

Soil physical and field-studies on the demonstration site of the University of Kassel Am Sande / Witzenhausen

Students work at the Department of Rural Engineering and Resource Protection

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Witzenhausen, february 1996

Summary

On the demonstration site of the University of Kassel, Department of Rural Engineering and Resource Protection, Witzenhausen, soil physical and field-studies have been carried out in order to characterize some basic structural and macromorphological soil properties. The cause of this study was the projected more intense utilisation of the site for experimental purposes. The site is located in the vicinity of Witzenhausen at the border of the floodplain of the river Werra on shallow sloping holocene sandy alluvial deposits. The lower part of the site is still scarcely inundated in late winter, the elevation of the main part of it is in the range of 0 to 3 meters above the highest flood-level. In 1966 the terrain had been terraced for demonstration purposes.

As a result of the survey, the dominating soil-profile was classified as a sandy Fluventic Eutrochrept (USDA); (F AO: Fluvi-Eutric Cambisol). During the terracification topsoil-material has been moved in directipn of the slope and also perpendicular to it, therefore profile-depth within one terrace shows a two-dimensional dependency. The upper 45 to 80 centimeters of the profiles consist of a dark (grayish) brown fine sandy mollic or ochric epipedon with an av. clay content of 11 % and approx. 1,2% av. COrg. In a range of 50 to 110 cm depth there is a layer of more or less rounded stones accompanied by a rapid change in colour to reddish brown and significant increase in clay content. This layer has been classified as a relictic soil horizon of an older holocene land surface. As confirmed by ksal-measurements, its permeability is small compared to the highly permeable upper layers. Like an argillic horizon, it enables interflow of percolating water in the overlying strata under nearly saturated infiltration conditions, as they occur from october to may. On a transect through four terraces severe compactions of the buried former surface layer (mollic epipedon) were detected by penetrometry. Soil strength profiles showed good agreement with bulk density. Aided by profile-pit-calibration, penetrometry proved to be an adequate method to determine the spatial distribution of the parameters bulk desity in the compacted zone and depth of compacted zone upper boundary.

The operation of the hand-held Penetrograph (Type STIBOKA, Fa. Eijkelkamp /Hameln) was limited to a depth of 75 cm, therefore the detection of the of the fossile argillic horizon was restricted to the shallow profiles in terrace 5.

Due to compacted sublayers and substantial variation of profile depth, the terraces can not be treated as homogenous in the sense of experimental designs that assume spatially independent variability of soil effects. Marginal zones of the terraces can be excluded from experimental plots. This would reduce soil variability and gradients overall and within a terrace.