Flowers and Plants

– more than just beautiful…

Flowers and Plants – more than just beautiful…

AIPH
International Association of Horticultural Producers

Contents:

Introduction

Flowers and plants are beautiful. Everybody feels that. Everybody is familiar with flowers and plants; everybody is accustomed to them in daily life. But who knows what they really mean to us? What do we know about the benefits flowers and plants have for the eco-system, and about the contribution they make to mankind? To many people, flowers and plants seem like luxury goods. But we depend on them in an elementary way. How can this be? What is so special about flowers and plants?

This brochure tries to answer some of these questions. An outline of the historical background of gardens, as well as people's interest in plants and flowers will be given. The main part deals with plant properties and the benefits deriving from that as well as the cultural and social significance of flowers and plants.

The message of this brochure is that decision makers must reconsider their priorities in favour of greenery and plants. People ought to realise the benefits of flowers and plants - and how much they contribute to society at large. For that reason, AIPH - the International Association of Horticultural Producers – is happy to share its knowledge of the positive effects that flowers and plants have on daily life.

The basis for this brochure was a presentation at the 56th AIPH Congress in September 2004 in Ghent, Belgium. Promoting the idea that flowers and plants improve the quality of life is one of the objectives of AIPH; initiatives like "Plants for People", the "Green City", "Entente Florale", and "Cities in Bloom" do the same.

Ornamental horticulture produces all kinds of plants – trees and shrubs, perennials and annuals, cut flowers and pot plants. We wish that this booklet may inspire you to even more enjoy the art of nature through its beauty and colour.

Dr. Doeke Faber
President of AIPH
International Association of Horticultural Producers

June 2006

Flowers and plants in history

Owning a garden, or at least having access to one, seems to fulfil a basic need. A brief look into history shows that gardens are part and parcel of man´s cultural development.

According to Christian belief, the first thing God did after creating man was to plant a garden. In Genesis 2:8, it says: "And the Lord God planted a garden eastward in Eden; and there he put man whom he had formed." The Garden of Eden, also called Paradise, is precisely described in the story of Creation: "And out of the ground made the Lord God to grow every tree that is pleasant to the sight, and good for food; the tree of life also in the midst of the garden, and the tree of knowledge of good and evil."

So gardens, nice to look at, were invented by God himself so that man would have trees to give him shade as well as delicious fruit.

But what exactly is a garden?

According to the Bible, it is a place that is pleasant for people to be in.

The words *Paradise* and *Garden* have similar roots. Paradise is derived from the Old Persian word *pairidaeza*, meaning 'an area surrounded by a wall' or 'a tree garden'. *Garden* stems from an Indo-European word meaning 'an enclosure protected against the surrounding area' – the wilderness. The same applies to the Latin word *hortus*.

The history of gardens is a wide field which can barely be touched in this brochure. Garden culture

Left: "God planted a garden in Eden"

Right: The famous Zen gardens of the 16th century are admired worldwide

started when people began to settle. As nomads, they were roaming around with their cattle. But when they started to work the soil in order to grow fruit, they had to protect it with a fence. In doing so they created a garden. So horticulture is actually older than *agriculture* since everything started from a garden.

In Upper Egypt they already had gardens 3.000 years before Christ. Also the Chinese had gardens 2.000 years before Christ. Excavations of Pompeii tell us about Roman gardens. The Japanese started having gardens at about 500 after Christ. The famous Zen gardens of the 16th century are admired worldwide. In the European monasteries of the 6th century, monks started growing medicinal plants, herbs and vegetables. But also the aristocracy in their castles had small gardens where they spent their leisure time. In the 16th, 17th and 18th centuries in Europe, there was quite a big movement of creating fantastic gardens. Many famous baroque and rococo gardens are still being maintained, admired and visited by the public. In England towards the end of absolutism and during the first steps towards democracy, the idea of landscape gardens

took shape, finding its adepts all over the world.

Today, gardens and parks borrow from history, using elements like topiary from Roman times, herbaceous borders from 19th century English gardens or ideas from the medieval hortus conclusus (walled garden). Also, a kind of exchange in garden tastes is going on between the continents. Thus, Japanese gardens with their purism enjoy growing popularity in Europe, while flowering plants, perennials, and herbaceous borders are becoming the craze in Japan. The same exchange of ideas we see in floristry, with Europeans practising Ikebana and the Japanese visiting Europe in order to study the different styles of flower bouquets. Here, concerning plant varieties, too, we witness a kind of globalisation – with breeders in Asia, America and Europe quickly sharing novelties.

