

## UMBRISOLS (UM)

The Reference Soil Group of the Umbrisols accommodates soils in which organic matter of low base saturation has accumulated at the surface to the extent that it significantly affects the behaviour and utilization of the soil. Umbrisols are the logical pendant of soils with a mollic horizon ([Chernozems](#), [Kastanozems](#) and [Phaeozems](#)). Not previously recognized at such high taxonomic level, these soils are classified in other systems as Umbrepts and Humitropepts (USA Soil Taxonomy), Humic Cambisols and Umbric Regosols (FAO), Sombric Brunisols and Humic Regosols (France) or 'Brown Podzolic soils' (e.g. Indonesia).

### Definition of Umbrisols

Soils having

- 1 an [umbric](#) horizon, **and**
- 2 no diagnostic horizons other than an [anthropedogenic](#) horizon less than 50 cm thick, an [albic](#) horizon or a [cambic](#) horizon.

*Common soil units:*

[Thionic](#), [Gelic](#), [Anthric](#), [Leptic](#), [Gleyic](#), [Ferralic](#), [Arenic](#), [Stagnic](#), [Humic](#), [Albic](#), [Skeletal](#), [Haplic](#).

## Summary description of Umbrisols

*Connotation:* soils with dark topsoil; from L., umbra, shade.

*Parent material:* weathering material of siliceous rock; predominantly in late Pleistocene and Holocene deposits.

*Environment:* cool and humid climates; e.g. in mountain regions with little or no moisture deficit.

*Profile development:* AC- and A(B)C-profiles.

*Use:* predominantly forestry and extensive grazing. Under adequate management, Umbrisols may be planted to cash crops such as cereals, root crops, tea and coffee.

## Regional distribution of Umbrisols

Umbrisols occur in cool, humid regions, mostly mountainous and with little or no soil moisture deficit. They occupy about 100 million hectares throughout the world. In South America, Umbrisols are common in the Andean ranges of Columbia, Ecuador and, to a lesser extent, in Venezuela, Bolivia and Peru. They occur also in Brazil, e.g. in the Serra do Mar. Umbrisols in North America are largely confined to the north western Pacific seaboard. In Europe, Umbrisols occur along the north western Atlantic seaboard, e.g. in Iceland, on the British Isles and in north-west Portugal and Spain. In Asia, they are found in the mountain ranges east and west of Lake Baikal, and on fringes of the Himalayas, notably in India, Nepal, China and Burma. Umbrisols occur at lower altitudes in Manipur (eastern India), in the Chin Hills (western Burma) and in Sumatra (Barisan range). In Australasia, Umbrisols are found in the mountain ranges of New Guinea and Southeast Australia and in the eastern parts of South Island, New Zealand.

 Dominant  Associated  Inclusions  Miscellaneous lands

**Figure 1.** Umbrisols worldwide.

## Associations with other Reference Soil Groups

Umbrisols are associated with Reference Soil Groups that occur under cool-temperate, moist, free-draining conditions. Linkages with the age of the landscape and local conditions. Umbrisols in cool and/or wet areas are associated with [Regosols](#) and [Leptosols](#), and in places with [Histosols](#). In low-lying areas with a fluctuating water table, Umbrisols on lower slopes are found adjacent to [Gleysols](#) and [Histosols](#) (in depressions) and [Cambisols](#), [Podzols](#), [Regosols](#) and [Leptosols](#) (at higher elevation).

In places, this general pattern was compromised by human intervention. Where Umbrisols are being cultivated, lime is normally applied in appreciable quantities. This increases the soil's base saturation level, in places to the extent that the [umbric](#) horizon comes to resemble a [mollic](#) horizon. Ultimately, the Umbrisol changes into a [Phaeozem](#). In other cases, notably in Western Europe, Umbrisols under cultivation have received bulk quantities of organic manure or earthy materials for several centuries. Here, the umbric horizon gradually transformed to a [plaggic](#) horizon or a [terrlic](#) horizon. In such areas, a complex mosaic of Umbrisols, Phaeozems and [Anthrosols](#) can be found.

## Genesis of Umbrisols

Vegetation and climate strongly influence development of an [umbric](#) horizon. In some instances, an umbric horizon may form quite rapidly while concurrent development of an incipient, non-diagnostic, [spodic](#) or [argic](#) horizon is slow. This explains why an umbric horizon is found in young, relatively undeveloped soils that lack any other diagnostic horizon, or have only a weak [cambic](#) horizon. Profile development is strongly dependent on deposition of (significant quantities of) organic material with low base saturation at the soil surface.

The organic material that characterises the Umbrisols can comprise a variety of humus forms that have been variously described as 'acid or oligotrophic mull', 'moder', 'raw humus' and 'mor'. It could accumulate because of the slow biological turnover of organic matter under conditions of acidity, low temperature, surface wetness, or a combination of these. However, Umbrisols were never cold and/or wet for sufficiently long periods to have developed a diagnostic [histic](#) horizon.

## Characteristics of Umbrisols

### *Morphological characteristics*

Most Umbrisols have AC- or A(B)C-profiles. The central concept of Umbrisols is that of deeply drained, medium textured soils with a dark, acid surface horizon rich in organic matter as the distinguishing feature. Umbrisols may have an [albic](#) horizon provided that there are no other diagnostic horizons present within 200 cm of the surface. In the absence of an albic horizon a [cambic](#) horizon may be present as evidence of incipient soil formation. Umbrisols that were modified by Man may have a raised surface horizon (less than 50 cm thick), which is classified as an [anthropogenic](#) horizon.

### *Hydrological characteristics*

Umbrisols do not have particular hydrological characteristics as soil texture and soil depth may vary widely.

### *Physical and chemical characteristics*

Most Umbrisols are moderately deep to deep, medium-textured, permeable and well-drained soils. Gravel, stones and boulders may occur throughout the profile. Base saturation is less than 50 percent in the umbric horizon and normally also deeper down. They have good physical properties and a moderate natural fertility level, largely on account of the high organic matter content of the [umbric](#) surface horizon. Umbrisols on slopes are susceptible to erosion if exposed to torrential rains.

## Management and use of Umbrisols

Many Umbrisols are (still) under a natural or near-natural vegetation cover. Umbrisols above the tree line in the Andean, Himalayan and central Asian mountain ranges, or at lower altitudes in north and western Europe where the former forest vegetation has been largely cleared, carry a vegetation of short grasses of low nutritional value. Coniferous forest predominates in Brazil (e.g. *Araucaria spp.*) and in the USA (mainly *Thuja*, *Tsuga* and *Pseudotsuga* species). Umbrisols in tropical mountain areas in south Asia and Australasia are under montane evergreen forest.

The predominance of sloping land and wet and cold climatic conditions restrict utilization of many Umbrisols to extensive grazing. Management focuses on introduction of improved grasses and correction of the soil-pH by liming. Many Umbrisols are susceptible to erosion. Planting of perennial crops and bench or contour terracing offer possibilities for permanent agriculture on gentler slopes. Where conditions are suitable, cash crops may be grown, e.g. cereals and root crops in the USA, Europe and South America, or tea and cinchona in south Asia (Indonesia). Highland coffee on Umbrisols demands high management inputs to meet its stringent nutrient requirements. In New Zealand, Umbrisols have been transformed into highly productive soils, used for intensive sheep and dairy farming, and production of cash crops.