
بسم الله الرحمن الرحيم

Soil orders found in Pakistan

SOIL CLASSIFICATION

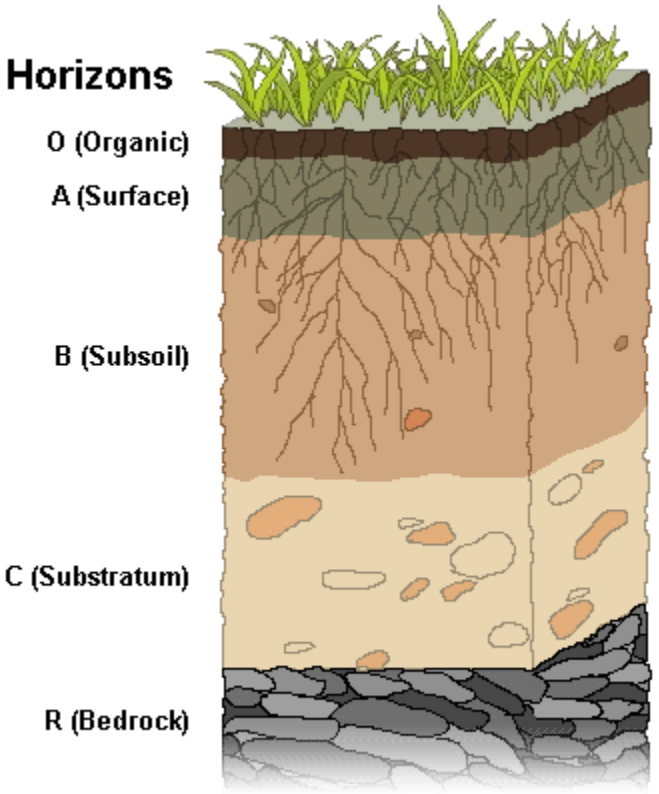
"Soil classification is the systematic grouping of soil into various categories based on morphological, mineralogical and chemical features."

SOIL TAXAMONY

"Taxonomy is the science that deals with laws and principles of soil classification."

Soil Profile

- Soil profile: a vertical section of soil from the ground surface to the parent rock.



CATEGORIES OF SOIL TAXONOMY

- Six levels of the categories in the hierarchy of soil taxonomy:
- 1) Order
- 2) Sub-order
- 3) Great group
- 4) Sub-group
- 5) Family

ORDERS

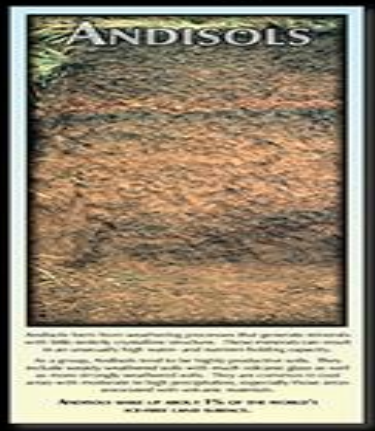
There are twelve orders all over the world:

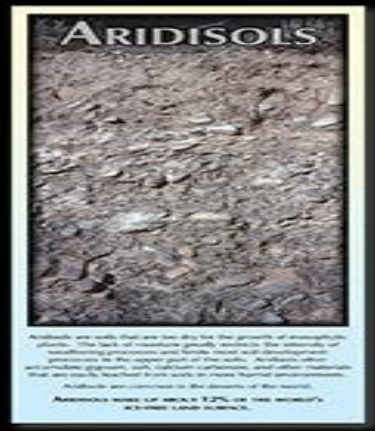
Order Name	Formative Element	Memory Device
Alfisols	alf	Pedalfer
Andisols	and	Andolike
Aridisols	id	Arid
Entisols	ent	Recent
Histosols	ist	Histology
Inceptisols	ept	Inception
Mollisols	oll	Mollify
Oxisols	ox	Oxide
Spodosols	od	Podzols
Ultisols	ult	Ultimate
Gelisols	gl	Frozen
Vertisols	ert	Invert

