

# ANTHROSOLS



**Otto Spaargaren**

ISRIC – World Soil  
Information

---

Wageningen  
The Netherlands

# Definition of Anthrosols

***Anthrosols:*** soils that have been formed or profoundly modified through **long-term** human activities, such as addition of organic materials or household wastes, irrigation or cultivation.

# Diagnostics of Anthrosols

Anthrosols have one of the following:

- A ***hortic*** horizon
- An ***irragric*** horizon
- A ***plaggic*** horizon
- A ***terrlic*** horizon, or
- An ***anthraquic*** with underlying ***hydragric*** horizon,

all 50cm or more thick

# Hortic horizon

Results from deep cultivation, intensive fertilisation and/or long-term application of organic wastes:

- Munsell value and chroma 3 or less
- Average organic C 1 percent or more
- $P_2O_5 > 100 \text{ mg kg}^{-1}$  in upper 25cm
- Base saturation 50 percent or more

# Irragric horizon

Results from long-term irrigation with sediment-rich water:

- Munsell value and chroma more than 3
- Uniform structure
- Average organic C > 0.5 percent, and remaining > 0.3 percent at its lower limit
- Even distribution of carbonates and clay
- Higher clay content than underlying soil

# Terric horizon

Results from long-term addition of earthy manure, compost or mud:

- Non-uniform texture
- Colour depending on source material
- Base saturation 50 percent or more

# Plaggic horizon

Results from long-term addition of sods mixed with farmyard manure:

- Uniform texture (sand or loamy sand)
- Average organic C > 0.6 percent
- $P_2O_5$  > 250 mg kg<sup>-1</sup> in upper 20cm
- Base saturation < 50 percent

# Anthraquic horizon

Results from long-term wet cultivation and includes a *puddled layer* and a *plough pan*:

- Platy structure in plough pan
- Rust mottles along cracks and root holes
- Bulk density of plough pan 20 percent or more compared to that of puddled layer
- Porosity in plough pan 10-30 percent than that of puddled layer



# Hydragric horizon

Subsurface horizon having characteristics associated with wet cultivation:

- Fe-Mn accumulation or coatings of illuvial Fe and Mn; or, at least, 2x more  $Fe_d$  or 4x more  $Mn_d$  than surface horizon; or
- Redoximorphic features associated with wet cultivation; and
- Thickness more than 10cm

# Genesis of Anthrosols

Main soil-forming factors are:

## **Man and Time**

Main soil-forming processes are **centuries-long, recurrent, mono-management practices**, for example:

- Intensive fertilization
- Continual application of earthy material
- Irrigation with sediment-rich water
- Wet cultivation

