oil and wine mainly for own consumption. Most farmers have another work or are retired and continue to cultivate the land as a hobby. The increase of the average age, the rise of materials prices and the change of the common agricultural policy have led many farmers to wonder whether or not to continue theirs activity.
As for future prospects the questions that we have tried to answer are:
How the land use will change in the next few years, when the younger generation cultivate the land of their grandparents, with a less affection feeling to the land of their fathers?
What tools of agricultural policy is necessary to activate now to maintain the important role of agriculture as a producer of landscape?

Event and daily grind: Challenges in after-use concepts of International Garden Festival Sites in Austria

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Abstract
Austria has a specific culture of Garden Festivals, with differing concepts in the federal states. International approaches in Festivals were made 1964 and 1974 in Vienna and 2000 in Graz, Styria. 2013 a tri-national show in the region of Lake Constance will take place. Strategies for follow up use have been part of all these event programmes. The site's development – parts remain as a public park – leads to an up-valuation of the nearby area. The aim is to detect the foreseen ideas for the after-use and the strategies of the actual state of the realised projects. Starting point for the comparative survey is the project IG Unterpremstätten Graz, a work of late garden-architect Dieter Kienast. The remaining site is under responsibility of Joanneum (Landesmuseum) and houses the Austrian Sculpture Park, an internationally remarked collection of contemporary works. The art collection is in progress, but traces of decline can be attested in the garden as piece of art. The maintenance is ambitious and needs a lot of skilled craftsmanship in gardening but also understanding for Kienast's philosophy and work. Ten years after the opening some major and cost intensive preservation works are evident and forthcoming. They are an expression of limited investments and a lack of understanding in previous years. A care concept would help to maintain the garden; investments can be phased and budgeted. The garden could be sensibly adapted and developed further to the new use as a place for displaying art without loosing its unique design. In fact the problems shown are results of the garden show concepts, the lacking discussion of what comes afterwards and the missing understanding for the coherence of design, planning, using and maintenance in garden architecture and administration.

Lawns: are they more than just a nice green color?

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Abstract
As urban and suburban areas grow, concern about pollution in urban waters has increased. In urban watersheds, sources of contaminants include anthropogenic and natural, or as wet and dry atmospheric deposition. Lawns can have an impact on the surface and ground water quality from nitrogen (N) and phosphorus (P). Several studies showed more P losses in runoff from unfertilized lawns than fertilized lawns due to lower runoff. Fertilized lawns had higher dissolved P losses than the other land uses but only on the shallow runoff prone soils. Particulate P losses were highest from the unfertilized wooded and urban barren land use due to erosive P losses. There was a two fold increase in P loads to a stream when compared to the undeveloped, forested upper watershed. Best management practices should focus on reducing runoff and P loss from high source areas to realize the largest reduction in P loading to surface water. Fertilized lawns had higher N loss than the other land uses in areas with a high runoff potential. On the deeper soil with low runoff, the fertilized lawns had lower N loss than the other land uses. Precipitation derived N inputs had an influence on N lost from all land uses in the watershed, while N measured in through fall under the wooded canopy was of the same order of magnitude as the N lost in runoff from these areas. The N stream loads were as high as or higher from the undeveloped upper watershed indicating the urban areas may be an N sink. The risk of N impacting groundwater quality is affected by age of the site, fall fertilization timing and irrigation. Long term, the source of N had no effect on the extent of NO3 leaching and controlled summer irrigation reduced the amount of N leaching. Thus, to reduce the risk of N impacts to groundwater, N applications should be less as the site matures, limit the amount N applied in mid to late fall and control the amount of irrigation to closely match the amount of evapotranspiration.

Public Gardens Private Spaces

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Abstract
Gardens have always been places of contradiction, mixing utilitarian function with ornamental form. Historically, artists have represented them as cultivated enclosures that convey a sense of paradise when juxtaposed with the reality outside the garden gates. Germany is home to one million private allotment gardens that are clustered together in colonies and open to public view. Allotments offer a glimpse into the varied creative endeavors of thousands of gardeners in a concentrated, urban setting. In Germany, these seemingly natural spaces are in fact artificially constructed on top of landfill, and exist as the result of concerted horticultural and political efforts on the part of gardeners and their advocates. Consequently, the German garden plot exemplifies the challenges and artistic possibilities inherent to the practice of maintaining nature in a city.
Kleingärten spaces are constantly in flux. The gardeners choose what elements to cut, contain, cultivate and adorn, revealing the individuality of their spaces in the same way that, in filmic terms, the choice of framing and editing reveals intention. I see the Kleingärten as occupying a metaphoric position that connects documentary to spectacle, making them ideal material to explore the notion of authenticity in art. Fences contain the individual spaces; there is a sense of privacy, although public pathways serve as a network to view the garden scenes as personal tableau. They act as a verdant backdrop, a "natural" retreat, for the gardeners to evoke fantasy in the center of a metropolis. At the same time their historical significance and the constant maintenance required in the gardens calls for a documentary approach to filming them.

Healing gardens in Italy: current status and technical proposals

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[4] Landscape architect, AIAPP/EFLA

Abstract
The importance of horticultural therapy is well known now in Italy too: a large number of gardens are designed and realized near healing buildings.
In the last ten years we can appreciate an evolution around this culture: to offer a healing garden is now considered a value to add to a healing centre, an opportunity to win a contract, specially for private enterprises.
This Department is studding and working around this reality from more than 10 years, and it is time to evidence the evolution: it is well accepted that urban greening plays an important role in the social and natural sustainability of a city, but we go over.
This study aims at highlight how the landscape design is changing according with the new requirements of civilized society.
Italian sanitary requirements are different from Anglo-Saxon one, but also there is an interesting movement around common people request, and the offer of individual traders; people requires a new landscape, or is getting back to an old landscape, to a sensible landscape, and people is on hand to pay it.

Management of Landscape and Urban Horticulture in Punjab - India

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Abstract
Landscape be in urban or country, plays an important role for refreshing human life. Horticulture provides the best platform for Landscape in general and in urban life particular. The best combinations of Landscape and Urban Horticulture in any city, reflects the living standards of its people. With average of 13 % area under forests, in India it is widely varied from a minimum of 3.17 % to a maximum of 83 % while in urban life it varies from 4 to 13.5 %. The north and progressive state of India, Punjab have provided 5-7 % greens in urban life. Five major cities of the state are managed by their Municipal Corporations i.e, Amritsar, Bathinda, Jalandhar, Ludhiana and Patiala.These cities are provided with 346, 105, 235, 727 and 195 parks respectively along with 36, 9, 28, 45 and 17 roadside plantations besides 22, 5, 8, 10 and 6 road islands, in addition to few scattered green belts which constitutes the major Landscape and Urban Horticulture. Being a developing country, ample budget is not there for the desirable management of such greens for the pleasant living of their residents. Watching the global scenario, these Municipalities have introduced the " *Public Private Partnership*". Under this system Amritsar, Bathinda, Jalandhar and Ludhiana cities have allotted 240, 56, 195 and 390 parks of the total number to their local Welfare Societies so called *Park Management Committees* for the most economical as well as the best performance for their up-keep with nominal grant provided by the municipalities. Similarly Landscaping of 22, 3, 8, 16 and 6 municipal roads of the total is being maintained by the Advertising agencies in lieu advertising revenue. In addition development and maintenance of Landscape of 12 round abouts in Amritsar, 3 in Bathinda, 7 in Jalandhar, 6 in Ludhiana and 3 in Patiala is being looked after by different industrial houses in lieu for their publicity. It is quite evident that the *Management of Landscape and Urban Horticulture in Punjab – India* is significantly economical as well as better than that of being maintained by their own efforts.

SESSION 2

URBAN LANDSCAPE HORTICULTURE

POSTER PRESENTATIONS

Mitigation of the detrimental effects of artificial turf on the environment and end users: an innovative hybrid natural-artificial sports pitch construction system.

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Abstract

Third generation artificial turf pitches have long been the object of criticism due to their high abrasiveness to athletes falling on the surface, the high temperatures recorded in summer periods and their unpleasant rubber odour. On the other hand, natural turf pitches are not able to withstand the high play volumes currently associated with modern high-profile sports pitches and community sports pitches. Hybrid systems with a varying presence of artificial fibres and reinforcements have long been tested and installed, without providing a definitive answer to the abovementioned problems of natural turf. During 2004-2007 an innovative hybrid natural-artificial sports pitch construction system was devised and tested at Pisa University. This system consists of a modified third generation artificial grass with organic infill, on which natural grass is allowed to grow. Specific procedures need to be followed during construction, installation and turf establishment in order to carry out a successful construction and grow-in. An 11000 m^2 experimental pitch was constructed in Pisa in summer 2007 and tested during 2007-2008. The hybrid pitch showed total absence of rubber odour, summer temperatures similar to natural turf pitches, wear resistance superior to natural turf pitches, abrasiveness similar to natural turf pitches and good infill particle size stability. Playing quality parameters fell within both the FIFA standard requirements for artificial turf and generally accepted playing quality parameters for natural turf. During the first two years of its life the pitch was the object of repeated fungal disease attacks from various pathogens, from which the pitch always recovered. Optimum hybrid natural-artificial pitch maintenance proved to be very similar to a natural turf pitch, except for the absence of any soil aeration procedures. Future research will focus on continued monitoring of the pitch for natural turf behaviour, turfgrass disease management procedures, long term infill particle size stability, pitch drainage performance, and testing of alternative turfgrass species for warmer climates.

Zoysia: a high quality warm season turfgrass genus for urban and sports lawns. vegetative establishment behaviour and adaptation to the mediterranean climate

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Abstract
Zoysia is a warm season turfgrass genus native to Asia and the South Pacific that is well adapted to the transition (including Mediterranean), warm-arid and warm-humid climatic zones. Zoysiagrass is relatively inexpensive to maintain and environment friendly because of its excellent heat, drought, pest and wear tolerance compared with the more common cool season grasses. Its main disadvantage lies in its slow establishment which limits a more widespread use.
The objective of the study, carried out at the research station of CeRTES, University of Pisa (43° 40' N, 10° 19' E, 6 m a.s.l.), was to evaluate the differences in establishment rate and adaptation to the latitude of coastal Tuscany.
In this study 5 cultivars of *Zoysia japonica* Steud., 2 cultivars of *Zoysia matrella* (L.) Merr., *Zoysia tenuifolia* Willd. Ex Thiele and 2 interspecific hybrids of *Zoysia japonica* x *Z. pacifica* Goundsw. were evaluated.
Sample stolon length, stolon number per plant and stolon cumulative length per unit area were measured. During the establishment period stolon weekly growth rate was measured along with monitoring of temperature at soil surface. Ground cover until full establishment, turf quality and turf colour were also evaluated.
For the tested zoysiagrass cultivars, ground cover was more influenced by stolon number than by stolon length. Stolon growth sensitivity to ground temperature seems to be cultivar specific and indicates that most zoysiagrass cultivars continue to grow until average ground temperatures reach 10°C.

Optimizing water use efficiency in urban landscapes using GIS

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Abstract
Improved design and management of irrigation systems can lead to significant higher efficiency in water usage and / or better distribution of the water sources in order to have more sufficiently irrigated –hence vigorous- plants. Urban landscapes are usually complicated regarding the plethora of plant species and their spatial distribution which makes the design and management of relevant irrigation systems a hard work to do.
In the framework of the proposed design approach, in GIS environment, the landscapes are first divided in hydrozones based on different area parameters (geometry, usage), soil characteristics (type, slope) and landscape evapotranspiration rates (microclimate, plant density and species). For the calculation of the reference evapotranspiration the well established method of Penman-Monteith is used while the water needs of every zone are estimated using the WUCOLS approach. In this stage, alterations to plants selection can be proposed aiming to more uniform zones regarding water needs. The hydrozones are then combined with the usage of each area in order to select the proper irrigation system (type, layout and precipitation rate). Finally, detailed seasonal watering schedules are formed for each zone based on water needs, plants, soil and irrigation system characteristics.
The use of GIS facilitates the design process and gives a strong visual dimension to it. The first outcomes (application for the improvement of the irrigation system of a 10 acres university campus and a 0,5 acres public garden) resulted considerable water savings.

Use of endemic plants as ornamentals in the Canary Islands.

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Abstract
With a complicated orography and great variety of microclimates, Canary Islands have developed a wide endemic vegetation. However, just some of these endemic plants have been widely used in gardening; lack of knowledge on how theses plants behave cultivated in gardens is one of the reason to remain underutilized. This review focuses on 23 endemic species of the island of Gran Canaria with potential value in gardening. Several criteria have been used to choose species such us ornamental potential value and presence in Gran Canaria. Three aspects with ornamental and environmental interest are studied in plants cultivated in gardens: Flowering phenology, biometric measurements, chorology and spatial use restrictions in Gran Canaria. Spatial use restrictions are underlined in order to avoid enviromental problems such as hybridism and subspontaneity in Gran Canaria. Important differences in flowering phenology and biometric study were found between wild and cultivated plants, with longer flowering period and larger biometric measurements.

Low impact development techniques for urban sustainable design: a case study of “rain gardens”

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Abstract
Private gardens and small urban open spaces can play an important role in preventing local floods caused by urban run-off especially during heavy rainfall events. Borders and other garden spaces, designed for the interception, storage and drainage of rainwater, collected by the nearby impervious surfaces, are defined as “rain gardens”. The appropriate planning and design of “rain gardens” can, at the same time, have a positive influence on the water cycle and offer interesting opportunities for aesthetically creative landscape design. The paper presents a case study of the application of the “rain garden” model to different public and private urban sites, in the Veneto region. Different solutions in regards to dimensioning, species selection, and site preparation are presented.

The effect of design of an urban park on traffic noise abatement

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Abstract
One of the major environmental problems of the big cities nowadays is the traffic noise. This study was aiming to evaluate the effect of vegetation and design of an urban park (Pedion Areos) in the centre of Athens on the traffic noise attenuation inside the park, and to propose solutions for extra noise reduction in it. The noise (dBA L_{10} and L_{90}) was measured on the whole area of the park and on the streets at the boarders of the park. Major differences (5-10 dBA) in traffic noise reduction were found at the first 60 m of the park perimeter depending on the vegetation, altitude and design of the park. Dense vegetation of shrubs and trees in the periphery of the park, compared to areas where the vegetation consisted of trees only, resulted in extra noise reduction. Differences of the altitude also affected noise reduction. The wide lanes of hard laying (mainly asphalt) that are crossing the park, and the big squares of hard laying, too, did not allow big noise reduction in the central area of the park. Proposals for planting and noise barriers are made in order to minimize the noise level inside the park.

The effect of planting level at an urban road slope on plant growth

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Abstract
In this work it was studied the growth of *Lantana camara* L., *Limoniastrum monopetalum* Boiss. and *Teucrium frutescens* L., as affected by the planting distance from the foot of an urban slope. The experimental area was divided in two zones, the upslope and the footslope. Plants of the three species were planted randomly at the upslope and the footslope at the end of June 2003. From the day of planting until the middle of October the plants were irrigated automatically by a drop system. Every month until October the plant growth was evaluated, measuring the plant height, number and length of lateral shoots, main and lateral stem thickness, plant diameter and flower number, depending on plant species. In December of the same year the dry weight of the plant foliage was measured, too. Chemical characteristics of the soil and soil moisture were also measured at the two experimental zones. It was found that the planting zone affected plant growth in all species. *L. camara* plants at the footslope were taller, developed more and longer laterals, thicker stems and more flowering shoots, as well as bigger dry weight, compared to *L. camara* plants at the upslope. *T. frutescens* plants at the footslope developed more laterals and had bigger total length of shoots and an indication of bigger dry weight compared to the upslope plants. The growth of *L. monopetalum* plants in both upslope and footslope did not differ during the first three months of culture, but after six months in culture the plants of the footslope had bigger total, leaf and stem dry weight. The *L. camara* and *T. frutescens* plants were left to resprout during the following year and measurements were repeated with similar results. *L. monopetalum* plants were damaged by exceptionally low temperatures that occurred in winter 2004 in the region.

The role of the urban agriculture in the construction of the landscape of Beijing

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Abstract

The acceleration of the urbanization in China brings some advantages for the Chinese people, but it also pulls major inconveniences of mainly economic, social and environmental order. The fragility of the urban agriculture is evident against the city explosion.

Beijing was chosen to organize the Olympic Games in the 2008 summer by the CIO. For this occasion, the town planning undergoes important transformations. To welcome this big event, series of works are made on several domains notably in the environmental sphere. Its main challenge is the fight against the pollution, and the essential governments answer is to increase the greenery rate which became its main preoccupation. It is about one of the basis of this search as the same as the acceleration of the urbanization and the importance of the construction of the ecology, the transfer and the dynamics of the agricultural space from the landscape point of view.

The objective of this search is to understand the current situation of the urban agriculture of Beijing. We will try to prove the following hypothesis: the urban agriculture of Beijing as landscaped element can play a role or even be necessary for the construction of the Beijing landscape.

These last years, the construction of the Beijing landscape corresponds to the main objectives of the Chinese government, and thanks to some exemplary operations, the idea of the urban agriculture such a place of landscape extended considerably. But at the same time, because of a several failing politics, insufficient knowledge and other troubles, errors were committed. I aspire to the fact that this search could put a new vision on the landscape, the urban agriculture, and especially give a justification for the necessary role of the urban agriculture in the construction of Beijing landscape. This knowledge will hopefully allow to improve in the future.

New methods for the recovery of post industrial areas: choosing plants for phytoremediation

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Abstract

During the last years ecologists have started working on urban ecosystems, considering the interaction of the social, biological and physical components of a city as one of the best way to understand dynamics and driving forces in urban development. Besides, urban design and planning projects have been devoted to find sustainable ways to control increasing phenomena such as urbanization and urban sprawl. In this context urban green areas can carry out many environmental functions in particular related to increasing biodiversity, assessing meso and microclimate, absorbing noise and promoting air and soil quality. Among these phytoremediation is a set of remediation methodologies that are based on the use of plants to remove pollutants, especially metals, from the soil or to reduce their impact on the environment. Ornamental plants can be used for this purpose in urban design, where both environmental and aesthetical solutions are needed. A pilot study was carried out in two green areas in the city of Turin (Italy): 'Pellerina Park' and 'Spina 3' Park, that is a post industrial area. Four plots for each species were planted. Two species have been tested: *Helianthus annuus* 'Holeko H.O.' and *Brassica juncea* 'Red Giant' Physico-chemical characteristics of top soil before and after the experiment were determined. During cultivation growing data on plants were determined. After harvest, metal contents in plants were measured. Results demonstrate that the use of phytoremediation techniques in urban soils can be an interesting method to control heavy metals accumulation during time. Species like *Helianthus annuus* can be successfully used both for ecological and aesthetical purposes. Further studies are required in order to find new ornamental species useful in urban green areas and to evaluate proper methods for their disposal.

Design of Athens' Tram and Urban Bus Depots surrounding areas based on noise levels monitoring

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Abstract
Athens' Tram and Urban Bus Depots were installed near the former International Airport of Athens soon after its translocation in 2001. The current study monitored the traffic noise levels at the areas surrounding the depots, the neighboring highway and the inhabitant area in the vicinity of the depots. The aim of the study was to determine the sources and the levels of noise pollution. It was found that the recorded A-weight sound pressure levels (L_{10}) were over the permissible limits of 70 dB for open spaces. The noise pollution detected within the inhabited area originated mainly from the buses moving from and to the depot and from the highway. It was also identified that the noise problem from the bus depot became more profound during the night at the end of the bus shift. In contrast noise levels from the Tram depot did not exceed the permissible noise limits. Based on the traffic noise levels and taking into consideration the adjacent inhabited area a design proposal was created rerouting the passage of the bus line. In addition specialized sound barriers, noise control earth berms and sound masking techniques combined with thick vegetation strips were suggested in order to reduce noise level. A new urban park was also designed and proposed around the depots, which attended to serve the inhabitants of the neighboring municipalities. The proposed urban park is expected to reduce the noise pollution, to improve the microclimatic conditions of the region, and to contribute to the ecological restoration of the natural environment. The abovementioned improvements are expected to rejuvenate an area that has been negatively affected for many years by the operation of the depots and the International Airport of Athens.

Temporal shifts in plant composition of turfgrass mixtures in response to plant growth regulators

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Abstract
As a result of the positive environmental and social value of lawn areas, turfgrasses have become an important component of urban centers and are used in many different macro and micro climates. A 2 year field experiment was conducted at the Experimental Agricultural Farm of Padova University in Legnaro, Italy, to investigate temporal changes in species composition of three turfgrass mixtures to which a plant growth regulator was applied.
Three grass mixtures were established in 2006 and subsequently treated with the plant growth regulator trinexapac-ethyl (Primo) at either half, recommended, or one and a half the recommended rate, or left untreated (control). The three turfgrass mixes used were 1) *Lolium perenne* (40% [by weight]), *Festuca rubra* ssp. *trichophylla* (15%), *Festuca rubra* ssp. *commutata* (15%), and P*oa pratensis* (30%); 2) *Festuca arundinacea* (90%) *and Poa pratensis* (10%) and 3) *Lolium perenne* (60%) and *Poa pratensis* (40%). Species in each mix consisted of 2 varieties in equal proportions. Plots were mowed at 4.5 cm and 15-9-15 fertilizer was applied at 20 gN m^{-2} yr^{-1}. Treatments were replicated three times in a randomized complete block design. From February 2007 to July 2008 the succession of the species composition of the three mixtures was studied by means of linear analyses method.
Plant growth regulator applications did not affect species composition; however there was a shift in plant composition over time for mixtures 1 and 3. *Lolium perenne* decreased in both mixtures, while a constant increase of *Festuca rubra* and *Poa pratensis* was observed in mixture 1 and 3. The composition of mixture 2 stayed stable with *Festuca arundinacea* as the dominant species. Results indicate that under climatic and management conditions prevalent in this study, *Lolium perenne* can disappear rather rapidly while Primo has no effect on changes in species composition.

Romanian urban landscape, antagonism or cooperation between public and private green areas

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Abstract

Case situation in witch the urban development highly accelerated, can generate unpleasant contrasts or even *antagonisms* between *public* and *private* landscape properties. These case situations are typical for countries with a high urban development, related with residence crisis.

Analyzing the current situation in our country, we can observe a gap between the use of vegetation, association of vegetation, maintenance of landscape areas belonging to the city hall and private landscape areas with direct impact upon the urban landscape, especially at county level.

This case situation is amplified by the lack of laws regarding the urbanism, inobservance of the laws, even by the authorities. Appling the laws, by the authorities is a decisive factor in accepting them by the citizens for a proper education and discipline regarding the urban landscape.

For accomplishment of the mentioned above strategies, the urban landscape plays a key role for prevailing the advantages of the green spaces, with accent on the urban aspects.

The paper propose a case study with main idea focused upon *the coherence of the urban landscape* finding adequate solutions for urbanism and landscape that will lead to a harmonization of the contrasts in the adopted styles.

Concluding, the paper propose the *extension and comprehensive retail of the landscape areas* by finding modern solutions for landscape designing, respectfully for the laws and classical urban standards, especially for the *contact area* between the public and private landscape properties, with direct implementation in the general urban area.

Hydroponic pergola as an example of living furniture in urban landscape

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Abstract

Current city centres are evolutioning in their utilities into functional and public uses. That makes more necessary to provide urban population with living green places to use while they are out of their homes. Since city centres are already developed it is very difficult to find out the way to obtain more garden surfaces, usually limited to the historical gardens of the cities. Besides this, traditional gardening is not considered correct among the population, due to the high water consumption they mean. On the other hand, xerogardening is an alternative that usually does not generate the levels of vegetal covered surface or natural shade it is desired in this kind of urban areas. The use of hydroponic techniques with recirculating nutrient solution to design new models of urban furniture means a new way to enjoy the profits that traditional gardening offered, as for example natural shade, vegetal covered surface or green urban landscape, with none of its disadvantages, as they are the high water waste or specifically prepared soil.

The main of the project is to find out a model of urban furniture with minimum water consumption using compatible ornamental plants with recirculating techniques.

The model of an hydroponic pergola is an example of urban furniture, able to build urban landscapes using living plants, to provide green areas with all the profits that citizens expect.

Public open spaces of Baeta Neves District, São Bernardo do Campo City, state of São Paulo, Brazil

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Abstract
The environmental quality in urban areas requires specific procedures to research the open spaces system and the function of the vegetation in the city. This work was firstly based in the definition of open spaces and the survey of public open spaces in the Baeta Neves District, São Bernardo do Campo City, near São Paulo Metropolitan Region, state of São Paulo, Brazil. In the quantitative analysis, it was considered the existence or not of the open spaces in that area, verifying its ability to support the recreation of the population that lives in the around open spaces, and the quantification of open spaces. Subsequently, we analyzed the quality, function and distribution of open spaces of the District.

Integrating Green Technologies into Curriculum for Tomorrow's Professionals

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Abstract
As revitalization of metropolitan areas continues to expand, innovative green technologies hold considerable promise for creating sustainable urban ecosystems. Over the last three decades green designs have been successfully applied over a diverse range of environmental problems including storm water management, energy conservation, microclimate mitigation, pollution remediation, food production, and biodiversity restoration. Keeping current with new trends in these rapidly evolving technologies is crucial to comprehending the potential of green plants that accelerate ecological transformations of urban land.
This rapid development of green technologies suggests teaching opportunities at the university level to assist future professionals in understanding the principals of green designs. The new interdisciplinary course engages students majoring in various fields such as landscape architecture, horticulture and natural resources and acquaints them with the effective selection and use of plants in the modified urban environment. The course familiarizes students with a broad range of innovative green technologies including green roofs and green walls; phytoremediation and bioretention including bioswales, wetlands and rain gardens; as well as urban streetscaping, and discusses the design principals related to each technology. The course also addresses the proper selection of plant genotypes based on proven attributes which are critical for the success and sustainability of each installation. Selection of the optimal plant for a specific environmental concern requires an understanding of the characteristics and capabilities of different plants and their suitability to perform effectively under specific conditions in order to employ the concept of green applications to its fullest potential. And finally, the course presents principles of how to design sustainable plant communities specific to each installation that are based on the ecological models and principals of designing for biodiversity.

Stage overlooking Volterra's landscape

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Abstract

We have worked for a requalification project of a garden in the Tuscan landscape The garden has a charming overview of the surrounding landscape characterized by spectacular formations of badlands, a view of Volterra's town, woodlands and cultivated fields that change aspect every month.
The garden, whose extension is about two hectares, is close to a ancient rural building, now undergone to restructuring in order to obtain a holiday housing complex. Since all the trees have been abandoned the first phase of the project requires the safety implementation by applying modern arboriculture techniques. The difficult agronomic characteristics that affect the area, (clayey soil, orography characterized by high slopes and summer drought) combined with the impossibility of reaching groundwater due to excessive depth, have bound the project phase to a preliminary identification of the most suitable plant species and have determined the need to install a phytopurification system of sewage waters to recycle them for the garden's irrigation. The need to cushion the impact of the built complex and the infrastructures attached to it, safeguarding at the same time the exciting views that open from this stage on Volterra's landscape, has been solved with the insertion of autochthonous arboreal and shrubby species. In conclusion the project of the garden requalification has been developed with the intent to preserve the spectacular views, to valorise the historical traces of the place, to favour the social cohesion among the different user typologies and to minimize maintenance costs.

Reshaping the landscape in the Asylum of San Francisco de Paula, in Jaboticabal, Sao Paulo, Brazil.

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Abstract

It is trite fact that there are elderly who have no family or who don't receive any kind of help from their relatives because the family normally doesn't have sufficient financial conditions to help them. Those elderly live in shelters privates or publics that normally don't have enough money to cover all costs necessary, being forced to survive with donations. In these shelters, is funded, primarily, nutrition and health, being treated with little importance the leisure and often the well-being. But that leisure could be obtained in a simple and effective way: the green area of the site, which normally already exists and is spacious, though misused, can become a rest area with a simple landscaping project. It is important to mention that a garden it's not just a beautiful landscape, it becomes a place of importance for the day-by-day life of older people.The objective of this study was to improve the quality of life of elderly who live in the Asylum of San Francisco de Paula, in Jaboticabal, Sao Paulo State, Brazil. In this study, the survey was conducted planners-altimetry, photographic and registration, besides an analysis of local ground. Were also recorded the preferences of employees and visitors of the building, as well as the critical points of the area. After this primary analysis was done the planning landscape (with AutoCAD), prioritizing the use of plants with easy maintenance and not dangerous. Besides that, was created a space for an orchidarium with the goal of providing weekly workshops for cultivation of orchids.

Autochtonous shrubs in the urban green of mediterranean coastal towns

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Abstract
Shrubs have an important role in urban landscape, mainly as border elements and for biodiversity conservation. In the "Regolamento del verde" of many Italian municipalities the use of autocthonous species is highly recomended but such tool is still poorly used by administrations of coastal towns of Mediterranean area. Moreover the use of autocthonous shrubs in the urban green is usually restricted to a little number of species: a preliminary survey in four towns (Sanremo, Livorno, Bari, Palermo) showed that only oleander, dwarf palm, laurel, *Teucrium fruticans* and *Tamarix* spp. are significatively used. A low diffusion of autochtonous shrubs has been observed mainly in towns where in past times there was a strong introduction of exotic plants (Sanremo, Palermo). Such situation contrasts with the fact that the flora of Mediterranean maquis offers a large number of species with different morpho-phenological characteristics (height, colour, flowering period) useful in urban green design and suitable for low input maintanance. A list of species with high ornamental value, landscape significance and drought resistance is reported on the basis of the experience of the authors on cultivation of native flora species, some of them endemic.

Old grapevines in historical city centres and suburbs of Emilia Romagna: inventory and preliminary characterisation of a cultural heritage

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Abstract
The long history of *Vitis* in Italy is strictly linked to man. Cultivated in the countryside, grapevine has been introduced in the cities near buildings or in country houses as a complement of ornamental and productive interest. Several urban specimens have survived to the events occurred to houses and owners and to the changes of life style, acquiring a cultural and historical meaning, enriching the urban landscape with a rural touch and representing a potential source of germplasm for ornamental and agronomic purposes. Nevertheless their existence is almost unknown and generally neglected even in the projects specifically devoted to the inventory and collection of *Vitis* genetic resources.
A program aimed at the individuation of *Vitis* specimens near the buildings in the Emilia Romagna city centres and suburbs has then started in 2007 in order to collect information on their traits, present use and state of conservation. Exploration and collection of information about their presence was the first step of the work. Passport data were collected; for site location Global Positioning System (GPS) information was recorded, for geo-coding purposes. Plant size has been measured. As a first step towards the varietal identification, the ampelographic characterisation of leaf, bunch and berry samples for some of the inventoried plants has been started, according to the OIV descriptors.
The plants individuated are maintained both near private or public buildings and have sometimes important locations: churches, cloisters and squares in the city centres (S. Biagio and Piazza della Pomposa, Modena; cloister in the area of S. Maria Maddalena convent, in Bologna). The plants are generally leaned against the walls of buildings or trained to pergolas.
These information are the base for planning protection and conservation activities and for grapevine exploitation at a scientific, spreading and educational level.

Design of green areas for the promotion of agriculture: a study case of vine-growing and wine-producing farm

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Abstract

Architectonic quality represents an issue of great topical relevance in the design of farm open spaces, also in light of the inclusion of landscape considerations within the strategic Community guidelines rural development in the period 2007-13.

Thus the theoretical and technical framework in the design of farms shall consider the general matter of landscape quality of rural areas, since farms potentially represent centres attracting customers, big buyers and common visitors, and their peculiar form of settlement deeply structures rural landscape.

The work discusses landscape design as a technique for conceiving structural and functional organization of rural areas that seeks and materializes a deep sense of the relationship between the whole and its parts.

The work suggests the design results of the case study of the open spaces of a farm located in the hills of Imola, Emilia-Romagna (Italy), characterized by an articulated set of design constraints and functional requirements related to wine production. In fact, the experimental practice of the landscape design of the open spaces of farms represents both a very important theme in itself, and one of the main base subjects for the consideration of the broader issue of the evolution of countryside.

The theme of landscape quality came to the fore in agricultural business with reference to the needs of promoting production at national and international levels. The need for users and external stakeholders visiting the farm and for their stay in the farm, both for short time visits and longer stay at the guest-house for professional or recreational experiences related to the culture of wine, led the case-study design process through needs that usually are not part of the tradition of the project of rural farms.

The contemporary issues themselves determine the centrality of the landscape in the design and therefore of the landscape project as a philosophy of conceiving rural development.

Green Marvel – A 100-Year Integrated Vegetation Strategy for the Red River Floodway

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Abstract

The Red River Floodway is a 48 kilometre diversion channel constructed in the 1960's to protect Winnipeg and adjacent prairie communities during flood emergencies. Built in spite of great political opposition, the massive project has saved an estimated $10 billion in property damage. In 2008, it was recognized by the International Association of Macro Engineering Societies as one of the world's greatest engineering marvels for its technical achievement and foresight.