Left: Pavilion in a Renaissance Garden

Above: Element of a traditional Chinese Garden

Right: Doctors and then botanists went abroad as plant hunters, looking for new plants. Sir Joseph Banks and Captain Cook landed in Australia

Discovering new plants

In the 18th Century, *botany* (i.e. the science of plants) became an independent branch of scientific research. Before that time, only medicine was dealing with plants, since nature was man's best and only pharmacy. Doctors had to be plant experts, too. They used of all kinds of medicinal plants for curing people. At first the doctors, and later the botanists, went abroad as plant scouts, hunting for new plants. They went all over the world, but mainly to Africa, North and South America, and Asia, looking for unknown plants and bringing them back to Europe. Alexander von Humboldt, Franz von Sieboldt, Sir Joseph Banks, Engelbert Kaempfer, David Douglas, Joseph Hooker were famous plant hunters, just to name a few.

As the knowledge of new plants quickly increased, it became necessary to find a precise way of naming them. Up to the 18th century, plant names confined themselves more or less to Latin definitions like "Narzissus polyanthus orientalis calice medio luteus odoratus maximus", which means "medium sized oriental daffodil with yellow chalice and strong scent."

In the 18th century, Carl von Linné created his own new system of plant nomenclature. He boiled it down to only genera and species, plus the cultivar's name. In this system, the daffodil is now called Narcissus tacetta 'Minnow'. Due to its striking clarity, Linné's new nomenclature became standard all over the world and has been in use up to now.

Working with these new names made it much easier to communicate with each other all over the world. No wonder, then, that even today, plant hunters are still on the move – no longer in undiscovered territories, true, but now roaming the whole world; for there is still a huge amount of wild plants – which can serve for cross-breeding with known plants, endowing them with new qualities. Even in botanical gardens or through colleagues from other countries, plant hunters discover novelties for markets at home or abroad.

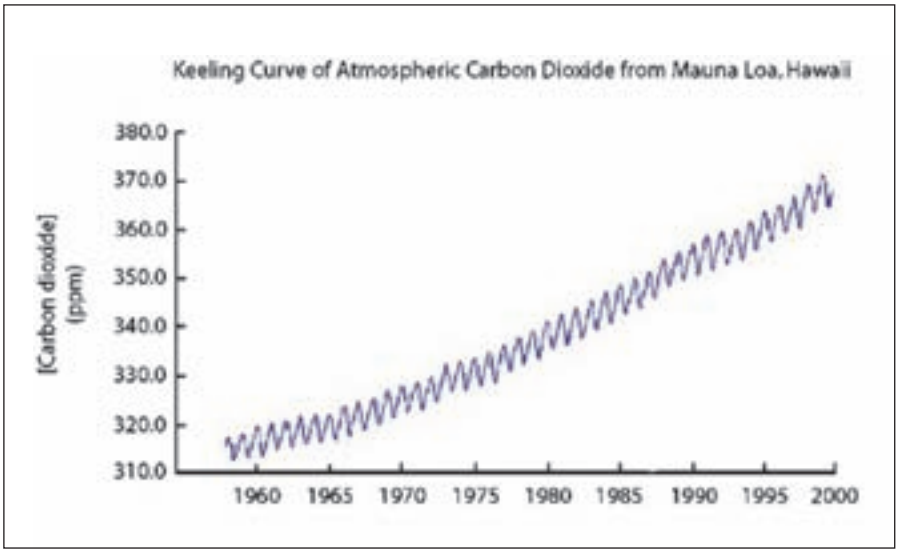
Beneficial properties of plants

No life on earth without plants

Most people have forgotten what they learnt in school: that, without plants, there would be no life on earth.

Only plants can, with the help of chlorophyll, collect the sun's energy as well as hold it and even store it – transforming it into sugar through the process of photosynthesis. It is thanks to this capacity that single celled organisms could evolve into complex plants, now serving as energy providers themselves. Without plants, there would be no food stuffs on earth. We all – men as well as animals – live on plants. Even complex food chains originate in grasses, leaves, fruit or wood.

No living beings – neither people nor animals or even plants – can exist without breathing. They need oxygen. But only plants have the ability to produce oxygen. During the process of photosynthesis, they take in carbon dioxide CO_2 and water H_2O and change it into carbon-hydrate CH_2O, in order to build their structures. The remaining oxygen O_2 is the basis for life on earth. Every plant, down to the pot plants in our home, gen-



A graph of Dr. Keeling's famous curve of increasing CO_2 concentration. The little squiggles in the curve show the annual fluctuations caused by vegetation

Every tree in our streets reduces carbon dioxide

erates oxygen. But for the amount we need, we have to rely on the plants in the landscape, in the forests, and especially in the sea.

Without plants, there would be no primary energies. Wood, coal, peat, mineral oil and gas – they all derive from plant matter, even if, during their millions of years of storage time in the ground, they may have undergone great transformation. Fire, which was mastered by man in the course of his cultural development, depends on the plants' capacity for producing and storing carbon-hydrates. The process of burning is the reverse, as it were, of the process of photosynthesis. The oxygen is consumed, while the carbon dioxide locked up in the plant is released again. This is why every car drive, every coal-fired power plant, every lighting of the gas stove and every aeroplane take-off blows carbon dioxide into the air. Our output in carbon dioxide is as gigantic as our energy consumption. Due to this, carbon dioxide has won the bad reputation of a "global warmer", because the more CO_2 rises into the atmosphere, the more our climate warms up.

