



Soil of the Year 2017: Hortisol

(WRB: Hortic Anthrosols)



Authors:

Dr. Stefan Brune, Thüringer Landesanstalt für Umwelt und Geologie, mit Kollegen, gemeinsam mit dem Kuratorium Boden des Jahres. Schirmherrin ist Ministerin Anja Siegesmund, Thüringer Ministerium für Umwelt, Energie und Naturschutz. Translation: E. Eberhardt and S. Broda, BGR



Farmhouse garden in Thuringia

Ap-horizon

Dark grey, humus-rich very loose as deep as dug with the spade

Ex-horizon

Grey brown, loose, humus containing subsoil with many soil organisms

Brown soil that existed prior to the gardening use

Profile of a garden soil
Photo: Thüringer Landesanstalt
für Umwelt und Geologie

The name *Hortisol* is of Latin origin and combines 'hortus' (garden) and 'solum' (soil). The garden soil belongs to the 'terrestrial anthropogenic soils' of the German soil classification system. They have thoroughly been modified by man in a way that few characteristics resemble the original state. This also applies to the *Hortisol*. Similar soils are *Plaggenesch* (Plaggic Anthrosol, SoY 2013) and vineyard soil (SoY 2014).

The *Hortisol* has an active soil life with particularly many earthworms that mix the soil material intensively. The part of the soil that is subject to the so-called bioturbation (Latin 'turbare', to churn up) is a specific, humus-rich and often dark grey layer (Ex horizon in the German horizon symbolisation), that reaches – in combination with the also humus enriched topsoil – down to more than 40 cm below the soil surface.



Earthworm in a garden soil. Photo: ...: ©patila/Fotolia.de

Which processes do go on in a garden soil?

Why are garden soils so rich in humus and fertile? Man in close collaboration with soil organisms, climate and the soil beneath are the most important factor of garden soil development. Garden soils literally grow on or in various soils or materials. Often, man has also brought on the material for the soil in laborious efforts, e.g. in old gardens on terraces on the slopes or in castle and cloister complexes. But only the gardener's cultivation over decades or even hundreds of years makes the soil mature or growing to become a garden soil:

- The soil is dug and turned, loosened and enriched with materials regularly with the spade, hoe and other tools.
 - Compost, faeces, ashes, sweepings, organic waste, lime, and as well bones, sherds etc. are put on the soil and mixed in.
 - The soil is watered regularly during dry phases in summer and autumn.
- By this work of the gardener, the soil grows by 40 to more than 100 cm, depending on the duration of the garden use. On its top, it develops a new soil layer that is particularly humus and nutrient rich, loose and fertile. This soil layer contains much more phosphorous and nitrogen than other soils. Both are important nutrients for crop plants.



Compost – key part of fertile garden soils
Photo: M. Dworschack, Geol. Dienst, NRW



Earthworm casts on garden soil
Photo: S. Schulte-Kelling, Geol. Dienst NRW

Clay particles and humus retain a lot of rainwater that is then available to plants. The high humus content provides for high biological activity. Beneath one square metre of a garden do live far more organisms (insects, spiders, earthworms, annelids, small mammals, fungi, bacteria) than humans on earth. In particular, the many earthworms contribute to incorporate plant residues and compost into the soil, down to a depth of even more than 1 metre. Roots, soil organisms as well as lime make for a soil structure composed of crumbs and consistent soil particles that keep the soil loose, but stable. As a result, garden soil can supply plant roots with oxygen and release carbon dioxide at its surface. Plant roots do not need only nutrients and water, but also oxygen to make crop plants thrive.

Ways of using garden soils – culture-historical diversity

Household and cottage gardens: guardians of best soils

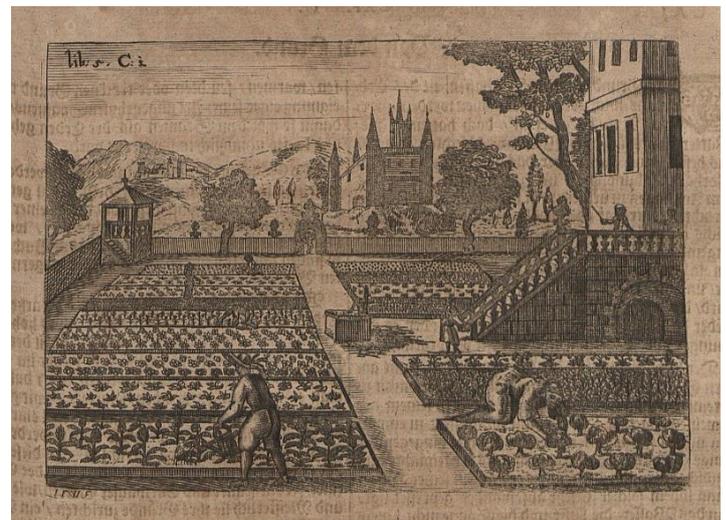
Wherever humans settled, they changed part of the land near their houses and cottages into gardens. In these places, one often can find the oldest and deepest *Hortisols*. Almost any old village centre holds considerable areas of garden land even today. Here, garden soils could develop broadly undisturbed. Cultivated were vegetables, herbs, ornamental plants and as well feed crops. Rearwards, often orchards and lawns with fruit trees adjoined, where poultry and young stock were herded. If farmsteads were too small or if village centres did not provide sufficient space, also land on the edge of the village centre was included. On this so-called *Grabeland* (land to dig up) mainly various kinds of cabbage and root crops like potatoes and beets were cultivated. After a long and intense use, typical *Hortisols* can be found here.