The Floodway currently is being widened to provide even greater flood security. As part of this expansion project, the Manitoba Floodway Expansion Authority is re-examining the role of this 2400 hectare landscape in the region. Where the original floodway was seen primarily as a limited access utility, the expansion project includes a visionary vegetation management strategy integral to the operation of the floodway and the growing communities flanking the channel. In addition to being one of the largest native prairie restoration projects in North America, the 100-year strategy weaves in food production, agro-forestry, alternative forage and grazing practices, carbon sequestration, habitat restoration, recreation, interpretation, and economic development. In its scale, foresight, and technical challenges, this plan is a living complement to the engineering marvel, and a boost to its sustainability and local quality of life.

Social characteristics of floriculture agribusiness in the Minas Gerais State (Brazil)

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Abstract
Floriculture features through the growth of ornamental plants, cutting plants (flowers and leaves), pot plants, flowering or not, even seeds production, bulbs, palm trees, seedling, shrub, and other gardening species. Minas Gerais state (Brazil) was currently considered 4th in national ranking of ornamental plants production. The characteristics of the production in this state, however, are unknown. Thus, aiming to carry out a diagnosis of the floriculture in the mentioned sate, analyzing social characteristics of the producers of ornamental plants trade, a survey was performed in Minas Gerais state producers from 2003 to 2005. The interviews were done *in loco*, and the individuals were identified by visiting the productive area and answering the questionnaire themselves. Studying the answers, it was found that the Minas Gerais sate ornamental plants production is practiced by 427 producers. This sector envolves 2.633 workers, being 2.591 permanents and 42 temporaries. The most part of the producers works in this activity for 4 to 10 years (48%) and, 68,9% of the producers work in this activity by the lucrativity. Others social information were observed and are described in this article.

Identification of mineral and organic waste resources as alternative materials for a fertile soil reconstitution

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Abstract
Plante & Cité is a French national technical centre dedicated to landscape and urban horticulture. The aims of this platform are to develop new scientific and technical research programs, realisations and data transfer to green spaces professionals working in local governments and landscape companies.
As for agronomy and urban soils aspects, difficulties have become to appear for many years concerning availability of materials used for fertile soil reconstitutions and tree plantations. Two options of fertile soil reconstitution are usually practiced, (i) a transported agricultural soil, or (ii) a compacted mix of transported soil and stones with a bearing capacity for pavement. Both materials - transported agricultural soil and quarry stones - are non-renewable. Besides, distances to supply materials become more and more important increasing consequently their economic and environmental costs.
This research program aims to (i) identify alternative materials from urban waste resources available and (ii) propose new options of fertile reconstituted soil by associating a mineral fraction (fine fraction or recycled stones) and an organic fraction (certainly normalised composts).
This project started in 2008 will last at least for 3 years. First, the method is based on an exhaustive inventory of potential waste resources from the European Waste Catalogue (Commission Decision 2000/532/EC of 3 May 2000). Then in 2009, a selection of 5 to 10 materials with best potential will be studied for their agronomic, geotechnical, mechanical properties and their eventual ecotoxic effects or impacts on human health and environment. Finally a third step will test in real conditions (through urban tree plantation programs) many mixtures of materials evaluated previously with laboratory studies. Here are some examples of potential materials identified thanks to the prospective study: demolition and building materials (rubbles and fine fraction), excavated soils, mineral washing residues, dredging sludge, non-toxic industrial residues and normalized composts.

Influence of soil temperature on ornamental quality of bedding plants through mulching

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Abstract

Five landscape mulches as grass-clipping, peat, bark, keramzit and paper were evaluated to determine their influence on soil temperature and ornamental quality of such bedding plants as *Impatiens walleriana* and *Tagetes patula*. Results show that mulching reduces fluctuation of soil temperature in warmer summer months. During the day and night time the most stable soil temperature stays under bark mulch. At night higher soil temperature was under paper mulch and diurnal stays in unmulched plots. Other mulches also show different results depending on day and night time. Dry weight of plant different parts also can be affected differently by soil temperature under mulching materials. Plants can produce higher flower biomass in cooler soil conditions provided by mulching. A negative correlation is found between *I. walleriana* plant flower's dry weight and the soil temperature. Changes of soil temperature have influence on growth of bedding plants in summer month. Other results will be discussed.

Tree inventory in Reggio Emilia Province.

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Abstract

The project's aim is to inventory and map all the public trees in Reggio Emilia Province, adding some private monumental trees, in order to develop a long-term maintenance plan of the trees.
The area of the project is about 230.000 Ha, crossing different landscapes: flat lands, humid areas, hills in 45 municipalities.
All the trees were identified, mapped and evaluated using a Visual Assessment Form mainly pointed at physiological, pathological and management aspects. A photograph is also taken of each tree.
The collected data were incorporated into a Microsoft Access application and AutoCAD software and presented on the web site: www.censire.it, a portal with a hierarchical controlled access.
On the web site, maps and some information of the visual forms are available.
The inventory update is made by the technicians of the Municipality or by external professionals and arborists.
"Censire" is periodically tested by the technicians of the Consorzio Fitosanitario Provinciale of Reggio Emilia.

Characteristics of the arbors in urban greening of Chaoyang district, Beijing

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Abstract
In order to improve the urban ecological environment in Beijing, huge financial capital has been invested for greening construction by the government. Accordingly, problems related the greening management and maintenance are attracting public's attention. In order to set up an efficiency digital management system, the government of Chaoyang District, a highly urbanized district in east of Beijing, started to build a data base of the greening land in 2007. As technical support, we helped to establish an evaluation system and to survey the accomplished greening land to collect all of the basic data. On the basis of analyzing the data, we present here in this paper the characteristics of the arbor composition in the greening belt. In the district, there were 72 species/cultivars of arbors which are categorized into 31 families, summed up to 670540. It included 63 kinds of deciduous trees and 9 kinds of evergreens, with category ratio of 7:1 and quantity ratio of 1.4:1. Among the 72 species, there are 55 quick-growing species and 9 slow-growing species, with category ratio of 6.1:1 and quantity ratio of 3.3:1. The species of *Salix matsudana* 'pendula' , *Pinus tabulaeformis, Platycladus orientalis, Populus tomentosa* and *Robinia pseudoacacia* etc. share high percentage in number in all kinds of greenbelts, especially the willows and poplars. The analysis revealed problems existing in the plant landscaping such as low biodiversity, too higher ratio of quick-growing species and number as well as the monotony in the way of grouping plants, etc. The data will be of great value not only for the new approach to urban greening management, but also for the references of the future landscape design.

Urban green and rural green: similarities and differences in "Comprensorio Imolese"

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Abstract
The territory of the "Comprensorio Imolese", an area of center of Italy near Bologna, has been the subject of a thorough investigation in order to highlight the differences between the rural and urban ornamental green. The natural and anthropogenic components, that were located in 3 sample areas, which were representative of 3 different territories (flat, hilly and mountainous) were surveyed and loaded in a database containing all information relating to each type of green. The results obtained were processed for the preparation of a book about the transformations of the landscape and future prospects.

Tanslocation of active ingredient using three trunk injection methods.

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Abstract
Trunk injection of trees is a way to treat many different insect and disease problems, as well as nutrient deficiencies, in an efficient and environmentally friendly way. The used active ingredient is Azadirachtin and it has been compared with the only water injection.
The functionality of these treatments has been tested to find out the best method and its effective utility in practice activities.
54 young Nettle tree (Celtis australis L.) has been testes with three instruments – Arboprof®, Arbocap® e Arborjet® – different for the injection pressure. These treatments were done using both active ingredient and water with a organic colouring. The trees were knocked down after 2-5-72/96 hours after the injection. Stems were cut until the colour was visible, and the length of the translocation profile was misured. This preliminary work suggest some changes in the next experiments, such using adult trees and increasing the knock down time.
The average of the length values explain that the best method of trunk injection is Arborjet®.

An efficient and far-sighted trees management: the case of Golf Club Verona

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Abstract
Trees management in a Golf Club is very difficult both in terms of maiuntenance and especially in economic terms.
This research, conducted in Golf Club Verona, located at Sommacampagna in northern Italy, near Garda Lake, tries to define and semplify some trees management strategies, that attempt to lower costs in middle-long periods, optimising work times and ensuring people's safety.
The research has provided for the trees census, the exact geographical position and the compilation of a card, containing information about species, diameter, shapes and phyto – sanitary conditions of each tree.
Then it has produced a GIS, able to handle every information obtained in field, to encourage a faster and efficient trees management.
The research has also considered the possibility to use microchips to insert inside each plant to improve the Golf Club management.

The "Partecipanza Agraria" in Cento: proposals for landscape enhancement, environmental improvement and enjoyment of traditionally rural areas

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Abstract
Still in use in Veneto and Emilia, the "Partecipanze Agrarie" are old forms of collective ownership of land subject to reclamation, whose origins are traced to the Middle Ages.
The research, conducted to enhance the landscape and improve the use of these traditionally agricultural areas, was conducted in Campedella locality, on lands that belong to "the Partecipanza Agraria" of a town called Cento, near Ferrara. The survey, started with historical studies and analisys of the actual area, has therefore led to the drafting of a range of solutions, designed to promote the area. Retraining of "maceri", outdoor classrooms, life paths, routes and cycle paths, tree-shrub bands are just some of the solutions proposed.

"Green masterplan: guidelines for the design of green in the town of Senigallia"

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Abstract
The research tries to define the guidelines for the design of green in the town of Senigallia, in Marche region, center of Italy.
The basic element of this project is the sustainability in environmental, social and economic terms. New strategies, innovative ideas and programming models of the "green" are the results of this research, that tries to improve the quality of the urban green, lowering maintenance costs on middle-long period.
The research has led to the drafting of the Structural Plan of the Green.

Sustainable Landscape for new Urban Residential Areas

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Abstract
New residential landscapes need to consider strategies to minimize the environmental impact. The new goals for these projects are: historical landscape preservation, rain water conservation, pollutants control, house energy control.
For a sustainable living we need more plants and less machines, we need to go back to an ecosystem processes in which man has to be part, and the landscape will respond: an attentive choice of plants helps the control of buildings temperature, minimize storm water run off and the contamination of water -bearing layer, reduce the air pollutants.
Shapes, colours and textures of plants are becoming important for human well-being.
Plants' use is revalue as spatial structural element for orienteering, instead of the over presence of signboards.
The paper shows some cases of urban residential areas where landscape is not only a decoration but also a way to preserve the ecological environment, and a place where people can interact with plants in a positive and therapeutic way against modern stressed way to live.

Bike and pedestrian paths for showing Marche fruits and vegetable germplasm in rural areas

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Abstract
The present project was meant to improve the multifunctional valorisation of the Experimental Farm of the Polytechnic University of Marche towards elementary and college students, and to urban citizens.
The Experimental Farm has already arranged several open days concerning agriculture and its technical problems and it has organised some visits for the demonstration of local traditional products and seasonality.The actual idea is to introduce the enjoy of sport and natural life style joined with the introduction of the marvellous beauty of the vegetable and fruit germoplasm.
The mountain bike tours and the pedestrian tours are studied to visit the different fields, where traditional regional varieties are cultivated. The message that we want to pass is: enjoy the nature and the human work to produce food, culture and beauty.

Prairie reconstruction as a model for sustainable landscape design in the upper midwest

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Abstract
The tallgrass prairie of North America stretched through 68 million hectares before European settlement and supported a diverse community of herbivores and their predators. The long term effect of glaciations, climate and the growth/decay cycle of plants and animals made prairie soils the most fertile and suitable for farming. Thus, for the last one hundred and fifty years, the development of large scale agriculture led to an extirpation of prairie habitats. However, an increasing interest to restore and reconstruct prairies is emerging rapidly in the Midwest region of U.S., not only in an effort to conserve biodiversity in rural communities, but also as a form of sustainable landscape for the design of urban environments. This work presents the environmental and economic benefits of employing native prairie perennials in an effort to beautify the landscape, while restoring valuable ecological services that enhance the sustainability of human dwellings. Selected arrangements of grass and forb species will be presented to inspire horticulturists and landscape architects to support enthusiastically, the feasibility of this type of design for landscapes in this unique bioregion of the USA.

Hydroponic system for growing ground cover plants on vertical surface

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Abstract
There are not many ways of increasing the vegetation surface in urban environment since it is very difficult to find out available surfaces. It could be with the well known *Vertical Gardens* or *Green Roof*. This kind of garden have been revealed like excessively expensive and not very easy to built and keep in good conditions.
Like other forms of vegetation surfaces, the ground cover plants have advantages as removing carbon dioxide and volatile organic chemicals from the air, keeping the environment cooler in the summer or warmer during the winter, etc.
Ground covers also can cover the wall as a carpet of vegetation, enhance the beauty of buildings and break up the monotony of urban landscape. Ground cover plants provide a variety of textures and colours. The list of species that can be used for ground cover has over 250 species.
In comparison to another plants traditionally used in *Vertical Garden*, most of cover species has a small radical volume and its management is minimum. Another advantage is that a ground cover should spread by itself, since they are species that produce rhizomes or stolons and they will develop rapidly into a dense cover.
In the present article we try to expose the possibility to execute easily modular sets with a minimum cost and a very brief period of execution, with an easy management.
The aim of this paper is introducing a simply and cheap structure based in hydroponic system with low density substrate and cover plants as a solution for urban areas that make difficult the use of plants in landscape designs.

Native ornamental species for landscaping and xerogardening in semi-arid environments

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Abstract

Vegetation is the most important component of any landscape project. Sustainability, biodiversity and low maintenance are the main issues underlying the current trends in landscape designing. In addition, native species are of great interest because of their ability to adapt to abiotic stresses (heat, drought and salinity). The Región of Murcia (SE Spain) is a territory of a great floristic diversity, most of them with ornamental and ecological features of great interest for landscaping and xerogardening. The purpose of this project is to develop a guide of use of native species with ornamental value for landscaping and xerogardening in semi-arid regions via web. The web contains information about ecology, nursery production methods and xerojargardening and landscape uses of a wide range of Mediterranean native species, including trees, palms, shrubs and herbaceous perennials. The data is available to the general public and to the professional sector and is expected to be increased in line with the professional sector needs. The home page explains the site map, the involved partners the species forms, links to related websites and scientific references that support all the information contained in the web. The web will be updated with a powerfull search engine that provides real-time data and advice in selecting the most appropriate to each type of project and landscape design.

Identification of Alternative Ornamental Plants in Response to Invasive Species for Landscape Industry Sectors of Hawaii.

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Abstract

In the State of Hawaii, landscape industry sectors across the state grow, specify and use ornamental plants to improve the urban environment. Unfortunately, some landscape plants escape their urban environments and become invasive. The management of invasive species in Hawai'i is estimated at $150 million annually. To help combat this, organizations are working with private and public stakeholders to reduce environmental impacts from these invasive ornamental plants. Assisting in this effort, this study is identifying the most frequently used invasive ornamental plants and selecting non-invasive alternatives. Through literature review and industry surveys, 5 trees and 5 shrubs were identified from a list of 60 highly invasive ornamental plants to be selected for possible replacement. After a match of landscape form and function, 3 alternative non-invasive trees and shrubs (1 native, and 2 exotic) for each invasive trees and shrubs were selected for invasiveness test. These selected plants where analyzed through the Hawaii-Pacific Weed Risk Assessment (WRA) to determine there invasive potential in Hawaii. Plants that rated as non-invasive were then split up into two groups: 1) plants for field testing and 2) plants for greenhouse propagation and planting. Data from this project has identified underused ornamental plants for use by Hawaii's landscape industry which is not an invasive threat to Hawaii's natural environment.

Investigating The Changing Process of Vineyards and Orchards In Kayserı City And Its Vicinity

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Abstract

Kayseri, which is a developing industry and economy city, has a deep rooted history. According to historian Stephanus, Kaisareia (Kayseri) is the capital of Cappadocia. The first settlement in the plateau in which the city is currently situated dates back to the XI century BC.

The city has settled on the north foots of the volcanic Erciyes Mountain which is the highest mountain of Middle Anatolia. Vineyard and orchard areas surround the city especially from its south. Most of these areas are in the domain of the greater city municipality. Other vineyards are in a close spatial and functional relation with the city and they tend to be merge with the city spatially and administratively.

Vineyards, their existence has known from XV. century, have been householder for Christian and Moslem communities until XX. century. In the settlement pattern, there are natural, urban, archeological and mixed protected areas. Vineyards and orchards in which a rich cultural pattern, together with viticulture, fruit growing and making wine have been impotant activities for economic intentions. Varied types of fruits have been kept as fresh or dried and molasses and fruit juice have been produced.

These areas are not suitable for agricultural an urban uses from the viewpoints of slope, soil structure and geomorphological structure. And now, a lot of house in these areas have been abandoned and neglected. Some of the historical buildings have destroyed and instead of them, summer cottages which cause a style caos have built. Vineyards - orchards and traditional vineyard life have disappeared in the course of time and lands have become smaller by dividing. And they are face to face with multi storeyed and dense urban development.

In these study, the past and present situations of vineyards and orchards will be compared, the solution proposals will be improved for make viticulture and horticulture activities alive and revitalizing.

SESSION 3

ECOPHYSIOLOGY AND VEGETATION MANAGEMENT IN THE URBAN ENVIRONMENT

ORAL PRESENTATIONS

Potential effects of global change to urban vegetation: vulnerability and adaptations

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Abstract
An urban area is a space with high population density which develops new, major and complex structures in comparison to the areas surrounding it. Urban areas may be cities, towns or conurbations.
In order to develop these structures and to maintain population and its activity, metabolism of urban areas need a lot of external sources of energy and nutrients (water, food, materials ...) and produce heat waste, garbage, sewage and pollution, which are some major problems for urban areas, and the close and far areas of it.
This metabolism develops specific microclimates, which are attributable to the large clustering of heat absorbent surfaces that heat up in sunlight, the important modifications in hydrological cycle due to drastic soil reduction and that channel rainwater into underground ducts.
This metabolism promotes major environmental changes in the urban areas. From XIX century, hygienist movement developed a new way of life of the citizens by means of gardens and landscape design. This process has been increased in the last decades in together with the development of social economy and social sensibility. As a result urbanism and landscaping have acquired a very important role in the quality of life of the people.
These environmental changes modify natural flora and potential plants used in gardening.
The main environmental factors that affect vegetation in urban areas are water stress (drought at soil and air level); flooding; salinity; radiation and light levels; wind; pollutants; competitiveness due to sources scarcity and invasive species, which are defined as global change.
Ecophysiological studies can provide objective information that ready to be used as a tool to improve the vegetation management in urban areas from design to the garden, and consequently avoid the potential vulnerabilities associated to global change.
This presentation will be mainly focused on Barcelona's vegetation.

Information about eight tree species tolerance of urban paved sites – a review from the perspective of tree planners in Scandinavia

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Abstract
Urban paved sites are complex stress environments and when selecting trees for paved sites, urban tree planners must prioritise stress tolerance above aesthetic appeal and functional aspects. The fact that unhealthy or dying trees are unattractive and unable to fulfil their intended functions makes this priority ranking unavoidable. However, this requires detailed information about the tolerance of tree species to environmental stresses, so as to support urban tree planners in selecting a wide range of trees for urban paved sites. Therefore a review of dendrology literature, literature directed at plant use in cities, and scientific papers have been carried out with the aim of: characterise species specific information available for tree planners in Scandinavia about the tolerance of trees to environmental stresses in urban paved sites; analyse any differences in the available information between much used species, species used to some extent and species with very limited use; assess the information in books and papers in relation to the needs of tree planners when selecting trees for urban paved sites. For the review, eight tree species were selected along a gradient representing their intensity of use in Northern Europe. The review shows that information is piecemeal and the majority is either too general (dendrology literature) general or too focused or contradictory (scientific literature) to meet the requirements of urban tree planners, while books directed at plan use in cities do not integrate enough the local perspective by explicitly referring to the location of the plantings from which the experiences are gained. Moreover, contextual information local to the Scandinavian region is mainly provided for the already much used species. These findings led to suggestions on how urban forestry and arboriculture research and dissemination efforts can encourage tree planners to use a greater variety of tree species in urban paved sites.

Refining Qualitative Measurements of Plant Stress for Water Conservation

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Abstract
Turfgrass drought performance is often evaluated through qualitative parameters using a numerical scale of 1 to 9. Irrigation of turfgrass is often initiated at the first sign of leaf necrosis or wilt. The inability for consumers to delineate incremental drought stress relating to plant health can result in the misuse of water resources during droughty conditions. Qualitative plant measurements may not precisely inventory drought stress characteristics such as turfgrass quality and leaf firing so as to apply across regions or climatic zones. Digital image analysis has been shown to effectively quantify turfgrass color and percent cover while removing evaluator bias; however digital imaging has not been evaluated as a drought stress indicator. A two-year drought simulation field study captured weekly images of bermudagrass (*Cynodon dactylon* [L.] Pers.), zoysiagrass (*Zoysia* spp. [Willd.], and St. Augustinegrass (*Stenotaphrum secundatum* [Walter] Kuntze) at different stages of dry down during 60 days without water. Correlations are discussed between percent green cover and relative drought canopy expression for all three species. A relationship for comparing drought studies in different regions has now been established to inventory three turfgrass species response to drought severity and different site specific environmental variables.

Sub-irrigation of Petunia: benefits in dry summers

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Abstract
With the increasing frequency and magnitude of warmer days during the summer in the UK, bedding plants which are a traditional part of the urban green landscape are perceived as unsustainable and water-demanding. During the summers when the bans on irrigation of vegetation in the public spaces were in place (2003, 2006) there was a significant decrease of bedding plants planted in the south of England, having a negative financial impact on the nursery industry. Furthermore, retaining these 'water-loving' traditional bedding plants as a feature in public and private spaces may be conditional on them being managed in such a way as to minimise their water use.
Using *Petunia x hybrida* 'Hurrah White' as a model species we aimed to discover which irrigation approach was the most efficient for maintaining plants' ornamental quality (flower numbers, size and longevity, shoot and root growth) under water deficit and periods of complete water withdrawal. Our previous work showed that irrigating containers with 50% of the full container capacity does not significantly reduce ornamental quality. Plants were grown in wooden 'root-boxes' (0.4 m (h) x 0.15 m (w) x 0.1 m (d)) where the front of the box comprised the clear Perspex which enabled us to monitor root growth closely. The irrigation treatments were:
1. watering with the amount which constitutes 50% of container capacity by conventional surface drip-irrigation (T1)
2. 50% as sub-irrigation at 10cm depth (T2)
3. 'split' irrigation: 25% as surface drip- and 25% as sub-irrigation at 15cm depth (T3)
4. 25% as conventional drip-irrigation (T4).
Plants in T2 and T3 had better ornamental quality throughout the experiment; furthermore, in T2 quality was least affected when water was withdrawn. There were no significant differences between T1 and T4. The root growth was smaller at deeper soil surface levels for T1 which indicates that irrigation methods like T2 and T3 and stronger water deficits encourage deeper root growth. It is suggested that sub-irrigation at 10cm depth with water amounts of 50% container capacity would result in the most root growth with the maximum flowering for *Petunia*.

Effect of Marine Aerosol on Seaside Grown Plants

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Abstract
Aerosol marine strongly affects the growth and development of urban, garden and landscape plants. The few studies available are focused on sodium chloride effect on plant growth, usually applied in the irrigation water or substrate media. No information are available on ecophysiology responses of plants to marine aerosol. Therefore, the aim of this work was to evaluate the physiological responses of different plant species to sea water nebulisation treatments. Plant species were selected among those that are commonly used along seaside and among those that might be potentially used for this purpose. Plants were bought in local nursery and species used were *Acacia cultriformis*, *Callistemon citrinus*, *Carissa edulis microphylla*, *Gaura lindheimeri*, *Jasminum sambac*, *Westringia fruticosa.* Plants were placed in randomised block in greenhouse and treated once everyday for 5-10 seconds with sea water or irrigation water (control) using a nebulisation system.
The effect of marine aerosol was studied by monitoring leaf chlorophyll *a* fluorescence, SPAD measurements, leaf osmotic potential, leaf area damage by image analysis tools and leaf gas exchanges.
Results were different among species. The effect of treatment was represented by leaf necrosis, reduction of chlorophyll a fluorescence and photosynthesis. The most resistant species was *Callistemon citrinus.*

Root adaptations of Mediterranean species to hypoxia and anoxia

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Abstract
Mediterranean species are popular ornamentals in the UK and well suited to the predicted climate change scenarios of hotter drier summers. This work investigates how these species respond to the wetter winters also predicted. More intense and unpredictable rainfall bringing spring and summer flooding are also possible future problems, especially in urban environments where soil sealing may restrict drainage.
Initial work on flooding of four Mediterranean species (*Lavandula angustifolia* 'Munstead', *Salvia officinalis, Stachys byzantina and Cistus x hybridus (syn. C. x corbariensis*) in a pot experiment, showed that the effects of waterlogging were only severe when the temperature was high and flooding prolonged. All plants survived the flooding in winter, but during the summer a 17-day flood resulted in the death about one third of the *Salvia officinalis* and *Cistus corbariensis*.
To examine the response of roots to oxygen deprivation over a range of conditions from total absence of oxygen (anoxia), low oxygen (hypoxia) and full aeration, rooted cuttings of *Salvia officinalis* were grown in a hydroponic-based system and mixtures of oxygen and nitrogen gases bubbled through the media. Anoxia was found to reduce root length dramatically. When the plants were subjected to a period of hypoxia they responded by increasing the production of laterals close to the surface and increasing nodal root production thus enabling them to acclimate to subsequent anoxia. This greatly increased their chances of survival.

Effects of irrigation treatments on physiological parameters of *Photinia* x *fraseri* "Red Robin and in *Viburnum lucidum* grown under drought conditions.

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Abstract

Understanding of physiological responses to drought stress in ornamental plants can be very useful to optimize their use in urban architecture, expecially in regions characterized by long dry periods such as Mediterranean countries. *Photinia* x *fraseri* "Red Robin" and *Viburnum lucidum* are two examples of broadleaf hedge shrubs; the first is widespread all over Italy, while *V. lucidum* is relatively unknown and scarcely used for urban landscaping, except in dry regions as Sicily.The aim of the research is to evaluate the effects of different irrigation treatments on some biometric and physiological parameters in these two species in order to assess their adaptability to drought stress and to optimize their use for urban hedges. The experiment was conducted in a greenhouse; the plants were grown in pot filled with peat and pumice (1:1) in order to control the moisture content in the rooting zone all over the growing period. The irrigation was regulated by means of soil moisture FDR sensor; it was activated whenever moisture content reached value of 73%, 66% or 80% (control) of container capacity. In a different treatment the moisture content was maintained constantly at 73%. Net phothosyntesis, stomatal conductance, water use efficiency, chl a fluorescence and some biometric parameters (leaf area, root growth, biomass accumulation) were monitored periodically during the experiment. A parallel experiment was conducted by growing the two species in open field with different irrigation frequency with the goal to obtain a first evaluation of their behavior under conditions similar to those typical of urban landscape. *Photinia* "Red Robin" showed a greater adaptability to water stress, expecially where water supply was reduced in terms of irrigation frequency. On the contrary, *V. lucidum* showed less adaptability and significant differences between treatments and control.

Sustainable water use in urban landscapes in the 21st century: a Las Vegas perspective.

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Abstract

Water conservation in the urban landscape can and should occur in every region of the United States. However, in communities located in arid regions of the southwestern United States, a higher percentage of the water is used outdoors. In Las Vegas, the residential sector uses approximately 60% of all the water, with approximately 70% of that water used for the irrigation of residential landscapes. Many communities including Las Vegas continue to grow at a rapid pace while facing an uncertain future with regards to water resource availability. Water managers must plan for a future where more people exist, less water is available and some of the water available for use is of poorer quality. In light of this, are cities located in arid and semi arid regions sustainable? In particular, are urban landscapes sustainable with regards to water? Gleick et al (1995) defined sustainable water use as "the use of water that supports the ability of human society to endure and flourish into the indefinite future without undermining the integrity of the hydrological cycle or the ecological systems that depend on it". Based on this definition, many communities in the southwest may find it difficult to maintain water sustainability in the 21st century. Baker et al. (2004) suggested that a "severe drought might be the tipping point that will test the resilience of desert cities". In the purest sense, landscapes are sustainable only if they do not require any additional resources, that they achieve a certain level of self sufficiency. Although this goal can be attained in wetter regions; arid and semi arid regions can only hope to move toward a greater level of water use sustainability. It is therefore appropriate and critical that cities implement conservation programs that emphasize significant water use reduction on urban landscapes.

Irrigation Water Conservation for Urban Lawn Areas

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Abstract

High temperatures, limited precipitation, and uneven annual rainfall distribution in many parts of the world limit the sustainability of adequate turfgrass growth and quality unless frequent and abundant irrigation is applied. In addition, lawn irrigation in residential and industrial areas in particular has been identified as a major source of high potable water use during the summer months, as irrigation water is applied in excess of a evapotranspirative demand. Consequently, strategies aimed at conserving potable water use for turf irrigation are encouraged. There are several options to reduce or eliminate the amount of potable water used for turf. First, potable water used for irrigation could be eliminated completely and replaced by recycled or low quality ground water that does not meet standards for human consumption. Second, low water use grasses that are adapted to the local climatic conditions present could be used. Third, adopting the most efficient available method of irrigation would reduce water losses significantly, and fourth, a combination of all three measures could be used. The paper will discuss in detail the impact of all aforementioned strategies on turfgrass irrigation water use in an urban landscape.

Efficient irrigation and water use in urban landscapes

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Abstract

Urban population growth, improved living standards, limited development of new water supplies, and dwindling current water supplies are causing the demand for treated municipal water to exceed the supply. Although water used to irrigate the residential urban landscape will vary according to factors such as landscape type, management practices, and region, landscape irrigation can vary from 40 to 70% of household use of water. So, the efficient use of irrigation water in urban landscapes must be the primary focus of water conservation. In addition, plants in a typical residential landscape often are given more water than is required to maintain ecosystem services such as carbon regulation, climate control, and preservation of aesthetic appearance. This implies that improvements in the efficiency of landscape irrigation will yield significant water-savings. Worldwide, urban areas face different water supply and demand issues and a range of factors will affect how water is used in the urban landscape. Our presentation summarizes how irrigation and water application technologies, landscape design and management strategies, the relationship between people, plants, and the urban landscape, the reuse of water resources, economic and non-economic incentives, and policy and ordinances impact the efficient irrigation and water use in urban landscapes. We recommend that communities adopt water application technologies and specify the level of uniformity and management needed for their irrigation systems to maximize irrigation efficiency. Urban water managers must use water budgets to schedule irrigations. A tiered-rate water pricing structure that is based on a water budget decreases water consumption without compromising the quality of the landscape. So, municipalities that are committed to efficient water use in the urban landscape might want to consider a water budget-based, tiered-rate pricing structure. Reuse water and filtered nursery runoff can be used to irrigate the urban landscape. Effective landscape ordinances can cause significant water savings in urban landscapes.

Eco-friendly methods of winter maintenance in Krakow green areas

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Abstract

European Commission report estimates that Krakow, one of the oldest and historical Polish city, belongs to large European cities with poor air quality. It is known that urban vegetation improves inhabitants quality of life because of active contact with nature by gardening and increasing peoples comfort. Trees play a crucial role in urban environment. They fulfill esthetic, socio-cultural, ecological, health-promoting and economic functions. Urban development and related human activity bring many risks to green areas within urban space. Plants are exposed to stress connected with water, soil and air pollution. Living space, harmful light and thermal conditions, drought, high density and changeable soil pH with excessive salinity are further disadvantages. European and Northern American cities have to cope with a serious danger of tree die-out. It is caused mainly by the use of de-icing chemicals in winter, particularly sodium chloride applied due to the cost-effectiveness and availability.

The paper describes traditional de-icing chemicals used in urban areas and newly developed sodium chloride substitutes. Moreover, prophylactic methods aimed to prevent negative impact of de-icing campaigns, rules of planning and design of urban landscape, and reasonable management measures and pro-ecological modern technologies reducing and reversing consequences of inappropriate actions are presented.

Downscaling of ecophysiological information from natural communities to urban trees.

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Abstract

Knowledge about ecophysiological attitudes at tree level is basic for a correct knowledge of the performance of each species in different environments, and for the comprehension of the mitigation and compensation aspects that urban vegetation may exert. Data on photosynthesis and stomata conductance may be obtained from measurements at single leaf level, but their upscaling to plant level is very complex, due to the needs of considering light extinction patterns within complex canopies, and all the other regulatory physiological and physical factors. This paper starts from the opposite direction: scaling down information about single trees photosynthesis and stomatal conductance from data collected at stand level.