In the Kyoto agreement, nations have committed themselves to reducing their output of CO_2 by saving energy. But the reduction of CO_2 output is not only a matter of responsible use of energy. Also plants can help – through their growth. Every green area as against desert land, every reforestion, every garden, every tree in our streets reduces carbon dioxide. Saving forests and rain forests, wood- and grasslands is important – not only in order to keep animal and plant species alive but also to keep CO_2 inside the plants.

Plants in modern cities

Every day, about 200.000 people worldwide migrate from the countryside to the cities. This is why the United Nations have dedicated the World Environment Day 2005 to "Green Cities". More than 50 of the world's largest cities committed themselves to "build an ecologically sustainable, economically dynamic and socially equitable future for our urban citizens." The agreements call for action aimed at putting cities on a path to greener, cleaner, and healthier environments for their current residents as well as the estimated 1 million people moving into cities each week.

City climate is determined by stone and concrete. Both materials have a high capacity for conducting and storing heat. That's why city temperatures are about 5° C higher than elsewhere. Equally, city air is considerably drier. If the ground is sealed with concrete and asphalt, all moisture exchange with naturally grown soil – and thereby the absorption of rain water – is prevented. This water, which otherwise would seep down to the water table, is being diverted via canal systems, thus depriving the water cycle.

Not only waste materials such as exhaust fumes from cars and heating systems sully the city air but also massive dust due to dry atmosphere. Therefore, a blanket of smog settles over the city, keeping the air from circulating. This situation puts a considerable stress on city dwellers – which can be significantly reduced by parks and trees, green aisles, streets, and roofs.

Vegetation functions like a buffer between direct solar irradiation and streets, roofs, and walls. If

the sunlight is kept out by foliage, all stone and concrete surfaces heat up noticeably less, and a considerable part of the energy goes into photosynthesis. At the same time, the warming of the leaf surfaces stimulates the water conduction from the root to the leaf. The leaf volatilizes moisture, and evaporation has a cooling effect. All of which results in the fact that temperatures in tree shade are principally lower than in building shade, conditions being otherwise equal.

Air moisture is increased by the evaporation from leaf surfaces. A beech tree one hundred years old has 1.600 square meters of leaf surface. Air moisture is also increased by the evaporation from the ground below, where not only the tree but also bushes and herbaceous plants are rooted, thus adding to the well-being of man. A lot of dust attaches itself to leaf surfaces. A single grown-up tree binds an average of about 100 kg of dust per year. In Frankfurt/Germany, 11.490 dust particles per cubic meter were measured in a treeless street – as against 3.830 particles in a tree-lined street, in otherwise equal conditions. The latter air, then, considerably reduces irritation and stress for the respiratory system.

Apart from local improvements in climate and air quality, the city climate as such can be improved, too. Green aisles leading out to the countryside are conducive to a better air exchange with the nearby surroundings. The glasshouse effect over the city will be much less massive.

A diverse scene of trees and bushes also reduces noise. While smooth surfaces directly reflect sound waves, the nimble, unsteady leaf surfaces break and divert sound waves, muffling the noise.

Plants around the house

A house with a facade covered in vines and a green roof strikes us as beautiful. Yet its "green fur" also has a direct influence on the microclimate, the water household, and the ecology.

Temperatures underneath a green flat roof are more balanced. While underneath a pebbled roof the temperature can easily climb to over 50° C, and under black bitumen foil even up to 90° C, underneath a green roof with about 15 cm of soil and vegetation, it hardly exceeds 20° C to 25° C. This is not only because of the cooling effect of the plants' evaporation and their absorption of sun energy. It is also so because earth is a bad heat conductor. Consequently, there is no heat congestion, which is common with the other roof types mentioned above. During winter, on the other hand, temperatures are much milder under a green roof, while under the other roof types, temperatures of –20° C are not uncommon. This makes life under a green roof much more pleasant. Energy costs are lowered, and the CO_2 output is reduced. The same effect is produced by walls covered with climbing plants.

Moreover, a roof or a wall with a "green fur" is not nearly as susceptible to repairs. While bare flat roofs must, at the worst, put up with a temperature range of up to 100° C a year, the range for a green roof is only about 25°. In other words, there is less strain on

Above: Even a shed for dustbins can be green

Left: Houses with a façade covered in vines strikes us as beautiful.

Below: 3.000 square meters of green roof on an industrial building

the roof insulation. The life span of such a roof is extended by about 60%. A greened wall is also better protected against rainfall.

Green roofs have a high capacity for absorbing and storing rain water. The release of surplus water is considerably delayed. The faster the conventional flat or pointed roofs are being replaced by green roofs, the more municipal sewage systems can reduce their dimensions. That's why so many municipalities in Germany and other countries are in favour of greening house roofs.