Cloister gardens: Places of innovative soil cultivation

Because of being part of a Europe-wide network, many innovations in gardening practice started out from cloisters. In many cloister gardens nuns and monks bred new kinds of fruit and vegetable, like cabbage, parsnip, onion and spinach, ornamental plants and culinary herbs from where they spread into the cottage gardens. In Thuringia, there are more than 200 historical cloisters and congregations. Many of them still have old gardens.



Cloister garden of the former Benedictine monastery
Herzebrock
Photo: M. Dworschack, Geol. Dienst NRW



Quelle: Deutsche Fotothek

Hundreds of years old castle garden used as kitchen garden
Photo: German Phototek

Urban-middle class kitchen gardens: using any small piece of land

In urban settlements, kitchen gardens have become common since the 12th and 13th century. The oldest gardens are situated in the core of development of the High Middle Ages; younger ones in the town expansions within or outside the town walls. These vegetable and kitchen gardens were very small. Cultivated for some hundreds of years, they contain now typical *Hortisols*. They are rare in the city centres, where much of the soil has been removed or overbuilt. Furthermore, the soil is often dirtied with fire debris, brick fragments, cement and metal remnants. In urban areas fertilizers often were – in contrast to rural areas – liquid faeces from the cesspools, organic household waste and ash, and since the middle of the 19th century, sewage sludge, compost and artificial fertilizers have been used. These gardens contributed, first of all, to the production of food particularly in times of distress, but serve also as a place for encounter and communication.



Communication – an important social function of gardens: Photo: S.Schulte-Kellinghaus, Geol. Dienst, NRW

Urban gardening' – a new impulse for kitchen gardens in the heart of large cities

Abandoned areas are now being cultivated in the fashionable urban gardening movement. Often, soils of these inner city areas are polluted with harmful substances. Then, urban gardening uses raised beds or boxes for planting, which do not initiate the development of a *Hortisol*. For soil-based cultivation, soils rich in humus are created in a short time by mixing in compost very deeply or by exchanging contaminated soil with horticulturally suitable substrates. It depends on duration and intensity of use whether *Hortisols* will develop.



Andernach on the Rhine, flower tub with culinary herbs
Photo: G..Milbert



Urban gardening on the Tempelhof field, Berlin
Photo: M. Milbert



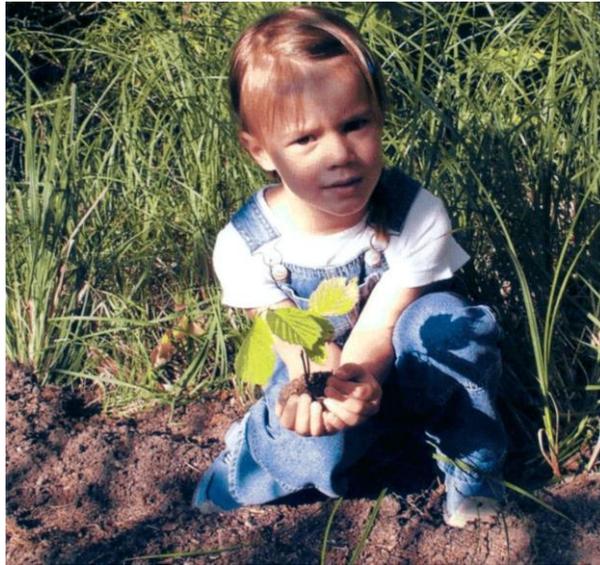
Weekly market offering vegetables produced in the inner city of Andernach Photo: G. Milbert

Protection of soil concerns us all!

For a careful use of soil, think of it as a living organism. Soil life needs to be preserved and taken care of to maintain the soil fertility. It is important to add sufficient organic substance and to avoid excessive use of chemicals (mineral fertilizer, plant protection products). Garden soils should not be sealed or heavily compacted, as they may lose their many functions for the ecosystem.

Unfortunately, many garden soils in the inner towns and along the edges of villages are now being overbuilt and, in consequence, are no longer a 'green lung' and lose their social function. Valuable evidence for our cultural history of over 350 years irrevocably disappear that the founder of the market gardening Christian Reichart (1685 to 1775) ushered in, pioneering the development of Hortisols.

In many cities, gardening schools and school gardens play an important role in conveying the value of and the threats to soil to children and young people.



Children study soils intensively
Photo: Böhme, HS Osnabrück)

Engagement in garden soils, which provide in urban agglomerations like oases in sealed areas the only access to the scarce resource soil, contributes to the awareness of and to the responsibility for their protection.

Further information:

Web site Soil of the Year (www.boden-des-jahres.de)

German Soil Science Society (www.dbges.de)

Bundesverband Boden (www.bvboden.de)

Thüringer Landesanstalt für Umwelt und Geologie (stefan.brune@tlug.thueringen.de)

Board Soil of the Year <boden@gd.nrw.de>

Soil scientific and history institutes at the universities of Erfurt und Jena

Information (poster and flyer 2017, collection of material on all soils of the year): Umweltbundesamt:
www.umweltbundesamt.de/publikationen/poster-boden-des-jahres-2017

CD-ROMs on all soils of the year 2005 to 2017: <frielinghaus@zalf.de>