Invasive exotic trees in the conservation units in Curitiba, Brazil

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Abstract
With the aim of conserving urban biodiversity, the municipality of Curitiba, Brazil, preserves 313 ha of woodland in parks and urban woods, which comprise the 22 municipal conservation units (CUs). These areas represent 5% of the area of urban forest. One of the greatest problems worldwide in the loss of biodiversity in conservation areas is their infestation by invasive exotic trees (IETs). The objective of this study was to inventory the IETs, with a diameter at breast height (DBH) more than 10 cm, present in the 22 CUs of Curitiba to assist with future actions aimed at controlling them by municipal public authority. This inventory is based on a list of IETs prepared by the Environmental Institute of Parana (Ordinance no. 095, May 22, 2007). Results obtained demonstrated that the most common species were broad-leaf privet - *Ligustrum lucidum* (39.75%), sweet pittosporum - *Pittosporum undulatum* (21.61%), pine - *Pinus* spp (10.34%), eucalyptus - *Eucalyptus* spp (9.37%), japanese raisin tree - *Hovenia dulcis* (8.66%), and black mulberry - *Morus nigra* (7.59%). The forests João Paulo II, Gutierrez and Parque da Barreirinha were the locations that showed the greatest density of IETs (number IETs/ha of woodland of the UC). A greater regeneration was observed for IETs (more than 100 individuals of the same species with a DBH less than 10 cm) in the parks Atuba, São Lourenço and Tingui and the forests Alemão, Gutierrez, João Paulo II, Portugal, Reinhard Maack and Irmã Clementina.

Individual valuation of street trees. Young Linden trees on Viale Cavour, Ferrara.

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Abstract
Street trees participate to the identity of a place and to its consistency. The traditional tree training consists in pruning in order to maintain a regular form of the trees. It doesn't take into account 1) the specific growing habit of the tree, 2) the unavoidable strong heterogeneity of the trees alignment due to severe and heterogeneous urban conditions. This leads to unstructured and often damaged trees and to a more heterogeneous alignment.
Individual diagnosis and treatment adapted to each tree.
In an urban tree population, the concept of "mean tree" has no signification. Diagnosis and treatment must be adapted to each individual tree. We proceeded in 5 steps.
1.- We have first established a standard to describe the morpho-physiological development of any tree species from birth to death. It is composed of 10 stages which can be summarized in 4 phases: 1) apical dominance of the trunk triggers height growth of the young tree, 2) transfer of apical dominance to the main and secondly to secondary branches leads to the establishment of the definitive canopy in the young adult tree, 3) permanent epitone renewal (reiterative process) of branches which allows the mature adult tree to endure injuring and senescing processes, 4) progressive regression of the reiterative process in the senescent tree which leads to the reduction of its root system and canopy.
2.- The standard has been adapted to each species.
3.- Each tree is compared to the specific standard to determine the development stage and eventually a pathological state.
4.- The trees are split in classes or types .

5.- Each type of tree is associated to a treatement (e.g. pruning)
Application to the 147 Linden trees of Viale Cavour.
The trees planted in 1985 on Viale Cavour in Ferrara were evaluated and pruned in 2000. They were evaluated again in 2003 and 2008. We could confirm the predicted evolutions of the different classes of trees, especially reactions to the adapted pruning techniques; but the strong differences between vigourous and weak trees increased faster than predicted.

The use of *Heliconia x nickeriensis* in landscape design

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Abstract
Heliconias plants and inflorescences are of great beauty due to its colors and forms. In Brazil the designer Roberto Burle Marx started the tradition of using heliconia for landscaping. Nowadays, this genus are used in private or public gardens and as cut flower. Most of the species are vigorous plants, easy manteinence and present long flowering period. The objective of this study was to evaluate *Heliconia x nickeriensis* Maas & de Rooij ornamental characteristics and management for landscape use. The study was carried out at Heliconia Collection from the Federal Rural University of Pernambuco state (UFRPE), Brazil, from January 2007 to July 2008. *Heliconia x nickeriensis* is identified as short height plant. The dark green leaves contrast with the yellow-orange inflorescence that are easely visualized above its foliage allowing plenty apretiation. This heliconia present quick development, with a dispersed type of clump architecture and open growth habit. The clump area reached 5,14 m^2 at 18 months after planting (MAP). It demonstrade the necessity of large space or the use of borders. The emission of shoots in the internal part of the clump, permited the complete coverage of the soil. The flowering period started nine MAP, reaching an emission of 15 inflorescence per clumb 18 MAP. The inflorescence in the clump kept the quality for more than 25 days after the emittion. These genotype represent a good option to be used isolated for covering large open areas or grouped with other ornamental plants to great compositions with diferents colors, forms and textures.

Rehabilitation for Severely Compacted Urban Soils to Optimize Tree Establishment and Growth

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Abstract
Three soil rehabilitation protocols were evaluated to determine their effects on soil physical properties and tree establishment, root development and other growth parameters for five deciduous urban tree species. Rehabilitation plots were scraped and graded according to common construction protocols. Subsoil compaction to an average bulk density of 2.0 g/cm^3 was achieved following topsoil removal with a vibrating compactor. The rehabilitation protocols under evaluation consist of several combinations of soil amendments and/or mechanical loosening techniques: Undisturbed (no topsoil removal, no compaction, and no amendments), Minimum Effort (topsoil amendment only), Enhanced Topsoil (topsoil amendment, rototilling) and Profile Rebuilding (compost amendment, subsoiling with excavator to a depth of two feet, topsoil amendment, rototilling). The treatments are arranged in randomized complete block with six replications. The effect of the rehabilitation treatments on soil physical properties is evaluated with bulk density. Bulk densities of 1.65 g/cm^3, 1.92 g/cm^3, 1.84 g/cm^3 and 1.35 g/cm^3 were measured for the treatments, respectively. The effects on tree growth and development is evaluated in terms of tree root length and distribution in the soil profile measured with a minirhizotron, shoot length, trunk diameter, leaf photosynthesis, chlorophyll content, fluorescence and water potential. First year average cross-sectional area increase by species ranged from 48-130% (Undisturbed), 26-125% (Minimal Effort), 42-127% (Enhanced Topsoil) and 71-195% (Profile Rebuilding).

Street tree root development in topsoil amended with great level of compost

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Abstract
High supply of organic matter can considerably improve urban soil physical properties and tree root growth. In return, tree root development can induce changes of bulk soil physical properties. Up to now, such tree root interactions have been hardly studied in the literature.
In October 2004, forty two big box containers (600L) were filled with two layers of substrate. The underlying layer (25-40 cm depth) was constituted of sandy loam. The topsoil layer (0-25 cm) was enriched with organic matter 40% (v/v). Three organic products were tested: green waste compost (GW), sewage sludge and woodchips compost (SS) and, sphagnum peat (SP). The control container was composed of two layers of sandy loam. Ostrya carpinifolia Scop were planted into twenty one containers. Two years after planting, dry bulk density, surface permeability and root development (total root dry mass, root impact number and distribution) were measured in containers with and without tree.
Organic matter had significant effects on the physical properties compared to control with a decrease of the soil bulk density and an increase of the surface permeability (GW>SS>SP>control). At the same time, organic matter improved the total root dry mass and the thin root number (diameter <1mm) (GW>SS>SP=control). The underlying layer was unsuitable for root growth with small root numbers. Conversely, the tree root development had almost no incidence on the bulk soil physical properties: for each organic product, comparing containers with and without tree, statistical analysis did not show significant differences of bulk density and surface permeability values.
Globally, great level of compost increased physical properties and thin root development but after two years, soil physical property measurements did not seem to be influenced by roots. Further observations five years after planting will be conducted in order to better assess the tree root impact on soil structuration.

How does compost improve the agronomic properties of planting holes?

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Abstract
Physical properties of urban soils are often limiting tree development. Urban soils are compacted, resulting in reduced water and air infiltration, and insufficient root growth. For street trees, the planting hole can be filled with different soil materials. The most often used is topsoil earth, which can be mixed in the upper part of the anthropogenic soil with organic matter, just before tree plantation. Green waste compost is the main organic product used. Added volumes vary from 10 to 50% of the earth volume, that is to say about 30 times more than for organic inputs in agricultural fields. But only a few studies focus on the influence of such high levels of organic matter on soil physical properties and tree development.
To investigate this, we built an experimental design in October 2004. Soils for tree plantation were reconstituted in 600L boxes with two layers. The top layer was a sandy loam amended with 20% or 40% of composts or peat. We measured soil properties during four years. Carbon contents decrease rapidly in all mixtures, related to biological stability of organic matter, but remain higher in 40% volume mixtures. Compost addition increases structural stability, porosity and hydraulic conductivity, especially with 40% volume. Tree developments in reconstituted soils were more important for composts than for peat, because of different nutrient supplies. Soil physicals properties were nearly not improved in soil reconstituted with 20%. These results clearly put the emphasis on the interest of incorporating great level of organic matter in urban soil.

The Role of Urban Vegetation in Filtering Fine Airborne Particulates

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Abstract
Fine airborne particulates (PM2.5, particles with a diameter < 2.5 µm) contribute to cardiopulmonary disease and their levels are regulated by governments worldwide. Awareness of the ecosystem services provided by vegetation has spawned interest in using trees as part of the strategy for reducing PM2.5 concentrations, especially in cities where levels are elevated by industrial and vehicular emissions. Models like the Urban Forest Effects model (UFORE) predict that the urban forest removes < 1% of PM2.5 at the city wide scale but cannot address the role trees play at the scale of individual parks and other small landscapes. It is at this scale where design could reduce exposure to local emissions, but species specific performance values have been lacking. We conducted wind tunnel comparisons of tree species representing a wide range of leaf morphologies to quantify differences in deposition velocity and extinction rates of particulate plumes. Although there are statistical differences among species with different leaf types, the filtering effect is small. Indeed, deposition to the interior surfaces of the empty tunnel exceeded deposition to the tunnel containing leafy branches. In all likelihood this is caused by particles being entrained in eddies downstream of leaves, thus having longer average residence times in the air. These findings lead to the conclusion that particle size, not surface characteristics, is the major determinant of deposition. Field measurements in and around different canopy types and at varying distances from roadways show that particle concentration not only decreases with distance from source but that hedges reduce particle concentration immediately down wind. This probably results not from filtration but from deflection of particle laden air over and around the canopy. While trees are inefficient filters, there may be legitimate opportunities for urban design to protect priority areas. Caution must be exercised when estimating the magnitude of this protection, however.

Urban trees and air quality: Nitrogen dioxide levels inside and outside urban tree canopies in Springfield, Massachusetts, USA

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Abstract
Urban and periurban environments are sources of air pollutants, resulting primarily from combustion processes. Nitrogen oxide (NO) is emitted from combustion of fuels. NO becomes nitrogen dioxide (NO_2). NO_2 is the signature pollutant typical of urban environments. NO_2 is also the starting point of the photochemical oxidant cycle, whose principal product is ozone (O_3). O_3 can accumulate and affect human and plant health. Reduction of NO_2 is likely to reduce O_3 in urban environments. Plants, particulary trees, have been shown to take up NO_2 at high concentrations under controlled experimental conditions. Large computer models have been used to quantify uptake and removal of NO_2 by trees in cities indicate that trees are a significant factor in NO_2 removal. Verification of the results with actual data obtained under ambient urban conditions is lacking. We have begun to address this need in a project in Springfield, Massachusetts, USA. A heavily traveled interstate highway runs through the city and is a source of NO_2. NO_2 is monitored with passive samplers (Ogawa) outside and inside the canopies of red maple (Acer rubrum) and London plane (Platanus x acerifolia) trees in plots along transects from the highway. NO_2 concentrations are consistently higher inside canopies of both trees than outside, a trend that continued throughout the 2008 growing season. We are continuing to investigate the significance of these unexpected results.

Direction in seeking for tomorrow's city trees – habitat studies as a selection model

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Abstract
Trees can be exposed to severe stresses in the urban environment, such as the lack of soil volume, and insufficient supply of water and nutrients. As a consequence, numerous city trees are found to be in a bad condition or even dying which reduces their aesthetic and recreational values as well as their ecological functions to moderate climates, capture air pollutants and serve as a habitat for wildlife.
Two approaches to address the problems are, first, to improve the growing conditions mainly under ground and, second, to search for plant-material, better adapted to the harsh environmental conditions in urban areas. Recent research has concentrated on improvement of site conditions, while selection of suitable tree species has received less attention. The choice of species used in urban areas is often quite narrow with an uncertain adaptation for urban environment among many if the species. This narrow catalogue of urban species can also jeopardize the future for urban greening depending on the risk for new serious tree-killing pests. Therefore, identification and testing of new species is required, better adapted to the urban environment.
An approach for plant selection is presented to find and select suitable trees for paved city environments from habitats where trees have naturally evolved under conditions which resemble the urban environment.

SESSION 3

ECOPHYSIOLOGY AND VEGETATION MANAGEMENT IN THE URBAN ENVIRONMENT

POSTER PRESENTATIONS

Urbanization effect on floristic and landscape patterns of green spaces in Guangzhou, China

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Abstract

The study asked two research questions: (1) How would rapid urbanization affect urban plant biodiversity? (2) How could the findings be applied to urban nature conservation? Managed green spaces in Guangzhou (south China) in nine districts were assessed to establish the floristic inventory. The relationship amongst species richness, diversity and urban development were analyzed by community ecology indices, cluster analysis, and statistical tests. The flora of 1033 vascular species was dominated by a small number of popular, evergreen and exotic species, accompanied by many rare species and urban endemics dwelling in small and scattered ruderal and remnant natural sites. By species richness, tree was the dominant growth form, followed by herb and shrub. Widespread adoption of western landscape style has brought exotic lawns and suppressed indigenous herbs.The urban vegetation contained two subpopulations: urban pan-tropical exotics and local-regional natives. Species richness and diversity, despite stressful site conditions and habitat simplification, was only slightly below urban-fringe secondary forests. Variations of species diversity between districts were not significantly correlated with development history and green area. Old and young districts offered disparate conditions for species enrichment to establish divergent floristic and growth-form assemblages. Urban species profile and multiplicity were mainly influenced by pragmatic human needs and changing landscape fashion rather than nature enhancement or inheritance. Massive urbanization in China and other developing countries could integrate urban nature conservation through habitat preservation, habitat creation, and a more naturalistic approach to landscape design and management.

Leaves of *Quercus ilex* as indicators of airborne trace element distribution in Lucca (Central Italy).

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Abstract

Ambient air has always contained particles, ranging from sub-micrometric aerosols to clearly visible dust and sand grains. Plants have evolved to maximise light interception and CO_2 assimilation and, as a consequence, they are also highly efficient receptors of airborne pollutants. The use of plant tissues has since long been shown to be an effective indicator of metal air pollution. Leaves of the evergreen species *Quercus ilex* were used as a passive monitor to describe the distribution of selected elements in the area around the Walls of Lucca (Central Italy).

Unwashed healthy mature leaves collected in June 2006 from 16 sampling sites were analysed by ICP-MS for Al, Ba, Be, Bi, Br, Ca, Cd, Cl, Co, Cr, Cs, Cu, Fe, K, Li, Mg, Mn, Mo, Na, Ni, Pb, Si, Ti, V and Zn. Values were normalised by subtracting baseline concentrations of biologically essential elements coming from *Q. ilex* plants collected into Botanical Garden of Lucca.

Enrichment factors (EF) were calculated taking Al as crustal reference element. Cd, Cu and Zn exhibited the highest EF, with values ranging between 100 and 1000. Varimax rotated factor analysis allowed to identify three main source groups of elements, namely crustal components, sea-salt spray and anthropogenic sources (vehicular traffic, industrial activities). The factor one (crustal components) explained 48.3 of the total variance. Common high loadings for this factor were Al, Bi, Br, Co, Cu, Fe, Si, V, and Zn, which indicate a predominant soil contribution. Results are discussed with emphasis on the potential role of vegetation for the removal of particulate pollution.

Ecophysiological and histochemical responses to ozone in tree species can be influenced by the provenance?

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Abstract
It is well known that the responses of trees to air pollutants vary between and within species under strong genetic control, but this phenomenon can be also regulated by plant provenance.
Leaf symptoms attributed to ozone (O_3) have been detected in a growing list of tree species such as ash, commonly planted in urban area and also important forest trees in Italy.
Two-years old seedlings of *Fraxinus ornus* and *F. excelsior*, represented both by two provenances (Piedmont e Tuscany) were exposed to O_3 fumigation (150 ppb for 8 h d^{-1}, 35 d) and compared to controls maintained in filtered air. After twenty days of fumigation, treated *F. excelsior* developed chlorosis and adaxial necrosis on mature fully expanded leaves. This was true for both provenances even if different photosynthetic efficiency was observed. Ozone directly influenced in some cases stomatal aperture, because stomata are closed prematurely, inducing a slow CO_2 movement into the leaf; in other cases, stomatal closure resulted as disturbances in the photosynthetic apparatus.
On the contrary, *F. ornus* showed variations between the provenances; trees from Tuscany were generally more tolerant to O_3 in terms of injury than those from North Italy.
Histochemical markers such as autofluorescence, the presence of cell-wall thickenings, the enlarged cell vacuole and the typical necrotic lesions of palisade tissue were investigated in order to understand if symptoms induced by O_3, being independent of the taxonomic position of species, allow differential diagnosis of O_3 injury. Moreover the final purpose of this work was to analyze species-specific and provenance-specific antioxidative capacity and to compare the antioxidant capacity of symptomatic (O_3 visible-injury) and asymptomatic (O_3-symptom free) leaves.

Ozone, CO_2 assimilation and PSII function in urban trees: the case of *Tilia americana*.

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Abstract
Air pollution is one of the main environmental problems in urban areas and not only. In particular, ozone (O_3) concentration in urban atmosphere during the warm season may be, for many hours, well above 100 ppb. Plant responses to O_3 vary significantly among species: the genus *Tilia,* for instance, generally does not show any foliar injury induced by O_3 under natural conditions.
Measurements of leaf gas exchange under saturating light and chlorophyll *a* fluorescence parameters were performed on *Tilia americana* L. during 45 consecutive days of O_3 exposure (120 ppb, 5 h d^{-1}). Although at the end of the fumigation the plants did not exhibit any visible foliar symptoms, ecophysiological parameters were altered starting from 15 days after the beginning of treatment. Ozonated plants compared to controls showed stomatal closure (-9.2%) and increased intercellular CO_2 concentration (+15.7%), leading to a significant decrease of photosynthetic activity (-24.5%). The reduction in CO_2 assimilation was confirmed from the light curve at high light intensities. Fluorescence parameters analysis (at the end of the treatment) suggested that the light reactions were virtually altered in treated plants as demonstrated by a significant reduction (-7.4%) of the maximum efficiency of PSII (F_v/F_m), that was preceded by a change in photochemical quenching (-17.1%) and in quantum yield of non-cyclic electron flow (-33.5%), indicating an effect on the PSII reaction centre by O_3.
This paper shows that physiological tools, such as gas exchange and chlorophyll fluorescence analyses play an important role in the early detection of environmental stress, even without symptom development, and could constitute an improvement for the management in urban environment.

Ethylenediurea (EDU) protects sensitive trees and shrubs from ozone injury

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Abstract

Ozone (O_3) is the air pollutant of major concern for vegetation, because of its elevated phytotoxicity and widespread distribution. In the Northern hemisphere, background ozone levels have increased 2-4.5 times since the pre-industrial age. Although precursor emission is decreasing, background levels are still increasing (0.5-2% every year). Ozone concentrations in the cities are usually lower than in suburban and rural areas, but levels in Mediterranean cities may exceed the criteria for vegetation protection. Ozone may induce a number of plant responses - including leaf visible injury, premature leaf senescence, growth reduction, altered water balance, predisposition to other urban stressors like water deficit or pathogen attack - that affect the ornamental value of urban forests. Antioxidant application may protect sensitive plants from ozone injury. The most successful synthetic antioxidant is N-[2- (2-oxo-1-imidazolidinyl)ethyl]-N'-phenylurea (ethylenediurea, abbreviated EDU). EDU is effective in protecting crop and tree species when regularly applied. EDU is rapidly transported in the acropetal direction, probably via the xylem stream, and accumulates in the apoplastic space of the leaves, but for a limited time. EDU in leaves is not transported from them to leaves that have developed since EDU treatment, hence the need for application at 1-3 week intervals to provide continuous protection for newly-formed leaves. The application to adult ornamental trees, however, is technically difficult. Foliar spray and soil drench would require a prohibitive amount of EDU to treat large trees. Injection and infusion in a tree trunk require making an entry hole. We summarize the most recent results of EDU application to ornamental trees (*Fraxinus excelsior*) and shrubs (*Hibiscus syriacus*) in Italy. The results show that EDU can be used for scientific (analysis of ozone mechanisms and effects), diagnostic (determination of ozone involvement in visible injury occurrence in the field), and practical aims (protection of ozone-sensitive plants).

New aspects on the impact of vegetation in urban environment.

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Abstract
Benefits of trees in the urban environment include reduction of pollution and atmospheric carbon, shading and reduction of temperature, better visual impact and an increase in human health and well-being. Trees can emit gases known as volatile organic compounds (VOC) that can contribute to the production of pollutants, especially ozone and particles. This new aspect, relating to the impact of vegetation in urban areas, is receiving increasing attention. The present study investigated the effectiveness of different forest species in carbon sequestration, and screened and quantified VOC emission in order to provide useful information for a correct and innovative management of trees for the improvement of air quality and life condition in urban environment.

Evaluation of salinity tolerance in *Buxus* spp.

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Abstract
Urban green area design and management require deep knowledge on environmental context. Many abiotic stresses can compromise the vitality and the aesthetic value of plants, such as salinity. Especially in the Mediterranean regions, characterized by hot, dry summers and cool, wet winters, several urban green areas are on salt-affected soils, irrigated by saline water, affected by sea aerosol or contaminated by antifreeze solutions.
Salts exert their toxic action on plants both indirectly and directly. Indirect damages are caused by an increase of the osmotic pressure. Direct damages are caused by the contact of salts with foliar or root tissues that induces diffused or local necroses and alteration of chlorophyll content. Thus, information about salt tolerance in ornamentals are needed in order to select species suitable for urban environment.
This work aimed to investigate the response to saline stress in two species of *Buxus* commonly used in Mediterranean green areas. One-hundred twenty plants of *B. sempervirens* and *B. microphylla* were grown from January to June 2006 at the Experimental Centre of the Faculty of Agriculture of the University of Turin (Italy) and submitted to two NaCl solutions (0.125 N and 0.25 N), applied at the beginning of the experiment by immersion or perfusion. Colour variation, determined by means of spectrophotometer and visual check, SPAD values and leaf chlorophyll content were evaluated each two weeks. Differences between NaCl supply methods and between species were observed. Perfusion with NaCl, unlike immersion, negatively affected plant growth and ornamental characteristics. In particular, foliar damages appeared in *B. sempervirens* perfused with both NaCl concentrations after 72 days, in *B. microphylla* after 87 days with perfusion at 0.25 N NaCl.

Bioherbicides for the urban environment

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Abstract
Weed presence in urban environment is undesired and implies that appropriate weed control measures should be undertaken. Eco-compatible weed management appears to be of greater importance in the urban environment than in the agro-ecosystem, as the high density of the urban population would imply a serious risk for human health if chemical weed control is applied on a large scale. Indeed, the application of the common herbicides in an urban context has enormous impact not only on the quality of the surrounding ecosystem but above all on the health of citizens exposed to the prolonged presence of herbicides in the atmosphere. In this background the efficacy of essential oils extracted from several Mediterranean asteracee was tested against two common weeds: *Portulaca oleracea* and *Digitaria sanguinalis*. Asteracee species as essential oils source were selected as a function of their typical rusticity in the perspective of their easy cultivation as crops for a new industrial production of natural herbicides. Indeed, the aim of the experiments was to explore the possibility to obtain an economic source of essential oils. The overlapping of quanti-qualitative productivity (plant biomass and % of extracted essential oils) and their efficacy indicate the good performance of some species such as *Artemisia verlutorum*, *Artemisia annua*, *Otanthus maritimus* and *Xanthium strumarium*. Their use as pre-emergence and/or post-emergence bio-herbicide was discussed as a function of the phytotoxic or phytocide effects of the several essential oils extracted from each plant species.

New guide-lines for urban landscapes plan and management by organic and ecological methods (Landemed)

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Abstract
Landemed is the first Associative Project that has elaborated and set-up a complex of methods and criteria for planning and managing urban green spaces of social interest, referred to urban eco-systems (public gardens and parks) and to semi-natural ecosystems (historical gardens, botanical gardens, thematic gardens and garden centres) characterised by the typical botanic, naturalistic and landscaping profiles from the Mediterranean Basin.
In order to apply this idea, the Association Landemed has:
1) designed an own logo / label
2) set-up different giude-lines for the organic management and planning, and the certification of urban and semi-natural ecosystems as previously defined, according to European and international standards
3) developed and organized a training system oriented to Institutions and professional's profiles, in order to qualify different skills to different tasks: a) *Professional's Offices – Freelances* (Landscape Architects, Agronomic and Naturalistic Engineers) for extending and implementing expetise in planning urban green spaces, and for service certification, according to Landemed guidel-ines. b) *Public Administrations and Organizations* for urban green spaces management and certification, according to Landemed guidel-ines. c) *Green Gardeners* for extending and implementing expetise in managing urban green spaces, and for service certification, according to Landemed guidel-ines.
4) set-up projects and actions, on its own and/or under assignment from other Organizations, in order to reach the aims previously reported.
In addition, Landemed will be
1) organizing conferences, exhibitions, training courses in order to promote the mission and the programs of the Association Landemed
2) co-operating together with organizations or individuals that operate and support diverse programs that help to protect the environment, both in the social and in the cultural fields
3) acting according the Valore Sociale standard.

Individual valuation of street trees. Old Sophoras on Piazza Capitaniato, Padova.

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Abstract
Seven 140 years old Sophoras are the remaining trees from an ancient alignment across the historical Piazza Capitaniato in Padova.
The old Sophoras were topped several times on main branches, resulting in hollow and thin-walled scaffold branches and trunk. Main roots were cut when the pavement was removed and injuries occur regularly at the collar. Nevertheless the trees are still vigorous and their dimensions exceed the mechanical capacities of scaffold, trunk and roots. Substitution of the trees by new ones is "politically" impossible.
What are the biological characteristics of the Sophora?
1) On young trees or after topping, long shoots (1-3 meters) develop at the tip of the last year's long shoot : the branches grow very fast. 2) After few years, however, the annual growth decreases (50 cm) and apical inflorescences develop. 3) On the upper side of the bending branches, new shoots (reiterations) develop if the number of branches is not too high. 4) The wood is light (530 $g.dm^{-3}$), flexible and doesn't break easily. 5) The cambial activity is exceptionnally high.
Is it possible to restore those trees?
Using the previous characteristics, 1) we can reduce progressively the crown of the trees without shortening branches of large diameter. We have first to simplify the forks by suppressing the lower branch. This allows new epitone reiterations to grow inside the crown. Few years later, we can cut back the branch at the level of a reiteration. 2) If we bring an aerated substrate (up to 30 cm above the soil) all around the collar, the cambial zone will initiate new roots from the collar. This large area around the collar must be protected from injuries at the expense of a few parking places. We suggest to place a circular bench around each tree, which will increase the convivial character of the place. .

Suitable plant species to meet the environmental conditions of Piraeus Port

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Abstract
The Port of Piraeus is located 9 km to the southwest of the city centre of Athens, Hellas. The port links mainland Hellas with the Aegean islands and Crete and constitutes the main gate of the European Union in the southeast. It is divided in two main sections the passenger and commercial port. The passenger port is the largest of Europe and amongst the largest in the world, accommodating for approximately 20 million passengers annually. The commercial port with an annual transhipment capacity of approximately 1.4 million TEUs and 670,000 cars is amongst the 10 largest of both Container and Car Terminals in Europe. Planting within urban areas requires addressing adverse environmental conditions caused by air pollution and urban structure. In addition to usual urban environmental conditions the planting surrounding the Piraeus Port is exposed to the effects of frequent heavy transport of large vehicles, containers and cargo, sea winds and in places sea waves. The main objective of the planting in the passenger section including the cruise section is to create an aesthetically pleasing landscape where people can commute and find shelter. Part of the ancient ruins of the Themistoclean Walls survive in the cruise section and require special attention. On the other hand the main objective of the planting in the commercial section is to provide a screen and shelter for the residents that live in proximity to the port. A site analysis of the overall planting surrounding the port was carried out and proposals are made to introduce new and improve existing planting. Soil analysis in problematic areas showed increased levels of soil salinity. In one particular area soil salinity is prohibitive for the majority of ornamental plant species. A native plant species growing on the site is identified and further research is proposed to investigate its potential ornamental use.

Reclamation of inclined bentonite mining byproducts by hydroseeding in the island of Milos

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Abstract
This 2year research study focuses on the reclamation of bentonite inclined surfaces using hydroseeding in a quarry of the island of Milos. Three types of hydroseeding seed mixes were utilized: a) a mixture from 7 native species of Milos's island, b) a mixture from 6 commercial species, c) a barley-oat mixture and d) a non-hydroseeded control. The study included two inclined surfaces. The first had a northern while the second had an eastern orientation. Each inclined surface had 12 experimental plots (12-15m height and 1,5m width and each experimental plot was subdivided into 3 subplots along the height direction (high, medium, low). Measurements included the total number of plants, the total number of plants per species, the number of invading plants; soil moisture and plant dry weight. It was found that during the 2 years of the study, the number of plants as well as the soil moisture was higher in the northern inclined surface compared with the eastern one. The commercial species mixture provided the highest plant number (66,39%, 59,04% and 73,78% more than native species, barley-oat and the control, respectively). However towards the end of the second year a significant increase was observed when the native plants mixture increased its total plant number (8,6% more plants compared with the commercial plants mixture). In contrast plant number in the barley-oat mixture was reduced by 3% from the first to the second year. The commercial plants mixture provided the most biomass as indicated by the dry weight. The species that provided the highest plant numbers were mainly *Lolium rigidum* and *Avena sterilis*. The plant-intruders that were detected without participating in the hydroseeding mixture were *Brassica nigra, Salsola kali, Inula viscosa* and *Mesembryanthemum nodiflorum.*

Evaluation of Spontaneous Species for the Innovation in Floriculture: *Pancratium maritimum* L. as Ornamental Plant

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Abstract
Pancratium maritimum (Fam. *Amaryllidaceae*) is a perennial geophyte, also known as *sea daffodil* or *sea lily*, which grows spontaneously on sandy dunes and beaches. Plants have a big bulb, linear leaves, twisted as a spiral, and scented white flowers, borne in umbels. It is widespread in Mediterranean coastal environments, where it plays an important role in the landscape preservation, keeping back the sand through the roots and preventing the dune erosion. However, natural populations are being drastically reduced during the last few years in many areas, because of sea erosion and human activities.
The aims of this study were: to investigate the behaviour of spontaneous plants in natural habitat, to better understand their biological cycle; to set up protocols for bulb production, by seeds and bulbs, to perform a fast and effective propagation; to evaluate the performances of plants grown in greenhouse, for cut stems or as an ornamental plant.
In natural habitat, research was carried out in the Legambiente Natural Reserve in Paestum (Salerno, Lat. 40° 25' N). Spontaneous plants grew in sunny and windy positions, at different distances from the shoreline, and bulbs reached a considerable depth. Flowering occurred from the beginning of July to the middle of October.
Propagation was easy by seeds but seed propagated plants grew very slowly and they did not flower during the first year. Bulblets were obtained in vitro by entire bulbs and twin- and three- scales explants.
Plants grown in cold glasshouse (Napoli, Lat. 40° 51' N) showed good growth performances in pot, on a mixture of peat-based compost and sand. Flowering occurred 2 weeks earlier than in natural habitat but it was almost 1 month shorter. Cut flower stems had good aesthetic characteristics but they were short and had brief post harvest duration.

Use of bioindicators to evaluate heavy metal and microelement concentrations in urban parks

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Abstract
The environmental quality of urban soil is closely related to human health. The heavy metals increase in urban environments was due to the anthropic activity. The urban parks monitoring in two cities of Emilia Romagna region (Bologna and Ferrara) will highlight heavy metals and microelements concentration in the leaf tissues of coniferous and deciduous trees, in mosses and in grass. The airborne pollutants was studied by washing and analysing the heavy metals concentration in washed-leaves water. The aim of the study was twofold: to find an integrations between different environmental compartments (vegetation and washed-leaves water) and to highlight the different contribution of pollution sources. The sampling campaign was carried out in two different seasons (Spring 2006 and Winter 2007) and involved taking samples of grass, mosses, leaves of deciduous and coniferous treesand washed-leaves water. The samples collected were suitably treated and analysed by means of optical emission spectrometry using a CCD detector (ICP-OES, Spectro CIR.O.S.^{CCD}). Integrated analysis of the different environmental matrixes permitted identification of the most critical sites, respect to the heavy metals and microelements concentration. The strong correlation between the concentrations found in the moss, grasses and washed-leaves water underlines how the urban parks in Bologna and Ferrara are highly susceptible to atmospheric pollution.

