Allergies and Plant Usage – the Allergological Gardens in the Bad Lippspringe Communication Park

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Abstract
The EXPO 2000 motto: The ‘World as Garden’ was also taken up in the design of the Allergological gardens in Bad Lippspringe and realized in the Communication Park of the Allergy Centre in Bad Lippspringe. These gardens presenting allergenic plants in communities and combinations are examples of real environmental situations and are intended to inform and instruct people who are either affected by or interested in allergies. More than 250 different allergenic plant species are grown in six different theme gardens. These plantings are complemented by other plants relative to the theme gardens but of a harmless nature.

INTRODUCTION
Allergies are one of the great health challenges of our modern society. Although allergic diseases have been known for a long time, there can be no doubt that there has been a marked increase over the past decades. According to an investigation made by Forsa Institute in 1999, 17% of the East German population and 23% of the West German one were said to suffer from allergies (Ring & Wenning 2000). About half of the allergic people reacted to pollen and a fifth to dust. As a consequence, the use of plants in gardens and parks is increasingly under focus in discussions on allergies (Huntington 1999, Ogren 2000).

Allergies – Man and his Environment
Allergies are usually acquired slowly. Only about 3-5% of the population in the Federal Republic of Germany is genetically preconditioned and particularly sensitive to substances causing allergies (Ring & Wenning 2000). Before an allergy can develop, however, it requires at least previous contact, so that the specific reaction of the organism can occur which is identified as sensitization. Between the initial contact with a foreign substance and the occurrence of the first visible reaction there are symptom-free periods of varying lengths. After the sensitization is over, and renewed contact is made, the symptoms reoccur within a few minutes (early reaction) to within a few days (delayed reaction). Once an allergy has completely developed, however, unlike in cases of poisoning, reactions can frequently become increasingly severe.

In addition, the time, quantity and type of allergenic substance have a considerable influence on the occurrence of an allergy. Allergens with a high sensitization capacity induce a sensitization in the case of many allergic people after just a few contacts (inhalation or direct contact). Weak allergens, on the other hand, can penetrate the organism over long periods without causing a sensitization. For those concerned, therefore, it is important to know the allergen or allergens to which they react in order to be able to avoid those substances.

There are several categories of allergens: Inhalation allergens are small particles which get into the mucous membrane of the mouth, nose, throat and bronchia via the air which we breathe. The most important allergens of this type are pollen from various grasses or wild trees such as hazel, alder and birch. The minute pollen grains can be blown by the wind over very long distances and can also trigger off allergies in places where there is no grain or tree as far as the eye can see. Foodstuff allergens are taken in with food. Vegetable foodstuffs which play a role here are nuts, legumes, grains, fruit,
seasonings and tea. As far as gardens go, this allergen category is, however, only of interest to the useful plant gardener, who should, if need be, avoid eating or cultivating certain fruits.

Some people react to stings from bees and wasps – and very rarely to stings from bumble-bees, hornets or gnats – with allergic symptoms (Insect sting allergens). Compared to the normal skin reactions these are excessively extreme. Itchy swellings over the whole body or even asthma can occur. Plants which attract bees and wasps to a great extent, so-called honey-producing plants, therefore act indirectly as allergy triggers. The only remedies for this are the use of butterfly plants, which are not frequented by bees, or sterile plants.

A further way of coming into contact with an allergen is by direct skin contact (Contact allergens). A typical trigger substance is the nickel in costume jewellery or in Euro-coins. The reddening of the skin, swellings and skin irritation which occur are frequently delayed reactions (contact eczema). In a few cases, some plants trigger off contact allergies (e.g. *Hedera helix*, and *Fremontodendron*-types).

The Project

Bad Lippspringe is a nationally recognized health resort and welfare climatic health resort and has been engaged for many years in the diagnosis and treatment of allergy and respiratory tract diseases. An allergy science track and communication park (Projekt Allergielehrpfad und Kommunikationspark) were created within the framework of the EXPO-Initiative OstWestfalenLippe and with the help of State Nordrhein-Westfalen.