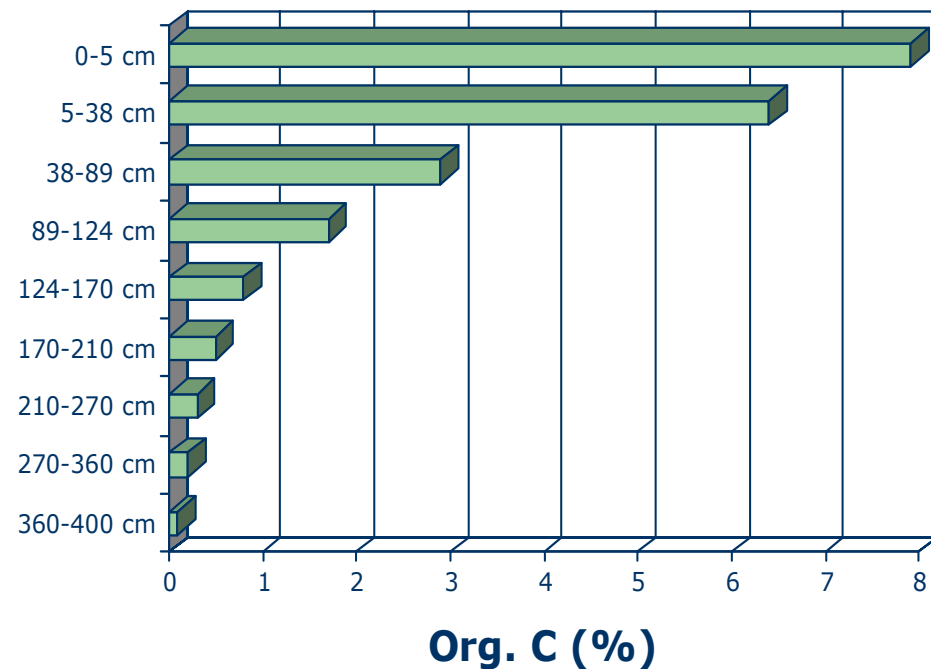
# Classification of Anthrosols

- **First qualifier:** nature of the surface horizon (*hortic, hydragric, irrigric, plaggic, or terric*)
- **Second qualifier:** nature of the underlying soil or material, or of a special property (*arenic, ferralic, gleyic, luvic, regic, spodic, or stagnic*)

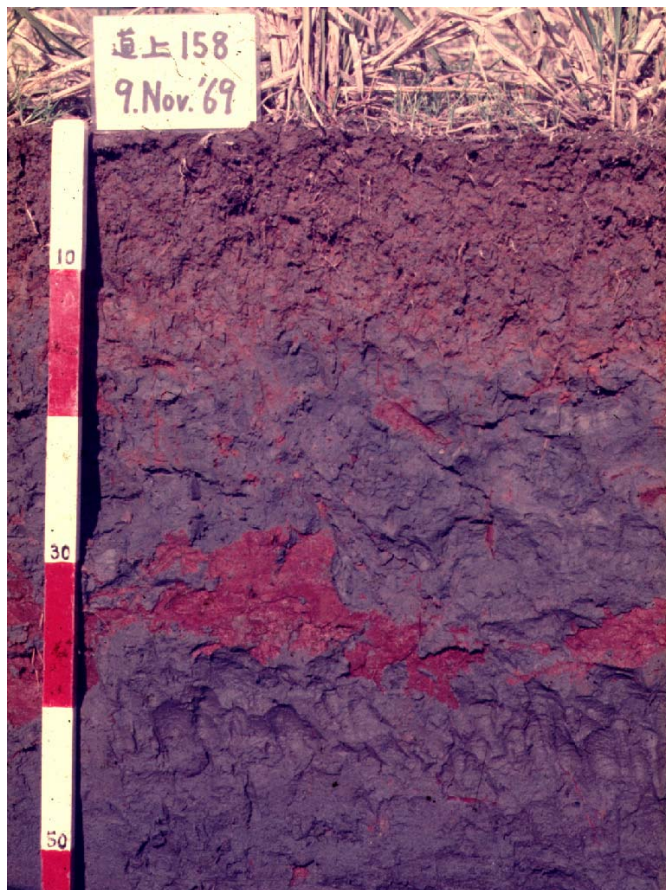
# Examples of Anthrosols (1)