Young street greenery supply with nutrients in Riga, Latvia, during 2007

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Abstract
The street greenery is a very significant landscape element with important ecological value in the high building density area of the Riga City central part (Latvia). One of the most widespread tree species of street greenery in Central, Northern and Eastern Europe, also in Riga, is lime tree *Tilia x vulgaris* H. The study was conducted to evaluate the young street greenery supply with nutrients. The concentrations of 6 macronutrients (N, P, K, Ca, Mg, S) and 6 micronutrients (Fe, Mn, Zn, Cu, B, Mo) were estimated in lime leaf and soil samples collected from 21 study sites (7 objects, to ~15 years old trees) in Riga (August 2007). Bioindication research on vitality of street greenery revealed slightly damaged status of young limes. The highest macronutrient concentration range was stated for Ca (5425-24936 mg/kg in soil, 0.98-2.78% in leaves), but the lowest for S (11-53 mg/kg in soil, 0.05-0.17% in leaves). For micronutrients the highest concentration range was found for Fe (521-3461 mg/kg in soil, 174-440 mg/kg in leaves), but the lowest for Mo (0.02-0.09 mg/kg in soil, 0.40-4.88 mg/kg in leaves). In general, the main factors negative affecting *T. x vulgaris* mineral nutrition were very low supply with N, S, K, and elevate concentrations of P, Ca, Mg. Decreased concentrations of S, K, P (Mn and Cu in several sites), as well as increased concentrations of Mo and Fe were stated in leaves. Well visible K and Mn deficiency symptoms in tree leaves were observed (K≤0.66%; Mn≤18 mg/kg). There was no close correlation between the element concentration in the soil and lime leaves.

Native Mediterranean *Cistus* species for urban green areas

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Abstract

The landscaping and gardening with native Mediterranean ornamental species of wild flora are a very interesting possibility to have plants largely resistant to environmental stress quite frequent in the urban area. The shrub plants, in relation to morphological and physiological traits, can be particularly suitable to adapt to urban green area conditions. In relation to richness of Sicilian flora various species could be used in the landscaping. *Cistus* plants are evergreen woody shrubs and their blooms are profuse and attractive. They are natives of lands surrounding the Mediterranean Sea and five species are native of Sicily. A preliminary problem to improve this plant utilization in urban green areas is linked to the individuation of the better nursery cultivation regimes.

In this view on different *Cistus* species trials were carried out to individuate the suitable propagation modalities. In these species the heat generated by fire is a key germination stimulus. Also for these reasons different temperature of germination (from 15 to 25°C) and dry and wet high temperature pre-treatment (from 80 to 120°C) were analysed in four *Cistus* species (*C. creticus*, *C. crispus*, *C. monspeliensis*, *C. salviifolius*). The results showed that in all analysed species the temperatures of germination have only slightly effects. The high temperature pre-treatment, especially the wet ones, are able to improve the germination rate.

Influence of winter pruning on ornamental plants grown in two types of container

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Abstract

Pruning is an operation that assures adequate functional and aesthetic attributes to ornamental plants. A regular development of the roots is essential for the plants grown in pots, because the root system deformations can slow down plants establishment and compromise the stability of the trees. The aim of this research was to investigate the performance in the nursery of *Elaeagnus x ebbingei* 'Limelight', *Ligustrum lucidum* 'Excelsum Superbum' and *Malus* 'Profusion' grown in two different containers (a traditional and a modified container for "air pruning" effect on roots) and pruned with increasing intensity (light, moderate and severe) compared with unpruned plants. During growing season shoots growth was monitored. At the end of season the vegetative parameters such as plants height, shoot length, leaf area, dry and fresh weight of leaves, shoots, branches and roots were measured. Plants were also subjected to a commercial evaluation. In spring the aesthetic worth of flowered *Malus* 'Profusion' plants was assessed. Some differences among treatments were observed in all species. In *Elaeagnus x ebbingei* 'Limelight' unpruned plants had the lowest score and the best results were obtained with pruning at moderate intensity because they guaranteed a regular canopy development. In *Ligustrum lucidum* 'Excelsum Superbum' shoots growth was superior in the severe pruned plants. The unpruned control had the worst results because the canopy presented a weeping aspect. In this species the pruning at light intensity was needed to obtain an uniform and round shape. In *Malus* 'Profusion' the unpruned plants had a worst blooming whereas severe pruning yielded vigorous and flowering shoots. In all species the adoption of modified container to obtain the "air pruning" effect guaranteed a good development of the roots eliminating the roots spiralling. The best ramification of roots induced with modified pots should increase survival and reduce transplant shock.

Wildflowers pollinators-attractivity in the urban ecosystem

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Abstract
In order to increase biodiversity in the urban environment several wildflowers species were tested in terms of pollinators attractiveness. Indeed the species were selected as a function of their mutualistic relation with entomofauna in terms of pollination biology. Plants with very showy flowers, like in the botanic families of *amaryllidaceae, iridaceae, asteraceae, apiaceae, ranunculaceae, lamiaceae, caryophyllaceae* and *campanulaceae*, are some typical examples of botanic families of wildflower species that have been and could be utilized for this purpose even in the urban environment. In this case the positive effect of the presence of wildflowers it is not due only to the increase of biodiversity but even to the human psychology that strongly depends by the living environment since man lived until a very recent period of his evolutionary history in a natural ecosystem. Indeed the wildflowers vegetation within urban areas (parks, gardens, flowerbeds, tra?c , etc.) could even become self-sustainable because, unlike ornamental herbaceous species (whose survival is crucially dependent on human action) since they can have persistence dynamics even without any human intervention. In synthesis, the introduction of wildflowers into the city landscape would favour a transition from the adverse visual impact of buildings to a scenario that may – perhaps in man's unconscious – be reminiscent of pleasant country scenes. In this perspective several wildflower species were grown and tested into the urban environment to explore their potentiality to the pollinators attractiveness (bees, bumblebees, diptera and butterfly) in spite of the typically adverse life conditions of the urban environment.

Effects of drought stress on growth and development of ornamental species for urban architecture.

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Abstract
One of the most widespread problem of urban architecture in Mediterranean countries is drought stress that affects plants during drier periods resulting in lower development and ornamental value. With the aim to obtain information on adaptability of different species to drought stress, a research was carried out in open field providing water with two different frequencies during dry period. Species under investigation were: flowering shrubs (*Myrtus communis* subsp. *tarentina, Genista lydia, Kolkwitia amabilis, Philadelphus virginalis, Ceanothus thyrsiflorus* "Repens", *Mahonia aquifolium, Spirea vanhouttei*); evergreen hedge shrubs (*Osmanthus heterophyllus, Berberis tunbergii* "Atropurpurea", *Prunus caroliniana, Viburnum lucidum, Photinia* x *fraseri* "Red Robin", *Arbutus unedo, Myrtus communis*); creeping shrubs (*Loropetalum chinense* "Fire Dance", *Pittosporum tobira* "Nana", *Lonicera pileata, Cotoneaster damneri* "Coral Beauty", *Viburnum propinquum, Hedera variegata, Leucophyta brownii* and creeping roses cvs. "Tapis Rouge", "Domenicana" e "Austriana"). All species were divided in two groups, dotated of a drip irrigation system and replicated in randomized blocks. The first group was irrigated weekly, while the second one was irrigated every three weeks. Frequency of irrigation changed according to rainy days. No intervention of pruning or fertilization were carried out. In the first year, results showed that most plants can grow and develop their roots anyway, because the rain could compensate for reduced irrigation. Therefore they seem to adapt very well to drought stress, without effects on ornamental characteristics. After winter all plants were pruned mantaining the same irrigation treatments to evaluate the capacity of plants to develop new vigorous shoots.

Investigation on five ryegrass cultivars' response to increasing salt (NaCl) in irrigation water

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Abstract

Soil and water salinity is one of the biggest problems in the way of green space development in most countries in Middle East such as Iran. Changing the irrigation water source and site bed soil is too extravagant or maybe impossible. Therefore, it is necessary to find and select tolerant plants for these countries. As turfgrass and ground covers are the most effective elements in parks and green spaces, it is important to find their tolerant cultivars for saline lands. Ryegrass (*Lolium perenne* L.) is a common turfgrass which is used in urban landscape. According to the wide use of ryegrass; the experiment was started to investigate the salt tolerance ability of five ryegrass cultivars ('Taya', 'Fancy', 'Barrage', 'Yarandi' and 'Esquire'). Results showed that the seeds of all the cultivars used had very good germination percentage and 'Taya' had the best seed germination percentage ('Taya': 98%, 'Fancy': 96%, 'Barrage': 96%, 'Yarandi': 94% and 'Esquire': 90%). However, 'Yarandi' had the best germination rate (time required for 50% seeds to germinate) and had the highest uniformity, i.e., the shortest total germination duration. Thereafter, 'Yarandi' showed the best seedling vigor. In order to determinate the inhibitory impact of salt on germination percentage, germination rate and root growth in solution culture, 30 seeds of each cultivar were sown in plastic beads which were floated on surface of 0.1 strength 'Rorison' nutrient solution, containing 20, 40, 60, 80, 100, and 200 mmol/L NaCl, along with control (deionized water), in 200 mL plastic beakers. A completely randomized design (CRD) was used with three replicates of each treatment. After 14 days, the germination percentage and rate and root length were measured in each beaker. Data were analyzed by MSTATC software, and means were compared using Tukey's test at 5% level. Results showed that increasing NaCl concentration caused a decrease in the rate of seed germination and seedling root length in all the treatments. Different cultivars were screened according to their ability to stand salinity. In highest NaCl concentration (200 mmol/L) 'Taya' was the most tolerant, and 'Esquire' was the most sensitive cultivar, respectively. 'Esquire' showed 100% decrease in seed germination rate and seedling root length compared to control. The longest roots were observed in 'Taya' which indicated 90% increase compared to control. It can be concluded that 'Taya' should be used as monoculture or in seed mixture/blends in saline lands. 'Esquire' is not recommended in these regions.

Biological control of twospotted spider mite in landscape bedding plants

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Abstract
Florida's landscape is a highly managed one of home and condominium lawns, business landscapes, institutional grounds, parks, etc. and includes flowers, turf grass, trees, shrubs, bedding plants, etc. Landscape care businesses often are in charge of arthropod management and maintain aesthetics and health of plants while protecting citizens and the environment. Properly applied, commercial management includes regular scouting, identifying pests and beneficials, assessing the landscape's ecological status, and applying interventions as needed. When pesticides are required, minimal areas are treated. Biological control is desired, but information is lacking. The twospotted spider mite, *Tetranychus urticae* Koch (Acari: Tetranychidae), is a pest of landscape bedding plants and often requires control. Miticides are available but their use often is objectionable in the landscape. Experiments were performed to evaluate a single release of *Phytoseiulus persimilis* Athias-Henriot (Acari: Phytoseiidae) predatory mites for spider mite control in marigold (Tagetes patula L.) landscape plant beds in comparison to a miticide and an untreated control. Programs of the miticides abamectin, bifenazate, and hexythiazox controlled the spider mites exceptionally well. *P. persimilis* applied at 3-5 predators per plant controlled the spider mites after about 5-6 weeks. Some spider mite damage occurred to plants before predators gained control. *P. persimilis* can be used effectively to manage spider mites in bedding plants and eliminate objections to miticides in the landscape.

Insects associated to *Heliconia* spp. inflorescenses used as ornamental plants

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Abstract
The exotic and colored inflorescence and green foliage of most *Heliconia* species are characteristics that permited the use of this tropical plants as ornamental plants. The inflorescences consist of bracts could accumulate exudates, water and floral parts that favor insects occurrence. This aspect should be taken into consideration for the heliconia indication, selection and management as ornamental plants. The objective of this study was to evaluate the insects associated to *Heliconia* spp. inflorescenses used as ornamental plants. From March 2005 to March 2006, the insects from *Heliconia* spp. inflorescences from the UFRPE Heliconia Collection, in Pernambuco-Brazil were collected. The flowering period, inflorescence color, position and number of bracts was consider to analyze the insects infestation. The genotypes *H. pseudoaemygdiana, H. rauliniana, Heliconia x nickeriensis, H. psittacorum x H. spathocircinata* cv. Alan Carle, *H. psittacorum* cvs. Suriname Sassy, Strawberries & Cream, Red and Red Gold Opal and *H. latispatha* cv. Yellow-Red Gyro present less than 20% of infested inflorescences, however, it occured in more than 50% of the assessed months, excepted for *H. pseudoaemygdiana* and *H. rauliniana*. It was observed difference in infested inflorescence frequencies values between the genotypes with erect and pendent inflorescences, and between genotypes cultivated in full sun and half shade. The months of highest temperature demonstrate the highest infested inflorescence frequency.

The CO_2-concentration characteristics of Beijing Olympic Forest Park

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Abstract

As one of the gases which cause the greenhouse effect, the carbon dioxide (CO_2) has been a matter of concern in recent years. As the ancillary facilities for the Beijing 2008 Olympic Games, Beijing Olympic Forest Park (BOFP), a precious 'green heritage' for the urban dwellers left by the great event, also plays a role in improving the regional environment quality, with the huge area (680 ha) , high vegetation coverage and high biodiversity. In order to assess its ecological efficiency, we have been monitoring the atmosphere change including the CO_2 concentration, microorganism, etc. In this paper, data of CO2 from April of 2007 to Jan. of 2008 are presented. 19 sampling points, including 17 in the BOFP and 2 out of the park as control, were chosen and CO_2-concentration was measured 4 times, respectively in a clear day of April, July, November of 2007 and Jan. of 2008 with a CO_2 infra-red analyzer. The results indicated that CO_2-concentration in the BOFP have apparent characteristics of seasonal and daily temporal-spatial variation. Compare the daily average CO_2-concentration of July, 318?mol.mol^{-1}, indicating the data of growing season, with the daily average CO_2-concentration of 440?mol.mol^{-1} from Jan, indicating the data of non-growing season, the seasonal difference is significant. In July, from 7:00 to 11:00 A.M, the CO_2-concentration of the test points inside and outside of BOFP decreased significantly, and then fluctuated at a low level from 11:00 to 13:00. During 13:00-17:00 P.M, it decreased continually in the first hours and then increased quickly. The minimum daily average CO_2-concentration (315 ?mol.mol^{-1}) appeared at about 15:00 P.M. On the other hand, in Jan, the minimum daily average CO_2-concentration (390?mol.mol^{-1}) appeared at 13:00 P.M., two hours earlier than that in the growing season. We attribute the main factors resulting in the difference of this gas to vegetation photosynthesis, vegetation and soil respiration. The spatial characteristics of the CO_2-concentration in POFB was presented as gradient change, with gradually decrease of CO_2-concentration from the points located near the border of the park to the central of the park. This is considered mainly influenced by the locations, the way of plant grouping and plant community structures. These data will be valuable for the future analysis of the ecological function of this specific greening land.

Resistance of rose rootstock to *Meloidogyne hapla* nematode

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Abstract
The roses are widely utilized in landscaping. One of the most important phytosanitary problems of this ornamental plant in gardens is the fitonematodes, especially *Meloidogyne hapla,* being the most important in colder climate regions. This work had the objective to study the resistance of nine rootstocks (Rosa multiflora 'Paulista', R. multiflora 'Japanese', R. multiflora 'Iowa', R. multiflora 'Kopman's', R. multiflora indicates x , R. shows' Mayor ', R. sp. "Brier Christmas', and R. R. Manetti canine' inermis') to the nematode *M. hapla*. Seedlings of rootstocks were planted to 14 liters pots containing soil: manure (3:1) with free nematode soil. Were utilized ten repetitions of each rootstock, being each repetition constituted by one plant per pot. Lately was realized a collect of the roots that visually had galleds, in a commercial area of cut roses, to do later an isolation and identification of the nematodes. The inoculum of *M. hapla* was previously multiplied in rose and tomato seedlings in the greenhouse. After the prepare, were inoculated 10 mL of the suspension obtained and adjusted to 300 eggs and juveniles of the second stage / ml in four holes done in the substrate around each plant. The plants were harvested ninety days after inoculation. The roots were washed and the number of the eggs and juveniles recuperated in the root system of each plant it was quantified. Based on the reproduction factor, were verified that all the rootstocks evaluated were susceptible to the nematode *M. hapla*.

Occurrence of plant-parasitic nematodes in ornamental and flowering plants at UNESP/FCAV, Campus of Jaboticabal São Paulo State, Brazil .

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Abstract
The plant-parasitic nematodes are responsible for serious injuries in roots and shoots of ornamental plants, reducing its beauty and consequently its economic value. This study aimed to ascertain the occurrence and distribution of plant-parasitic nematodes through the analysis of the roots of ornamental and flowering plants at UNESP FCAV's landscape. The roots were collected from fifteen different species as follows: *Anthurium andreannum, Rhododendron simsii, Impatiens walleriana, Calathea stromata, Cordyline terminalis, Dieffenbachia picta, Dracaena marginata, Ficus benjamina, Spathiphyllum ortgiessi, Spathiphyllum wallise, Odontonema strictum, Portulaca grandiflora, Strelitzia reginae, Tradescantia zebrina* and *Tradescantia pallida*. Samples of roots were processed. The plant-parasitic nematodes identified in the samples were: *Meloidogyne sp. (Anthurium andreannum, Impatiens walleriana, Calathea stromata, Dieffenbachia picta, Ficus benjamina, Odontonema strictum, Portulaca grandiflora, Spathiphyllum ortgiessi), Helicotylenchus dihystera (Calathea stromata, Dracaena marginata, Portulaca grandiflora, Tradescantia pallida, Spathiphyllum ortgiessi, Tradescantia zebrina), Tylenchus sp.(Anthurium andreannum, Rhododendron simsii, Calathea stromata, Dieffenbachia picta, Cordyline terminalis, Ficus benjamina), Aphelenchoides sp. (Dieffenbachia picta, Spathiphyllum ortgiessie, Spathiphyllum ortgiessi, S. wallise) Rotylenchulus reniformis (Cordyline terminalis, Dracaena marginata, Odontonema strictum), Paratylenchus sp. (Spathiphyllum ortgiessi, S. wallise), Ditylenchus sp. (Spathiphyllum ortgiessi, S. wallise)* and *Pratylenchus brachyurus (Tradescantia zebrina).* No plant-parasitic nematodes were found in the roots of *Strelitzia reginae*.

Influence of hydric stress in the production of toxic principles in *Nerium Oleander*

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Abstract

Many plants utilized in the urban center shows substances considered toxic whose production could be influenced by some factors, like hydric stress, including ornamental *Nerium Oleander*, widely used in gardens in various parts of the world, which presents production of cardioative glucosides, considered toxic. This study had the objective to evaluate the effect of field capacity at the level of cardioative glucosides in seedlings of *Nerium Oleander*. The experiment was carried at UNIDERP, in Campo Grande City, Mato Grosso do Sul State, Brazil, at the University for Development of State and of Pantanal Region, using the experimental delineation in randomized blocks. There were 4 treatments (25%; 50%; 75% and 100% of the field capacity), 5 replications and 4 plants by parcel. The evaluations were realized 60 days after the seedlings were planted. The quantitative analysis of the cardioative glucosides was realized by gravimetric test, after selective extraction of the glucosides. Were conclude that increase of the quantity of water in the soil raised the biomass production until 75% of the field capacity and increased the grade of cardioative glucosides, showing that water management is very important and should be provided only the necessary to development of the plant.

Allelopathic effect of *Pinus eldrica* Medw. leaf extract on seed germination and seedling growth of four turfgrass genera

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Abstract

The phenomenon of allelopathy, where plant species chemically interferes with seed germination, and growth or development of other plant species has been known for over 2000 years. The term of allelopathy, is a word, to describe all kinds of reciprocal biochemical interactions (inhibitory as well as stimulatory) among plants. *Pinus eldrica* Medw. is one of the most common trees planted in Iranian parks and urban landscapes. According to the wide use of these trees in urban landscape, experiments were conducted to study the allelopathic effect of *P. eldrica* Medw. leaves on four turfgrass seed germination and seedling growth using the sandwich and extraction methods. In the sandwich method, 5 mL agar (5%) was added to 6 petri-dishes containing 5 g (in dry weight) of *P. eldrica* Medw. fresh leaves. After solidification, 3.2 mL agar (5%) was added to the leaves agar layer. Twenty seeds of each turfgrass genus (*Lolium perenne* L., *Festuca arundinacea* Schreb., *Poa Pratensis* L. and *Agrostis capillaris* L.) was placed on the agar culture medium separately, with five replications per genus used. After 7 days, the seed germination percentage and the length of shoot and root of seeds were measured. In the extraction method, a completely randomized design (CRD) was used with 5 replicates of each turfgrass genus at four concentrations of leaf extracts (25%, 50%, 75% and 100%) along with control. Hundred seeds of each turfgrass in 5 replicates were placed on the filter papers inside the petri-dishes and were irrigated with deferent concentration of *P. eldrica* Medw. leaf extracts. The seed germination percentage and rate, and root length of seedlings in each Petri-dish were measured after10 days. To prevent increasing

the EC in each petri-dish, the filter papers were replaced with new ones before each irrigation time (except the control treatment which irrigated with deionized water). According to the results, *P. eldrica* Medw. showed an strong allelopathic effect on some turfgrass genera used. The least allelopathic effect was observed on *Lolium* and the highest on *Poa*. It can be concluded that *Lolium* is the best selection for planting as a turfgrass under the *P. eldrica* Medw. trees, as monoculture or in seed mixtures/blends. *Poa* is not recommended under the same condition.

Problems of Green Areas Integration in the Supermarket Parkings

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Abstract
The here about paper proposes the establishment of determinant factors in the designing and realization of the plantations. A series of data have been studied among which: the general plan for traffic and parking areas systematization (reserved area for plantations and their configuration); the technical solutions for infrastructure (concrete areas, paved, asphalted, the thickness of the constructed layer, the depth and the tracking way of the underground systems), the depth and the practical volume for the plantations, the area climate and the microclimate generated by the constructed area. The present study proposes to analyze and to elaborate the criteria for establishing the types of plantations for parking areas (trees rows, hedges, shrub mass plantings), for selection of the varieties and the characteristics of the planting material (root ball or bare root plant material, high, trunk diameter). A case study have been done regarding the behavior of varieties planted in the parking areas of two large commercial centers in North and East of Bucharest, respectively conditions of planting and maintenance (vegetal soil, tutors, irrigation, pruning) have been analyzed; the effect of the physiological stress (growth rhythm, desiccation of the branches, burns of the leafs); pollution effect, mechanical degradation.

In vitro propagation of endemic shrubs for Mediterranean-style urban design

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Abstract

Several endemic species of the Mediterranean area have a great ornamental value for their morphological and chromatic effects for production of pot plants, green cut branches with or without fruits, and last but not least, for gardening and urban green design, combining ecological and agronomical aspects with historical and artistic features. In addition the resistance to stress as drought, fire injuries and hot temperature permit to consider these species also for reforestation.

In general they are semi-woody shrubs with inefficient propagation owing to the poor seed germination percentages and to the difficulties in adventitious rooting. The increasing commercial interest needs the establishment of *in vitro* propagation protocols.

In this presentation useful protocols for micropropagation of *Pistacia lentiscus, Ceratonia siliqua* and *Arbutus unedo* are described starting from axillary buds of selected plants.

The shoot proliferation was induced by BAP or Zeatin and permitted to obtain good multiplication rates (up to 5 shoot per explant per month depending on the species) and shoots with optimal quality to be used for rooting experiments.

Root development occurred with interesting percentages in all the species either in *in vitro* condition or after dipping in auxine solutions and immediate transfer to the acclimatization greenhouse; the root-shoot connection was also hystologically investigated. Observations on the acclimatization phase are discussed.

Relation between high and low molecular weight carbohydrates in tall fescue plants under sever mowing management

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Abstract

With the aim to increase the knowledge about carbohydrate reserves in a tall fescue turf, the evolution of water-soluble carbohydrates (WSC) was studied in a field experiment in NE Italy.

In a randomized complete block with two replicates four treatments were compared: 1. *Festuca arudinacea* Schreber (Fa) ´Safari´, cut from 4 to 3 cm and fertilized with 200 kg N ha^{-1} $year^{-1}$; 2. Fa ´Safari´, cut from 8 to 6 cm, 200 kg N ha^{-1} $year^{-1}$; 3. Fa ´Safari´, cut from 8 to 6 cm, 100 kg N ha^{-1} $year^{-1}$; 4. Fa ´Noria´, cut from 8 to 6 cm, 100 kg N ha^{-1} $year^{-1}$. Four soil samples (4.5 cm diam. x 15.0 cm depth) including above ground biomass were taken from each plot immediately after cutting, to determine WSC content in roots and leaves + rhizomes (stubble). Total and low molecular weight WSC were extracted using the Suzuki (1968) procedure, quantified using the anthrone reagent procedure and read by a paper chromatography. High molecular weight WSC were obtained by difference.

Results showed that stubble and roots WSC concentrations were higher in winter and after a long mowing interruption than during the vegetative growth period. Moreover, the concentration of low molecular weight WSC was almost always higher than that of high molecular weight WSC.

SESSION 4

GREEN BUILDINGS

ORAL PRESENTATIONS

People and Nature: integrating aesthetics and ecology on accessible green roofs

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Abstract

The simple classification of green roofs into intensive roof garden types versus extensive ecological systems is useful in a broad sense, but perhaps less useful in terms of design and planting potential. It is perhaps time to move away from these two terms to consider each roof on its own merit. Extensive green roof types have been driven by their technical capabilities, but tend to look the same the world over. Aesthetic considerations have not been at the forefront and until recently the promotion of biodiversity was a secondary consideration. Similarly, there is no reason why ecologically informed approaches should be restricted to inaccessible, extensive green roofs. There is great scope for using extensive and semi-extensive techniques on accessible roofs, combined where feasable with strategically placed larger herbaceous and woody plant material to create contemporary roof gardens that are much more sustainable than the roof gardens of the past. Green roofs are most commonly promoted as ecological features: layers on a building surface that deliver a wide range of environmental benefits. Their landscape, amenity and aesthetic value are perhaps given less prominence, or are dealt with on a fairly superficial level of 'helping to integrate a building with its surroundings'. The simple classification of green roofs into intensive roof garden types versus extensive ecological systems is useful in a broad sense, but perhaps less useful in terms of design and planting potential. Green roofs are seen as either intensive or extensive, but there is no reason why elements of both cannot be combined on the same roof. Why should roof gardens and intensive types be high maintenance and rather traditional in their appearance? Conversely, why should the exciting possibilities of naturalistic planting, biodiversity, sustainable water management and all the other environmental benefits associated with the more extensive types be restricted to roofs which are seen as primarily not for human use?

It is perhaps time to move away from these two terms to consider each roof on its own merit. Extensive green roof types have been driven by their technical capabilities, but tend to look the same the world over. Aesthetic considerations have not been at the forefront and until recently the promotion of biodiversity was a secondary consideration. Similarly, there is no reason why ecologically informed approaches should be restricted to inaccessible, extensive green roofs. There is great scope for using extensive and semi-extensive techniques on accessible roofs, combined where feasable with strategically placed larger herbaceous and woody plant material to create contemporary roof gardens that are much more sustainable than the roof gardens of the past. Moreover, ecological objectives and creative or innovative design can be seen as incompatible. Green roof design for aesthetic impact alone may be inherently unsustainable, whilst design for biodiversity can neglect visual quality and human interests. Where green roofs are visible and/or accessible there is great potential to integrate aesthetics and ecology.

The experience of relevant research, both on green roofs and on the ground, suggests that the main factors that promote invertebrate and other faunal diversity in designed or non-natural landscapes are a) vegetation diversity, b) vertical vegetation structure, and c) horizontal landscape structure - topography, surface texture, and 'open' and 'closed' nature of the vegetation. Some invertebrate species in particular may be tied into specific plant species as larval or adult food sources. Plants and vegetation are therefore key to effective green roof design to promote biodiversity; however, the precise vegetation composition may be less important than is commonly supposed. Similarly, a requirement to use native plant species exclusively, or to use plant communities typical of the locality on a green roof because they are best adapted to local climate and soil conditions does not necessarily stand up to detailed ecological scrutiny, although there are of course many important reasons for choosing and working with native species and plant communities.

Accepting a more liberal view of the relationship between ecological benefit and aesthetic opens up a wealth of creative design possibilities for low-input, naturalistic green roofs. Vegetation design, and promotion of dynamic, ecological processes is crucial. But instead of, or as well as, ecological criteria being the highest priority, aesthetic considerations such as colour, scale, texture, diversity and form play an equal role. It is fruitful to view the design of ecological green roofs, or green roofs for biodiversity as being a gradient or continuum of approaches, from a purist restoration ecology approach, through to a liberal, more horticultural approach. To date, the former approach has held sway. The UK, with its strong horticultural tradition, is well placed to pioneer the latter.

Ecological systems are complex. Over and over again, research suggests that greatest faunal/invertebrate biodiversity is found where plant diversity is greatest. Apart from where particular animal species are dependent for particular plant species for parts of their life cycle, promoting diverse vegetations will pay off in increased biodiversity value. Highly diverse green roofs planted for aesthetic value may well also be very good wildlife attractors. The specific wildlife attracting features (e.g log and stone piles) can be placed amongst any sort of vegetation – it doesn't just have to be native. Similarly, changes in substrate depth and topography can be used with a wide variety of planting types. Rubble substrates are not necessarily any better than other stony substrates – indeed the highly variable nature of brick rubbles makes their use problematic. It is the open stony surface that is important – it doesn't have to be from demolished buildings. And sedums do have some biodiversity value, particularly if part of more diverse vegetations.

Development of Turfgrass Management Systems for Green Roof-type applications

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Abstract

With the effort to green urban environments, turfgrass systems provide intriguing aesthetic and functional opportunities. However, turfgrass systems are not passive, requiring routine management to obtain acceptable playing surfaces. Turfgrass systems are typically grown in mineral soil-based systems with soil depths in excess of 30 cm that provide load–bearing obstacles to roofed systems. Reducing soil depth increases soil moisture retention that can adversely impact turfgrass performance. This experiment investigated the effect of three depths (0, 5, and 15 cm) of a traditional sand-based mix modified with a novel coating of sands to alter soil physical and chemical characteristics for growing sports turf bermudagrass (*Cynodon dactylon* x *C. transvaalenis*). Turfgrass quality, putting green ball roll distance, surface firmness, and soil moisture were determined over two years. Turfgrass quality and ball roll were not affected by soil depth. Soil depth affected soil moisture retention and surface firmness. While reduced or modified root zone mixes can provide suitable growing media conditions for turfgrass systems, adjustments in management will need to be identified for a range of proposed mixtures and usages. Examples of unique sports turf venues grown on modified substrates are provided.

Investigation of dynamic cycles of semi-extensive green roof

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Abstract

The phenological study of green roofs (e.g flowering performance and growth pattern over a year) has been limited although it is crucial to create aesthetic and seasonal interesting green roofs. This study aimed to investigate the dynamic cycle of semi-extensive green roofs. To achieve this aim, the following four points were studied on the green roof of Moorgate Crofts Business Centre Rotherham, UK from February to November 2006: (1) Characteristics of seasonal change (2) Individual plant growth pattern and flower performance (3) Planting design (effect of plant species diversity and planting density). This green roof was installed in the summer 2005 and 54 species of perennials, ornamental grasses and bulbs were planted at 10 cm (areas with gravel mulch) and 20 cm (areas without mulch) of substrate. 32 places of quadrates (50 cm x 50 cm) were set up by the combinations of plant species diversity (High and Low), planting density (High and Low), aspects (South East, South West, North East, North West) and covering gravel mulch (with and without). The percentage of coverage, plant height, flower succession, number of weeds invasion and self-seeding were measured. The result showed that it was possible to create aesthetic extensive green roof which has long flowering and seasonal interest with little maintenance and supplemental irrigation if appropriate plants were chosen. Except for *Sempervivum arachnoideum* and *Sedum spathulifolium*, var. *purpureum* all plant species used in this study showed good growth and flower performance. Throughout 9 months, at least 3 species flowered in each month and the highest number of flowering species was observed in June. *Silene uniflora, Erodium ciliatum, Sedum kamtschaticum* var. *floriferum* 'Weihenstephaner Gold' and *Calamintha nepeta* showed particularly long flowering performance. It was shown that plant species diversity might affect overall flowering succession and dynamic change and planting density might affect interaction between plants. In areas of high plant species diversity, there were more possibilities to have a longer flowering term, more seasonal interest and dynamic change than low plant species diversity. In areas of low planting density, individual plants generally produced the better growth than those in high planting density. Moreover, the plant growth had more interaction between species in the higher planting density. However, these tendencies were not only because of the difference of plant species diversity and planting density itself but they were affected strongly by the combination of species which were used. Therefore, it is important to be aware of individual growth characteristics such as plant size (coverage and vertical), phenological growth pattern and flowering season. Such information would be useful for selection of plant species and planting design for further extensive green roof instalment.