Apart from all these advantages, we should not underrate the aesthetic quality of green roofs and walls – let alone their significance as a habitat for birds and insects.

Plants for the landscape

Can you imagine a beautiful landscape without plants? Impossible! Agriculture with its fields and meadows plays an important role in shaping our landscape. But a rich landscape also presupposes trees and shrubs, woods and hedges. In the '70s, agriculturalists proposed, for efficiency reasons, to clear away trees and hedges in order to make space for bigger machines so as to increase their work output. Trees and hedges were considered obstacles. Nowadays this has changed. We now know that we do need trees and shrubs in the landscape – not only for their beauty, but also for breaking the wind, for a favourable microclimate, for preventing erosion and for offering birds and other wildlife a habitat and refuge.

Forest is the best protection against erosion through rain and wind. Wherever a forest was cut down, completely laying bare the top soil, all fertility was lost. In very rainy regions like the tropics, erosion is destroying the best soil, turning the ground into washed-out skeleton soils, soon to end up as deserts. In the moderate zones, arable soils and gardens have

been successfully preserved by creating plant wind breaks. Their protection is optimal, as they allow the wind to pass through while slowing it down at the same time. Impenetrable walls, on the other hand, force air currents to circumvent them, even accelerating their speed.

Slopes are even more exposed to erosion than flat plains; and the best means to forestall this is to plant the slopes. What matters most here is to bind loosely connected layers of soil with roots, which also prevent soil being washed away by rain water or subterranean water currents. Depending on the situation, erosion can already be prevented by matted surfaces of lawn grasses, or by planting fast growing pioneer plants such as willow, robinia and alder (Alnus glutinosa) the roots of which penetrate deeper. Meanwhile, slow growing kinds such as ash and oak can gradually take on their task. This method is similar to riparian repair. Here, too, a mesh of live roots creates an elastic barrier to the onslaught of waves, protecting the soil behind.

Left: Fields and meadows play an important role in shaping our landscape

Above: Hedges serve as a windbreak in the open landscape

Right: A mesh of live roots creates an elastic barrier against the waves

Traffic and plants

Mobility is a very important aspect of modern society. We need an efficient traffic system in order to meet people's needs. We build more and more streets, highways and railway lines. Plants can play an important role in counteracting the negative impact of our traffic systems on our landscape. Along streets and highways, plants can serve as protection for our eyes from blinding lights, or as noise buffers and wind-breaks. They even function as crash barriers. Especially the wild rosebush (Rosa multiflora) makes a good natural crash barrier. Tree lined roads are also a valuable element in the landscape. They also provide

Above: Even railway stations can be embellished with flowers

Below: Trees on parking lots keep the temperature in the cars down and lower the risk of accidents

shade, reduce street noise and serve as a wind-break. The same applies of course for tree lined streets inside towns.

Most people see trees along roads and on parking lots as a mere embellishment. A survey by Brahe/Bernatzky/Beck on parking lots with and without trees, however, shows that they do much more. If the sunlight is allowed to shine straight on to cars, the temperature inside can quickly rise by over 20° C. If car owners start driving such a car, they get into heat stress, even if doors have been opened beforehand and the AC has been put on. It takes five minutes for the air-conditioning to lower the inside temperature from 60° C to a bearable 30° C, and another five minutes to bring it down to 25° C: a lot of time indeed in which heat stress can accelerate the heart beat, resulting in dizziness and diminished reaction capacity. A study on driving under such conditions, carried out by the ADAC (General German Automobile Club), documents a 20% accident increase. A high risk potential – that can be avoided by parking in tree shade.

Cleaning properties of plants

Procuring clean drinking water for every human being on earth, keeping our surface and underground waters clean, plus the purification of sewage water, are among the big challenges of our time. Plants can play a decisive role here. Swamp and water plants have a considerable natural cleaning capacity that we can put to use in plant-based municipal water filter plants, in turning sewage waste into earth, in the renaturalization and restoration of riverbeds, in the seepage of surface water, and last but not least, in swimming ponds.

In Europe, mostly bulrush, yellow iris and various reeds and rushes are being used in this context. Similar plants are available in all other climate zones and regions of the earth. When constructing a purification plant, filter

Yellow Iris is not only beautiful but has a considerable natural cleaning capacity

beds are planted out with them and the contaminated water channelled through them several times, underneath the bed surface. The bacteria nesting in their roots draw all contaminating particles from the water, turning them into food for their own growth.

In this way, not only organic substances, nitrates and phosphates are being eliminated, but also dangerous germs. Even in winter, when the plants above are dormant, their roots and bacteria are active enough for a sufficient cleaning job. Studies in Europe and USA prove that rootzone treatment of sewage is as effective as any conventional sewage-works. Besides using the rootzone treatment of wastewater only cost a third of the conventional sewage-works. But even aesthetically and ecologically, plant filtering simply makes more sense. They don't stick out as obtrusive technical constructions, but easily blend in with their surrounding landscape.

