Geophysical Research Abstracts,
Vol. 11, EGU2009-11764, 2009
EGU General Assembly 2009

The formation of frangipane horizons and their influence on physical-chemical properties of soils from glass houses

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The pedological, mineralogical and geochemical studies performed by as on soils (s.s hortic antrosols) from Iasi (Copou glass house), Barlad and Bacau glass houses have show that, in most of cases, the profile of hortic antrosols have the following compositions: Aho-AC-C or Ck, and Aho-B/C or Ck, respectively. In function of parental material nature and specific exploitation technologies, can appear the diagnostic horizons of association (hiposalic–sc, hiponatric-ac etc.) and / or of transition (A/B, A/C, C/A, A+C, ABk etc.). Specific for soils from glass houses are intense modifications of soil profile, large variability of mineralogy and chemistry, salinization processes (by progressive accumulation of soluble salts) at superior horizons level and formation, at 50 cm depth, of a compact and impermeable horizon (frangipane horizon). From chemical point of view, the hortic antrosols are generally characterized by high values of saturation in bases, of accessible phosphorus and of ratio between humic and fulvic acids (organic matter is dominant in intense humified fraction).

Regarding the formation conditions, the mineralogy and geochemistry of frangipane horizons, in this moment, in literature are not too many data. In case of studied soils, the frangipane horizons appear in specific forms, where their structure, morphology and chemistry varied in large limits. In hortic antrosols where are formed, the frangipane horizons determined a sever pedogeochemical segregation. Thus, the horizons situated above to the frangipane horizon evolutes in weak oxidant conditions, weak acid-neutral pH (5.87 – 6.95), high salinity and humidity, intense biological activity; while the horizons situated below to the frangipane horizon evolutes in weak reduction conditions, neutral – weak alkaline pH (7.61 – 8.04), reduced salinity and humidity, weak biological activity. This determined an important differentiation of micro-elements and organic compounds dynamic, evidenced by the reduction of the accessibility of these for cultivated vegetables, and have important consequences on the productivity and on the quality of obtained products. Under these conditions, in the same time with the formation of frangipane horizons, the fast degradation of physical-mechanical and chemical properties of antrosols occurs.

The conditions for the frangipane horizons formation are not yet elucidated. Ours experimental results indicate that the formation of frangipane horizons in soils from glass houses is first determined by the intensive technologies used for vegetables cultivation, by the application of a supra-dimensional irrigation system, the maintaining of high and relatively constants humidity state and temperatures (in comparison with un-protected soils). The nature of parental material has also, an important influence on the physical-chemical and mineralogical properties of frangipane horizons and these control the formation and spatial extension rates of these horizons.

Acknowledgments

The authors would like to acknowledge the financial support from Romanian Ministry of Education and Research (Project PNCDI 2-D5 no. 51045/07).