Elements of the entire project, which is intended to offer a health-orientated world of adventure and experience by means of information, entertainment and relaxation for all age groups, are an allergy science track (Allergielehrpfad), the Centre of Documentation and Information on Allergies (ADIZ) and the Allergological Gardens in the Communication Park (MZG-Westfalen 2000). The Allergological Gardens were created by the University of Applied Sciences Lippe and Hoexter as a science garden within the overall design framework which the landscape architects Nagel, Schonhoff and Partner (NSP) Hanover developed for the Communication Park and used a planting concept developed by Boison, Bouillon and Seyfang (Boison et al 2003).

As there were no corresponding models for an allergy science garden a completely new concept of presentation and combination of allergenic plants had to be developed for this project, which also had to meet various structural demands and care requirements. As allergies are specific, it was impossible to design a so-called “low allergen garden” as proposed by Huntington (1999). In view of the wide spectrum of allergenic plants too much information would be lost by omitting all of them.

SCIENCE GARDEN CONCEPT

The first question that arose when planning the content of the gardens was whether the variety of allergenic plant species with their different allergens in a confined area did not create additional risks for allergic people. From the medical point of view these doubts could be dismissed for the most part, as the quantities of allergenic types are very low in relation to the usual plant stocks and many of the types planted occur very frequently in nature. Consequently, their pollen can anyway be encountered in the air at certain times.

Allergenic plants or their active substances occur in all areas of our environment (Roth et al.1994, Hausen & Vieluf 1997). Analogous to the motto of EXPO 2000 the ‘world as garden’, a science garden for allergenic plants was set up in the Arminius part which portrayed the milieu and the range of uses of these plants as individual sections of the human environment. In order to inform people affected by allergies, and those interested in these plants, six different theme gardens were planted on the terraces below the Prinzenpalais with more than 250 allergenic plant types, which were correspondingly explained and combined with other representative but harmless plant types.
Each terrace symbolizes a step in the human cultural development showing mankind’s increasing influence on nature. From the almost virgin woodland and woodland borders of the lowest terrace, via environments such as meadows, byways and debris borders to ploughed land and utility gardens. The planting arrangements of the natural environment illustrate garden interpretations which are based on natural plant communities. The largest human influence is evident in the flower and seasonal garden on the uppermost terrace. Here plants with a marked cultivation influence, summer plants and pot plants, which are correlated with allergies, are situated.

In order to emphasize the character of the plantings out of everyday reality and their structural integration into the park as a whole, widespread plantings from one plant species surround the individual theme gardens, much as passe-partout, focusing the interest on the respective “picture content”.

By means of careful labelling the visitor obtains the information on each plant in the theme garden; plant name, origin and use as well as its allergenic effect. On the individual terraces there are larger scale notice boards informing the visitors about the particular area.

ALLERGOLOGICAL GARDENS

Meadow
- Types of smooth oats meadows in various forms
- Aspect: Island planting of allergologically effective perennials as well as widespread sowing of a grass and wild flower mixture.

The meadow area located in the southern area of the terraced gardens represents a smooth oats meadow which is to be mown just twice a year, nowadays rare, which comes under the meadow types found with the most varieties in Central Europe. There are island plantings of native shrubs and grasses which are meant to spread into the widely sown grass and wild flower mixture in the course of time in order to develop into different forms of the smooth oats meadow, from dry to humid.

Near to the main pathway there is a meadow of tall rich-blooming perennials with meadow plants, predominantly from the sub-alpine mountains and the Alps, which spread out concentrated on stream courses and on humid and deep soils. In midsummer Aconitum vulparia and Aconitum napellus, together with the delicate blooms of Thalictrum aquilegifolium und Thalictrum dipterocarpum, determine the picture.

Woodland and Woodland Border
- Types of environment: woodland and woodland border
- Aspect: semi-shaded to shaded areas passing from meadows of tall perennials with emphasis on grasses to woodland
- Passe-partout planting: Epimedium x versicolor

Mighty crowns of horse-chestnut, hornbeam and common maple give this terrace a woodlike character, the border areas at the pathways are similar to forest borders with different light conditions. It was not the intention to imitate the well-known beechwood community but the aesthetic design aspect was given priority. Alongside plant species predominantly at home in Central Europe several plants from other parts of the world were used. In this way it was possible to give the plantings flowering features over a considerably longer period. Only in the most shady area do grasses and ferns, together with less flowering plants such as Corydalis cava and Convallaria majalis, determine the picture. The five different plantings on the terrace are embedded in a passepartout made of Epimedium x versicolor ‘Sulphureum’, which shoots its sulphur yellow blooms between April and May over the wintergreen foliage.