Little is known as yet about the capacity of plants and their root bacteria for decontaminating soil as well. We do know, however, that plants also can absorb soil contaminators such as oil and heavy metals, integrating them into their metabolism. But in this respect, more research is urgently needed.

Swimming ponds are kept clean by plants and do not need chemicals

Beneficial impacts of indoor plants

Flowers and plants enhance the quality of life also inside our buildings. And this applies to all kinds of buildings: private houses, apartments, offices, hotels or shopping centres. On average, we spend 20 hours per day indoors. Nowadays building materials and furniture are rarely drawn from purely natural resources. Normally they are made of, or treated with, synthetic materials which in most cases fill the air we are breathing with volatile chemicals. Formaldehyde, xylene, benzene, phenol and nicotine are some of them. They are emitted from flooring, chipboards, gloss paint, plastic bags, glues or tobacco.

In the 1980's Dr. Bill C. Wolverton, a researcher at NASA, found out that indoor plants effectively reduce the level of harmful chemicals in homes and offices. More research on this subject was done in Europe which confirmed Wolverton´s findings that plants have the potential to reduce the level of harmful chemicals in the air. Thus, a Chlorophytum comosum weighing 300 g decontaminates a space of 50 cubic meters of 0.1 ppm formaldehyde within one and a half hours. Other plants with an active metabolism like Ficus benjamina and Epipremnum aureum produced similar decontamination results.

No less important is the fact that plants can improve the level of air humidity: 50% to 70% air humidity is optimal for human well-being and health. Particularly during the winter months, however, when the air is being dried by heating systems, most people live and work in spaces with only 30% to 40% relative air humidity. Burning, reddened eyes, taut skin, irritation in nose and throat are the consequences. Resistance to bacteria and virus attacks decreases. Cold, bronchitis, conjunctivitis abound. Here, bringing in indoor plants has proved an effective countermeasure. Thanks to their continual evaporation, they enrich the air with biologically cleaned moisture, as it were. Technical air humidifiers, on the other hand, not only consume more energy: if not properly tended, they turn in-

NASA-Researcher Dr. Bill Wolverton

to hotbeds for infectious germs. 3 to 6 major plants suffice for raising the moisture in a space of 30 square (i.e. 90 cubic) meters to the required 50%.

As a rule, the bigger, more vigorous and fast growing a plant is, the greater its capacity is for cleaning and humidifying the air. Plants with a very slow metabolism, like cacti – that are adjusted to dryness – are not nearly as helpful as, e.g., the fast growing and big-leafed Sparmannia africana or Schefflera. Many plants, however, have not yet been assessed for their decontamination potential. Our knowledge about plant properties concerning cleaning and improving the air is still very scanty. Nevertheless, there is no doubt about their positive influence on human health.

Tove Fjeld, a researcher from Norway, has studied the effect of "green" offices on the health of those working in them. One half of the rooms remained unchanged, while plants were installed in the other half. In the rooms with plants, hitherto typical diseases of employees – like colds, influenza, headache, short breath, or skin irritations – went down by 52%. Absenteeism due to illness decreased from 17% to 6%. 92% of all employees were convinced that the indoor vegetation had positive effects.

In another example she asked customers in a Norwegian shopping-centre after its conversion into a "green" place:

- 70% were convinced that the shopping-centre had a better atmosphere
- 26% said it looked more beautiful, more attractive than before
- 10% felt the air was better
- The frequency of visits increased by about 50%.

Green shopping-centres – better atmosphere and more attractive

The healing power of flowers and plants

Psychological impact of plants

Prof. Roger S. Ulrich, A & M University of Texas, architect and clinical psychologist, has for several years been studying the impact of nature elements on the mental and physical well-being of man. The results of his work: Looking at greenery and plants leads to significant stress reduction in almost no time.

For instance, according to one of his studies, freshly operated patients who could look into greenery were recuperating on average three quarters of a day sooner than patients who were looking at a wall. On average those looking at plants were getting up sooner, needed less strong painkillers and complained less about little post-operational complications. Laboratory results of 120 persons tested showed that even a five minute exposure to a natural scene or simulation of one reduced stress symptoms like a higher blood pressure, tensed-up muscles and increased sensitivity of the skin.

Other scientists confirmed Ulrich's findings. In one such report, two groups of prison inmates were compared. Those with a view from their cells on to a natural surrounding fell ill significantly less often than those looking at prison walls through their windows. This, too, underlines the positive effect of plants on man's psyche.

Greenery leads to stress reduction, is the undisputable conclusion of these and further studies. Looking at natural greenery has a relaxing effect, not only in the actual stress phase but also in the regeneration phase following any stress situation. This means that difficult situations are experienced as less burdensome and are overcome faster if plants that calm the soul are in sight.

The special effects of gardening

Instinctively many people are using the garden to relax and to reduce stress. What are the reasons for this? Why is a garden so special?

There seem to be several reasons for it.