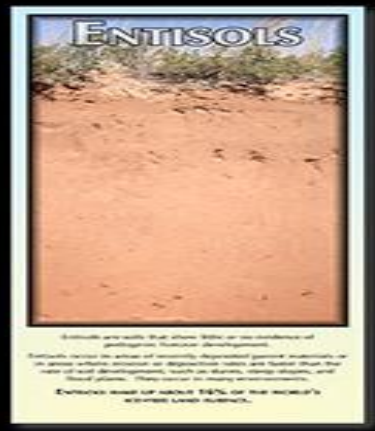
USDA

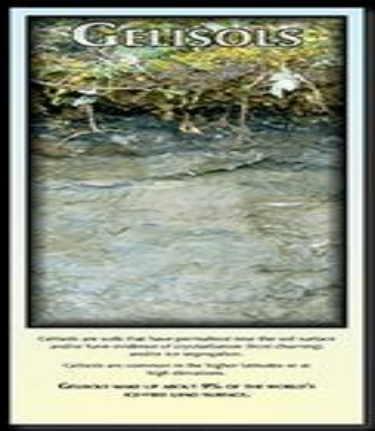
United States Department of Agriculture

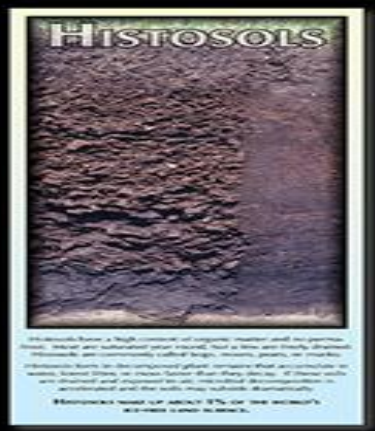
The 12 Orders of Soil Taxonomy

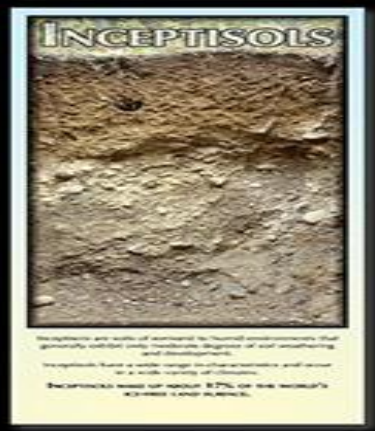


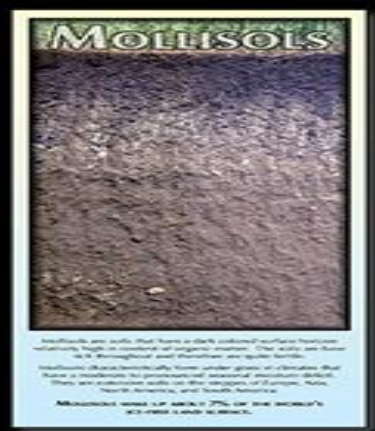


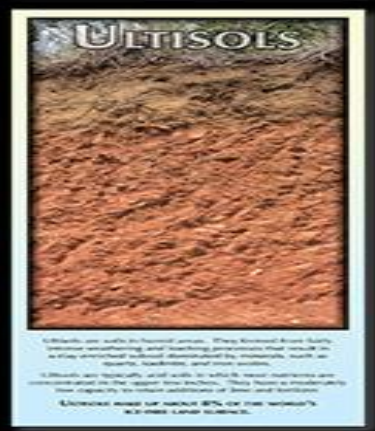












US System of Soil Taxonmy

The US System classification scheme contains 6 categories:

1. Order – the most general grouping

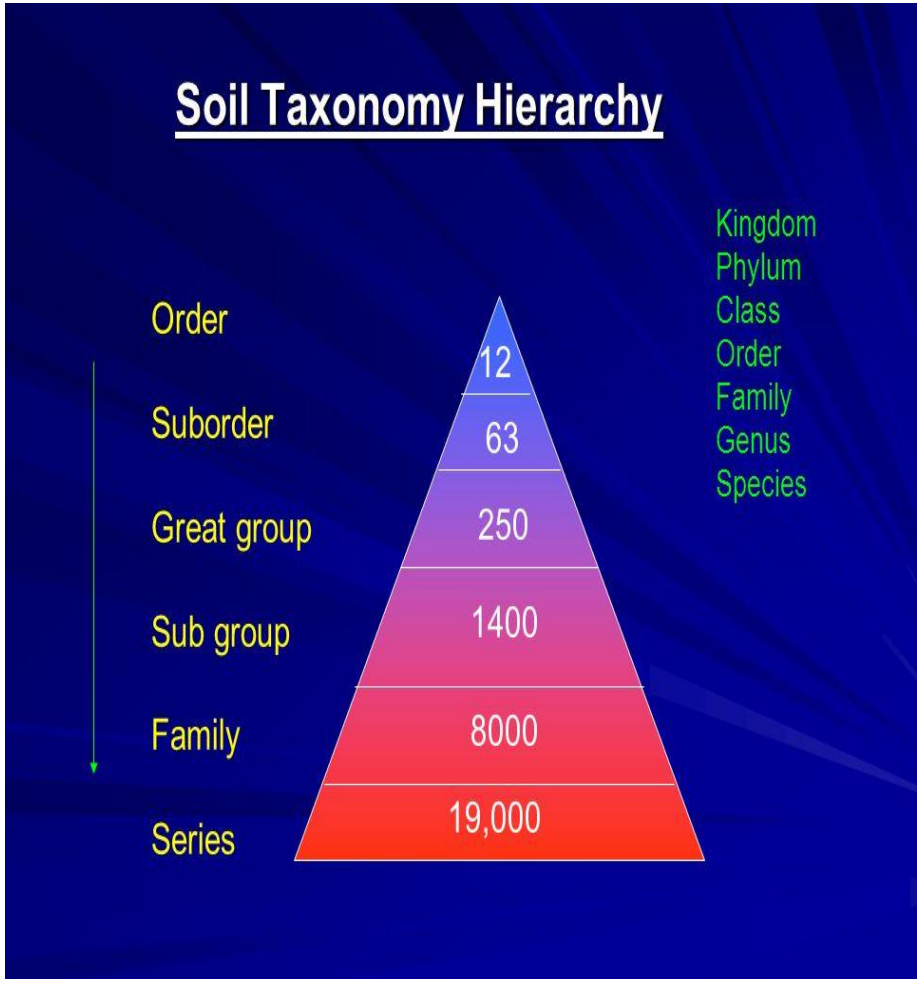
2. Suborder - defined by moisture, temp, dominating chemical or textural Features

3. Great Group - by differentiating horizons

4. Subgroup - three types: typical (typic), intergrade, not one of the other two

5. Family - plant growth or engineering properties.

6. Series – common name, like yours and mine.



Cont....

- In addition to these categories, we have the soil

Phase (or soil Type), which refers to surface properties such as texture, thickness, slope, coarse fragments, salinity, erosion, etc.

- This is added to a series name (like Aiken clay

loam, eroded phase).

- **Order, Sub-Order, Great Group, Sub-Group,**

Family, Series and Phase or Type

Table 7-1 Formative Elements and Their Connotations for Names of Great Groups and Other Designations in the U.S. Soil Taxonomy System.

Element	*Connotation*	*Element*	*Connotation*
Acr	Extreme weathering	Hist	Presence of organic materials
Al	High aluminum, low iron	Hum	Presence of organic matter
Alb	Albic horizon	Hydr	Presence of water
Anhy	Very dry	Kand, kan	1:1 layer silicate clays
Anthr	Anthropic epipedon	Luv	Illuvial
Aqu	Aquic conditions	Melan	Black, presence of organic carbon
Argi	Argillic horizon	Moll	Mollic epipedon
Calci, calc	Calcic horizon	Natr	Natric horizon
Cry	Cold	Pale	Excessive development
Dur	Duripan	Petr	Cemented horizon
Dystr, dys	Low base saturation	Plac	Thin pan
Endo	Implying a groundwater table	Plagg	Plaggen epipedon
Epi	Implying a perched water table	Plinth	Presence of plinthite
Eutr	High base saturation	Psamm	Sandy texture
Ferr	Presence of iron	Quartz	High quartz content
Fibr	Least decomposed stage	Rhod	Dark red color
Fluv	Floodplain	Sal	Salic horizon
Fol	Mass of leaves	Sapr	Most decomposed stage
Fragi	Fragipan	Somb	Sombric horizon
Fragloss	Both *fragi* and *gloss*	Sphagn	Presence of sphagnum
Fulv	Dark brown color, presence of organic carbon	Sulf	Presence of sulfides or their oxidation products
		Torr	Torric moisture regime
Glac	Ice lenses or wedges	Ud	Udic moisture regime
Gloss	Glossic horizon	Umbr	Umbric epipedon
Gyps	Gypsic horizon	Ust	Ustic moisture regime
Hal	Salty	Verm	Wormy or mixed by animals
Hapl	Minimum horizon development	Vitr	Presence of glass
Hem	Intermediate stage of decomposition	Xer	Xeric moisture regime

Source: Soil Survey Staff, *Soil Taxonomy: A Basic System of Soil Classification for Making and Interpreting Soil Surveys,* 2nd edition, Agriculture Handbook 436, USDA, Washington, DC, 1999, 128-129.

