

Phänologischer Garten Linden

Hessisches Landesamt für Umwelt und Geologie (HLUG), Wiesbaden

Rheingaustraße 186, D-65203 Wiesbaden

Institut für Pflanzenökologie, Justus-Liebig-Universität Gießen

Heinrich-Buff-Ring 26-32, D-35392 Giessen



Phenological Garden Linden

Hessian Agency for Environment and Geology, Wiesbaden

Rheingaustrasse 186, D-65203 Wiesbaden

Institute for Plant Ecology, University of Giessen (IPE-JLU)

Heinrich-Buff-Ring 26-32, D-35392 Giessen

contact persons / Ansprechpartner

PD Dr. Ludger Grünhage (IPE-JLU)

Tel.: +49 (0)641 99 35392 Fax: +49 (0)641 99 19907 Email: Ludger.Gruenhage@bot2.bio.uni-giessen.de

Dr. Helmut Wolf (HLUG)

Phone: +49 (0)611 6939 276 Fax: +49 (0)611 6939 275 Email: h.wolf@hlug.de

GLOBAL PHENOLOGICAL MONITORING (GPM)

"Global Phenological Monitoring (GPM) started as an initiative of the Commission "Vegetation dynamics, climate and Biodiversity of the International Society of Biometeorology (ISB).

The main objectives of GPM are:

- To link 'local' phenological networks and to encourage establishment and expansion of phenological networks throughout the world.
- The furthering of co-operation between phenologists world-wide. At the same time, information on phenological research and data banks is to be collected and made available for research purposes.
- To encourage research that correlates phenological trends with climatic trends, especially in the context of global change monitoring and to encourage research agricultural uses (such as crop/integrated pest management and timing of agricultural operations), and human health (pollen warnings).
- To explore methods of using phenology to stimulate public interest, especially among pupils and students by setting up education programmes (e.g. the Canadian initiative "Plantwatch" or the GLOBE initiative "Budburst").

The occurrence dates of phenological phases are dependent on the environment conditions, e.g. soil type, soil moisture, and insolation. However, temperature has the greatest influence in medium latitudes with winter rest and vegetation activity in summer; this is especially true for the "early" phases, whereas it is not quite so pronounced in the autumnal phases. Nevertheless, one can speak of a dominance of temperature influences in these latitudes. That is why the determination of the temperature is the sole purpose. As the influence of temperature and precipitation may not be separated, irrigation yields clearer results. Consequently the objects observed are irrigated in case of water shortage. In order to obtain the exact date of the beginning of a phase, observations should be made at least 3-4 hours after the sun has passed zenith (midday).

A number of indicator species have been selected (see below) and grouped in two groups: a Standard Program and a Flowering Phase Program. Both programs together form the Maximum Program. The Standard Program consists of fruit species and the Flowering Phase Program consists of ornamental shrubs and snowdrops.

Selection criteria of indicator species:

- The timing of phenological events of the plants are clearly sensitive to climate, whereas temperature has the greatest influence.
- For each climate type (cool, medium and warm), within the medium latitudes, three fruit species should be represented, whereby the cold-resistant and warm-loving species also can grow under the medium climate.
- The timing of flowering of the plants selected should cover a substantial period of the year (almond blooms first, European chestnut last).
- The fruit species had to be commonly used (wide-spread; apple, pear cherry).
- The plants should have a large distribution and/or a broad ecological amplitude."

For more details see:

Bruns, E., Chmielewski, F.-M. & van Vliet, A.J.H. (2003): The global phenological monitoring concept. in: Schwartz, M. (ed.): *Phenology: An Integrative Environmental Science*, 93-104.

GLOBAL PHENOLOGICAL MONITORING (GPM)

Die Phänologie ist die Lehre von den jahreszeitlich wiederkehrenden Entwicklungsstadien in der Pflanzen- und Tierwelt. Um die Gesetzmäßigkeiten des Pflanzenwachstums erkennen und die Abhängigkeit dieser periodischen Entwicklung von den Umweltbedingungen – insbesondere von Witterung und Klima – untersuchen zu können, müssen auffallende Wachstumserscheinungen beobachtet werden, deren Eintrittszeiten sich möglichst auf einen bestimmten Tag festlegen lassen.