- The natural rhythms of a garden, of plants – their growing and blooming – work as a counterpart against stress, hectic, the flood of information and the pressure of the competition which burden so many people in our modern societies.
- There is silence and peace in the garden.
- The work in a garden, the work with plants is quite different from the type of work many people have to do in their job.
- The garden gives people the possibility to be creative, to make things on their own. They are not bossed around or ordered to do their jobs along the normal guidelines.
- And there is the satisfaction and pride in growing things.

This is the reason why the Chinese say in their proverb:

> "If you want to be happy for an hour, get drunk.
> If you want to be happy for three days, get married.
> If you want to be happy for eight days, kill a pig and give a feast.
> But if you want to be happy all your life, make yourself a garden."

In this garden in Southern Germany horticultural therapy is applied to young people with psychological and psycho-social problems

Horticultural therapy

Horticultural therapy makes use of the positive effects of flowers, plants and gardens on body and soul in order to cure ill people or to make their living circumstances better. Horticultural therapy is a very wide field and it is actually an umbrella word for all those different medical indications and applications.

The roots of horticultural therapy date back to the 19th Century, when huge asylums for mentally ill people were built. Because of the high costs the asylums were planned to produce their own food so patients worked in the fruit and vegetable gardens and the fields. Here doctors noticed that patients working – especially with plants and animals – became calm, less aggressive and lost their fears. Their senseless, boring, unstructured life took on a meaning. They experienced success through their own hands. Recognising this, doctors started to use working in gardens and fields as a therapy. Working therapy they called what was the first use of horticultural therapy.

With the discovery of anti-depressants the situation changed. Only a pill was necessary to keep patients calm. The low efficiency of their work in gardens and fields made no sense any more. But in time patients and their relatives started to complain about the side effects of the psychopharmaca,

that changed the personality and made them feel like living behind glass. This is why in the '60's the value of horticultural therapy was rediscovered in the USA. Again hospitals for psychic or mentally disabled people started to let them work in gardens. In the '70's a first course of study „Horticultural therapy" was offered at the Kansas State University. Today it takes four years of study to become a horticultural therapist.

From the USA horticultural therapy came back to Europe and started to move towards Asia. Single projects like hospitals, homes for elderly people and workshops for handicapped people use horticultural therapy very successfully. But the public and politicians do not really take notice of these projects. In spite of this, horticultural therapy has developed a lot in the last years.

We note the application of horticultural therapy in following cases:

- psychological and psychosocial disorder
- addictions
- dementia
- rehabilitation after accidents and strokes
- rheumatic diseases
- geriatric and orthopaedic rehabilitation
- motorial disorder
- disorder of perception
- apallic syndrome (coma)
- curative education
- blindness and deaf blindness

How plants are used and which plants are used, depends on the special needs of the patients for whom the garden is planned.

Most important for horticultural therapy are:

- the calming and relaxing effects of plants
- the natural rhythm of the plants, which is a counterpart to daily stress and makes people patient
- to work with living organisms, that follow their own, unchangeable rules
- the colours, aromas, textures, sounds and even the tastes of plants, that tackle all senses
- the effort of coordination in working with plants on muscles, care and attention
- the huge variety of different applications making it possible to suit the abilities of every patient and offer them the chance to experience success
- the normality of the garden in contrast to the sometimes frightening atmosphere of a clinic or a caring institution.

Cultural and social significance of flowers and plants

Cultural meaning

So far little research has been done regarding the social and cultural functions of flowers and plants. We know, however, from the myths of all kinds of peoples that from very early on, plants were said to have special powers. Plants nourish, warm, quench the thirst, and alleviate complaints. Yet they can also make ill, cause mischief and have demonic properties. They harbour strength, toughness, the capacity to resist and to assimilate. They disappear under the earth and reappear. They endure the worst frosts without any harm. All this has inspired men to endow them with a soul, to put them on a par with gods and spirits. They were convinced that some of the magical power was passed on to anybody who was adorned or honoured with the flower or plant in question, secretly mixed into their food or hidden in their clothes.

In this natural religion lies the root of all plant symbolism that to this day motivates people worldwide to make presents of flowers, or decorate with flowers or use them in religious ceremonies. Plants become carriers and harbingers of wishes, longings and hopes. They accompany the small gestures of friendship and affection, the central feasts and holidays, but most of all the decisive life dates.

In nearly every society around the world they are an integral part of rituals from birth to death. It is therefore all the more astonishing, how little is understood about their significance in celebrating and grieving. Researchers found that flowers are an important part of the bereavement process as a source of comfort and warmth and to help deal with grief. Their functions in brightening up the sombre environment and providing a conversational diversion also were highly appreciated. The primary reasons for sending flowers are to comfort survivors and show respect for the deceased.