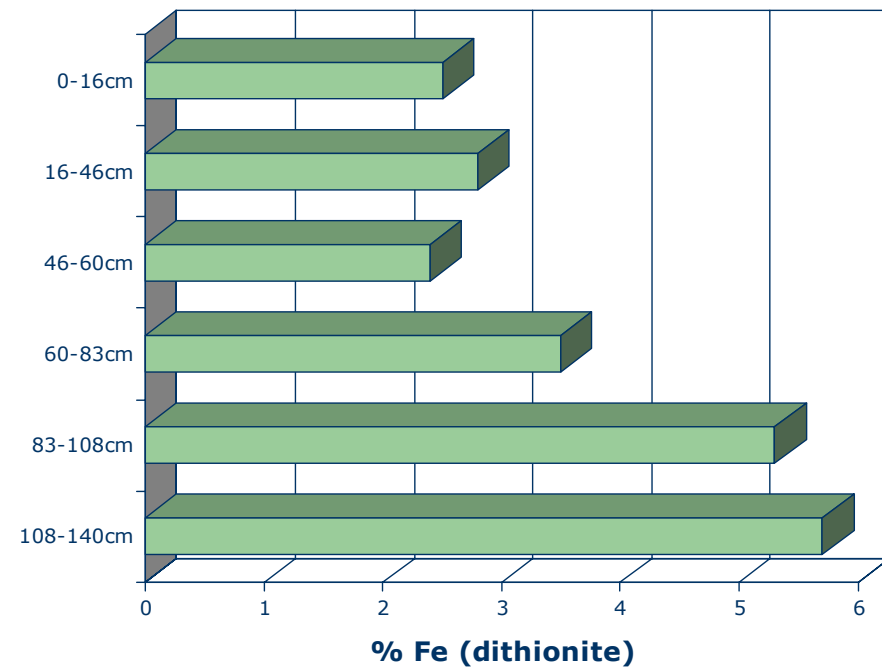
Ferrali-Hortic Anthrosol,  
Brazil (*Terra Preta do Indio*)