Phänologische Phasen sind u.a.:

- Beginn der Blühtentfaltung
- Beginn der Blüte
- Vollblüte
- Ende der Blüte
- erste reife Früchte
- Beginn der Blattverfärbung
- Beginn des Blattfalls

Da in den mittleren und hohen Breiten die Pflanzenentwicklung maßgeblich durch den Temperaturverlauf bestimmt wird, sind phänologische Beobachtungen gute Indikatoren, um die Folgen des Klimawandels für die Biosphäre zu dokumentieren.

siehe:

www.uni-giessen.de/cms/Klimabiomonitoring_Nov08.pdf

GPM-Ansprechpartner in Deutschland:

Ekko Bruns
Deutscher Wetterdienst
Abteilung Messnetze und Daten
Kaiserleistraße 42
63067 Offenbach
Email: ekko.bruns@dwd.de

GLOBAL PHENOLOGICAL MONITORING (GPM)

Plant List of the GPM Program / Pflanzenliste des GPM-Programmes

Scientific name 'variety'	English	German	IPG plant no.	number of individuals
<i>Standard Program / Standardprogramm</i>				
<i>Prunus dulcis</i> 'Perle der Weinstraße'	almond	Mandelbaum		2
<i>Ribes rubrum</i> 'Werdavia' (white variety)	red currant	Rote Johannisbeere (weiße Sorte)		2
<i>Prunus avium</i> 'Hedelfinger Riesen' type Diemitz	sweet cherry	Süßkirsche		2
<i>Prunus cerasus</i> 'Vladimirskaja'	morello	Sauerkirsche		2
<i>Pyrus communis</i> 'Doyenne de Merode'	pear	Birne, 'Philippsbirne'		2
<i>Malus domestica</i> 'Yellow Transparent'	apple	Weißer Klarapfel		2
<i>Malus domestica</i> 'Golden Delicious' type Golden Reinders	apple	Apfel		2
<i>Castanea sativa</i> 'Dore de Lyon'	European chestnut	Edelkastanie		1
<i>Flowering Phase Program / Blühphasenprogramm</i>				
<i>Hamamelis x Intermedia</i> 'Jelena'	witch hazel	Zaubernuss		2
<i>Galanthus nivalis</i> (genuine)	snow drops	Schneeglöckchen		50
<i>Forsythia suspensa</i> 'Fortunei'	forsythia	Forsythie	IPG 421	2
<i>Syringa x chinensis</i> 'Red Rothomagensis'	lilac	Chinesischer Flieder	IPG 431	2
<i>Philadelphus coronarius</i> (genuine)	mock-orange	Falscher Jasmin		2
<i>Calluna vulgaris</i> 'Allegro'	heather	Besenheide		6
<i>Calluna vulgaris</i> 'Long White'	heather	Besenheide		6
<i>Hamamelis virginiana</i> (genuine)	witch hazel	Herbstblühende Zaubernuss		2

GLOBAL PHENOLOGICAL MONITORING (GPM)

additional plant species established at the Linden garden / weitere Spezies im Lindener phänologischen Beobachtungsprogramm

Scientific name, 'variety'	English	German	IPG plant no.	number of individuals
national program of the German Weather Services / nationales Programm des Deutschen Wetterdienstes (DWD) bzw. International Phenological Gardens (IPG) / Internationale Phänologische Gärten				
<i>Syringa vulgaris</i>	common lilac	Gewöhnlicher Flieder		1
<i>Prunus cerasus</i> , 'Schattenmorelle'	morello	Schattenmorelle (auf Standardunterlage)		1
<i>Crataegus laevigata</i>	hawthorne	Zweigriffeliger Weißdorn		1
<i>Cornus mas</i>	Cornelian cherry	Kornelkirsche		1
<i>Corylus avellana</i> 'P.Müller.Platz'	hazel	Hasel	IPG 411	1
<i>Prunus spinosa</i>	blackthorn	Schlehe		1
<i>Salix caprea</i>	goat willow	Sal-Weide (männlich)		1
<i>Ribes uva-crispa</i> , 'Grüne Kugel'	gooseberry	Stachelbeere		2
<i>Taraxacum officinale</i>	dandelion	Löwenzahn		
<i>Dactylis glomerata</i>	cocksfoot	Wiesen-Knautgras		
<i>Alopecurus pratensis</i>	meadow fox-tail	Wiesen- Fuchsschwanz		
<i>Ribes alpinum</i>	alpine currant	Alpen-Johannisbeere	IPG 311	1
<i>Betula pubescens</i>	downy birch	Moorbirke	IPG 211	1
<i>Sorbus aucuparia</i>	mountain ash	Gemeine Eberesche	IPG 271	1
<i>Prunus avium</i>	wild cherry	Vogelkirsche	IPG 241	1
<i>Salix smithiana</i>	Smith's willow	Küblerweide	IPG 324	1
<i>Sambucus nigra</i>	common elder	Schwarzer Holunder	IPG 331	1
<i>Quercus robur</i>	common oak	Steileiche	IPG 256	1
<i>Tilia platyphyllos</i>	larged-leaved lime	Sommerlinde		1