Evaluation of perennial herbaceous species for their potential use in a green roof under mediterranean climate conditions

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Abstract
Green roofs are constructed vegetation system with aesthetic and environmental qualities that are becoming popular as an ecological roof cover.
The environmental benefits of green roofs make buildings more thermally efficient, prolong the life of a roof, ameliorate the extremes of temperature and humidity, moderate surface water run-off, help to reduce air pollution and noise and provide green-space for people and wildlife. All this suggests that green roofs have the potential to play a significant part in improving the quality of urban life. However, establishment and survival of vegetation on green roofs can be limited by several factors: extreme temperature, drought, low fertility, high winds and pollution .
In Mediterranean region climates is characterized by wet winter and dry summer season. Summer drought places a great deal of stress on the local vegetation and mostly on roof conditions.
Understanding of what species will survive and thrive under drought stress conditions in this geographic area is required.
The aim of our research was tested several herbaceous perennial species, succulent and non succulent, for vegetation performance in drought stress conditions. The screening was taken place in a greenhouse in a soilless system during summer period. Several bio-agronomical (dry weight shoot biomass, growth index) and physiological (relative water content of leaves, canopy temperature etc.) parameters of perennials species were measured. The results showed significant differences on water stress tolerance among the tested species and explain their observed microhabitat preferences. These information can be used for selection of suitable species for establishment of green roofs under Mediterranean climate conditions.

Strategies to improve foliage plant acclimatization to interior landscape

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Abstract
Interiorscaping has become an integral part of contemporary life and the role of plants as living air purifiers and to improve psychological stress associated with high population densities is getting more relevant. Ornamental foliage plants are spread used in interiorscaping to their low light condition adaptation through an appropriate acclimatization. For this reason these plants are usually produced under shading conditions.
With the aim to investigate the effect of shading levels and their period length on quality and performance of weeping fig and croton in simulated interior environment, plants were grown in pots for three months under 50, 70 and 90% shading level. After this period, half of the plants belonging to 50 and 70% shading levels were transferred to 90% for two further months. At the end of cultivation plants were transferred in a characteristic interior environment (low light and RH) and kept there for eight weeks. Tested species showed different response in relation to previous cultivation conditions. During interior keeping either species showed higher net photosynthesis in plants grown under low radiation availability. Nevertheless weeping fig showed a better adaptability to interior conditions if the plants were transferred to the highest shading level only during the last period of cultivation. On the contrary plants of croton grown under low light intensity during all or a part of cycle kept better high values of aesthetic characteristics during indoor life.

Apples Vs House Plants: Can Giving Your High School Math Teacher a Plant For The Classroom Make the Classroom and a Better Environment to Teach and Learn In?

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Abstract
The notion of bringing an apple to your teacher would put you in a better situation with them, and possibly a better grade in the class may not be as effective as giving them an indoor plant for the classroom! A pilot study conducted in math classes, indicates that having indoor plants present in the classroom improves teacher's feelings, perceptions, and interactions with their students; in addition to improving student's behavior and academic test scores. These results further the information that indoor plants can improve indoor air quality, reduce particulate matter, and remove volatile organic compounds. In addition to these findings, recent research has shown that there are powerful aesthetic and emotional values associated with plants such as their ability to reduce peoples stress, increase worker productivity, and aid in health recovery. Since math has been inherently a subject that evokes a stress response in many students, this pilot study was developed to place indoor potted plants into classrooms to see if teacher's perceptions, feelings and interactions changed as opposed to classrooms without indoor plants. Teachers were anticipated to have lower levels of stress, feel more comfortable in their classrooms and to perceive that their students felt better, behaved better, and would score higher on academic testing. This research project consisted of placing plants into five math classrooms at a Hawaiian high school that was located in a lower social-economic area for one academic semester. Classes consisted of male and female students, and ranged in age from sophomore to seniors. During this time, teachers recorded weekly self-report data and also tracked student academic progress and disciplinary behaviors. Preliminary analysis of the data reveal that classrooms that incorporated indoor potted plants had more positive effects on teachers, as well as students as opposed to when plants were not present.

What are the benefits of plants indoors and why do we respond positively to them?

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Abstract
Plants are essential for our survival. They provide food, fibre, building material, fuel, and pharmaceuticals. Plants also produce intangible benefits for people, such as improving our health. These benefits occur with plants outdoors and indoors. People have been bringing plants into their homes for thousands of years. We increasingly work indoors, and we are making ample use of plants in these spaces as well. Plants indoors have many benefits. Physically, they contribute to cleaner, healthier air for us to breathe, thus improving our well-being and comfort. They make our surroundings more pleasant, and they make us feel calmer. Interior plants have been associated with reduced stress, increased pain tolerance, and improved productivity in people. Research studies documenting some of the benefits associated with interior plants will be presented.
Of increasing interest to many people is the question of why plants have intangible positive effects on us. If we understand this, then we can make better recommendations regarding the use of plants indoors and out to enhance their effects of people. Studies indicate that people have learned and innate responses to plants. Some of these responses appear to have genetic components. Specific studies will be discussed, and potential applications of the results of these studies will be presented. For example, some primates are able to detect subtle differences in leaf color, selecting those with the highest nutritive value: we have shown that people respond more positively to plants of some colors than to others. By selecting plants of various colors, we may be able to enhance our responses to them.

Athens Concert Hall Roof Garden Construction

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Abstract
The uncontrolled increase of urbanization has resulted in contemporary cities characterized by the lack of open spaces and vegetation. Roof gardening is considered as a unique opportunity to effectively create green spaces in an established city environment. The extension of Athens's Concert Hall was built in a portion of the city park "Eleftheria". The extension included a library, two big halls and five smaller ones with storehouses, a subsidised patio, a three level garage, and the connection with the underground railway. However, considering the tight urban planning and the lack of vegetation in the city of Athens most of the Concert Hall was built below ground in an effort to recreate the original park after the construction. As a result, a roof garden totalling 20,000 m^2 was created over the roof of the extension building of the Concert Hall. The particularity of the project consisted to the variable slopes of the building shell that varied from 2% to 69% due to an effort to retain the sloppy surface of the original park. The presentation will focus on the decision making processes during the selection of the drainage systems and the soil substrates in the different parts of the green roof that were dictated by the different slopes and loading capacities of the building shell. Due to the steep inclination at some parts of the roof, reinforcing and stabilization techniques were necessary. A combination of soil reinforcing nets in conjunction with geocomposite honeycomb material was utilized to prevent soil movement and slippage as well as surface erosion. Stabilization of the big tree specimens was performed with underground anchorage provided by concrete donut-shaped constructions. The biggest roof garden in Greece has been constructed in such way that it can host multiple functions without aggravating the city environment and will surely improve the life quality of the citizens of Athens.

The performance of 32 native and exotic species on an extensive green roof in Melbourne, Australia

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Abstract
There is increasing interest in establishing green roofs in Australian cities due to their demonstrated environmental benefits. However, the lack of scientific data available to evaluate the applicability of extensive green roofs to Australian conditions is a major barrier to their widespread use. Relying on European and North American experience and technology is problematic due to significant differences in climate, available substrates and plants. To overcome this knowledge gap we have constructed Australia's first experimental extensive green roof and evaluated the performance of 32 native and exotic plant species over 10 months. Our 20 m2 green roof utilised a Zinco system with 125 mm of scoria based substrate. It was divided into four quadrants, (native grasses, native herbs, native succulents and exotic succulents), which were planted with 10 individuals of eight species (=320 plants). Survival and growth were recorded using digital photo analyses and aesthetic appearance assessed. Australian grasses performed poorly, and only *Lomandra multiflora* had greater than 50% survival. The performance of the native herbs varied but a number of species did well. Exotic succulents, particularly Sedum species, survived and expanded while native succulents such as *Marieana georgei* and *Calandrinia polyandra* have great potential for green roofs.

Effects of artificial light intensity and ambient CO_2 level on photosynthesis of Araceae Species commonly used for interior landscape

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Abstract.
The photosynthetic light-response curves of *Aglaonema* Sylver Queen, *Anthurium andreanum* Dakota, *Dieffenbachia picta* Camilla, *Philodendron erubescens* Red Emerald, *Spathiphyllum wallisi* Mauna Loa, *Syngonium podophyllum* Maya Red plants were analyzed after a 3-month acclimatization period in a phytotron under 380-400 ppm CO_2 concentration, 26 ±2 °C temperature and 8/16 hours of light/night (20 umol ? m^{-2} s^{-1} neon lamps). CO_2 assimilation of completely expanded leaves, grown during acclimatization period, was measured by a infrared gas analyzer LI-6400XT increasing *PAR* from 10 to 200 ?mol $m^{-2}s^{-1}$ photon flux (common indoor conditions) and with two CO_2 levels (400 -800 ppm).
Light saturation (*s;* ?mol $m^{-2}s^{-1}$), light compensation (*g*; ?mol $m^{-2}s^{-1}$), apparent quantum efficiency (*AQE;* ?mol CO_2 ? ?mol PPF^{-1}), respiration (*Rd;* ?mol CO_2 m^{-2} s^{-1}), maximum photosynthesis rate (*Amax*; ?mol CO_2 m^{-2} s^{-1}) are discussed and used to classify species and define the suitable intensity for artificial indoor lighting.
Light compensation point resulted under PAR 10 umol ? m^{-2} s^{-1} for all species and regardless of CO_2 concentration while light saturation ranged from 128.0 (*Anthurium)* to 584.4 *(Syngonium*) and from 130.8 (*Spatiphyllum)* to 324.0 ?mol $m^{-2}s^{-1}$ *(Aglaonema)*, under ambient and 800 ppm CO_2, respectively. At PAR of 200 ?mol $m^{-2}s^{-1}$, CO_2 enrichment increased assimilation from 35.2 (*Philodendron*) to 80.6% (*Anthurium*), getting to 1.42 in *Philodendron* and 5.51 umol ? m^{-2} s^{-1} in *Syngonium*.

Development of design criteria to improve aesthetic appreciation of extensive green roofs

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Abstract
Books, reports, and articles have discussed the aesthetic as well as psychological benefits of implementing green roofs. These claims are based on studies which show that scenes or landscapes containing natural elements (usually vegetation) are either preferred over urban scenes or landscape devoid of these elements; or that they are more psychologically beneficial. The authors submit that these results can not actually be readily applied to extensive green roofs, for two reasons. 1. It is possible that extensive green roofs would not be perceived as natural elements but as infrastructure, as part of buildings. 2. The appearance of extensive green roofs is very different from aesthetically valued nature scenes. Studies involving the preference between nature-containing scenes have distinguished between scene content (types of plants) and scene structure or spatial organization. Both have been found to influence aesthetic appreciation. Sanitary or seasonal conditions of the vegetation, soil coverage and colour have also been found to have an impact on preferences. In terms of spatial organization, preferred or restorative landscapes have been mostly described as park-like settings of smooth grass and trees. Studies indicate that the quality of the urban environment as well as the views could impact on preferences or aesthetic appreciation. Based on an extensive review of research results, the authors will propose design criteria to increase aesthetic appreciation of extensive green roofs. The possible contribution of familiarity, knowledge and environmental attitude to the enhancement of aesthetic appreciation of extensive green roofs will also be discussed.

Façade greening – a case study of plant performance from Melbourne, Australia

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Abstract
Despite the increasing interest in and use of façade greening in cities, there is little published research literature in the area. This paper describes the results of a detailed study undertaken at the Council House 2 (CH2) building in central Melbourne, Australia. The CH2 façade greening is located on nine levels of the northern side of the building. It consists of 90 modular planters (300 litres volume), each located on a platform and supporting a 1000 mm x 2000 mm stainless steel X-tend™ mesh trellis. Six different species (*Aphanopetalum resinosum, Clematis aristata, Kennedia rubicunda, Kennedia nigricans, Pandorea pandorana,Trachelospermum jasminoides*) were used, totaling 164 plants.The study evaluated the project 18 months post-planting, in March, 2008. The results showed a 60% failure of all plantings. The plant failure was due to a multitude of factors including poor plant selection, irrigation system failure, container substrate design and problems in installation and establishment. The paper explores and discusses each of these factors in detail, particularly comparing species performance, site issues and analyzing substrate properties. It concludes by identifying some key research questions important to the development of façade greening for the future.

SESSION 4

GREEN BUILDINGS

POSTER PRESENTATIONS

Agronomic performance of several xerophytic species grown in dry green roofs

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Abstract
Green surfaces in dense urban centres are indispensable to prevent the well note "heat island" effects and to improve the urban comfort as a function of the positive psychological involvements of a green landscape. From an aesthetic point of view, green roofs help to maintain a pleasant living environment and to inducing an attractive balance between native vegetation and urban infrastructure. A crucial characteristic needed for this perspective is the dry-tolerance of the vegetation since water is the strong limiting factor of this bio-architecture application and evolution due to economic and ecologic problems. The aim of the present work was to test the agronomic performance of several native Mediterranean xerophytic species. Germoplasm of these species (*Asteraceae*, *Cariofyllaceae*, *Crassulaceae*, *Euphorbiaceae*, *Globulariaceae*, *Graminaceae*, *Lamiaceae*, *Scofulariaceae* and *Valerianaceae*) was collected from dry ecosystem during the year 2007 and the progeny was grown in 2008 in the experimental green roof. This agronomic environment, without irrigation, was obtained by using an experimental substrate, from vulcanic origin, implemented with a basal layer of hydroperlite. In the Tuscan environment (Roselle, GR) the following parameters were analyzed: biomass growth, canopy cover dynamics, flowering periods and plant survival after the summer period. The results evidenced the optimal performance of several of the tested species in spite of the deep drought that occurs during the july and august months. Finally the several criterions of plant selection (ornamental, scent production, entomofauna attractivity, etc.) were discussed.

Germination ecology of Mediterranean species from natural "living walls"

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Abstract
Green spaces in the urban landscape improve their habitability because they assume many functions as well as psychological recreation, environmental benefits in terms of noisiness reduction. Besides urban vegetation increases the availability of wildlife habitats since they are needed to allow biodiversity in this anthropized ecosystem. In the cities space on the ground is very limited but vertical space is plentiful. Consequently the possibility to "greening" the urban walls assume a crucial role in the evolution dynamics of bio-architecture. This vertical vegetation, called "vertical garden", can be quite spectacular in appearance, and in some cases, can even work to filter clean air into the building in which they are growing upon. Unfortunately the common "living walls" utilize plant species that needs water to grow and consequently they imply economic and ecologic problems. However it is easy to observe that often old buildings are infested by some vegetation that grows in this deep stressed environment. This stress is due not only by nutrients lack but overall regards to the erratic water availability. The aim of this work has been to select some of the typical "walls species" characterized by flowering with positive aesthetic impact and to test their seed dormancy and germination characteristics in a perspective of their agronomic use for the realization of dry vertical gardens. Experiments were conduced *in vitro* in Petri dishes by using climatic chambers regulated to different light and temperature conditions. In the cases of deep dormancy several physical, chemical and/or physiological seed treatments were tested to improve germination.

Performance of native *Sedum* species on an extensive green-roof system in Bologna surroundings, Italy: flowering and coverage pattern in relation to propagation.

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Abstract.
The genus *Sedum* includes the most popular species of perennials for extensive green roof systems, with thin substrate and not irrigated conditions in dry Mediterranean areas, too, as the result of drought and wind tolerance, ability to withstand temperature extremes, rapid establishment, long life and fast self-propagation.
The horticultural available sedums are more than 50, including cultivars and species, but many regional forms can be identified, morpho-physiologically different and well adapted to specific pedo-climatic conditions.
Five Italy native *Sedum* types (*S. album, 'green'* and *'grey'* forms of *S. reflexum, S. sexangulare, S. hyspanicum* var. *pallidum)* from the Appennino Tosco-Emiliano have been grown in modules for extensive green roof, with a 9 cm substrate, including 8-12 mm and 3-5 mm volcanic tuff in the bottom and in the superficial layer, respectively, and gravel on top. The percentage of coverage, plant height, flowering period and length were valuated over one year, from October 2006, in relation to type (tip or stem) and weight (g/m^2) of cuttings at planting.
At flowering time, after 7.5 months from planting, the *S. reflexum 'green'* type resulted taller and earlier (7 ± 2days) than *'grey'* one and exibited a coverage around 10% higher, from digital image analysis (48.7-38.4 % coverage respectively, starting from 100 cuttings, equivalent to 200 g/m^2/). The cutting number seems to influence coverage more than initial cutting weight. Plant area of *S. album*, *S. sexangulare* and *S. reflexum 'grey'* was alike (10.3-10.7 and 13.6 cm^2/plant) with a higher establishment capacity of tip than stem cuttings. Flowering period ranged from the15th May to the end of June. All types tested survived during winter and resulted suitable for the use on non irrigated extensive systems, except for *S. hyspanicum* var. p*allidum* because of its growth as an annual and leaf lack during summer.

Turfgrass growth and evaportranspiration in intensive green roof systems

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Abstract
Green roofs constitute an alternative way to increase green space in modern cities which are characterized by dense construction and lack of free space. The aim of the study is to investigate the intensive green roof substrate and drainage effects on turfgrass growth and evapotranspiration. Two studies were performed in outdoor lysimeters having an internal diameter of 30cm and a height of 45cm. The lysimeters were filled with 2 different drainage systems. The first drainage system consisted either from 15cm Lava and a geotextile on top [G] while the second drainage system consisted from 10cm Lava and 5cm sorted sand. In the first study [A] the substrates were SL_{60}-P_{40}, SL_{60}-P_{20}-PER_{20}, SL_{60}-PER_{40}, SL_{30}-P_{40}-PER_{30}, SL_{30}-PER_{70}, while in the second study [B] the substrates were SL_{30}-P_{20}-PER_{30}-L_{20}, SL_{30}-P_{20}-PER_{30}-PV_{20}, SL_{30}-P_{20}-PER_{30}-LV_{20}, SL_{30}-PER_{40}-PV_{30}, SL_{30}-PER_{70}, where SL= Sandy Loam soil, P= Peat, PER=Perlite, L=Hellenic Lava, PV=Italian Pumice, LV= Italian Lava. Each study was replicated in two different time periods (autumn and spring). The lysimeters were seeded with *Festuca arundinaceae* and the growth of the turf was determined by clipping's dry weight. In study A turf growth was promoted mostly in substrate SL_{60}-P_{40} in both seasons. The least turf growth was observed in substrate SL_{30}-P_{40}-PER_{30} during the autumn and in substrate SL_{60}-PER_{40} in the spring. In the second study [B] turf growth was promoted mostly in substrate SL_{30}-PER_{40}-PV_{30} in autumn, while there were no differences among the substrates in the spring. The effect of drainage system was not significant concerning the growth of the turf in any of the two studies. Evapotranspiration (ET) was increased in substrates SL_{60}-P_{40} and SL_{30}-PER_{40}-PV_{30} which was directly correlated to turfgrass growth. Differences in the spring were detected neither for the drainage systems nor for the substrates. In contrast the geotextile drainage system increased the ET in both studies by 6.4mm during the autumn.

Metalaxyl-m leaching from different substrates and drainage systems in intensive green roofs

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Abstract

Contemporary urban areas are characterized by the lack of open green spaces due to the overwhelming presence of structured surfaces. Green roofs seem to be, an effective alternative in order to increase the green areas of the cities and urban centers. However, there is a lack of research evidences concerning the leaching potential of the applied agrochemicals on the green roofs that might end into the sewage systems. Therefore the aim of the present study was to investigate the leaching potential of metalaxyl-m (mefenoxam), a highly soluble fungicide, used in turfgrass culture. The study comprised by 2 trials and was conducted in outdoor lysimeters, (450mm height and with 300mm ID). Fifty four lysimeters were constructed and filled with different substrates using two different drainage systems: a) a tri-layered sand/lava system (S) and b) a geotextile/lava (G) system. For the first trial (A) the substrates were SL_{60}-P_{40}, SL_{60}-P_{20}-PER_{20}, SL_{60}-PER_{40}, SL_{30}-P_{40}-PER_{30}, SL_{30}-PER_{70}. The substrates for the second trial (B) were SL_{30}-P_{20}-PER_{30}-L_{20}, SL_{30}-P_{20}-PER_{30}-PV_{20}, SL_{30}-P_{20}-PER_{30}-LV_{20}, SL_{30}-PER_{40}-PV_{30}, SL_{30}-PER_{70}, (SL=Sandy Loam Soil, P=Peat, PER=Perlite, L=Greek Lava, PV=Italian Pumice, LV=Italian Lava). All lysimeters were seeded with *Festuca arundinacea*. The highest recommended concentration of metalaxyl-m (1.476,9 mg L^{-1}) was applied once in every lysimeter at the initiation of the trials, and the effluent was collected and analyzed for fungicide traces. Metalaxyl-m was determined by high performance liquid chromatographic-mass spectrometric (LC/MSD) detector configured for atmospheric pressure chemical ionization (APCI). It was found that metalaxyl-m leaching rate was greater in the substrates that did not include peat as soil amendment, regardless of the drainage system. In addition metalaxyl-m concentration in the leachate was reduced, as the peat participation in the substrate increased from 0 to 20 to 40%. However it was noticed that despite the observed differences in-between substrates, all the detected concentrations exceeded the maximum permitted residues level (MRL) of 0,1 ?g L^{-1}.

Living walls as traditional element in urban growth

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Abstract
The lack of vegetation in the urbanized areas, as a result for the development of the human establishment, directly affects the quality of life, from a physical and a esthetic point of view.
The transition to a healthy urban environment, ecological, with high esthetic valences can be accomplished by applying innovative technologies in the landscape area, only by profundity studies, safety methods and technologies, usage of durable materials and compounds.
The construction of living walls is recommended both in interior and especially in the exterior of the buildings. By applying these technologies, any kind of area can be used at its maximum capacity, obtaining esthetic valences, benefic for the environment and for the human health.
Compared with the classical front side of buildings composed by climbing plants like (*Hedera, Partenocissus, Wisteria, Clematis, Lonicera*), for the construction of living walls we can choose a variety of dendro-floricol species like height, habitus and shape: succulent plants, shrubs, ferns, decorative grass, perennial species and others.
Even if the price of constructing and maintaining the living walls is higher than a classical landscape area, compensates by the environment benefits, raising the vegetation surfaces, with impact for reducing the pollution effect.
The new modern concepts for landscape development are keen on using any kind of surfaces of glass on concrete turning them in real vertical gardens, being possible to overcome the development of the urban area making a smooth transition for a healthy green urban environment.

Above the Street, Below the Clouds: People's Psychophysiological Responses to Green Roof Landscaping in Urban Hawaii

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Abstract
The green roof movement is in its emerging stages in the State of Hawaii, with public and political interest increasing. Even though rooftops are not an everyday thought, green roof technologies offer many benefits in storm water abatement, heat island mitigation and energy savings in comparison to conventional roofing. What has not been extensively addressed, are people's emotional and physical responses to green roofs. Since green roof technology is not widely known, and the high initial cost of green roofs relative to conventional construction, discourages their installation. In Hawaii, especially Honolulu which has approximately 17,603,180 square feet of roof space in business districts alone, urban sprawl and demand for new agriculture lands is resulting in the conversion of Hawaii's landscape from an aesthetic natural icon into a tapestry of commercial and industrial development. Hawaii's economic base, which is largely dependent on the visitor industry, is threatened with the degradation of its main attraction, namely the natural beauty of the islands. Development of urban and industrial rooftop technologies seems a promising means by which to address concerns about existing and future development and current loss of vegetation. In addition, improvement of urban aesthetics throughout the islands from adopting wide use of green roof technologies potential to sustain and increase economic revenues through tourist dollars, but also improve Hawaii's natural environment. The use of psychophysiology in previous research indicates that plants and landscaping dominated by vegetation contribute to people's states of arousal and calmness. This information could have tremendous economic and social impacts for office workers, high rise tenants, and tourists that have a view of a green roof versus a conventional roof. This paper address people's emotional, economic and physiological responses, for green roof technology verses standard roofing practices in Hawaii.

The landscape construction of the cover: Energetic challenges for the 21st century

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Abstract

In last years urban population has grown exponencially, especially in the Third World. 50 cities around the world have more the 15 millions people, being 40 of them in the Third World. This spontaneous global urbanization produces urbanized regions like the megalopolis of the developed world, having high environmental degradation with few viable options to improve. Though strategies like public transport, which reduces global CO_2 emission, have been implanted, we should look for a wider solution as landscape is.

Huge "unusable" covers, which are frequently seen in megalopolis, could be transformed into "green" covers, with a rigorous planning and execution in general scale, as a strategy to fight against the increase of current indexes of global warming. These actions will allow us to improve air quality in our highly pollutioned cities, reducing overheating of the atmosphere by increasing green surfaces, promoting thermal and acoustic insulation of buildings, and minimizing energetic consumption of cities. Apart from an administrative legislation wich allows that a large scale action reaches Kioto protocol in 2012, transformation of these spaces will permit a healthier culture.

In view of the ecological accumulated short-term benefits by the employment of these actions, landscape construction of covers, bets on being a tool to bear in mind when planning our cities.

Orto volante: Green roofs on Rome local markets

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Abstract

In historic towns it's difficult to identify green areas alternatives at the existing gardens.

In Rome, the roofs of local markets could offer new opportunities in this sense. Must of these buildings have flat roofs that constitute potential places to localize green areas both for children and adults leisure and for educational activities. In fact the local markets are well localized in the urban network often inside crowded areas, easily accessible and well served by public transport.

The presentation describes the proposal of a garden on roof of a local market in a Rome central district. In the project the roof becomes a new public space where connect the horticultural activities at primary school teaching methodologies (observation of plant life cycle, knowledge of seasonal vegetables variety, etc.) and where use low maintenance plant associations.

Then the green roof layout shows intensive cultivation system for the vegetable garden and extensive cultivation system for the playground areas. In these areas the use of wildflower associations has the main aim to enhance the esthetical value of urban landscape controlling, at the same time, the garden maintenance costs.

The highest level (*terrazzo*) is an inaccessible area with shrubby plants; the medium level (*prateria*) is accessible (playground and sport areas) and has gramineous and wildflowers planting. The lowest level (*sosta*) is an area for leisure and educational activities as botanic pathway and teaching vegetable garden.

Green roofs within climate change: an environmental tool for the Mediterranean city

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Abstract

Ecological equilibrium should exist between Man and his environment…wellbeing concerns the global environment from a single habitation to the entire atmosphere (World Health Organization WHO).

Half the world's population lives in cities, most of whose environmental snapshots are degraded, and in which 'urban heat islands' are on the increase. In the near future, many Mediterranean cities will become such.

Green roofs can play a role in reducing urban heat islands (UHI), but to date, there is insufficient data on the appropriate techniques and technologies for the Mediterranean.

This work proposes the study of green roofs as a tool of environmental mitigatation for urban requalification strategies.

By means of several real and virtual case studies, guide lines are drawn specifically aimed at the Mediterranean city using green roof technology and garden placement. Therefore, particular importance is given to Mediterranean landscape and xeriscaping.

By means of bio-mitigation, plants and green roofs can contribute to reducing urban heat. Furthermore, sustainable planning as well as optimum landscape planning, can considerably improve urban microclimates and consequently the quality of life.

Principles of selection of ornamental woody plants assortment for gardens on roofs in conditions of Minsk

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Abstract

For control of woody plants growth and their development in gardens on roofs we studied microclimatic conditions on roof surfaces of buildings with different number of storeys and these conditions influence on 30 species and forms. Fall in temperature of substrate till - 18-22º ? in winter and its heating till + 25-33,4º ? in summer are revealed as main limitative factors by growing of woody plants on roofs. There are some typical features for seasonal development of woody plants on roofs in conditions of Minsk such as: increase of vegetation period by majority of taxa, shortening of fruits ripening period, more intensive tonality of autumn colouring of leaves. Ability of roots of woody plants for hardening by growing in gardens on roofs is proved. It allows extend an assortment of commonly used plants. As a result of the research we revealed the main criteria by choosing a range of plants such as: high winter hardiness, especially of root system; compact growth form; high ornamentality perceived within short distance. By such criteria the most suitable for these purposes are ornamental forms of introducted species which were long-tested and showed sufficient steadiness in conditions of Minsk. Adaptive possibilities of plants and developed recommendations on keeping agrotechnics let them preserve high ornamentality by cultivation on roofs of buildings within 10-12 years.

With the head in the clouds and the feet in the cover. Green roofs Systems.

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Abstract

Garden-roofs, also known as green roofs, have been executed for centuries as natural thermal insulation, for low temperatures in cold climates, and to protect from intense solar radiation of hot climates. Benefits of thermal insulation, allow us to minimize climatic extreme situations, reflecting vegetation part of the long wave caloric radiation emitted by the construction and preventing that wind takes contact with the surface of the substratum, diminishing building heat loss.

Green roofs, or ecological covers, which arose to give efficient response to these and other requirements, concern to the vernacular architecture. Today, they have joined to sustainable strategy.

We will analyze different horizontal and inclined green roofs solutions, and we will develop their most significant constructive details.

The Problems of Interior Landscape Design inTourism Buildings at Antalya Region

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Abstract

In 2008, nearly 948 tourist facilities are being estimated in the city of Antalya. Unfortunately, definite numbers cannot be given concerning the tourist facilities as each and every day a new one is opened.

Due to the fact that in the city of Antalya -with a surface area of 2.810.437 hectare- these 948 tourist facilities were completed in a short time, high competition between the tourist facilities has started. This has resulted in searching new alternatives of inner decoration for the tourist facilities.

Therefore the inner garden concept also became a very important decoration object. As the number of inner gardens used in the decorations increase, the number of problems have also increased.

Due to the fact that the plants used in the inner gardens are living things, some esthetical problems started to occur after the applications of the projects. Sometimes a very compact type of a plant has grown so much that it almost closed the way. At times, the plants which were planted at the second line grew so fast that they blocked the plants in the front lines. Additionally dirt started to occur due to defoliation and due to spread land. The chemical ingredients given to the plants of the inner gardens were causing damages in the inner garden decorations; at times even causing them to melt down.

Besides such esthetical problems of the inner garden plants, some other problems also started to occur over time due to physiological needs.

In order to have healthy plants in the inner gardens as a piece of inner decoration, and in order to obtain the required color and shape of the plant, the growth circumstances required by the plant must be fulfilled. The inner garden can easily be a great failure if one cannot came across with the water, light, air and alimentation needs of the plants. One other reason of failure is the mistake

made in maintenance. For example the light is a very important source for the plants for photosynthesis and also for them to produce alimentation. The duration, quality and the density of the plant must be arranged in the ratio the plant requires.

At the end of the research, some criteria are determined, which are very important for inner designs in esthetical and functional terms.

Medicinal plants in interior landscapes in therapeutic facilities

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Abstract

In therapeutic facilities medicinal plants should be presented all year long blooming and in good vital condition. There's very little knowledge about medicinal plants and methods for earliness and cultivation. The goal of this first study was to evaluate a serious of medicinal plants in respect of the effects of light and temperature on growth and flowering.

The tested species were *Achillea millefolia, Calendula officinalis* 'Fiesta Gitana', *Hypericum perforatum, Echinacea purpurea* and *Urtica urens*

Illumination: from 6am – 6 pm, if the irradiance was lower than 275 µmol/s/m^2

variant 1: 24,4 µmol/s/m^2

variant 2: 48,8 µmol/s/m^2

Temperature: 11/23/06 – 01/04/07: 10°C

01/05/07 – 03/31/07: 14°C

The experiment commenced by batches 11/23/06, 12/20/06, 02/05/07, 02/21/07

Results:

The temperature of 10°C was too low for a good growth rate.

Achillea millefolia and *Calendula officinalis* 'Fiesta Gitana' started blooming by the end of February. These species are suitable for early blooming combined with an attractive appearance. The lifespan under indoor conditions is about 10 weeks.

Althea officinalis and *Echinacea purpurea* starts blooming in April and a non-uniform growth was observed.

Urtica urens showed an attractive vital appearence

Hypericum perforatum was very susceptible for *Botrytis cinerea* and showed no blossoms until the end of March.

This first study had revealed that medicinal plants can successfully be cultivated in wintertime and being presented in interior landscapes. However, it needs more research work to extend the range of species of medicinal plants and to investigate the trigger mechanism for their flowerinitiation.