Meadows and Waysides
- Types of ruderal mugwort meadows
- Aspect: Ruderal debris meadow on stone clover donkey thistle meadows on
permeable, nutrient-rich and loamy soil in full sunlight

- Passepartout planting *Bergenia* ‘Eroica’

  On this terrace there are four plantings which are modelled on “natural” plant communities, whose creation and maintenance are dependent for the most part on certain human activities.

  The rose-bay woodland glade meadow extends where forest is destroyed. In addition it naturally occurs in thin forests or at forest fringes. The planting is characterized by the enormous occurrence of *Epilobium angustifolium* ‘Album’, *Digitalis purpurea* and *Verbascum thapsus*. *Phytolacca americana*, a variety with lush foliage and red-stemmed black berries was planted instead of the very poisonous *Atropa belladonna*.

  Nitrophile perennial borders are a characteristic element of the rustic cultivated landscape, in particular in gardens and parks. A typical representative of these borders of highly nitrogenous and humid locations is *Aegopodium podagraria*. Due to its very strong tendency to propagate this was replaced in the planting arrangement by the very similar *Peucedanum ostruthium*. *Filipendula ulmaria*, various types of geranium, *Silene dioica*, *Symphytum asperum* and *Valeriana officinalis* made up a plant community with relatively sparse flowering but distinguished by markedly variable leaf textures.

  Many perennial Debris mugwort meadows settle on fallow areas and on road scarps. A particularly colourful shrub meadow in a variety of shapes consisting of two-yearly or perennial types is found in warm summer districts on permeable lime crushed stone. A characteristic plant here is *Onopordum acanthum*, a variety which is attractive by its considerable size, strong reinforcement and furry foliage. Alongside *Verbascum bombyciferum* ‘Polarsommer’ und *Verbascum nigrum* are found here *Echinops sphaerocephalon* or *Echium vulgare*.

  The interpretation of the geranium border (“Blutstorckschnabel-Saum”) is particularly attractive. Here numerous types with striking, richly-coloured blossoms as well as graceful foliage grow: *Geranium sanguineum*, *Geranium sanguineum* ‘Album’, *Anemone sylvestris*, various aster types, *Dictamnus albus*, *Helianthemum apenninum*, *Inula ensifolia* or *Melica transsylvanica*. As passe-partout the *Bergenia* ‘Eroica’ forms a peaceful framework for the planting arrangements and ensures structure in winter by means of its evergreen leaves.

**Ploughland and Useful Plant Garden**

- Themes: root crops, cereals, useful plants and their accompaniment in the garden and on the fields
- Vegetable compositions, roses and herbs
- Passe-partout planting *Phlomis russeliana*

  On this terrace, vegetables, salads, herbs and crops grow. On four small fields, rye and the old cultural plant flax is cultivated alongside potatoes and sunflowers. In the following years, as in traditional agricultural practice, a crop rotation is intended to lead to the integration of further cultivated plants into the terrace gardens.

  Vegetables and medicinal and culinary herbs are from the design aspect sometimes shown in unusual combinations in three different beds. These are planting arrangements which differ in their foliage colour or leaf surface and shape. Themes are ‘Composition in blue-green’, ‘Composition in red-green’ and ‘Composition of decorative foliage and fruit’.

  The framing passepartout is made up of *Phlomis russeliana*, a large-leafed plant with yellow flowers appearing in stages between July and August and whose dried flower stems still make the frame easy to identify in winter.