fertilizer varieties / Befruchter

Scientific name, 'variety'	English	German	number of individuals
<i>Prunus dulcis</i> , 'Rosa Nr. 10'	almond	Mandelbaum	1
<i>Ribes rubrum</i> , 'Rovada'	red currant	Rote Johannisbeere	1
<i>Prunus avium</i> , 'Büttners Rote Knorpelkirsche'	sweet cherry	Süßkirsche	1
<i>Ribes uva-crispa</i> , 'Invicta'	gooseberry	Stachelbeere	1

Loation of the garden / Lage des Gartens

latitude / Länge: 50°32' N

longitude / Breite: 8° 41.3' E

(part of the Environmental Monitoring and Climate Impact Research Station Linden / Teil der Umweltbeobachtungs- und Klimafolgenforschungsstation Linden: homepage: <http://www.uni-giessen.de/cms/ukl>)

plant community / Pflanzengemeinschaft

Arrhenatheretum elatioris Br.-Bl. *Filipendula ulmaria* sub-community

wechselfeuchte Glatthaferwiese

soil / Boden

stagno-fluvic gleysol on loamy-sandy sediments over gley

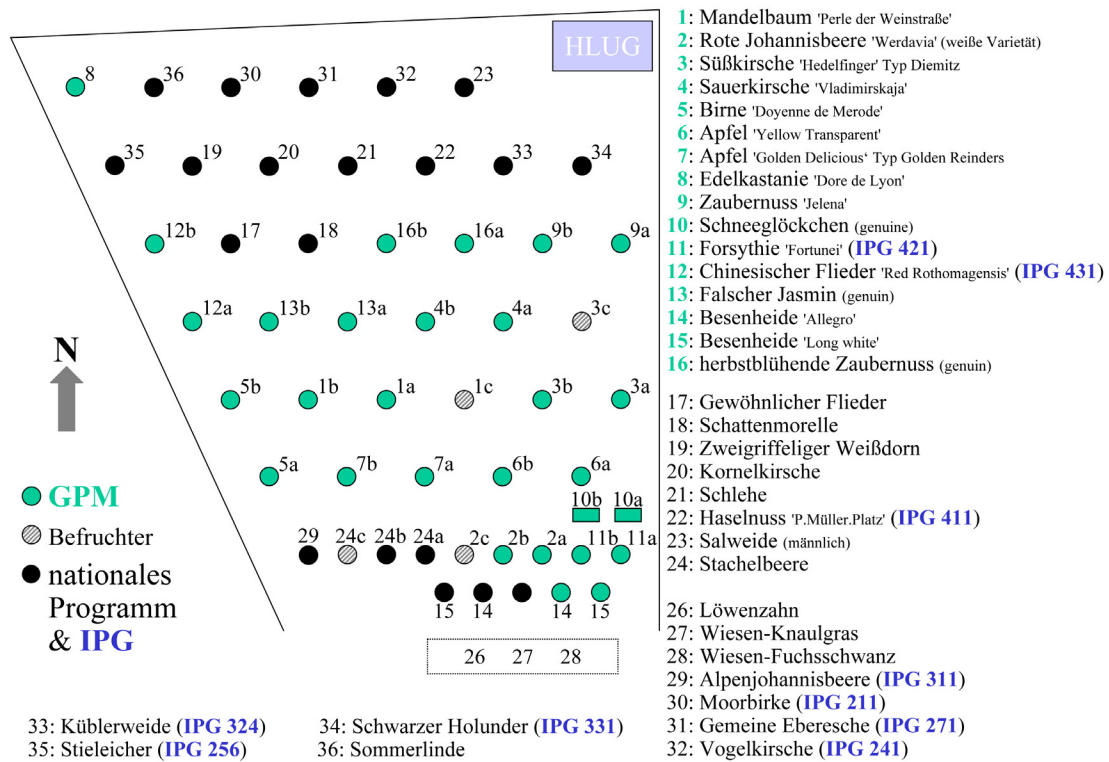
Pseudogley-Auenboden aus holozänen Auensedimenten über miozänen Tonen