In vitro plantlets from somatic embryos of selected ornamental plants- a new prospect for interior decorations and horticulture industry

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Abstract

Somatic embryogenesis is a multi-step process for the induction of somatic embryogenesis, embryo development, embryo maturation and embryo germination.All plantlets obtained through somatic embryogenesis did not differ phenotypically from the parental clones. In this study, several plants such as *Gerbera jamesonii*, *Begonia* x *hiemalis* Fotsch., and *Saintpaulia ionantha* were successfully regenerated through somatic embryogenesis process. Explants such as leaf, petiole and stem were used to induce somatic embryos from all the plant species. Explant were cultured on Murashige and Skoog (MS) medium supplemented with various types of plant growth regulators such as 6-Benzylaminopurine (BAP), ?-Naphthalene acetic acid (NAA), 2, 4-Dichlorophenoxyacetic acid (2,4-D) and Thidiazuron (TDZ). Due to the attractiveness and elegance of in *vitro* plantlets derived from somatic embryos, they have the potential to be promoted and marketed as interior decorations, scientific handicrafts and further publicized as a new prospect in horticulture industry

SESSION 5

SOCIAL AND PSYCHOLOGICAL ROLE OF HORTICULTURE IN THE URBAN ENVIRONMENT

ORAL PRESENTATIONS

Biofeedback evidence of social and psychological health benefits provided by plants and flowers in urban environments

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Abstract
Biomedical instrument advancements have made it possible to record and understand human responses to plants in urban environments. Biofeedback is an experimental method used to measure stress by monitoring blood pressure, heart rate, skin temperature, muscle tension, and electro-dermal responses. Initial biofeedback research at KSU involved measuring finger tip temperature responses to interior plants while subjects listened to a relaxation tape. Within five minutes, subjects near a live plant had increased skin temperature and lower stress, while those looking at a photograph of the same plant were less responsive, and minimal change occurred in the same room with no plants. Another group of subjects, walking through a botanical garden had significantly lowered heart rate and blood pressure. Stress reduction occurred and fast beta brain waves increased for subjects in a room with red flowering geraniums as compared to responses in a room with green foliage or in an empty room. For groups of students who were gardening, within 40 minutes, significant changes in immunoglobulin A and cortisol occurred, as compared to those who were not gardening. This resulted in fewer colds and respiratory problems reported by the gardening group. Other KSU research has measured social interaction, stress, and pain perception to fragrance, color, and plant density within hospital rooms, classrooms, and landscape gardens.

Urban parks in Tunisia: spaces for psychological rest cure

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Abstract
The creation of public green spaces in urban areas was an occidental invention. Since 1891 this policy has been installed by and for the French settlers in Tunisia, bringing improvements to urban landscapes. After Independence in 1956, the Tunisian government had the priority of creating and resolving city planning issues. That's why we qualify this period as a "Silent Green" one. It has taken thirty years ever since to notice the emergence of the "Green Policy" as part of the government's agenda.
This policy has emerged with the creation of the National Agency of Environment Protection in 1988, followed by the foundation of the Ministry of Environment and Sustainable Development. "Green Hand" is a basic strategy elaborated by the Tunisian Ministry of Environment. It aims to protect natural resources. Its sphere of action is the creation of national programs and projects like the National Program of Urban parks (1996) established in order to create hundreds of parks in the national territory.
Throughout this contribution, we do not intend to conduct an inventory of environment policy programs. Rather, we will try to address the following question: What is the rationale for urban park creation in capital city of Tunisia and for whom?
It was indispensable to observe people in parks in order to determine their practices. We have also made a sample survey which refers to visitors from different social classes. This study proves that the success of a territorial program such as the National Program of Urban Parks depends not only on insiders' actions but also on visitors' practices and perceptions.
Twelve years after the launching of this territorial program, twenty six parks were founded and were open to the public. By this research, we have studied the sample of three parks: Nahli Park, Mourouj Park and Farhat Hached Park localised in Great Tunis.

Identifying restorative elements in small urban parks using eye movement tracking

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Abstract
Earlier evidence suggests that natural scenes are in general more restorative than built scenes but we know very little about which specific elements or structures in nature that promotes restoration. Restoration involves the process of recovering from stress and restoring cognitive functions. By using eye movement tracking this study investigates which elements e.g. flowers, trees, bushes, type of ground cover etc. that people actually focus on when evaluating if the space is restorative or not. A sample of 38 photos of small urban green spaces (pocket parks) was preselected for low and high restoration likelihood. 33 students with varying study background participated. First subjects were briefed about the procedure and the rating task in which the subjects should indicate on a scale from 0-10 how good a place it would be to restore and recover in. They were then asked to imagine themselves being mentally tired and in need of restoration. Photos were presented for 10 seconds, on a 19" screen, 670mm from the participant. Eye movements were registered for each photo, followed by the rating task on screen. Various analyses, such as generation of heat maps and analyses of fixation number and dwell time in areas of interest were made for each park, based on all subjects, to identify which areas attracted most attention. Further analysis will be done and result from the analysis will be presented at the conference.

With stewardship, turfgrass offers environmental and sociological benefits

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Abstract
The use of turfgrass in urban environments is routinely scrutinized. Concerns are raised about fertilizer and pesticide application, as well as, water management practices associated with turfgrass maintenance. The objective of this project was to review research pertaining to the environmental and sociological benefits of turfgrass. A second objective was to provide alternatives (e.g. Best Management Practices - BMPs) which mitigate the environmental impact of turfgrass management practices. Studies have demonstrated the positive and non-harmful impacts of turfgrass systems, particularly pertaining to nutrient and water use. Often turfgrass is perceived as being an over-consumer of fertilizer and water, in spite of multiple research studies showing turfgrass has a high affinity for nutrient uptake and could survive periodic periods of drought. Additionally, but less discussed are the effects of landscapes, turfgrass is a component of an overall landscape, on human behavior and psyche. Turfgrass establishment is a critical component of erosion and sediment control. This project relates findings from published scientific studies and case studies that demonstrate where turfgrass systems have served a functional role in community enhancement and how active stewardship by industry practitioners can influence conservation and policy.

Horticultural training improves inmates job prospects and sense of well being

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Abstract

University of Nevada Cooperative Extension (UNCE) faculty members have taught basic horticulture to inmates of Southern Nevada correctional facilities for over eight years. The training material used was originally the 70-hour curriculum used to train gardening volunteers. Over the past three years we have revised it to direct it more toward job skills to assist inmates after release. The curriculum was first expanded to do more intensive teaching on such topics as irrigation, landscape plant selection and maintenance, and problem solving. Even with these changes horticulture jobs were generally limited to low paying, entry level ones. To improve employment opportunities, UNCE collaborates with the Nevada Department of Agriculture. After inmates have passed the horticulture program, they may take the state pesticide applicator training and examination. Conversations with potential employers indicate that this significantly enhances their likelihood of employment at a higher than entry level. Most recently we have added a unit on resume writing and applying for jobs.

More than 300 inmates have completed the training to date at six institutions ranging from minimum to medium security.

For many prisoners, completing the training program is their first educational accomplishment. Some report that because of this training they enrolled in college after leaving the prison system. The incarcerated population of the US is growing. The total prison and jail population reached 2,258,983 by the end of 2006, representing 0.7% of the US population From 1995 to 2000, the prison population increased by 17%, while educational programming increased by only 1%. Any program that can lower recidivism is essential. Due to the nature of their crimes, many inmates cannot return to previous professions. This is especially true of prisoners who commit white-collar crimes. These inmates need new avenues for employment to make a legal living. Horticultural training provides an opportunity to change attitudes and life goals.

Urban Agriculture in Israel: Between Civic Agriculture and Personal Empowerment

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Abstract

This paper examines several representative case studies of urban agriculture in Israel from the mid 1930s and the early 2000s.It suggests that as the economic value of this practice was, and still is very limited; people relate other meanings for cultivating small, private vegetable and flower gardens. Beside the personal benefits of the practice, or its environmental contributions, the paper identifies the civic role of the practice - not merely for the community, but for the entire nation.

As a civic practice, urban agriculture is lately discussed not only as a mode of locally-based food production aimed for communities' social and economic development, but also as a mechanism for strengthening connectedness to place via embodied work and agricultural literacy.

The Israeli case is unique. During the pre-state period, urban agriculture was perceived as an agent that cultivates national pride and cohesiveness. Agriculture was considered as a public action of commitment to the nation's ideology that aspired to bring back the Jewish people to cultivate their ancestral land. Urban gardeners were recruited into this framework as representing the share of the urbanites in the national project.

Lately, as agriculture work lost its priority within the Zionist ethos, the country became more urbanized and crowded, and national ideology became less influential, the national expression almost disappeared from the urban agriculture discourse. Interestingly, urban agriculture remained in the form of nostalgia for a better, naïve Israel, or as a commitment to religious codes. Surprisingly, recent attempts to recruit new immigrants to establish urban gardens are based on the early 20th century rhetoric of nourishing place attachment via agricultural work. The findings reveal that such considerations no longer prevail within the veteran local population.

As a qualitative research, this work is based on diverse sources: archival documentation, case studies exploration and interviews with gardeners and experts.

Community health and urban agriculture

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Abstract
Urban gardening and farming are experiencing growth and recognition in much of the world. But while the entrepreneurial and urban planning aspects of urban horticulture are increasingly being understood, related health benefits have not yet convinced community health professionals to support actively the expansion of urban gardening and farming. Diverse interdisciplinary studies are beginning to amass peer-reviewed data that link public health outcomes with urban horticulture, however, this research is scattered and to date unrecognized. The purpose of this paper presentation is to present structured research evidence of the links between urban horticulture and health with the objective of convincing community health policy makers to centralize urban horticulture as an appropriate community health intervention.
Working with plants and being in the outdoors trigger both illness prevention and healing responses. Gardening-related exercise has been connected to reducing risks of obesity, coronary heart disease, glycemic control and diabetes, and occupational injuries. Health professionals use plants and gardening materials to help patients of diverse ages with mental illness improve social skills, self-esteem, and use of leisure time. Horticulture therapy promotes plant-human relationships to induce relaxation and to reduce stress, fear and anger, blood pressure, and muscle tension.
Urban community and school-based lands dedicated to food production encourage participation in the vigor of a positive urban environment. Working collaboratively to "green" a neighborhood creates safe and pleasant neighborhoods that decrease air pollution, reduce crime and enhance civic life. Social engagement is positively correlated with personal attention to health care and wellness.
Of course, urban gardens and farms also produce significant amounts of fruits, vegetables, fish, poultry, and meat. Urban agriculture provides a buffer both against local economic insecurity as well as periods of war and conflict that can disrupt normal food flows.

Urban agriculture industries in Georgia, U.S.A. respond to outdoor watering ban

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Abstract
Urban agriculture industries of Georgia U.S.A. have flourished, primarily as a result of rapid population growth. Urban agriculture industries include businesses involved in ornamental plant production, sales, installation, maintenance, design, and allied businesses. These concerns were loosely organized into several associations. Georgia experienced a significant drought in 2007. In September, 2007 most outdoor water use was prohibited in the northern third of the state (61 counties). This ban had an instantaneous negative impact on urban agriculture and resulted in unprecedented unification of the industry. Several associations joined forces through the Urban Ag Council (UAC). With the help of the UGA Center for Urban Agriculture, the economic impact of the outdoor watering ban on the industry was assessed. Industry-wide losses were estimated at $262,612,000 for each month of the ban and a calculated 35,000 employees faced layoff. The impact on the industry was an "unforeseen consequence" of the ban and few decision-makers were aware of urban agriculture and its economic and environmental impact. The UAC launched a political campaign which resulted in favorable legislation. A public education program was initiated to increase public awareness and understanding of urban agriculture issues and to highlight the benefits of urban agriculture in enhancing the urban environment.

How to project healing landscape?

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Abstract
The therapeutic function of landscape has been re-discovered and enhanced mostly in Anglo-Saxon countries, where it is primarily addressed to people suffering psychosocial disturbs. The garden therapy and the horticultural therapy are medical practices which employ plants and gardens as therapeutic tools in rehab programs; they are based on the principle, scientifically proved, that the contact with the nature has beneficial effects on individuals and it helps them to endure better pain and depression as well as to stimulate the improvement of the organism.
Over the last decade a number of studies have employed notions of therapeutic landscape to describe the ways in which places and environments become implicated in processes of healing or health enhancement (Kaplan and Kaplan, 1982, 1989, Ulrich, 19849, Cooper Marcus and Barnes, 1999).
The present paper analyses some possible criteria to adopt for the design of green spaces for horticulture and garden therapy, after a theoretical-conceptual dissertation. By means of an interdisciplinary approach to the planning, the authors identify new guidelines for the design and the development of design models for healing landscapes, starting from the shared experienced of the research group and from the integration of the single professional competences. Some of the design ideas and some of the examined study's guiding principles are concretely analyzed in the case study. The latter presents the elements of the projects, the methodological orientation which has been adopted and the single project choices. They all are discussed through an approach which integrates psychological clinical practice, landscape architecture and ecological and agronomic principles.

Self-sufficiency in suburban home gardens? On the history and prospects of the idea of food production in German home gardens.

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Abstract
From the beginning of civilisation agriculture has played a major, if not the central role in economic and cultural life. Ever since, a great deal of the food was self made at the *oikos*, the pre-modern home and self-sufficient economic unit that for most of the population was the centre of their world. The modern overall break up with domestic food production, with citizens relying completely on nourishment by supermarkets, is all but a matter of course.
In 19th century many of the rural population migrated to the cities that were not capable of granting subsistence to so many people. Allotments of the rising *Kleingarten* movement gave the chance for self-sufficiency in terms of vegetables, fruits and poultry. The idea was also supported by the *Garden City* movement and the German *Settlement* movement. An underdeveloped agriculture as well as depression and wars made home garden and allotment food production indispensable far into the 20th century.
Given industrialized agriculture, political and economic stability, after WW II vegetable plots were turned into leisure gardens. Today in Germany traditional growing of vegetables and fruits is restricted to the fringes of home gardens and to allotments. But in allotments, too, the trend for leisure and ornament has been observed for many years (*Groening* 1974).
Yet vegetable beds have not disappeared completely from the home garden. In an empirical study the author has shown that the productive garden survives – miniaturized and marginalized, but still important to many owners. Its character has changed from food production to aesthetic attraction and symbolic representation. Hence the productive garden is not the counterpart to the leisure garden any more; it has to be seen as a part and a special variety of it. Thus the suggested self-sufficiency of the productive garden turns out to be a refined manner of the luxury of being independent to real production.

Well-planned green spaces improve medical outcomes, satisfaction and quality of care: a trust hospital case study

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Abstract
Well-planned green spaces not only creates an atmosphere of relaxation, lowered stress level, social interaction and mental stimulation, but also can improve clinical outcomes through reducing pain medication intake and shorter hospitalization. Present study was designed to understand the people opinion about the impact of green spaces and gardening activities on health status and recovery level of the patients in Khadija Mahmood Trust Hospital, Faislabad, Pakistan. Questionnaires were developed to get the detailed information on a structural format from patients, visitors and doctors. Questionnaire contained personal questions, opinion question and question for their suggestions about the improvement of the landscape of the hospital. In total, 215 respondents was interviewed, 100 were patients, 100 visitors and 15 doctors. Data was analyzed by using chi-square test with SPSS (Statistical Package for Social Sciences) data analysis tool. Chi–square test is used for non-parametric population and nominal variables. Data were analyzed at 5 % of significance level. Findings from present study have converged that majority of respondents strongly agreed that green areas have restorative values and help the patients in recovering from diseases especially in stress releasing and hypertension. Present study has begun to appear suggesting that green areas in hospitals provide psychological benefits by engaging the patients in horticultural activities and enhance patient and family satisfaction with the healthcare provider and the overall quality of care. Well-designed green spaces in hospitals make good sense for the health of the entire community: patients, staff and visitors and it should become an integral component of modern healthy facility planning and operation to improve medical outcomes, satisfaction, and economic outcomes.

Allotment gardens: opportunity to pedagogic experiences in urban landscape

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Abstract
In present wider roles of allotments related to social, cultural and ecological issue, the pedagogic value represents an outstanding resource to improve relationships with natural environment and to cultivate community around a garden and outdoor learning centre. In this perspective different experiences of associations and didactic programs testifies co-operation projects to sensitize children for natural cycles and gardening, to lay out garden plots for their education about healthy food and care of land. Allotment gardens are welcome places to play, to learn from each other and, by working together, to build multicultural community integration. The focus of our contribution is analysis of educational aspects and influences reflecting over Italian historic evolutions, as pedagogic allotment gardens at the end of Nineteenth Century in Roma's region, Montessori school gardens, rural schools and horticultural programs by Opera Nazionale Dopolavoro (OND), and present study cases, as Roma municipality school projects, Rete Italiana of didactic farms, Slow Food association programs. By means of specific key readings and comparative rough overview of similar contemporary experiences the aim is to focalize how strategies of welfare policy and municipal local programs connect fruition of these green spaces to the open space system and extend values and tastes in social sphere of the city. In this way they can contribute to green wedges penetrating deeply into urban structure as well as to social enrichment of urban life.

College Community Gardens at Purdue: maximum cultural diversity at play.

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Abstract

Purdue University Village offers apartment living to students with families. The gardens have been integral part of the Village since its inception, with the acknowledged function of improving residents' life. These gardens, occupying 4 hectares divided into 300 plots of different size, remain the only example of community gardens for West Lafayette and Lafayette. Due to harsh winters in Indiana, plots are rented from April to November to both village residents and community members. Affordable rents from 25 to 40 dollars per season include irrigation water. Rent profits are funneled to the Village preschool. A strong international presence (60%) reflects in a great variety of plant species and growing techniques. The gardens contribute considerably to family food supply and provide an opportunity for individuals of different generations to meet, work, exchange ideas, share seeds, vegetables and different languages and cultures. They are a cultural mixing place for foreigners and locals, allowing people to keep growing and culinary traditions, while being exposed to different ones. Renters are the primary beneficiaries of the food they grow, therefore plots are intensively managed and virtually pesticide-free. The gardens are vibrant with activities and at the same time relaxing and sought after for leisure, especially on evenings and weekends. The recent addition of a fenced area reserved for dogs reinforces this concept. With renewed interest in urban food production we hope this experience will grow, possibly helping the spread of other community gardens in the area.

SESSION 5

SOCIAL AND PSYCHOLOGICAL ROLE OF HORTICULTURE IN THE URBAN ENVIRONMENT

POSTER PRESENTATIONS

Open air labs in school courtyards: experiences of environmental education

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Abstract
Planting mixtures of wildflowers in towns and cities is not just a way to improve biodiversity and to involve people in the sustainable management of urban green areas. It can be a very effective tool for teaching school children how to protect the environment.
The Regional Agency for Development and Innovation in Agriculture and Forestry of Tuscany (ARSIA) funded the project "Wildflower plantings for the sustainable management of town and school gardens". The aim was to assess the effectiveness of managing urban areas with wildflowers in terms of costs, sustainability and school teaching with the support of the local council of Livorno (Italy).
As part of our research project, we planted wwildflower meadows in the gardens of schools in Livorno in order to involve children in the observation and study of plants, insects, soil and biodiversity. The teaching staff were given training in how to involve 5 to 12 year-old children in practical activities, such as soil tillage, sowing and seed harvest. With help from their teachers, the pupils produced many art and scientific works such as drawings, poems, photos, diaries, and experiments. As a result of this pilot experience we are producing a guide to enable other towns and schools to replicate our success.

Extension master gardeners volunteers – managing the demand for horticulture leadership in urban areas

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Abstract
With increasing demands matched with decreasing budgets Cooperative Extension relies heavily on volunteer Master Gardeners to extend outreach. Presentation will include an overview of the North Carolina Master Gardener Program structure and administration including recruitment, training, management and impacts. In addition, the presentation will also include an overview of several of the on-line management tools designed to both enable county agents to delegate responsibility and to enable Master Gardeners to stay connected. Components of an effective volunteer program as well as strategies for inspiring participation will be covered.

Flower beds inspired by music

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Abstract
Plant material is an important natural element which has a significant influence on the visual identity of the environment. In nature it spreads freely and spontaneously thus creating complex horticultural unit. In areas like a park or a private garden man influences the choice of the plant material and arranges it according to the certain order and rules.
Plant material, besides it has its aesthetic function, is becoming a significant factor in the horticultural therapy thanks to its sensory characteristics as well as the fact that it is a live and growing element. Carefully selected plant material which stimulates all senses has a positive effect on the mental, physical, cognitive and social skills as well as the health of people.
Music, especially classical, has a positive influence on the brain as well as the general condition of man and is also used in therapy.
The goal is to connect different therapeutic methods - gardening, music and drawing in creating raised flower beds with plant material chosen according to drawings of participants associations inspired by selected musical composition.

Developing successful collaboration with the urban horticulture industry – the Georgia, USA experience

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Abstract
The UGA Center for Urban Agriculture is a unit within the College of Agricultural and Environmental Sciences (CAES) at the University of Georgia. The Center was formed to improve information transfer among college faculty and the rapidly growing urban agriculture industries in Georgia. The urban horticulture industries in Georgia were represented by seven professional associations. These associations were generally independent and seldom communicated with each other although an individual business might be a member of several associations. The Center fostered the collaboration of these associations for 10 years resulting in the development of the Georgia Urban Agriculture Council (www.urbanagcouncil.com). For the first time these industries now have a single, more effective voice for the diverse segments of urban horticulture and provides leadership for the individual associations.The Center supports urban horticulture by focusing on the council and its individual associations. Thus the Center maintains close relationships with the various industries and professional associations, thus enhancing information transfer among all parties. Educational tools include a Center web site www.gaurbanag.org, the Georgia Certified Landscape Professional program, email Alerts, on-line videos, on-line surveys, Center Reports, etc.

Plants for a better life – investigation of human-plant relations in indoor environments

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Abstract
"Plants for a Better Life" is a newly started project with the overall aim to research into interactions of humans and plants. It takes an interdisciplinary approach and seeks to combine knowledge from social sciences, health sciences and natural sciences in order to examine how plants and flowers in indoor environments affect psychological and physiological well-being of Danish adults. The project consists of five sub-studies. The one presented here is a study which focuses on how Danish adults think about and experience the effect from plants and flowers in indoor environments. More specific the study addresses questions like: What do Danish adults understand by words like plant, foliage plant, flower and potted plant? How do they use plants and flowers in indoor environments in everyday life? How do they use and experience plants and flowers in private life contra working life? How do they experience the effect from foliages plants and flowers (e.g. on health, mood, stress level, etc.)? Are various kinds of plants and flowers affecting them differently?
The study takes an explorative and inductive perspective, due to the fact that the aim of the study is theory development and generating knowledge that can be used to form hypothesises that can be tested in experimental and quasi-experimental settings. Therefore, most of the data will be collected by qualitative methods, such as focus groups or semi-structured interviews. However, quantitative methods such as a short questionnaire with closed ended questions will be used to collect demographic information and information about the number of plants and different type of plants the participants are exposed to in their homes and at their workplaces. The participants will be Danish adults, both male and female, from rural as well as urban areas, in different ages and with different occupational and socio-economic backgrounds. The collected data will be analysed according to the principles of grounded theory. Furthermore, the qualitative and the quantitative data will be compared in order to estimate the reliability of the data. The data collection will start in the end of January 2009.

The significance of plants in school grounds and environmental education of secondary schools in Trikala, Hellas

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Abstract
The beneficial effects of planting in urban areas are well documented. These benefits increase with the size of urban areas but their importance is not less significant for relatively small cities within rural areas. The city of Trikala with a population greater than 70,000 people is located within a rural area on mainland Hellas in the prefecture of Trikala. Amongst other green spaces school grounds can play a vital role in the interaction of students with planting. Planting in school grounds does not only provide an aesthetic environment in which students live in but also creates an educational environment that offers teachers the opportunity to teach various subjects and enhance environmental awareness of students. Environmentally based education programs can have a positive effect on student performance in addition to attention and enthusiasm for learning. The Ministry of National Education and Religious Affairs fund programs for Environmental Education, that are optionally taught to students' nationwide, to increase environmental awareness of pupils. Site analyses of secondary schools in Trikala illustrate that plant species present in school grounds are randomly selected and do not follow a particular planting design. A questionnaire survey is undertaken at secondary schools of Trikala with the objective to investigate the degree of satisfaction and attitudes of students and teachers towards the use of planting in the teaching curriculum and their interaction with planting in general. Preliminary results have shown that the planting at secondary schools in Trikala is relatively satisfactory but quantitatively inadequate. Plant material is sparsely used in the curriculum however students illustrate a desire for its use. Most students consider the presence of plants significant in school grounds with preference to plants providing shade and flowering plant species. Furthermore most students show an interest to voluntarily participate in plant maintenance.

The importance of organic method in social horticulture

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Abstract
The professional training and the labour management are primary aspects of the management of commercial farms, especially in so-called "social" or "care" farms in which horticultural therapy is often applied and personnel management must be combined with the need to obtain high quality products. Organic method represents a useful strategy to improve the quality of the production and to transfer agronomic competences to people with various types of disabilities.
The paper presents the results of two different projects in which nursery, horticultural and fruit tree crops were carried out in two different social farms in the province of Viterbo (latium, centre of Italy). people with mental disabilities and "double diagnosis", i.e. who are facing a psychiatric disability as well a substance abuse problems, were actively involved in horticultural activities with the aim to determine "good agronomical practices" to be adopted in this kind of situation. People involved showed a strong wish to share to these activities to assert own social identity. These techniques allowed to increase the involvement of disabled individuals, both in nursery and open field cultivations, to develop specific abilities and to obtain at the same time a satisfactory quality of potted plants and field crops that were sold in local market and fair.

Historical garden as cultural identity mark in Bucharest urban landscape - the Kiseleff Road and Garden -

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Abstract
Historical parks and gardens of Bucharest seems to be destined for today to an unfair neglecting, thanks to all the changes produced in common mentality by the new throwaway society, but more, because of greats economic interests which tend to monopolize every green centimetre, converting in this way, the urban oasis in unfailing money factories.
The Bucharest old public gardens which make in some senses urban image uniqueness also close this landscape with European cultural context of XIX modernity century. As identity elements, we observe on the one hand, real and / or imaginary, the urban morphology that abound of vegetal spaces, and on the other hand we remark the specific difference of use way for these areas.
The danger of these areas destruction could be appreciated from their inner multiple values:
- Ecological value – through the filter role for urban intense pollution
- Historical – architectural value – through the age of establishment, but more through artistic qualities and cultural bond with similar spaces and times from European Occident
- Social value – by specific way of use, community coagulation role and mark of appurtenance to a certain type of civilization.
Old places for social practice of leisure, green areas with heritage value are situated near current center of the city. That's why the high prices of these lands create an ascending pressure to decrease of free building spaces from central areas.
The link between culture, environment and community seems to be stronger if the people are conscious about the historical significance of living place, urban landscape being a powerful element of cultural identity.

The role of home vegetable gardening and community gardening for creating the value of life and the local community in Michigan, U.S.A.

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Abstract

In this study, to reveal the role of home gardening and community gardening in Michigan, an investigation was conducted on the actual conditions of these gardening and people's views and opinions in Michigan, U.S.A. This investigation revealed two important roles of the community gardening; one is "local community activation". The other is "self-sufficient production of foods", especially ethnic vegetables for people from other countries. Because, ethnic vegetables required for their food life are hard to buy. And, they also feel that it's very helpful to household economy. On the other hand, the home vegetable garden is in the back yard of private house in general. In both of home and community garden, most of gardeners do organic gardening, worrying about chemicals. They share the products with their neighbour and/or co-worker, and they also think they can make a good friendship/companionship through sharing products, seedlings, compost and/or information with the neighbour. Additionally, interviews indicated that home vegetable gardening was indispensable for elderly's welfare and creation of the value of life and also made it possible to live a more fulfilling life in the local community, by its contributions to the improvement of the people's health, their self-realization, the activation of the community, the invigoration of the region and the improvement of its environment.

The role of home vegetable gardening for community activation and human health in Japan

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Abstract

In the urban areas, as economic development and urbanization go on, human relationships trend toward weakness, and the number of people suffering mental health issues is increasing. To solve such problems, the role of home gardening or community/ allotment gardening have attracted attention. In Japan, self-sufficient home vegetable gardening had been done for a long time, but there are few in the urban areas now. In order to reveal the roles of gardening and to activate gardening in urban areas, investigations were conducted in rural areas; six remote southwest islands in Okinawa Prefecture, where people still live according to traditional life style. The results of interviews to 161 gardeners showed that almost all of gardeners share the products with their neighbour and/or relatives, and they think they can make a good friendship/ companionship through gardening, although some regional difference was seen. And most of them very much enjoy cultivating many kinds of vegetables and/or fruits in the garden every day, and they feel that working in the garden and products from the garden is very good for their health. A certain gardener also voiced that garden products in his garden are always shared with community members. Such a role of home vegetable gardening for community activation, which became clear by this investigation, should be utilized to achieve the healthy and fruitful urban life in urban areas.

A Phytoalimurgic garden to promote wild edible plants

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Abstract
The term phytoalimurgy derives from the Greek word *phytón* = plant, with the Latin words *alimenta* = food and *urgentia* = emergency. Hence, it means the study of ways to tackle a food crisis (famine, etc.). Wild plants have always been an important food source for people, not only in the distant past but also during more recent times of war. A wealth of information linked to human traditions has been gained on these plants which are worth preserving. As now these experiences are a prerogative primarily of the elderly in rural areas, there is limited time to preserve this knowledge. A Phytoalimurgic Garden (PG) is a place where edible wild plants are grown as if in their natural environment and is planned to produce food all year round. To create a PG now, as food emergency no longer exists in Europe, means to exploit and spread these plants, promoting popular customs, old flavours and uses. The PG is intended for agri-tourism and teaching purposes, to spread ethnobotanical knowledge and preserve biodiversity. This paper describes how to plan and to manage a PG and reports, as an example, the one realized in the plain of central Veneto (North-eastern Italy). A surface of about 900 m^2 was spatially divided in areas were different species were planted according to their respective ecophysiological requirements (in terms of shading, competition, etc.). In this manner we tried to recreate the habitats where these species live in the wild (tilled soils, meadows, uncultivated land, hedgerows, beneath hedgerows, etc.). As one of the aims of the garden is to capture people's interest, the layout was particularly considered. Currently, 7 shrubs and trees, and about 40 herbaceous alimurgic species are present in the garden. Some of the species have been analyzed for their nutritional value.

Bioenergetic landscapes, an innovative technique to create effective "Healing Gardens" utilizing the beneficial properties of plants.

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Abstract
It's well known that a great quantity of vegetable species have therapeutic properties used as phytotherapeutic or alimentary medicines. Nevertheless few know that it is possible to choose and use the peculiar electromagnetic properties of plants for our benefit. a long study on the biological influence of electromagnetism of our biosphere on living beings allowed to discover that each plant has its own characteristic influence on each organ of the human body, and that is possible to create particular interactions among plants and the natural and artificial magnetism of the place, measuring afterwards the positive effects on human body. the innovative technique of the "bioenergetic landscapes" consist in doing specific measurements on the environment and on plants, to use those with the most favourable properties for the body, by putting them in particular places of the garden. This can allow to amplify and spread for tens of meters their beneficial electromagnetic properties, using the best biological qualities of each species, amplified and spread in the environment by particular waves of the natural electromagnetism. with this application it is possible to offer the most effective instrument to realise parks and gardens whit an authentic natural therapeutical characteristic. On the basis of relevations made before on the ground it will be possible to project the green space underlining the potentiality of the area, obtaining by plants the best biological benefits without renouncing any aesthetic features.

Trees and the City. Some Remarks on the functions of a narrative urban style gardenesque as a matter of public didactics

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Abstract

Publications - from J. C. Loudons "Hints on Breathing Places for Metropolis…" (1829) to L. Baljons' „Green Urban Spaces in European Cities" (2002) - have pointed out some kind of interest in the reorganisation of the mutual functions of urban parks, arboreta areas, green wilderness cemeteries, and especially their outlining treescapes and neglected varieties. Today, those places seem to take over strong tasks in Hort therapy, or reflecting on aging services, health care or any recreation fields.To keep this in mind and to create a more known green urban future there should be a certain renaissance dealing with such (sometimes neglected or yet forgotten) horticultural narrations about old city parks and their tree funds, beside from the fact that they often seemed to be chosen for ornamental value only.

Actually, we'll have to listen to and to discuss together about the special roles this story-telling and remembrance could perhaps play in fascinating future types of reshaping identifying urban cultural life. One field to operate this is optionally to add more scholarly interest and attention to the importance of green *local knowledge* (C. Geertz) as city tree planting memories which would be a fine subject of *public didactics* – building the missing link between human horticultural relationship and successful concepts of urbanity.