◆ 7:3 Constructing Taxonomic Names

The complete taxonomic class for a soil indicates the *order, suborder, great group, subgroup, family,* and *series* of that particular soil. These taxonomic class names can be quite long and complex. The name is constructed from **formative elements** coined from various roots in Latin, Greek, or other languages (see Table 7-1). From each soil order **a root,** or portion of the order name, is used to designate the order in the complete taxonomic class name. Examples of these roots are *od* for Spodosols, *id* for Aridisols, and *oll* for Mollisols. As an example of a complete taxonomic classification, the **Obispo** soil is officially classified as **clayey, magnesic, thermic lithic Haploxeroll.** Dissecting this class name into its formative elements reveals the following:

Series	**Obispo** (from San Luis Obispo County, California)
Family	**Clayey, magnesic, thermic** (indicating a high clay content, magnesium from serpentine minerals, and a thermic temperature regime)
Subgroup	**Lithic** (indicating shallow to bedrock)
Great group	**Haploxeroll** (indicating simple, or minimal horizon development)
Suborder	**Xeroll** (indicating a xeric moisture regime)
Order	**Mollisol** (as indicated by the root *oll*)

Table 7-4 Twenty-Nine Soil Groups Used in the FAO Soil Classification System

Group Name	*Description*
Leptosol*	Shallow soil over hard rock or gravel, similar to some Entisols
Cambisol	Soil with cambic horizon, similar to Inceptisols
Acrisol	Soil with low-base-saturation argillic horizon, similar to Ultisols
Arenosol	Soil of loamy sandy or courser texture, similar to Psamments
Calcisol	Soil with a calcic or petrocalcic horizon
Ferralsol	Highly weathered soil with sesquioxide clays, similar to Oxisols
Gleysol	Soil with reducing conditions due to wetness
Luvisol	Soil with intermediate-base-saturation argillic horizon, similar to Alfisols
Podzol	Soil with a spodic horizon, similar to Spodosols
Kastanozem	Steppe soil with chestnut color, similar to some Mollisols
Lixisol	Soil with low-activity clays but high base saturation
Fluvisol	Little-altered soil from alluvial deposits, similar to Fluvents
Vertisol	Self-mixing soil, similar to Vertisols
Albeluvisol	Soil with an irregular, tongued boundary between an eluvial horizon and an argillic horizon
Solonchak	Soil with a salic (saline) horizon
Histosol	Organic soil with a histic horizon, similar to Histosols
Regosol	Thin soil over parent material, similar to some Entisols
Chernozen	Prairie soil with a mollic surface horizon and subsoil carbonates, usually formed in loess, similar to some Mollisols
Nitisol	Soil with shiny nut-shaped peds
Phaeozem	Soil with mollic surface horizon, but no carbonates in upper 100 cm
Solonetz	Soil with natric (sodic) horizon, similar to Natrargids
Planosol	Soil with an eluvial horizon above an abrupt boundary to an impermeable subsoil
Andosol	Soil formed in volcanic ash, similar to Andisols
Umbrisol	Soil with umbric (thick, dark, acidic) surface horizon
Alisol	Soil with argillic horizon but appreciable exchangeable Al, similar to some Ultisols
Gypsisol	Soil with a gypsic horizon
Anthrosol	Soil with plaggen or other human-made features
Cryosol	Soil with permafrost, similar to Gelisols
Durisol	Soil with cemented horizon

*Soil groups are listed in approximate order of declining abundance. Leptosols, the most common soils, occupy about 16.55 million km^2.

Source: Dominant Soils of the World, FAO, Rome, 1999 *(http://www.fao.org.).*

ORDER IN PAKISTAN

- THERE ARE SIX ORDER IN PAKISTAN

1. Aridisols
2. Entisols
3. Inceptisols
4. Alfisols
5. Vertisols
6. Mollisols

Aridisols>Entisols>Inceptisols>Alfisols>Vertisols >Mollisols

ORDERS

1. Alfisols: Relatively high base saturation; not organic rich; evidence of clay transport.
2. Andisols: Soils derived major properties from volcanic parent material. High P fixation.
3. Aridisols: Arid soils; Low in organic matter; high in salts and pH.
4. Entisols: Not well-developed even after long periods (can occur anywhere)
5. Histosols: Soils formed from organic matter(peats and mucks).
6. Inceptisols: Moderately weathered soils.

