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The role of soil classification in basic soil science disciplines

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The concepts of soil classification are commonly difficult to understand for science and engineering students, even for those with a strong pedological background. Undergraduate and graduate students in soil science do not want to struggle through different books with the whole soil classification background before using it. Often it is argued as an additional difficulty the lack of a universally acceptable classification system (Smiles et al., 2000). However, soil science does not remain the only discipline to have no single reference nomenclature. Nowadays, the acceptance of the World Reference Base (WRB) has put soil science in a relatively strong position compared to other natural sciences (Nachtergaele et al., 2001). Teaching of soil classification should take advantage of the fact that several systems, based both on existing knowledge and pragmatic circumstances, are required. This is because soil classifications always have been guided by a philosophy of service to an identified audience (Eswaran et al., 2003). Consequently, each scientific organization or even each person can prioritize the information that a soil classification should entail.

Curricula in soil science should be changed and modernized so that the content is more appealing to today's students. First, we emphasised the fact that the fundamentals of soil genesis and soil classification rely in the identification of the five major factors that control soil formation, namely: climate, organisms (flora, fauna and humans), parent material, topography and time span. Divisions into soil classes should be based on hierarchic and genetic principles. Soil profiles show symptoms of alteration or differentiation of the parent material and the study of these soil processes is the basic of soil genesis. Second, the World Reference Base for Soil Resources will be employed as the standard taxonomic soil classification system. This is because the possibility of interfacing with previous systems and improve them. In this way diagnostic horizons and diagnostic properties are described and reference soil groups presented as a challenge to capture the complexity of soil systems. We pay didactic value to explain how the various groups were taken into account. Third, the use of case studies in undergraduate and graduate courses can increase student engagement with the subject matter and improve analytical, problem-solving, and communication skills. We developed several modules with field description and laboratory data of soil profiles from different countries outside the European Union, namely Argentina, Brazil, China, Russia and USA. These profiles are classified according to the WRB and also the corresponding equivalence in the national system (when available) and in the Keys to Soil Taxonomy is given. In this way performances of several national classification systems for relevant soils, as well as the need for international correlation can be illustrated.

References

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Soil classification in Russia started with environmental-genetic ideas, and the systems developed applied the genetic concepts to identify high- and medium-level taxa in different ways. Soils were grouped in accordance with the combinations of soil-forming factors (climate, time), pedogenetic processes, or soil properties controlled by theories on soil genesis.Â Fuzzy k-means has been applied in a range of disciplines including soil science, hydrology, and vegetation mapping (e.g., Burrough et al., 2001; Irvin et al., 1997; Odeh et al., 1992).Â The idea of a basic soil classification system that consists of three independent components reflecting stable soil features, dynamic soil regimes, and features inherited from parent materials is discussed. View chapter Purchase book. Soil carries out numerous functions. It provides us with food, biomass and raw materials. It serves as a platform for human activities, our landscape and our heritage and plays a central role as a habitat and gene pool. It stores, lters and transforms substances such as water, nutrients and carbon. These functions depend on the structure of the soil, which is an extremely complex and variable.