homepage

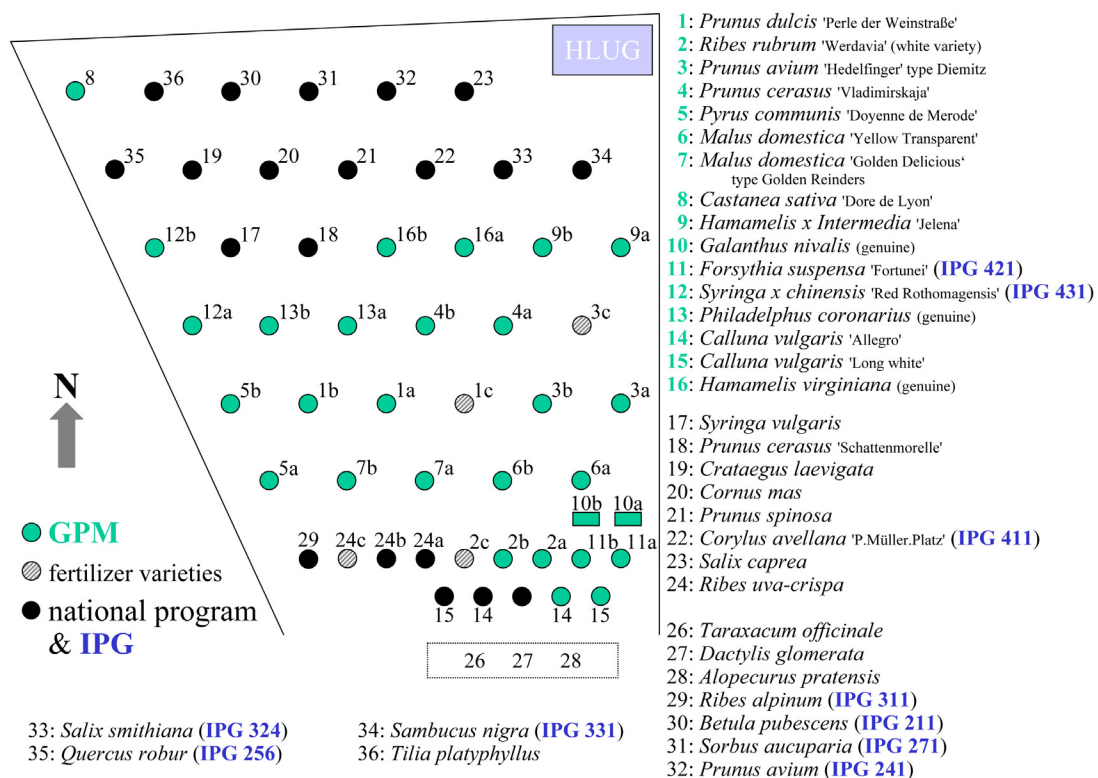
of the Linden phenological garden / des Phenologischen Garten Linden

<http://www.uni-giessen.de/cms/garten>

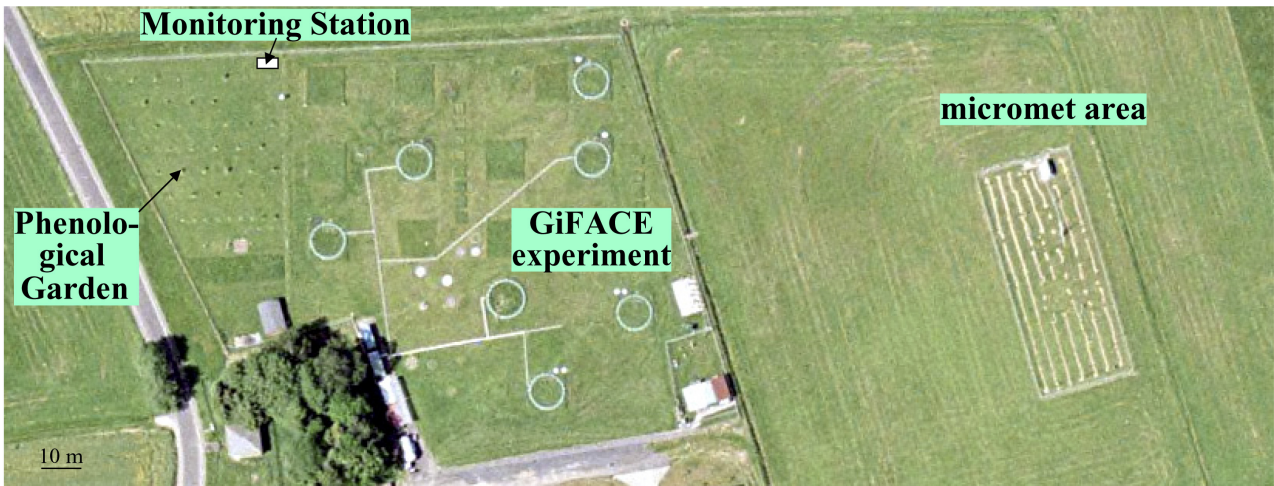
Arrangement of the garden / Anlage des Gartens