ORDERS

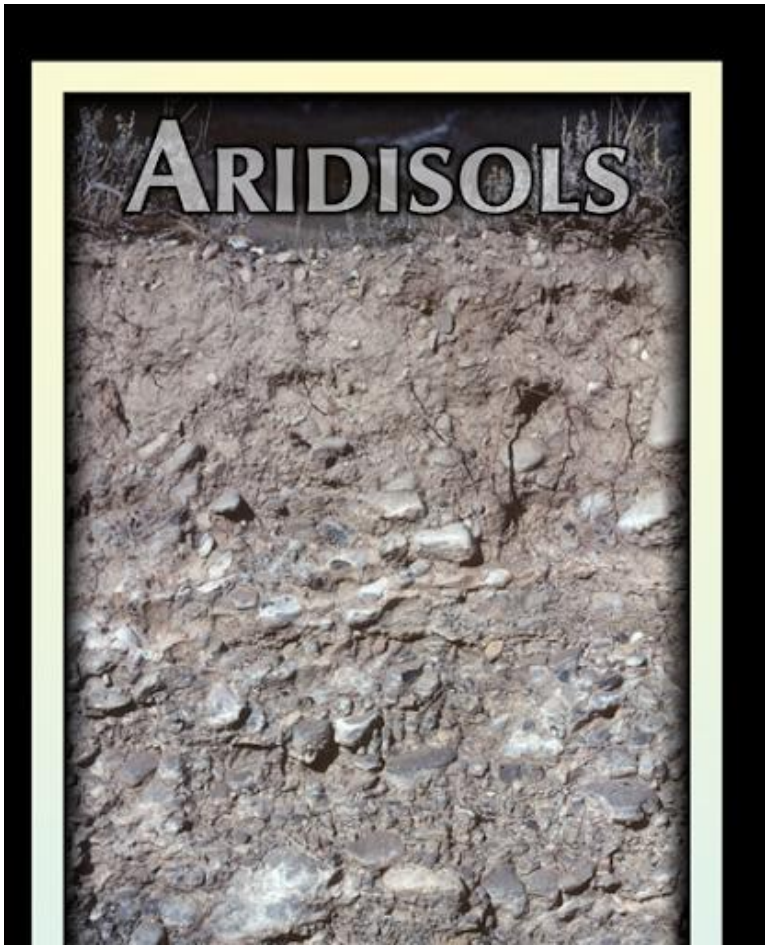
7. Mollisols: Brown-black surface horizons; High in organic matter, vermiculite or smectite.
8. Oxisols: Highly-weathered; Only quartz, kaolinite, and Fe and Al oxides left (e.g., tropical rainforest).
9. Spodosols: Evidence of Fe, Al, and organic matter transport; Often a whitish E Horizon (e.g., boreal forest).
10. Ultisols: low base saturation soils.
11. Vertisols: Mixed soils; Swelling clays, frost, etc cause lower horizons to mix with upper horizons; Often characterized by cracks.
12. Gelisols: Frozen soils

ARIDISOLS:

Description:

Extent: 259710 Km^2

- Aridisols have a very low concentration of organic matter.
- Water deficiency is the major defining characteristic of Aridisols.
- *Also required is sufficient age to exhibit sub-soil weathering and development.*
- Occurring: Arid and Semi-arid Climates
- Land Use: Wheat, Cotton, Rice and fodder Purposes



ENTISOLS:

Description:

Extent: 177000 Km^2

- These soils lacks any soil profile development except for some humification and homogenization in the surface horizon.
- Occurring: Dry Climate
- Land Use: Use for winter crops (Mustard, grams, wheat)

INCEPTISOLS:

- Description:
- Extent: 27700 Km

❖ They form quickly through alteration of parent material.

❖ They are more developed than Entisols.

❖ *They have no accumulation of clays, iron oxide, aluminum oxide or organic matter.*

❖ Occurring: Sub-humid areas

❖ Land Use: Wheat, apple, apricot, millet, maize, grazing livestock etc.

ALFISOLS:

Description:

Extent: 8350 Km2

- They have a clay-enriched subsoil and relatively high native fertility.
- *"Alf" refers to aluminum (Al) and iron (Fe).*
- Occurring: Alfisols form in semiarid to humid areas.
- Land Use: Grazing livestock, Wheat and Rice.

VERTISOLS:

- Description:
- Extent: 8350 Km^2

❖ A Vertisols is a soil in which there is a high content of expansive clay known as montmorillonite that forms deep cracks in drier seasons or years.

❖ *Alternate shrinking and swelling causes self-mulching.*

❖ Occurring: Sub humid areas

❖ Land Use: Rice, Berseem, Wheat, Mustard, Sorghum and gram under irrigation.

MOLLISOLS:

Description:

Extent: 6100 Km2

- Mollisols have deep, high organic matter, nutrient-enriched surface soil.
- *Dark in colour*
- Occurring: Sub-humid highlands
- Land Use: Wood cutting and grazing of livestock

Thank You!!!