# Examples of Anthrosols (2)



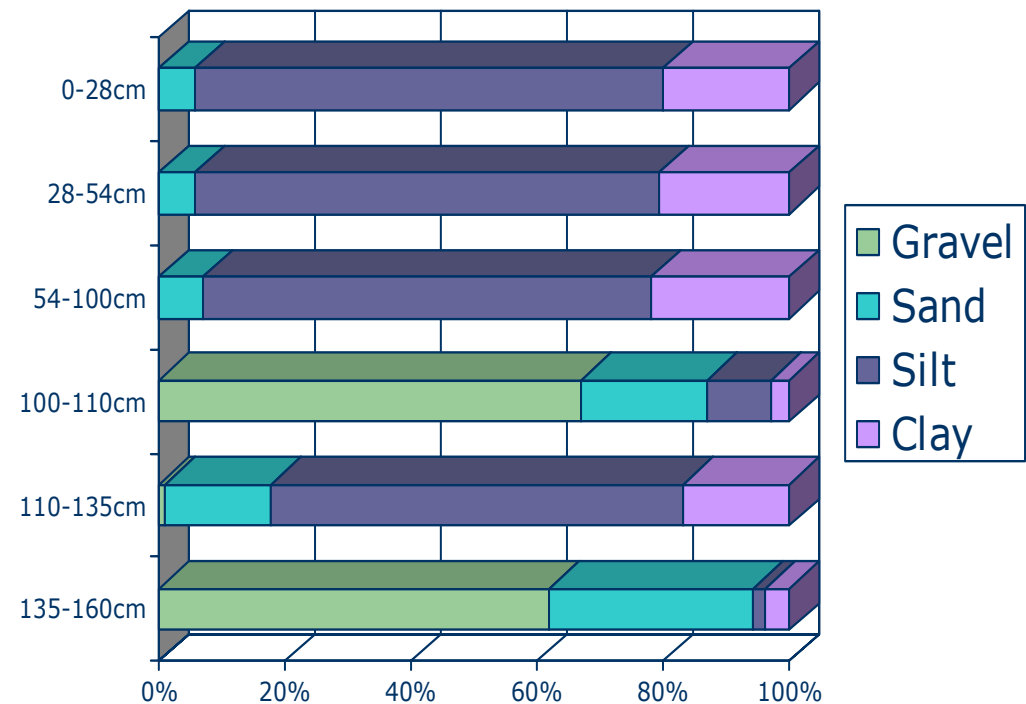
Gleyi-Hydragic Anthrosol,  
Japan



# Examples of Anthrosols (3)



Regi-Irragric Anthrosol, China

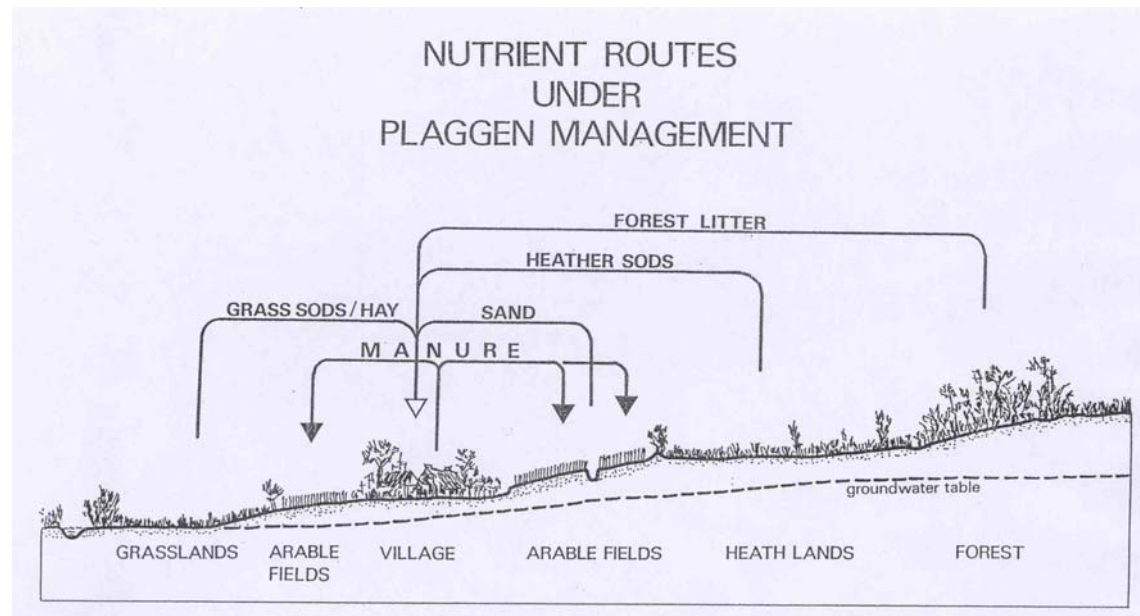




# Examples of Anthrosols (4)



Spodi-Plaggic Anthrosol,  
The Netherlands



# Associated soils (1)

**Plaggic** and **Terric Anthrosols** are associated with infertile soils such as Arenosols, Podzols and Albeluvisols, as well as with wetland soils (Fluvisols, Gleysols)

**Irragric Anthrosols** are associated with dryland soils (Calcisols, Gypsisols, Solonchaks, Regosols, and Cambisols)



## Associated soils (2)

**Hydragric Anthrosols** are associated with Fluvisols and Gleysols in low-lying areas, with Alisols, Acrisols, Lixisols and Luvisols in upland areas, and with Andosols in volcanic regions

**Hortic Anthrosols** are associated with virtually any Reference Soil Group

## Associated soils (3)

Soils comprising of "*anthropogenic soil material*" (urban waste, mine spoil, garbage dump, etc.) do **not** qualify for Anthrosol, because they lack evidence of pedogenetic change. They form a separate group within the Regosols, viz. **Anthropic Regosols**.

Recently, a new RSG has been proposed to classify these soils as **Technosols**.

# Distribution of Anthrosols (1)

- *Plaggic* and *Terric Anthrosols* occur mainly in Western Europe (Belgium, Germany, The Netherlands, UK and Ireland), covering some 500 000 ha
- Large areas of *Hydragric Anthrosols* are found in the Far East (China, Japan, Philippines, Indonesia, Thailand and Vietnam)

## Distribution of Anthrosols (2)

- *Irragric Anthrosols* are found in desert regions. Large tracts occur in the Middle East (Euphrates and Tigris valleys).
- *Hortic Anthrosols* occur everywhere where long-term intensive cultivation has taken place.