The message of some flowers is understood equally around the

In nearly every society all around the world flowers are an integral part of rituals from birth to death.

world, like the red rose, symbolizing love and eroticism. Others signify all sorts of feelings, like the chysanthemum, which in China is considered a symbol of long life, whereas in Japan it is the emperor's flower and symbolizes loyalty to the master, and in Europe it was for a long time the flower of late autumn and awareness of death. Only due to the increase of varieties and year-round production has it gained a more positive image. As shown in these two examples, functions of flowers and plants depend on the specific society and culture, on their values and customs.

Flowers and art

Art also tells us of the close connection between man and plants. Poetry and literature, from the Song of Solomon to Goethe or James Joyce, flowers, plants and gardens play a central role. The famous poem on the chrysanthemum by the Chinese poet Tao Yuanming was written in the 3rd century after Christ. Around 1560, the Osmanli poet Fasli touched the heart of Suleiman the Great with his song of the rose and the nightingale. But also in folksong and children's verse the flowers of the yearly cycle abound. They give cause to play and dance.

Flower and plant motives often decorate porcelain

Plant paintings are as numerous. From Japanese ink drawings to the murals of Pompei to Monet and Andy Warhol, flowers and plants populate our works of art. Many of the oriental carpets weave plants, blossoms and vines and even have been interpreted as gardens that could be taken along as a reminder of things alive into the most inhospitable regions. Porcelain painting is a chapter in itself. Flower and plant motives decorate Chinese vases thousands of years old, as well as the tiles of the Topkapi Palace in Istanbul or the products of the Royal Danish Porcelain manufacture. Plates, cups, vases, boxes and bowls all over the world were decorated with roses and water lilies, iris, poppies, forget-me-not and many other flowers. The eye was to take pleasure in them even if the natural cycle of seasons wouldn't allow it.

Plants as a factor of social stability

In modern cities many people have to live far from a natural environment. Does it mean anything to them? If one compares the costs of flats and houses it becomes clear that their prices increase when they are surrounded by gardens and greenery. Living vegetation and gardens obviously are considered valuable. Whoever can afford it chooses not to live in a grey, stony environment. That is felt to be boring and anti-life.

City neighbourhoods without greenery often turn into social problem areas with poverty, vandalism, and a high crime rate. As soon as plants move into such neighbourhoods, these developments however can be reversed. The slum gardens of the once notorious New York Bronx are a famous example. In the early '70s, the first of these gardens developed on rubble fields, roofs and back yards. They worked like a signal against discouragement, lethargy, and indifference. These garden projects were for the first time bringing the neighbourhood together. Out of chaos arose vegetable gardens, flower beds and green oases used as playgrounds and meeting points. These gar-

City neighbourhoods with a green environment have fewer social problems

dens became a signal for survival, creative open air workshops – places, where a new sense of responsibility for one's living surroundings was coming to light.

Similar paths were trodden in the Russian city of Danilov, where a devastated park in the city center was restored by a group of young people out of work. Not only vandalism stopped here. Elsewhere in the city greenery was perceived with new eyes – people started to appreciate it again.

Gardens are also helpful for refugees and migrants to find root again. In various German cities, so-called „international gardens" offer refugees from a variety of cultural backgrounds the opportunity to plant, tend and harvest.

Working in these gardens is a good antidote to apathy and depression. Their contact with nature helps them to slowly get over grief and traumas, and also breaks down their isolation. The garden and the preoccupation with plants offer opportunities for cross-cultural contacts. People exchange experiences and support each other, and of course also celebrate together.

In general one can say that parks and gardens are important places for social interaction, for events and activities. Parks and greenery bring a friendly and peaceful atmosphere to a town and are places for communication and recreation, incorporate playgrounds for children, and are an invitation to tourists.

Above: For refugees and migrants working in a garden is a good antidote to apathy and depression

Below: It makes children proud to have grown a nice plant and builds up self-confidence

Educational functions of flowers and plants

Flowers and plants should be more integrated in the upbringing and education of children. Dealing with plants teaches children already at a very early age to care and to take responsibility for a living being. It teaches them about nature and the environment so they understand how necessary it is to protect them. It helps to build up their self-confidence. It makes them proud to have grown a nice plant and it improves their skills. Some plants in their home, a little place in the garden, projects in Kindergarten and schools and a school garden will help to accomplish this.

Gardens for children, particularly now in the computer age, can help young people to shift from the head to the hand. Gardens convey practical experience instead of theory. In this, concrete learning-by-doing processes are only one aspect. Directly experiencing nature is at least as important. Plants feel warm and cold, smooth and rough, soft and hard. They smell, are fragrant or stink. They demand aim-oriented activity and teach organizing work. Planning your own beds stimulate your imagination and creativity and produce their reality check.

Not the grown-ups but the plants demand responsible behaviour. If watered rightly, they stand stiffly erect, if their watering is forgotten, they turn limp. Plants react immediately to how they are being treated; in this way, you can experience the consequences of your own doing. Looking at and observation reveal the dynamics of nature, e.g. the larvae of a lady bug suddenly cleaning up the blackfly on the tips of new sprouts. Your own doing leads to changes, but not everything is within your power, is the subtle message. Thus, children gain a more realistic idea of their surroundings and are being helped to appreciate the reality of their life in a new way.