Utilization of horticultural therapy for elderly persons in the urban environment

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Abstract

An attempt was made to develop a geriatric care technique characterized by the use of horticultural therapy that stimulates the senses in nursing homes. Beneficial characteristics of horticultural therapy activities were summarized. All of the horticultural therapy activities exhibited can stimulate three or four out of the five senses and a wide variety of symptoms that can possibly be maintained or improved. With respect to symptoms that can possibly be maintained or improved, all of the activities were expected to be effective with paralysis, mental disorders, akinesia, dependence and range of motion exercise. Specifically, however, craft activities are expected to be effective with flattening of affect, deterioration of balance control in a seated position and dementia, whereas cultivation activities are expected to be effective with deterioration of motor skills in hands, spasticity and osteoporosis. Overall, it was suggested that horticultural therapy as a care technique for elderly persons could become established if implemented in a structured manner by identifying the senses that can be stimulated in relation to the subject's symptoms by horticultural therapy activities and evaluating her/his progress as demonstrated in this study. In the city, many place of horticultural therapy at elderly people facilities were usually small area. However, it was revealed that the artifices of garden designing for the horticultural therapy that include indoor activities are able to expect maintenance or improvement of various symptoms.

Studies on making community places by flowers that made from PET bottles

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Abstract
The lifestyle harmonizing with the nature in Tasha Tudor lived in Vermont, was charmed people around the world. People in the world have gathered to see the life style and great garden. Through nature or a flower, it can be said that community setting is made on a world-wide scale. Also in Japan, there was an elderly person who liked flowers and always made a lot of flowers bloom in the garden around the house. A lot of blooming flowers all over the house garden were so splendid that many people came to see them from a long distance. However, when the person was not able to grow down flowers due to knee osteoarthritis of both sides and made flowers created with the PET bottles over the garden instead, it generated publicity and many people visited to see the garden and also people ranging from schoolchildren to senior visited to study the way of making from the nationwide. I will report the process of generating the place of the community through flowers made from PET bottles, without asking it the country and the urban environment.

SESSION 6

PLANTS IN HISTORICAL GARDENS

ORAL PRESENTATIONS

The gardens of ancient Pompeii

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Abstract

As opposed to most ancient Mediterranean sites, the image the Vesuvian territory covered by the eruption of 79 AD can be recomposed, also in those aspects which were irremediably lost elsewhere.

The refining of the techniques and methods which are peculiar to other scientific fields, applied to the ancient cultures, increases the disposable data, besides those traditionally "archaeological".

Consequently, the green areas within the tall walls of ancient Pompeii constitute an extraordinary heritage: they uniquely demonstrate the way green areas were distributed within a town two thousand years ago.

Alternative practices for vegetation management in archaeological sites - The case of Eleusis

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Abstract

In this study the vegetation management in the archaeological site of Eleusis (25 km west of Athens) was approached. Weeds, bushes and shrubs are natively grown in the site and in same cases cover a great part of the monuments constituting a severe problem. The main problem in such a case is considered the prohibitive control of the undesirable vegetation by herbicide spays in order to avoid possible deteriorations of the monuments, as they have been constructed by sensitive porous materials, and to insure human safety. The undesirable vegetation was recorded following a stratified procedure in selected sites, whereas we applied alternative control methods friendly to the historic environment. Soil solarization was applied to control the weeds, with 80% effectiveness during the following winter period and 55% effectiveness the following spring. An integrated method consisted by mechanical and chemical means was applied to bushes and shrubs. The branches were severely pruned and glyphosate (Round-Up) in a dense suspension formula was applied to the sections. Alternatively, the glyphosate was applied by injection inside the cambium. Both methods had 100% effectiveness. A particular problem is that of olive trees seedlings grown on the monuments, by means of seeds dispersal from olive trees that are part of the landscape of the archaeological site. Spraying once with 400 mg l^{-1} naphtalinacetic acid (Apponon), at the end of May – early June resulted in complete fruit abortion, thus this method is suggested to control the great distribution of olive trees in the majority of Mediterranean archaeological sites. A special layering was applied in a particularly sensitive site, a mosaic floor, closed to visitors, part of a Roman villa, in order to protect it from the weeds. The mosaic floor was covered with layers of quartz sand, matting, LECA and gravel, and by this way weed development was totally inhibited.

The Plants in Chinese historical garden and their cultural meanings in landscaping

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Abstract
China has a long history of gardening landscape and left great number of historical garden, becoming precious cultural heritage of human being. In the historical gardens, plant is not only one of the main elements for landscaping, but also the most important element in expressing the philosophy of the garden designer/owner. Therefore, it was extremely subtle in plant selection and arrangement/landscaping. In most of the cases, when specific species were chosen, the expression of the philosophy of the designer/owner was in a way of combining the plants with architects or other landscape elements as mountain, water and stone, etc. The symbolic meaning was expressed via understanding of the cultural content of specific plant species or, in a very common way, cluing on by inscribed boards or couplets hung on the pillars of a hall etc. Beside the concrete elements of landscaping, the climatic or other natural phenomena such as sun, moon, rain, wind, snow, frost and animals as birds, fish etc. were often borrowed in the garden as scenery element to express, combing with plants, the philosophic meaning of the garden. The cultural meaning of the plant was formed during the long history of civilization. Usually it was abstracted from the shape/form of the plant, its phonological calendar, ornamental characteristics or other biotic properties. After long history of development, the cultural meaning became the most significant characteristic of Chinese historical gardens, making the garden a joyful place not only for physical but also for spiritual life. Nowadays, the world is developed quickly and the material civilization is greatly developed, therefore, people are now pay more and more concern to the conflict of the human being and natural in view of ecological point, however, the cultural essential is of the same significance and should not be ignored. We may learn something from the historic gardens, not the exact way of building a garden, but the philosophy.

Splendor of Mexican prehispanic gardens

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Abstract
The rulers of ancient Mexico kept magnificent gardens where aromatic herbs, medicinal plants, vegetables, trees and flowers were grown. Those gardens were designed for the pleasure of the elite, who enjoyed especially the scents of flowers. The royal gardens were known as "palace of flowers" – *xochiteipancalli* while popular gardens were known as *xochicali* – "house of flowers".
Among the most famous prehispanic gardens are those of prince Moctezuma in Chapultepec and Huaxtepec (today Oaxtepec, State of Morelos); those of Cuitláhuac – Señor of Iztapalapa (Mexico City) and those of king Nezahualcoyotl in Cerro de Tezcutzingo (Texcoco, State of Mexico).
The unique floating gardens known as *chinampas* were located around the Lake Texcoco, which in the XVI century consisted of five large lagoons. The Nahuas (Mexicas) settled on the southern shore between 1350-1400, and obtained permission from the king of Azcapotzalco to establish the plantations of vegetables and flowers. In exchange, they had to pay a tribute in produce to the king.
To utilize the shallow lagoon´s surface the nahuas developed an innovative technique to prepare beds (camellons) for plant cultivation. The chinamitl (chinampas) were built on a structure of willow tree reeds (*Salix* spp.) whose root systems strengthened the border of the bed. Under cultivation were corn, beans, huauhatli (amaranth), squash, chili, tomatoes and aromatic flowers.
Most Mexican prehispanic gardens have disappeared but a few continue the rich tradition. For example, the Xochimilco chinampas, considered the birth place of Mexican horticulture are now undergoing rescue and conservation efforts.
The objective of this work is to present the Xochimilco chinampas and the gardens of king Nezahualcoyotl on the Tezcutzingo Mountain, as they were in ancient times and today.

Vegetation elements in Baroque gardens (The influence of foreign plants on Baroque program)

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Abstract
The main goal of this paper is to find out witch plant's species represent baroque style and in which way they were used. The first section of the paper includes a discussion about the appearance of vegetation elements in baroque gardens. Particular attention is paid to manner in witch non-native species, exotic plants and ornamental bulbs were used in planting design. The paper defines the individual plant types, the reasons for their introduction and their influence on garden design in terms of individual stylistic periods. The second section of this paper compares Slovenian baroque gardens to European. The Baroque period in Slovenian gardens began at the end of the 17th century and was particularly evident in Gori?ane castle, Slovenska Bistrica, ?rnci pri Apa?ah and Begunje. This study also investigates the influence of foreign plants on Baroque program. The case study of baroque park - Brdo pri Kranju shows the manner of using non-indigenous plants and spatial changes they caused. Park was establish around 1770. Here Karel Zois raised not only the indigenous plants which he had gathered on his botanical walks but also foreign trees. He imported plants from England, Italy, Austria and the Netherlands and arranged them in survivable orchards with no particular design in mind. It was the fertility of the land that dictated garden design. In this garden, foreign plants played a strictly scientific role. It was find out that certain types of plants provided the means to create higher geometric forms but in this specific regard foreign varieties did not offer any particular advantage over indigenous types. The introduction of new trees changed the relationship between space and surface elements, creating new accents and broadening the spatial rhythm. Ultimately, the Baroque quality of parks declined with the introduction of the new plants.

The restoration of the fire affected area of the medieval castle ruins at the traditional village of Leontari, Arcadia, Hellas

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Abstract
Leontari, is a relatively small traditional and historical village of the Peloponnese with approximately 384 inhabitants. It is located in the southwest of Arcadia at an altitude of 540 m on the northeast side of mount Taygetos, 11 kilometers from the city of Megalopolis and 30 kilometers southwest of the capital city, Tripoli. Rising within the village, a mound houses the medieval castle ruins, and two byzantine churches. The forest fires in August 2007 burnt a section of the village including the pine forest on the mound. The effect of the fires did not scar only the landscape but the inhabitants as well, who struggle to continue living within the region after the damages incurred to their livelihood. Efforts are being made to restore the landscape of the village. The exposure of the ruins from the fire attracted archaeologists and excavation works are carried out to study and highlight their historical value. A questionnaire survey was undertaken to investigate people's view on the landscape of the castle ruins prior to and post the fire, methods to restore and increase visitation of the site and the village in general. Preliminary questionnaire results illustrate that the majority of inhabitants want the mound restored and access to it improved. Inhabitants did not fear restoring the planting on the mound using the same species before the fire. A proposal to create a botanical garden with native plant species of the region at the bottom of the mound seemed indifferent to them. Based on the findings of the questionnaire survey and preliminary excavation works a design proposal is under way to restore the mound. Aims of the proposal include the selection of suitable plant species in appropriate locations determined by archaeological findings in relation to views to and from the castle, village and surrounding landscape.

Plants and plant material in nine gardens of LeNôtre

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Abstract
Plants and plant material are, together with water and ground, the three classic design materials in landscape architecture. Contrary to architecture where new materials have enabled new directions for design, in landscape architecture the design materials have been the same since the very beginning of the making of gardens and landscapes. The use and scope of plants and plant material as design material have their roots in the cultivating of plants for food, plants as medical herbs, for the making of gardens and horticulture. The use of plant material for gardens, parks and landscapes forms the basis for most landscape architectural interventions.
The goal of this paper is to show the rich experience the profession has in the using of plant material as design material in particular in the work of LeNôtre. In this paper we have analysed nine gardens of LeNôtre on the use of plants and plant material at different levels of intervention. The analytical framework is based on the distinction between element, structure and process.
The results are quite remarkable in the sense that they show the stunning craftmanship of LeNôtre as designer. How he has created such a variety and richness of visual and spatial qualities with very few and simple design principles. Moreover it is interesting to see how he integrated the three design materials water, ground and plantation.
This research is part of a larger research project that focuses on plants as design material in landscape architecture and urban design.

Beatrix Farrand (1872-1959), and her designs for the Marsh Botanic Garden, New Haven, Connecticut: a model for the conservation of wild plants in the built environment

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Abstract
In America in the 1890s garden designers became interested in the gardens of the Italian Renaissance and it was proposed that the Italian garden could be adapted to create a new type of American garden. This was opposed by ecologists who argued that a naturalistic approach to garden design was more appropriate. At that time landscape design and ecological conservation were seen as mutually exclusive, but in a career spanning five decades the landscape architect Beatrix Farrand demonstrated that the two subjects could be combined to good effect. Inspired by Charles A Platt's book, Italian Gardens, published in 1894, she visited Italy in 1895 and afterwards created formal gardens in America in an Italianate style. She was aware that the native flora of America was under threat from industrial development and she made a valuable contribution to plant conservation by mixing native plants selected according to the soil and climate with non-native, exotic plants to create ecologically based planting schemes within her formal gardens. She took this a stage further in 1923, with her design for the Marsh Botanic Garden at Yale University, where she proposed that a collection of native American plants should be planted within a layout reproducing the geometric plan of the botanic garden at Padua, the oldest botanical garden in Europe. Here she demonstrated that architectural design and wild plants could coexist, and in this paper it is suggested that her design for the Marsh Botanic Garden might now serve as a model for the conservation of plants in the built environment.

Introduction and conservation of autumn camellias in historical gardens of North-Western Italy

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Abstract

Camellia sasanqua, also known as autumn camellia, has Japanese origin and flowers during autumn and winter seasons. Since ancient times, in Orient *C. sasanqua* was appreciated as ornamental plant and represented in many paintings. In Europe, the first information were published by Engelbert Kaempfer in 1712 in *Amœnitatum Exoticarum*. In this book the Author named the autumn camellia as "Sasanqua of Japanese" and described the 25 main cultivars he saw in Japan. The introduction of *C. sasanqua* plants in Europe dates back to the first half of the XIX century. At that time this species was not very popular as ornamental because of the simple shape and soft colour of the flowers and was often confused with *C. oleifera* and *C. maliflora*.

This study aimed to investigate the introduction and the assessment of autumn camellias in Italy trough a detailed bibliographic research. Few information were found in ancient documents and catalogues kept in public and private archives and a small number of old *C. sasanqua* cultivars were found collected in historical gardens. To date, precious collections are located especially in gardens around the Lake Maggiore (Piedmont – Italy). This rare botanical heritage needs to be studied and preserved.

Green Traces from past to future: eco-cultural value of historical parks in Central Europe

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Abstract

Historical gardens and parks are widely acknowledged as hotspots of species diversity and as crucial elements for healthy and liveable cities in our future warmer world. Besides environmental and ecological services, historical parks provide important social and psychological benefits. In addition as a matter of particular interest one can stress their cultural value as historical monuments, especially concerning those of the 19th century.

The objective of the ongoing project Green Traces is to analyse the eco-historical dimension of Central European historical parks. The history of development of urban parks and its cultural-historical importance as well as the contemporary sanitary impact in the cities will be explored. The ecological effects of horticultural history of urban parks with its high concentration of exotic species of flora along a North-South gradient in Central Europe will be analysed in the context of global warming. The aim is to improve ecosystem services of urban historical parks, to strengthen diversity of species, habitats and communities, to provide a historical park network for enhancing interconnectivity in Central Europe. The project structure will be presented and first results will be discussed.

New challenges for Mediterranean horticulture and landscape planning: how can the Villa Thuret project respond to the urban society's demand for green?

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Abstract

Since one and a half centuries, Gustave Thuret and his successors have introduced, experimented, and described ten thousands of exotic plant species, making the Thuret Botanic Garden a historical centre for scientific research applied to Mediterranean decorative horticulture.Their work largely contributed to the renowned landscapes of the Côte d'Azur.

Today, the Mediterranean coast faces new challenges.

Together with urbanisation, grows the society's demand for green and the need to find innovative solutions to conquer new spaces as roofs, walls, urban equipments,... Moreover, climate change and its consequences on water resource is predicted to be particularly accurate in Mediterranean areas. This context induces the necessity of finding new methods and techniques of urban landscape planning and horticulture.

Therefore plants have to be considered in their complexity and the choice of plant species has to evolve to be adapted to these new conditions.

To address these challenges, the Thuret project aims to create a multi-partner competence centre dedicated to Mediterranean plants, landscape, and urban ecology. This will be lead in close partnership between research, education and private sector actors.

In a moving international context and to face the Mediterranean countries' challenges, this centre will have three main missions:

1. Research, Experimentation and Expertise, to contribute to document and understand Mediterranean plants and their potentiality to respond to urban demand.
2. Higher education on Mediterranean plants, water resource management, adaptation to climate change
3. Organisation of cultural, scientific and technical venues, to engage the interest of a wide range of people in value of plants

Beyond its expertise in plants, the Thuret Villa has a strong federative power and as in a past, a fundamental role to play in the definition and conception of the future Mediterranean landscape.

Plants in gardens and parks of XVIII century in Piedmont

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Abstract

While several public historical gardens, located in different provinces of Piedmont (Northern Italy), were studied in the past, numerous private gardens are still unknown. For this reason a research was recently performed with the purpose of better understanding style of the gardens, the work of famous landscape architects, the history of the sites with particular emphasis on the botanical richness. During the XVIII century, mainly English and German plant hunters travelled through eastern countries and discovered exotic trees, shrubs and flowers. These plants were collected and cultivated into private gardens of Piedmont and now represent an important botanic source of germoplasm. This study shows that in these gardens monumental trees such as *Cedrus,* different cultivar of *Fagus sylvatica, Quercus* and *Cycas* etc.. are present. In gardens closed to Lake Maggiore *Camellia* and *Rhododendron* species were planted during the XIX century. Moreover in many parks of Piedmont were built greenhouses for recovering exotic potted plants not frost resistant. During the study it was also possible to note a correlation between the history of the provinces and the evolution of the parks and gardens themselves.

Colour schemes by Gertrude Jekyll – an interpretation

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Abstract

The aim is to test if it is possible to apply colour theory on the planting design schemes of Gertrud Jekyll (1843-1932) with the purpose to increase the knowledge about her colour use principles. Jekyll is an important historical garden designer. Her studies in art, colour and garden craft, resulted in articles and books, where she described her planting design thoughts and principles. In “Colour Schemes for the Flower Garden” she produced a historical garden document of importance. This book can be deemed as a guidebook for the composition of plants from a colour point of view. The main questions I will try to give the answer to are (1) how does her colour scheme appear from a visual point of view and (2) how is the scheme linked to colour theory?

The method used is to compare her planting schemes and statements with the colour theory of Johannes Itten (1888-1967) as presented in “Kunst der Farbe”. The work contains an investigation in three steps: an interpretation of Jekyll´s colour schemes in colour analysis, compare these analysis with Itten´s colour theory, and compile Jekyll's aesthetic criteria in the form of supporting guidelines and reflections.

The result is a colour translation of Jekyll´s composition schemes, presented as a laboratory experiment which is commented upon from the viewpoint of “Ittens” colour theory.

The Role of Music in the Dissimilation between Eastern and Western Landscape Garden

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Abstract
Garden and music are standing on two different art systems, although both of them have their own development, they do have inseparable relationship. For thousands years, they effect each other, progressing together, and perfecting the characters of counterpart.
In fact, for most of the nations the special characters of art existed at very beginning, simultaneously presenting in many different categories of arts. In these different categories of arts, they also have very tight connection inside to share those characters.This point can be found step by step between garden and music. The worship in music is also impressed in the gardens which are in the same culture area, evidently signed in the layout of the garden, the gradation of the garden, the visual focus of the garden, and the composition of the garden. The whole organization has the reflection of musical metaphor, such as the different balance between western and eastern music, and the dissimilar temperament in western and eastern music, and so on, there are plenty arguments to be prove in the garden. Just as the eastern melody, called "BaiYan" system, was accurate used in their winding way and uneven building in gardens, the western melodies also were utilized in their regular paragraph arrangement and rigorous conformation of western gardens.That is one of the exact reasons why we should free more attention from the visual surface to the integration between garden and other categories of arts.
This article set the Music as an example within several parts (including Melody, Rhythmus, and tempo) to give partly explanatory notes about the root of dissimilation between Eastern and Western Landscape Garden. Meantime, it explains the reason of different aesthetics' shaping in landscape garden .By analyzing another form of Art - Music- this article intends to unfold a new thread for researching the regular laws of gardens' evolution.

Botanical gardens; from plant collections for scientific study to green urban spaces

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Abstract
Botanical gardens have a long history; they are the first type of gardens that were designed for a specific function, the systematic study of plants. Since most botanical gardens are associated with a university, we find them mostly in cities. Although plants are still studied, the number of botanical gardens has diminished, some have disappeared but there also examples that have diminished in size.
The goal of this paper is to make clear how the role of botanical gardens has changed in the urban context. In this paper we will analyse some examples both old and new, still functioning and changed in function and how this has affected the role of botanical gardens as urban green space.
The approach is based on the 'case-study method'. Case studies are all European and limited in number. The analytical framework is based on a distinction between element, structure and process. It results in a comparison between the different cases in relation to form, function and meaning at different levels of intervention. One of the conclusions of this research is that botanical gardens are typical urban phenomena. The special organisation of plants based on taxonomy, climate zones or other criteria does not interfere with the use as urban green space. The special layout, organisation of space and choice of plant species contributes to a special atmosphere and identity. Altogether a wonderful example of combination of functions that adds to the quality of these urban green spaces.
This research is part of a larger research project that focuses on plants as design material in landscape architecture and urban design.

Wooded meadow gardening in southern Sweden during the past centuries

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Abstract

The aim of my presentation is to give a view of the wooded meadow systems in the Swedish countryside, as garden substitute phenomena in the past. The haymaking meadows close to the farms and villages were at least in the 18th and 19th centuries not only a place for winter fodder collection, but also a substitute for traditional gardens by the houses. As a matter of fact the wooded meadow was the true garden of the farmers and other countryside inhabitants at that time. Here they were keeping their fruit-producing trees and bushes of different kinds and sometimes even perennials. When more formal gardens were introduced at the end of the 19th and the 20th centuries, the role of the wooded meadow was lost with except for some remote areas in the woodland region of southern Sweden. In these areas the degenerating traces of the meadow gardening land-use is still to be seen.

The main questions put in relation to the meadow gardening phenomena are: (1) which kinds and varieties of fruits and berries were grown, (2) what kind of patterns and structures were typical for this kind of wooded meadows, and (3) which were the main working elements in the garden-like meadows during a typical year? The most important information sources used are documents and maps from different archives, the traces in the landscape and interviews with old country-side people.

The results of my study shows that meadow gardening has been an important part of the cultural landscape character and of the husbandry. It is of great importance to keep the craft traditions associated to the meadow gardening practise alive, as well as the remaining orchard meadows and their old varieties of fruit and berries.

The characteristics of the historical gardens of Sicily

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Abstract

The complex history of Sicily, with its centrally strategic position in the Mediterranean made it an important crossroads of civilization, and also influenced the use of ornamental plants in historical gardens. However, very few studies have been carried out on these typically small gardens. Some years ago research was started on the characteristics of such gardens in Eastern Sicily. Over 50 gardens were analysed most of them from the late 19th and early 20th century. A tailor-made methodology was used to look more closely at the biological and agronomical traits of the plants in these gardens so as to understand them holistically. The results show that these gardens are characterized by high plant diversity despite the small surface devoted to plant cultivation. In fact over 500 taxa of ornamental plants have been identified. Often the species are very rare, so they may only be found in one or a few gardens. About 88% of the garden species were exotic while the remainder were indigenous. The plants are also characterized by exceptional hardiness and good adaptability to the Mediterranean environment. For about 18%, of the species there were various cultivars all of which are commercially defunct. There were also many edible plants creating a close tie between the ornamental and utilitarian role of the garden. There is also a discussion of the way the plants were used and their organisation within the gardens was often very original and closely calibrated to the Mediterranean environment.

The planting of flowers and its cultural connotations in Suzhou Courtyard Gardens

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Abstract
In Chinese traditional culture, the plants and flowers growing in courtyard gardens often have established, particular and symbolized cultural connotations, and the planting of trees and flowers and scenic arrangement also have their cultural symbols. People slop over in front of flowers and watch their blows and falls, which composing cultural connotations in Chinese courtyard gardens. Numerous plants and the distinctive plant disposition style play a very important role in the development of Chinese classical gardens. The plant material is one of the four gardening factors, and every gardening plant has its unique shape, color and charm.. As one of the principal parts of Chinese classical gardens, the plant landscape and its cultural intention are in people's good graces. And as one of the historic and cultural achievement of Chinese five thousand years history, the classical gardens show its strong Chinese historical spirit and national characters.

Plants in Kunming World Horticulture Exposition Garden

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Abstract
Kunming World Horticulture Exposition Garden established in 1999. It was the historical garden in which the Chinese Government held for the 1999 Kunming International Horticultural Exposition officially registered as a specialized international exposition rated A1 successfully From May 1 to October 31 in Kunming, Yunnan. Kunming Expo'99 was a large-scale international conference of showing garden plants and urban horticulture technology in the end of 20th century. As a display area of the top-class horticultural and gardening masterpieces, the Expo Garden boasts the considerable technical and scientific contents which embody the beautiful features, the artistic techniques and the intellectual value. About 2551 species of plant have been transplanted, including 60,000 arzbors, 300,000 shrubs, 66,000 vines, 200,000 herbs and 200,000 lignosa and other ornamental foliage plants; Over 400,000 m^2. of lawn and some 1,000,000 potted flowers have been cultivated, among which the precious and rare, endangered and high-valued ornamental plant species amount to 112. In the Grand Greenhouse, over 1200 species of plants growing in tropic, sub-tropic and frigid zones have been raised. The Bamboo Garden is a paradise for gigantgrass, square bamboo, spot bitter bamboo, bitter bamboo and so on. In the Tree Garden, 319 species of plant are transplanted, with the precious trees such as sago cycas, gingko, Chinese golden larch and Chinese manglietiastrum enjoying themselves there. In the Medicinal-Herb Garden, 464 species of medicinal herb like ginseng, pseudo-ginseng, gastrodia, taxus chinesensis and so on have survived and multiplied. The Expo Garden is a galaxy of plants from all over the provinces of China and foreign countries, among which many are rare and endangered.

From the Minerva Garden to *Circa Instans* illuminated herbaria: a virtual path without boundaries

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Abstract

The Historical Archive of *Botanica Salernitana*, placed inside the "Giardino della Minerva", keeps nearly 9.000 images of 16 illuminated herbaria which illustrate the herbs used in a medieval pharmacopoeia known as *Circa Instans*.

It is a virtual archive of texts and images related to the Salerno old botanical tradition, designed to revive the highest point of city's history.

The history of the Archive is deeply intertwined with that of the Giardino della Minerva.

The Giardino della Minerva, the first botanical garden in the world, is a historical and architectural document set in the heart of old Salerno. It is the Schola Medica Salernitana garden of "simples" (a simple being the part of a plant that was believed to contain the active principle).

The originals of these herbaria are kept in major museums all over the world, including London and Paris. Due to their value and fragility, it is very difficult to have access to these manuscripts. Moreover, due to the distance between the museums, it is obviously impossible to consult more than one herbarium at the same time, in order to compare, for example, the different representations of the same plant, or to appreciate the colouristic developments, the resemblance to reality, and so on.

This project, sponsored by the Salerno City Council, differs from other like products in the way the information is reached, that is by means of virtual reality and artificial intelligence technology. Most interesting is a 3D reconstruction of the Giardino della Minerva as a key to gain access to the herbaria images.The user will be able to take a virtual walk through the Giardino, and stop by each of the existing flower-beds. Here, he/she will be led to know about the over 500 embedded plants, through the presentation of: 1) a picture of the plant; 2) a picture of the same plant taken from a contemporary herbarium; 3) a picture taken from the illuminated herbaria showing how the plant was represented in the Middle Ages.

In order to make the product attractive for a wide range of users, the presentation of the information will resort to advanced adaptive techniques to suit the user's profile. For instance, the contents intended for a school kid will be different than the ones intended for a research worker these are the results of the research and didactics of the Archive.

The final project will also include the transcription and translation of the old texts a botanical file card and a comparison between past and present pharmacological uses. This will give everyone the opportunity to approach a difficult branch of learning, that of medicine, in an easy way.

SESSION 6

PLANTS IN HISTORICAL GARDENS

POSTER PRESENTATIONS

Restoration of the Royal Glasshouses and their plant collection in the historical garden of Racconigi in Piedmont

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Abstract

The neogothic Royal Glasshouses in Racconigi, designed by the architect Carlo Sada, are one of the most important examples of greenhouse and conservatory architecture of the XIX century in Europe. They were built between 1843 and 1850, under the supervision of the royal headgardeners, Marcellino and Giuseppe Roda, who were well aware of the new technologies and knowledge about gardens in Germany, Holland, France and Britain.

Until the beginning of the XX century, these glasshouses hosted a great botanical collection of over 2000 exotic and rare species coming from every country around the world. Alas, around the 1920s the decline of the entire park started, and the collection was gradually lost.

In order to safeguard and evaluate this heritage, an important project for the restoration of both the Castle and the Park is in progress. In particular, this study is focused on the restoration of the Royal Glasshouses and their botanical collection. A very precious document was found in the private archives of the Castle: the Inventory of the species that were grown inside the conservatory in 1892, handwritten by the then headgardener Ferdinando Caula.

The project is now to put back those plants inside the glasshouse, with the aim of bringing back the passion for agronomy and scientific experimenting that was typical of XIX century Europe and of the so called 'botanical fever', and that was the main feature of the Royal Gardens of Racconigi, the favourite mansion of the kings.

Citrus gardens in Pantelleria: places where tradition means innovation

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Abstract

The "giardino pantesco" is a tradition in the Pantelleria island. Located at 36.82N, 11.97E, 70 Kms part from Africa coast and 85 Km from Sicily, Pantelleria climatic and meteorological conditions do not allow the growth of important, traditional plants of Mediterranean. Strong winds, low rain, high summer temperatures are in fact limiting factors.

Traditional gardens are diffuse, made of local stones forming a circular wall, each including a single citrus, or a lemon tree.

Our study shows how these structures impact and modify local micrometeorology, and offer information about a very sustainable, traditional, low-impact plant protection structure.

Taxonomy, distribution and economic importance of Xylocarpus species at Carey Island – the heritage island of Malaysia

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Abstract
The genus *Xylocarpus*, belonging to the family Meliaceae is distributed in the tropics including mangrove habitat from Africa to Australia, Malaysia and India (Ridley, 1922). It is usually associated with *Avicennia*, *Excoecaria*, *Acanthus*, *Rhizophora*, *Bruguiera*, *Sonneratia*, *Nypa* and *Ceriops*. There are three species of *Xylocarpus* in Malaysia namely, *Xylocarpus granatum*, *X. mollucensis* and *X. rumphii*. They are considered important endangered mangrove species in Malaysia. *X. granatum*, commonly known as *nyireh bunga*, *is* important economically for wood carving. The inner bark is a source of dye for tanning, the oil from seeds is used for grooming hair, the fruits and seeds are used to treat diarrhoea, and a bark decoction for cholera. It has been mentioned as the best and most beautiful cabinet wood. Its fine, glossy texture is suitable for furniture (Burkill, 1966; Primavera *et. al*, 2004). However, the population of the species is dwindling hence there is an urgent need to conserve the species.
To date, there is no record on detailed morphological study of the species therefore it is one of the aims of the study to investigate the morphological characteristics of the species. Anatomical studies on the leaf and primary stem were also carried out.
Scanning electron microscope study revealed the presence of sunken, anomocytic-type stomata on the abaxial surface of the leaf. Results from anatomical studies showed the presence of thick cuticle on both abaxial and adaxial surface of the leaf. Sunken stomata and thick cuticle are adaptations of mangrove species to reduce transpiration. Tannin cells were also observed in the leaf lamina and primary stem and this needs further investigation.
Regeneration of this species from tissue culture had been attempted, however, only callus formation was observed.

Safeguard and valorisation of the productive areas in historical gardens

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Abstract
Fruit trees have represented since the beginning of their domestication both a main source of man's life and, owing to their beauty, a source of pleasure in gardens as well as in the rural landscapes.
Fruit trees have been used as ornamental plants in the different typology of gardens, regardless of their evolution and diversification, so that *brolo, verziere, pomario, hortus* are just examples of elements of gardens and parks in with fruit trees were the main constitutive traits. Furthermore, in the rural contest, fruit trees cultivation systems have represented a constant element of landscape, frequently establishing usefulness and uniqueness of large areas or single spaces. Historical gardens may represent oases of historical fruit orchards. In fact, owing to their confined and preserved nature, they represent in comparison to the rural areas more suitable places for conservation of fruit trees germplasm and traditional cultivation systems, becoming, therefore, sites in which botanical, ecological, cultural, historical and aesthetic values meet together. Nonetheless, the productive areas in some historical gardens are not considered as priorities in the restorations actions.
The study's aim was to define the global value of the productive area, i.e. the *pomario*, of the renascence garden of Palazzo Giustiniani Odescalchi in Bassano Romano (VT), Italy, actually limited to some residual plants. It has been applied an integrated evaluation system that has considered at first the biological value of the unique varieties of apple, pear and cherry. The applied methodology has allowed to recognize characters and functions other than the productive one, that represent the complexity, and added value of these area. The analysis of the cultivar identity and of the historical documentation has allowed to propose restoration actions coherent to the history and the original constitutive garden's elements.

