



Soil of the Year 2009: Gleyic Fluvisols (calcaric) ("Kalkmarsch")



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Curatorship Soil of the Year



Gleyic Fluvisols (calcaric)
(Photo: Filipinski)



Calcareous Marsh under oilseed rape (Photo:
Filipinski)

Characteristics

International classification (WRB): Gleyic Fluvisol (calcaric)
German classification: Calcareous Marsh.

These are characteristic of young, newly reclaimed soils of the North Sea coast.

What are calcareous marshes and what do they look like?

Calcareous marshes are calcareous, tidal gleyic soils originating from marine sediments. Under a usually ploughed humus top soil with a porous crumbling structure, a more or less rusty spotted horizon can be found in the vicinity of the groundwater. The reduced year-round groundwater filled horizon below is characterized by its dark grey to black color resulting from iron sulphides. The subsoil is normally clearly stratified.

How calcareous marshes were formed and where they occur?

In regions of tidal coasts the land surface is regularly flooded with salty sea water. Little by little, this leads to the sedimentation of salty material containing nitrogen-rich organic matter from dead organisms. Dyking is a widely used way to protect these areas from flooding and to reclaim land from the sea. Drainage by ridge and furrow ditches, and nowadays also drain tubes, lead to the aeration of these soils and result in rusty coagulations. Calcareous marshes are formed when salts are leached out from these marine sediments, in mostly silt soils, by percolating calcareous water (carbonate content up to 9 %). These soils are a preferred habitat for earthworms (up to 500 per m²), which build a porous crumbling structure, and over the years leads to a mixing of sediment layers, similar to tillage.

Acids originating from roots, micro-organisms, and sulphur dynamics cause a leaching of calcareous material which proceeds from the top to the bottom of the profile. This leads to the development of the "Kleimarsh".

Calcareous Marshes occur worldwide in tidal coastal zones of the sea and in estuaries, which were embanked during the last centuries. These areas are called polders.

How are calcareous marshes are used and what is the functional relevance of these soils?

Calcareous marshes are among the most productive sites worldwide. The organic matter content of the sediment with high nutrient resources, the slightly weathered minerals, and a high water holding capacity make them very fertile. In combination with the possibility to regulate the groundwater level, these soils are able to produce high yields, e.g. 10 tons of wheat or 4 tons of oilseed rape in Schleswig-Holstein in dry as well as in wet years.

In Dithmarschen in Southwest Schleswig-Holstein and in Lower Saxony, the calcareous marshes are traditionally used for potatoes and cabbage production due to their valuable properties. Like other soils, calcareous marshes are archives for historical developments, which allows the analysis of ancient land use and climatic conditions.

What are the risks for these soils?

Calcareous marshes require a careful regulation of the water balance by drainage and removal of surplus water through channels into the recipient and the sea.

Especially those sites which are rich in silt and clay are vulnerable to pressure, which can lead to oxygen shortage due to soil compaction from heavy machinery. Silty marshes tend to be crusted if not used adequately. The high pH can lead to higher nitrogen losses through ammonia volatilisation.

Where you get more information?

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Bodenkundlich orientierte Institute an Hoch- und Fachschulen sowie einschlägige Ämter in der Ad-hoc-AG, Boden: www.bgr.bund.de

More material (Flyer, Poster, CD's) are available: frielinghaus@zalf.de