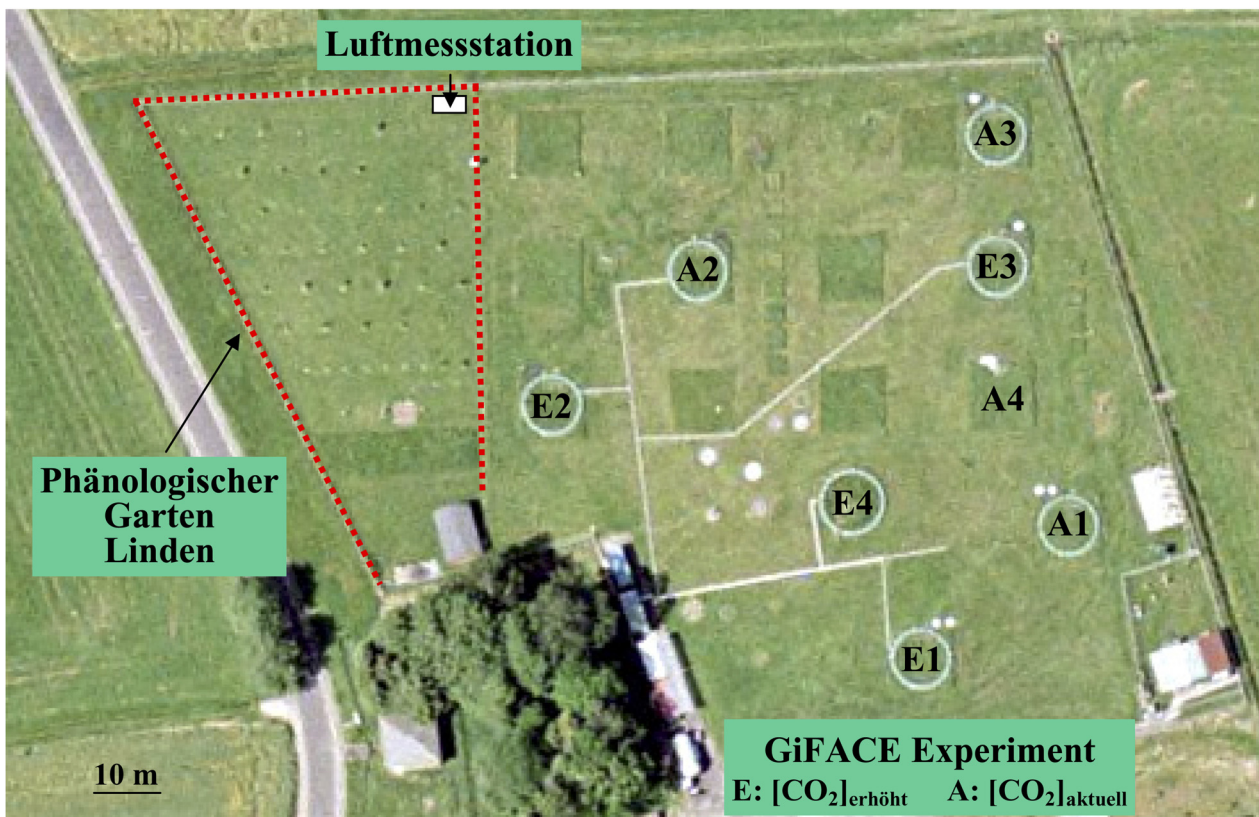
HLUG: lufthygienische Messstation / air quality monitoring station



Air photograph showing the surroundings next to the garden Luftbild der nächsten Umgebung des Gartens



(Quelle: Dig. Orthophoto © Hessisches Landesamt für Bodenmanagement und Geoinformation 2007)



(Quelle: Dig. Orthophoto © Hessisches Landesamt für Bodenmanagement und Geoinformation 2007)