Plant degradation in park Maksimir

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Abstract
Park Maksimir is one of the most significant symbols of Zagreb. In landscape architecture, Maksimir is known as the first public park in this part of Europe and by this he holds an important position in the garden art in general.
Its primary function is providing sanctuary to a person so he could be able to disassociate himself from pressure and growing dynamic of life in the city. Urbanization produces many positive changes, but also brings less acceptable. Considering the fact that the urban core is over-crowded, it takes hold of every open area. This is how the role of green areas becomes subordinated to building construction and traffic areas. Illegal urbanization has a direct influence on the park itself through construction of various buildings within the boundaries of the park. Even legal urbanization has caused a great deal of damage to Maksimir. It is fortunate that the larger part of the schemed contents was never carried out in full.
For some reason, a complete plan of revitalization has not been offered yet. There were mostly projects that referred to specific parts of the park. Accordingly, it is necessary to create a new park design plan in order to achieve its functionality in every sense, with respect to the history matrix and conservatory criteria. In order to actualize this plan, goal of this paper is revitalization of plant material. To achieve that, a few mostly present tree specimens were chosen and observed in order to evaluate their quality characteristics (scale, enclosure, quality of light, management, and stimulus).

Restoration of a Roman villa garden in the archaeological site of Eleusis

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Abstract
A study was carried out aiming to the recreation of surrounding area and gardens of a Roman villa found in the archaeological site of Eleusis. The Sanctuary of Eleusis was one of the most important idolatrous centres in the ancient Greek world, where the Eleusinian mysteries were taking place. In our days, the site is of great archaeological and historical importance and is visited by more than 20000 people yearly. The proposal was based on the type of Villa's gardens (*atrium* and *xystus*), plant species used at the Roman period and had a symbolic meaning, and low maintenance. The Roman villa is situated at the SW end of the site and is not easily noticed because of the hilly landscape. So, we emphasized the passage towards the villa with small trees or shrubs pruned into trees, as pomegranate (*Punica granatum*), myrtle (*Myrtus communis*) and oleander (*Nerium oleander*). The *atrium* was the centre of activities in a roman villa, where the *impluvium* (rain water tank) was situated. Often the *atrium* was turned into a garden. In our proposal the *impluvium* is surrounded by pots with myrtles. The *xystus* (*hortus*) of a Roman villa was the area where fruiting trees and vegetables were cultivated. So, in the *xystus* of this villa we suggest to plant one row of lemon trees (*Citrus limon*) and in frond of it two rows of pruned boxwood (*Buxus sempervirens*). We put box-wood instead of vegetables in order to keep the maintenance low. Furthermore the pruned shrubs remind to visitors that Romans were the ones that developed in particularly the topiary in order to give formal shape to plants.

Rediscovering a Forgotten Garden. Research upon a Monument Garden, Part of the Historic Assembly of the Otteteli?anu Mansion

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Abstract
We approach the present state of a monument-garden, which for 158 years has inconstantly changed concurrently with the changes from the Romanian society. This case is not a singular one in Romania, but here we face with a paradoxical situation: on one side, in legal view, as the garden has never had the status of "public garden", it was protected from the human masses flow and from the irreversible space rehabilitation, helping thus the initial restoration possibility. On the other side, although one of the first professionally-fitted garden in Walachia, included in a patrimony monument-assembly, it was "forgotten". Thus, the own evolution of the garden is interesting. The natural elements participated in a survival battle and nature entered its role where it was only desired to suggest it. The rehabilitation attempts in the past led to the unsuccessful transformation of the built elements, leaving much too obvious marks upon the romantic style. The vegetation has developed according to own rules and many specimens resisted in time, becoming natural monuments. The observance and determination of the species on-site disclosed an extraordinary conduct: exotic samples brought among the first into the country, have coexisted with the native ones, adapting themselves perfectly to the conditions of the site. The atmosphere has gradually become that of a forest and characteristic herbaceous vegetation has developed. Thus, the current forestry association of the Otteteli?anu Garden was classified in the geo-botanical category of the historic area, of waterside silvosteppe.

Historical reconstruction of Gomes Freire Square in Mariana – MG, Brazil

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Abstract
This study deals with the knowledge and the analysis of the historical evolution of Gomes Freire Square in the city of Mariana, located in the state of Minas Gerais (Brazil), with identification of the landscape representation of the square. Taking in consideration the collective unconsciousness of Mariana's inhabitants, this work was centered in the urban development of the city and in the transformations undergone by this square. Its history starts as an open space in the outskirts of the city and later it became a space organized as a place of recreation and promenade. The research on the historical evolution of this square focused its interest in the morphological transformations of its space and in the social representation of the square. For this purpose, the methodology with an interface between the inventive analysis and the subjective analysis method was applied. The inventive analysis enables an interpretation which considers the natural, patrimonial and social data of the place, identifying its physical and practical evolution processes. The subjective analysis does not conduct to a quantitative evaluation but reveals aesthetic, phenomenolical or symbolic values. Gomes Freire Square, even though presenting modifications in its structure and in its use through its history, was always a space of popular arrogation, a space "to see and to be seen", a space destinated to socialized leisure. Gomes Freire Square is located in the vicinity of the back side of Basílica Nossa Senhora da Assunção Cathedral and the historical and landscape dimensions of this square are evidenced as a space of popular representation.
This work was conducted with financial support by CNPq

Historical reconstruction of Tiradentes Square in Ouro Preto – MG, Brazil

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Abstract

The present work refers to the study and knowledge of the historical evolution of Tiradentes Square, located in the city of Ouro Preto, state of Minas Gerais (Brazil), aiming the identification of its landscape representation in the collective unconsciousness of this city inhabitants. Having this objective in mind, it was necessary to concentrate in the urban development of the city and in the transformations undergone by this square. This lead to the necessity of studying in depth the knowledge of the significance of these transformations throughout the years, which allowed the identification of its evolution as a public space. The research on the historical evolution of Tiradentes Square was centered on the interest in the morphological transformations and in the social representation of the square. For this purpose, a methodology with an interface between the inventive analysis and the method of subjective analysis was applied. By means of the inventive analysis it was possible to identify the physical evolutionary processes and the customs of this place. This implies in discerning what would be more appropriated in the specific relationship between the place and its social custom. The subjective analysis, even though it does not conduct to a quantitative evaluation, reveals aesthetical, phenomenological as well as symbolic values. Even though Tiradentes Square presents modifications in its structure and in its use, it showed a vocation to represent the public power during the course of history. It reached its apogee in the period of the settlement of the Republic regimen, when it embraced the monument to Tiradentes, which became a great symbol of this political moment along the XX century.

Integrated pest control in historical gardens: a successful example with Phytoseiidaea against spider mite on lime trees

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Abstract

Lime trees are very sensitive to the outbreaks of the spider mite *Eotetranychus tiliarium*. Damages are principally esthetical. Chemical treatments are restricting, expensive and kill the beneficial fauna. But an alternative exists: Phytoseiidae which are predatory mites of Tetranychidae. Since 1997, INNOPHYT is looking for solutions with the help of the French Acarology team of the ENSAM-INRA of Montpellier.

Experiments have taken place at Villandry castle on the lime trees (*Tilia platyphyllos*) of the park.

From 2000 till 2003, *Typhlodromus pyri* (Scheuten) and a mixture of two species of Phytoseiidae, *Euseius finlandicus* and *Kampimodromus aberrans*, have been introduced. Phytoseiidae were collected on wild lime tree with the branches where they are living in the wood around the park of Villandry. These 3 years of fundamental study allow observing the short and long -term effects of Phytoseiidae.

The population of the spider mite can be controlled with this technique which therefore is extended of all the lime trees in the garden. Phytoseiides and particularly *Euseius finlandicus* have now colonized the garden.

Identification of old lilac and crab apple cultivars growing in the City of Helsinki, Finland

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Abstract
Old parks and gardens of Helsinki City embody an assortment of woody ornamentals that is astonishingly diverse, in respect to the harsh climate and to the relatively short history of ornamental gardening in Finland. This paper reports the results of a study aimed at documentation, evaluation and identification of old common lilac (*Syringa vulgaris* L.) and ornamental crab apple (*Malus* Mill.) strains growing in the green areas of Helsinki. The survey was accomplished in 2005 and 2006.The study material included 62 individual common lilac shrubs and 30 crab apple trees.The morphological characteristics of each plant were measured and photographed. An initial idea on the cultivar identity was obtained via historical notes related to each growing site and via the cultivar assortment presented in contemporary Finnish nursery lists and gardening handbooks. The morphological traits of the plants were then compared to cultivar descriptions in reference works. For the lilacs, 26 phenotypes were distinguished, and nine of them were given a plausible cultivar name. Among the crab apples, 14 trees were preliminarily identified as known cultivars or as belonging to a certain cultivar group.

Conservation and use of palms in Brazil's landscaping

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Abstract
The palm trees belong to the Family Arecaceae and are widely utilized in landscaping of tropical countries. Although there are many species, just a few are used in Brazil's landscaping, being the majority coming from other countries. So, this study had the objective to make a characterization of the plants in the collection of palm trees at UNESP / FCAV, Campus of Jaboticabal, Sao Paulo State, Brazil, in order to know the behavior of several indications of palms for use in landscaping, as well as knowledge of the germination of seeds to increase the production of seedlings for use in landscaping, being that the biggest difficulty to spread new species. It was accomplished the introduction of new species in the collection. It was also made a survey of major pests and diseases that occur in the collection. The most common pests found were: *Brassolis sophorae*, *Parisoschoenus obesulus*, *Rhynchophorus palmarum* and *Coraliomela* spp. And the most common diseases: *Colletrotrichum* sp., *Curvularia* sp., *Bipolaris* sp., *Helminthosporium* sp., *Alternaria* sp., *Phyllosticta* sp., *Pestalotia* sp., *Exosporium palmivorum* and *Ceratocystis pardoxa*.

Reconstruction of the historic image of an urban garden, as a tool for preservation and enhancement

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Abstract

In the last century, town have substantially changed at landscape and architectonic level and green areas within urban context have been involved in such change process. Several gardens indeed have today an historic value and represent a remarkable heritage for the entire community, but in many cases their current plant arrangement is highly different from the original one. With the aim of preserving and enhancing such gardens, it results particularly useful to define analytic tools for the knowledge of original features of those places and for a comparison to the current ones, with particular consideration of plant and morphologic features.

The goal of the study is the definition of an operative method of analysis suitable to reconstruct the historic image of urban green areas with particular reference to the plant arrangement, the architectonic composition and the morphology, by means of the joined analysis of historic documents and of the survey of the present situation.

The method defined was applied to a study case represented by a urban garden in Imola (Italy), designed and built at the end of the 19th century and deeply changed because of the modifications in the ways of utilization and of maintenance of the site. The historic image of the area was reconstructed, basing on documental data obtained through the analysis of the original project documents and their digitalization by CAD, thus producing in digital format the plan of the site, vertical sections and the table of the plants as considered in the project.

The historic image was compared to the current situation, which was analyzed by means of a three-dimensional topographic survey, which allowed to draw up the plan of the study area and a 3D digital model, by creating a Triangular Irregular Network (TIN). The plant arrangement of the garden was surveyed both in a topographic way - by defining the location of threes and shrubs – and in a botanic way – by attributing a specific denomination to plants, according to the international binomial nomenclature. The comparison of the historic image to the current situation was performed by means of the overlay of digital plans, and by the creation in CAD environment of sections of the surveyed area and their superimposition with the design sections.

The results allowed to outline the transformations undergone by the considered area, and in particular to identify the original elements most significant at plant, composition and morphologic level. Those elements are today hardly recognizable because of the modifications which have altered the original site arrangement. The performed analyses therefore represent a tool with general validity, usable to define design choices for the preservation and enhancement of urban historic gardens.

Multidisciplinary integrated methodology in the vegetal restoration of the "Giardino dei Cedrati" in Villa Dora Pamphilj, Rome

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Abstract

The recovery, restoration and management of historical green spaces requires an integrated approach among different professional areas. The multidisciplinary approach provides new insights into the conservation value of restored and remnant vegetation according to the historical evolution of the garden, taking account the prospects for proper maintaining and management. The study of vegetal restoration of the "Giardino dei Cedrati" in Villa Doria Pamphilj (Rome) (Benocci et al., Il Giardino dei Cedrati di Villa Dora Pamphilj, Viterbo, Italy 2008), expresses the result of harmonious integration and synergy among diverse disciplines. This important area has changed over time with an integration of forms, species of plants, features, colours, pathways, spaces of aggregation. Nonetheless, over the years this space has been interested by a progressive abandon implying the risk of the loss of the garden identity. The scientific project was therefore based on detailed study of each of the components as part of a organic unity of the "Giardino dei Cedrati" and the interactions with Villa Doria Pamphilj's park to which it belongs. For successfully complete the project, a work breakdown structure was produced to identify the component tasks. Among them, the study of the historical evolution and cartography of the area, along with the compilation of a topographical map, has provided the base information. Other areas of activity have been covered by diverse disciplines, including botany, agronomy, plant pathology, management. Finally, alternative proposal concerning the maintenance and management were presented and compared.

SESSION 7

URBAN HORTICULTURE MEETS ARCHITECTURE

ORAL PRESENTATIONS

The landscape project between rediscovery and intervention

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Abstract

Beginning from the small scale of a punctual project like a terrace of reduced dimensions floating above a narrow ravine over an untouched forest, passing through the urban scale of an harbor plaza which is the connection of the city of Kreuzlingen with the lake and, at last, approaching a territorial scale project on a mountain like Cardada, we always move from the same fundamental principles and concepts, with the same design philosophy.

In first place we let ourselves be inspired by the site and wonder how to approach it, how to walk through, but also – at the end of experiencing the place- how to leave it.

The second step of this creative process refers to landscape, to the hidden dimension that is possible to be discovered beyond the physical perimeter of a place. An active and sensitive observation will allow us to focus on the existing dialogue with the surrounding environment of the area, and on the inspiring interaction between the nearby elements, and the horizon.

From here begins the research on the history of the site and the attempt to transmit a beautiful story or a tale through a playful dimension of design, always arousing curiosity and enhancing the desire of going deeper in perceiving the site. Hence the visitor of a small garden, of a plaza or a park will be invited to elicit questions without providing an immediate answer, and will explore the area feeling free to play with his emotions and imagination.

All the stages of this process are essential starting points for my research: we could find them in almost every project we could realized till today, but in every project _thanks to a re-interpretative operation_ they lastly give rise to a final result that is completely different from the previous one.

In the intervention "Esthetic of agricultural landscape" in the German metropolitan area of the Ruhrgebiet, the visitor doesn't know in advance anything about the project and he is even not informed on its existence; but if he shall walk through the wide acreages or will perhaps observe it from on high, he will be able _maybe_ to discover it with surprise.

The Nexus of Urban Horticulture and Architecture in New France

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Abstract

Surveys on the provisioning of cities across New France consent that bread and meat were the two main components of the colonists' diets. Yet, while horticultural produce were also significant elements of settlers' subsistence, the physical effects and spatial consequences of urban horticulture in shaping these settlements have been overlooked.

A detailed look at maps depicting New France settlements, as climatically diverse as New Orleans, Montreal and Quebec City, yields surprising information on the relation between urban horticulture and the built environment. The *intra-muros* layouts of these varied settlements are striking because what is almost always represented on each plot is a garden.

What was the function of those gardens and how did they interrelate with their surroundings? In seeking to answer these questions, this paper explores the nature of the relationships that linked urban horticulture to architecture in New France, with particular focus on 18th c. urban Montreal. It chooses Montreal to investigate the potential impact of urban horticulture on the morphology of an early colonial settlement situated on a cold-climate island. It does so, in emphasizing urban horticulture as (i) fruit and vegetable production cycles, (ii) transformation processes, as well as (iii) commercial paths within the settlement walls.

The paper unfolds in three sections: The first introduces the context of French colonial Montreal, as well as urban horticultural practices. The second presents evidence from core primary sources that include maps, traveler's notes, and archeological data referring to landscape, architecture and artifacts. In this section, specific parcels, building typologies and infrastructures (through which fruits and vegetables made their way from backyard gardens or empty lots to people's diets and to wastes or by-products) are surveyed. The third integrates these findings into a thesis that suggests connections between urban horticulture and architecture.

Landscape Horticulture in Shopping Malls and Retail Centers in Metro Manila, Philippines:Overview and Status

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Abstract
The modernization of the Philippine capital, Manila, and its environs has stimulated the construction of shopping malls and retail shops within the last 10 years to cater to local residents and international guests. These commercial centers usually have master-planned indoor and outdoor gardens. Ten shopping areas namely Alabang Town Center, Gateway Wall, Trinoma, Tiendesitas, Mall of Asia, Rockwell Mall, Robinson's Place, Market Market, Serendra, Filinvest Alabang areas located in Manila, Makati, Muntinlupa, Pasay, Pasig, Quezon City, and Taguig were studied. Their areas ranged from to 30,000 to 410,000 square meters while architecture ranged from ethnic Filipino to modern structures. With Metro Manila considered congested at 18,650 persons per square kilometer (2007), the landscaped areas function not just for trade but for social events, entertainment, cultural exchange, information center, and wellness activities . Developers and property managers meet the need of maintaining the gardens either by having full time landscape horticulturist leading a team or contractors doing the work. The following trends were observed: increased utilization of indigenous trees and ornamentals in the landscape, increased adoption of irrigation and maintenance equipment, increasing areas with atriums and interiorscapes, strategies of using low maintenance plants, adoption of modern landscape maintenance tools and use of new. introduced perennial trees, shrubs and herbaceous perennials. Opportunities include addition of annuals and colorful perennials for seasonal display, installation of children and senior citizen areas and design and construction of more garden accessories by local artists and craftsmen. Highlights of the special features of the mall and retail shop landscaped gardens and their maintenance status will be presented.

The Architecture of Parking Areas: a Challenge for Landscape Design. Garden-infrastructure in periurban areas.

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Abstract
The work represents a critical review of a selection of significant projects of parking areas chosen within the contemporary international context, aimed at discussing the role of parking architecture conceived as an opportunity to reinvent suburban and rural landscapes. Such issue is part of the very topical and broader theme of the relationships between infrastructure and landscape and deals with the important subject of holistic landscape design. Nowadays designers have to face several opportunities of parking design related to the construction of intermodal stations, airports, shopping malls, industrial areas, as well as natural, cultural and leisure parks.These places and design themes have now become usual, nevertheless they still require an appropriate and original design research.
Parking areas, besides their specific original function, can represent *gardens* and public spaces lying between the city an the countryside, capable of producing new hybrid landscapes blending architecture, infrastructure and nature.
The introduction of the work refers to the artistic phenomenon of the sixties and seventies known as Land Art, which proves to be useful to underline some essential concepts of *Landscape Design*. Land Artists preferred periurban, natural and rural landscapes as optimal spaces to test a new form of relation between man and nature, through an aesthetical and ethical claim. A*esthetical*, since non-urban landscapes represented open air scenes refusing the traditional exhibition halls and art markets, and, at the same time, places where the artistic work materials were mined, as well as sources of formal inspiration. On the e*thical side* the attention was strongly turned to the ecological issue, felt as an urgent need in that period, and focused on the key concepts of the reversibility

and temporary nature of human actions, very short if compared to the time of natural processes.
Since *(landscape) architecture* is a functional art, it assumes the above-mentioned aesthetical and ethical values and combines them with social an economic needs. Some contemporary projects of parking areas reveal a design approach aware of the specific features of suburban landscapes, meant as archetypal spaces where dialectics between human activities and nature, between agriculture and nature, between the landscape and the garden takes place.

Urban vegetation and perceived colour

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Abstract
Little or no research has been conducted on how distance affects the perceived colour of vegetation. The purpose of this paper is to present part of an ongoing research, aiming to generate new knowledge and understanding about conscious colour use in urban horticulture design. The intention is also to start a professional discussion about the interaction between colour, architecture and vegetation.
In the research project the experience of perceived colour depending on distance, season and species is studied in different plantings. The research area is located in the Landscape Laboratory at the Swedish University of Agricultural Sciences, Alnarp. The Landscape Laboratory focus on the construction of new landscape elements, characters and species combinations.
The research is based on studies of plantations with one species, *Quercus robur,* two species, *Quercus robur* and *Prunus avium* and complex stand with different key and complement species (*Quercus robur, Prunus avium*, *Sambus nigra, Tilia cordata, Fraxinus excelsior, Corylus avellana, Prunus padus, Crataegus monogyna*). The project is a case-study based on site observations and interpretations by a test-group as the main empirical sours. The methods used are *Colour notes of hue and nuance, Colour notes of feelings, Colour specification of the RHS Colour Chart* and *Colour analyse with artist's colours.*
The study is a contribution to the growing knowledge in relation to how colour experiences interacts with architecture and urban horticulture.

A public garden per resident? The socio-economic context of homes and gardens in the inner city

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Abstract
The ratio of open and built-up space in the inner city is depended on economic interests, city planning and the concept of living in a private home with garden, also called "the American dream". In times of economic upswing urbanization spreads, when suburbs are created along traffic lines and residents are pushed by real estate market and subsidizing out of a city's center. Lots are subdivided, built-up and eventually new neighborhoods grow together to become inner city districts with their own social and economic centers. Density increases, while open space is reduced. Since the population of a residential location, rental charges for apartments and the amount of open space is depended on the type of ownership and occupancy of the buildings, the district may be downgraded from middle- to low-income districts – with an further decrease in open space due to speculation. During times of economic downwind, these districts are vacated of their population, vacant buildings are built "back" and only some urban structures inhabited by few low-income residents remain. As more open space becomes available, residents create gardens next to their home as they had been dreaming of. This spurs renewed interest in the residential location and revives urbanization. Suburban development is re-introduced, succeeded by densification. The renewed pressure on land threatens the existence of the community gardens and the possibility of the residents to remain in their neighborhood. This scenario of urbanization is analyzed at the example of the drastic changes in urban and community gardens development in the South Bronx in New York City. The thesis is that the described cycle of urban growth and shrinkage could be broken in favor of especially the low-income residents by reconsidering the concept of the "American dream" and by providing a privately used public garden per resident.

Towards a new professional figure : the agri-city planner

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Abstract
Since a long time, horticulture collaborates with architecture. Formerly, for instance, orchards and also kitchen gardens were green components of gentry housing. so, in Versailles, famous *Potager du Roi* or *Orangerie* were conceived by la Quyntinie, a true *gardener-landscaper*, to be worthy of architectural conception of the palace. Similarly, urban design needs horticulture, because public gardens and parks are considered as essential to a modern city. But henceforth, we must consider other scales than usually; particularly, this one of urban region, or *archipelago city*, where *cities islands* are separated each other by green open spaces, or natural either cultivated. These latter become a part of urban design, when this one is managed at region level. Modern green belts of big cities are immense; they take up ten thousands km^2, such as in Paris, Peking or Toronto.
Also, meeting between horticulture and architecture is deeply different. Probably, supplying the town with food is always important, not only because horticultural belts were a traditional component of cities (still in southern poor countries), but also because there are nowadays a large range of new stakeholders involved in *urban agriculture*, in modern meaning of proximity grown food. More, there are henceforth other social values that horticulture deals with agriculture, more particularly rural landscape and heritage. Agriculture, and also they are involved in city governance.
So, we proposed to design a new professional figure, whose background would be various (architecture, agronomy and horticultural science, landscape design, urban planning), but who would be trained in order to work together and to design and manage a more efficient local project.

The Preservation and Protection of Urban Trees: Lessons from the Field and Case Studies from the City of New York

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Abstract

Urban population centers are ever increasing in size and spread, enveloping much of the remaining open and tree inhabiting landscapes within those centers. In the City of New York growth and development over the past six years, both in the private and public sectors continues to have consequences when occurring adjacent to vital urban tree resources and voluminous root occupied landscapes. The NYC Mayoral "PLANYC2030" proposed in early 2008 is the outline for a Green & Sustainable city and under that Plan unequivocally identifies urban tree resources as the organism of choice to address the matters of sustainability- the ecological, economic, social, health and quality of life issues currently confronting the 8 million inhabitants of the city.

Despite the PLANYC2030 and even NYC laws intended to protect public trees, construction from infrastructure and building development has directly impacted and damaged unforetold numbers of large and mature irreplaceable specimen public trees highly relied upon to deliver vital benefits and services, and with tree health that are significantly compromised and have become public liabilities.

When tree protection and preservation goals do arise, independent Consulting Arborists (CA) are invited to tell it like it is- informing and educating administrators, planners, engineers and their landscape architects precisely what conditions individual mature trees and their root zones require to ensure continued tree health and longevity. Experiences from the field by a Consulting Arborist cites numerous case samples where tree protection and preservation were successful and other dire lessons- where tree protection was set aside with obvious negative outcomes to those trees. Presented are strategies and technologies currently used within the City of New York by CAs to minimize the damaging aspects of construction upon trees.

Bioengineering and ecological restoration in urban green areas: examples from north-western Italy

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Abstract

The importance of green areas is increasingly considered for the restoration of urban ecosystems. Worldwide studies concerning people needs in urban landscapes have underlined the fundamental role carried out by greening in the cities not only for social and aesthetical reasons, but also for environmental aims. Problems like soil erosion, river flooding, lack of biodiversity are frequent in urban contexts and, in the last decade, ecological planning and design methods were often applied. In particular, the application of bioengineering and ecological principles at the urban scale represents an interesting novelty. For this purpose an interdisciplinary approach is needed, agronomists and architects have to work together in order to solve both ecological and technical problems. Therefore, in this study authors looked at the use of bioengineering techniques used in some recent interesting examples in urban green areas in Piedmont (north-western Italy). The proper use of methods (seeding; plantations, rock walls, piling walls), materials (wood, stone, geotextiles, biotextiles) and species (grasses and herbs, shrubs and trees) were analysed.

Differences from criteria used in mountain contexts, values and limits of these techniques in urban areas and their possible application along banks of rivers, slopes, roads, footpaths or bike paths were pointed out.

Six Jewish Garden Designers in Vienna

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Abstract
The lecture deals with the life and work of six Jewish women garden designers in Vienna in the 1920s and 1930s.It discusses the potential of garden design and horticulture as a part of women's economic self-determination. And it shows both the great impact these women had on Viennese Modern Garden architecture and the vacuum the emigration of 1938 left in Austria.
In 1913, Yella Hertzka, a friend of Gustav Mahler, Arnold Schönberg, Alban Berg and Ernst Krenek, founded the first Horticulture High School for Girls. In 1938 she escaped to Great Britain. Hanny Strauß' radically modern house, designed by Josef Frank in 1914, was the headquarter of her nursery of perennials, called „Windmühlhöhe". Following her contacts with Frank, she supplied the plants for gardens in the Vienna Werkbundsiedlung and designed the garden of the Austrian pavilion at the Paris World Exhibition in 1937. Oskar and Hanny Strauß escaped to Haifa. Anna Plischke, née Schwitzer, worked professionally as a garden designer. Married to architect Ernst Plischke, in New Zealand after 1938 she also turned to growing and propagating perennials. Dr. Paula Fürth was both the owner of a nursery and head of a school of horticulture in Vienna; she, too, worked closely together with modern designers and architects. Helene Wolf's „Helenium" and Grete Salzer's „Hortensium" were both nurseries that also designed gardens for houses of modern Vienna Architects.
This lecture will present results of a research project on landscape architecture in Austria between 1912 and 1945.

A new landscape for Milan

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Abstract
Milan's Municipality has started a renovation process of the urban landscape, based on some fundamental "levers". First comes the PGT. In compliance with Law 12/2005, also Milan is creating an instrument for managing the process of urban transformation. The identified unchanging features are the environmental and infra-structural system networks. Green areas and roads will constitute the connective tissue of the several other urban structures and functions, thus defining not only the shape, but also the functional and use articulation of collectively used open spaces.
A specific layer of PGT is the Plan for the Green (already defined in 2007), which specifies, besides the morphology, also the cultural and scientific contents of the future green areas: their connections, permeability, ecological and landscape quality, use,… duly scaled to the territory: from the neighbourhood green areas, to the great urban park, up to the outermost green belt.
The aim is more than doubling Milan's green areas (from 13 to 30 square metre per inhabitant), by working both on the creation of new greenery, therefore new parks, new plantations (aim: 500,000
trees), new vegetal species (consistent with ecological and environmental-friendly criteria); and on the systematisation of the existing and future green, through interconnected and protected use networks (green areas, gardens and lawns), which will enable the citizens to reach and use also areas which today are marginal and often inaccessible. An example of this is the vast agricultural landscape to the South of Milan, which will be reachable from the Darsena (wet dock) along the Navigli waterways, so as to appreciate a new kind of green, among farmhouses, abbeys, irrigation ditches, agricultural fields, with the possibility of visiting the numerous farms and of buying their typical, often certified, products. The new green

will be also supported by the waterways network, from the irrigation ditches and canals to the only river still "in the open", the Lambro, which will thus become the main ecological lane of the vast green system to the East of Milan, stretching from the city centre towards Parco Forlanini, Idroscalo, and then towards the outermost agricultural fringes. Thanks to a Green Area, it will be possible to reach this region, as well as Parco Montestella, Parco Nord or – along the Naviglio Martesana – to go beyond the municipality's borders until…Lecco!

In this way Milan, besides the more famous and discussed major works, has already started to renovate valuable areas, restore monuments, floodlight churches and theatres, light up squares and parks, enriching them with artistic performances.

Similarly, it has also started to redefine plans and projects in order to give them the required formal and constructive consistency. We are faced with a big challenge and the work is in progress, starting from the first practical need: coordinating the several public and private workers acting on the same vast territory.

The aim is not only that of avoiding overlapping or, -even worse- interfering, but also and above all activating synergies and economies of scale, useful to the creation of a widely shared urban quality.

By building a network with the other world cities that have already started important processes of urban regeneration, Milan is laying the foundations of an important renovation of its own urban fabric: not only through major works and big building sites, but also thanks to the re-establishment of the net of anthropic and environmental components that constitute its intrinsic value and memory.

SESSION 7

URBAN HORTICULTURE MEETS ARCHITECTURE

POSTER PRESENTATIONS

Sustainable landscaping: a low-maintenance project for a green area in Pisa (Italy)

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Abstract

We are creating a new design for the 4 ha garden that is part of the National Research Council in Pisa. Due to inadequate planning and a recent shortage of funding, this green area needs radical restyling. In order to reduce the planting costs and the maintenance, the key elements taken into account were: use of native hardy species, use of compost, irrigation limited to the representative areas, renewable energies. Improvement in biodiversity and enjoyment for people were also considered important aspects. The garden restyling would then benefit the thousand of people who work there and all the out-patients who regularly come to the clinic, that is also located in the same area.

Urban landscape in public places of dense built area

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Abstract

The presence of vegetation in urbanized places is looked punctual or accidental, reason for it's required a proper analysis of the situation and action practices as soon as possible.

In the highly urbanized places of the city, the vegetation in competed by the commercial posts and banners. The perennial character of vegetation and poor maintenance of the urban landscape can represent other factors that led to few vegetation areas in these areas.

Due to these unfortunate events, we consider as opportunity or compulsory practice, adopting new solutions for increasing the vegetation surfaces, related with the norms and laws of the EC witch stipulate the vegetation area/inhabitant will reach 26 m^2/ inhabitant till year 2010.

Due to the mentioned above situation, the presence of vegetation is compulsory for its benefic effects, which assume certain equilibrium in the urban landscape.

The paper proposes monitorization of the local dendro-floricol species, behavior of some new introduced species in the Romanian landscape regarding the climatic conditions specific to our country. Another point of interest is keen on the possibility for a better integration of the vegetation in the urban landscape, regarding the front side of the buildings in the highly urbanized places.

Concluding, due to proper studies and analysis regarding the actual urban landscape area, will be possible to make *suggestions* and *new definite solutions* for raising the surfaces with vegetation in the highly urbanized places, for a proper concordance of the Romanian landscape architecture with the EC standards and norms.

Agriculture, agrarian landscape and territorial planning: characterization of the territory and hypothesis of development in Santa Flavia (Palermo) - Italy

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Abstract

Today, complying with national and regional legislature, territorial planning in Italy must guarantee a careful management of the territory. Therefore it cannot omit the support of environmental studies (geological studies, agricultural-forest studies, E.I.A., S.E.A., etc.) that define new and different perspectives to be assumed in landscape analyses and project choices. The present study case, carried out in Sicily with the contribution of different professionals, takes place in this context. The research is located in the territory of Santa Flavia (Palermo), a small coastal town divided between an economy based on tourism and one based on traditional fishing and agriculture

Through agricultural-forest study methodologies, the analyses so far conducted have carefully examined the municipal territory so as to identify possible actions of restoration, protection or exploitation of the forest and landscape resources. To reach this objective a methodology of data elaboration has been adopted that distinguishes the territory in "landscape unities" homogeneous regarding use and need of planning actions.

The research reveals a territory possessing a rich naturalistic, historical and environmental patrimony, about 70% of which covered with agrarian cultivations that deeply characterize the landscape.

The analyses in detail underline the extreme fragmentation of landed property that, with the abandon of citrus cultivations and the pressure of thirty years of indiscriminate urbanization, disfigure the territory.

Therefore, striving not to lose any peculiar historical-cultural, landscape and productive characteristics of the local countryside, some useful hypotheses have been formulated in order to exploit or re-qualify local agriculture, not only in terms of cultural re-conversion but also of alternative uses of agrarian properties.

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