**Flower Garden**

- Bedding shrubs and wild shrubs with bedding character

  On the uppermost terrace around the Prinzenpalais there is a large, flower garden, rich in variety and with an extravagant design. Here, perennial plants such as cultivated and wild perennials with flower bed characteristics dominate the scene.
In early summer, *Iris sibirica*-varieties, *Geranium ‘Sirak’* and *Hemerocallis* introduce the flowering roundelay. *Helenium ‘Kanaria’, Ligularia stenocephala* and *Solidago rugosa* as well as shrubs which can stand light shade such as *Hosta ‘Royal Standard’* or *Campanula latifolia var. macrantha ‘Alba’* provide a splendid sight in midsummer. Later, these are joined by *Miscanthus sinensis* and *Eupatorium maculatum ‘Atropurpureum’* which, as structural plants together with *Telekia speciosa* and *Astilboides tabularis*, provide the planting arrangement with a peaceful character. *Vernonia crinita, Veronicastrum virginicum ‘Diana’* and the fruit from *Molinia arundinacea ‘Transparent’* round off the autumn look.

**Seasonal Garden**
- Combination of pot plants of various different origins with summer flowers fitting into the colour scheme
- Themes: Tropical foliage plants, mediterranean flowering bushes, citrus plants, climbers
- Passepartout planting of *Buxus sempervirens*

In the seasonal garden, pot plants are presented in a grid frame within carpets of annual summer flowers. Banane, trumpet flower and *Zantedeschia ‘Mango’* are typical representatives of Tropical leaf plants. To these are added in the undergrowth, *Kniphofia ‘Royal Standard’, Mimulus luteus, Mirabilis jalapa* and *Tropaeolum peregrinum* in strong yellow to red shades.

*Ceratonia siliqua* and *Olea europaea* are representatives of Mediterranean utility bushes. At the foot of these *Eschscholzia californica ‘Milky White’, Linum flavum ‘Compactum’, Nigella hispanica ‘Miss Jekyll Alba’* and *Scabiosa stellata ‘Sternkugel’* in white and yellow colours grow.

Also from mediterranean climates are citrus fruits and their accompanying plants, lemon and orange as well as *Ficus carica und Agapanthus praecox*. In contrast to the mainly orange-coloured fruits are the violet and blue blossoms of the summer flowers such as *Heliotropium arborescens ‘Marine’, Salvia farinacea ‘Silver’* and various *Verbena* cultivars.

Further themes are attractive flowering bushes such as *Lantana Hybrids, Nerium oleander*, and *Plumbago auriculata* on a white-blue-yellow carpet and in Central Europe, Climbers that are not winter-hardy in a carpet of red-violet summer flowers. Evergreen *Buxus* – cut out as a flat carpet – forms the passe-partout and acts as a compensation for the colour variety of the flower beds.

**EXPERIENCES AND OUTLOOK**

The Allergological Gardens in the Communication Park, Bad Lippspringe went down well with the visitors and those concerned. This can be evaluated as an indication of the correctness of the design and didactical concept. However, the further development and long-term acceptance of the gardens stand or fall with the guarantee of care from an engaged expert, which places high demands on the personnel responsible for the care of the gardens. These demands range from the systematic maintenance and replacement of the labelling, careful control of the development of natural plant communities to annual re-cultivation and creative integration of crops, vegetables, summer flowers and pot-plants in the prescribed framework. Special courses in plant care for those persons responsible for the upkeep of the site can provide a minimum of basic theoretical and practical experience but it is nevertheless only by means of the gardeners’ identification with the garden and the subsequently growing engagement of the gardeners involved that the allergological gardens will develop a permanent place in the Communication Park. The gardens link specific information on plants with aesthetic pleasure and, as such, fulfil an important function as an adventure area for all visitors.

**Literature Cited**
Boison, Y., Bouillon, J. and Seyfang, V. 2003. Allergologische Gärten im
Figures

Fig. 1. Overview of the allergological gardens. Photo J. Bouillon.
Fig. 2. Flower garden with *Rudbeckia fulgida* var. *sullivantii* `Goldsturm` and *Helenium* `Kanaria`. Photo V. Seyfang.

Fig. 3. Mediterraneum utility plants in the Seasonal garden. Photo V. Seyfang
Fig. 4. Woodland and woodland border. Photo V. Seyfang.

Fig. 5. Waysides and ruderal mugwort meadows. Photo V. Seyfang.
Fig. 6. Varied meadows. Photo V. Seyfang.