Gardens can help young people to shift from the head to the hand

Plant lovers and their societies

The great variety of plants as well as their beauty and uniqueness inspired man very early on to collect them. Whereas at first, only the well-to-do could afford the hobby of plant collecting, soon also commoners were infected by the passion for collecting. It did not take long for them to band together in order to share their information and experience, as well as admire each others' exploits, and also to encourage others to find an interest in garden and plants.

The Royal Horticultural Society (RHS) established in London in 1804 was one of the first – maybe the first – dedicated to advancing horticulture and the promotion of gardening.

Also in other countries gardening was no longer a subject reserved only for the nobility. Like the RHS it was discovered that horticulture and gardening enrich people's lives, that it is worth bringing the personal and social benefits of gardens and gardening to a diverse audience of all ages, to help people share a passion for plants, to encourage excellence in horticulture in private and public spaces, to help create healthy, sustainable communities and support long term environmental improvements. Our modern societies are discovering again how important flowers and plants are for the well being of the people.

Besides the societies for gardening in general, associations of

plant lovers arose to exchange knowledge about their special plants. For many of their members they are an essential means for communication, social contact and encounter. All of these gardening groups and plantsman's societies, taken as a whole, constitute a strong, stabilizing element in our society. Politically speaking, however, they are usually not given credit as such.

Exhibitions of flowers and plants

Exhibitions are one of the most important initiatives on the part of these garden and plant societies. Anybody successfully collecting plants and bringing them to grow, flower and bear fruit, will want to present their success to others. Such private shows soon became so popular that they had to extend their framework. Almost two hundred years ago, societies such as the RHS, the „Societé d'Agriculture et de Botanique de Gand (Agricultural and botanical society of Ghent)" or the „Verein zur Förderung des Gartenbaues in den Königlich Preussischen Staaten (Society for furthering gardening in the Royal Prussian States)" started organizing flower and plant exhibitions. What started as short-term show in halls and exhibition grounds, soon extended to open air shows lasting up to half a year.

Soon it was realized that these open air shows were an excellent means of creating new parks and green landscapes. Thus, garden shows became an instrument of green politics. With their help, huge disaffected industrial areas were transformed into green landscapes, such as the Liverpool South Docks/Great Britain in 1984.

Above: AIPH coordinates international horticultural exhibitions

Left: Perennials are an important group of plants for plant lovers

Former military bases became recreation parks, like Magdeburg/Germany in 1999 and Potsdam/Germany in 2001. New cities were given their green structure through garden shows, as 1992 in Zoetermeer/Netherlands. The AIPH (International Association of Horticultural Producers) coordinates and recognizes international horticultural exhibitions worldwide.

Final remarks

Considering all these aspects one has to ask if flowers and plants really get the attention they deserve in our societies? How can you measure their significance in comparison with other fields like music, theatre, sports, museums or arts? One could of course compare the turnovers of these different branches. One could also look at the media coverage these sectors get – in newspapers and magazines, in literature or on TV. Or one could add up the competitive time people spend on these subjects. We do not know of any such analyses. Some degree of research in this field seems to be urgently needed.

In a free market oriented economy people decide according to their preferences. Preferences can be influenced by information, promotion and marketing. But it is not only the private consumer who makes decisions about buying flowers and plants, as well as building or improving a garden. Politicians of communities and other state bodies are always eager to explain that they would like to spend more money on trees, shrubs and other plants, on parks and green spaces – inside cities, along streets and roads, and in the open countryside. But that they do not have enough money for it. Or there are, as they put it, other priorities. Priorities must change in favour of greenery and plants. Politicians have to realize the benefits of flowers and plants – and what they contribute to the members of society at large.

Photo Acknowledgements:

BGM Düsseldorf	page	13 B
CMA		28 T, 29
Die grüne Stadt		12, 20 T
Grünes Presse Portal		11, 20 T, 28 T, 29
Helga Panten		Title, 5, 6 B + T, 9, 10, 11, 13 T, 15 B + T, 17, 18, 20 B, 21, 22, 26, 30, 31, 32
Plants for People		19
Peter Ruhnke		14, 16 B + T, 23, 25, 27, 28 B

Editor: **AIPH**
International Association of Horticultural Producers
Louis Pasteurlaan 6, P.O. Box 280, 2700 AG ZOETERMEER (NL)
Fon: 31-79-347 07 07, Fax: 31-79-347 04 05
E-Mail: aiph@tuinbouw.nl , Website: www.aiph.org

Authors and Layout: Helga Panten, Peter Ruhnke, Bonn/Germany

Translation: Ethel Rae Perkins, Cologne/Germany

Printed: Köllen Druck+Verlag GmbH, Bonn/Germany

First Printing – September 2005
Second Printing – December 2006