

## THE ROLE OF CLAY MINERALS IN EVALUATION OF ORIGIN OF THE RED MEDITERRANEAN SOILS IN ISTRIA, CROATIA

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Red Mediterranean soils constitute important soil resources in Istria, Croatia. These clayey to silty clayey soils are situated on hard and permeable limestone and dolomite of the Jurassic-Cretaceous-Paleogene carbonate plain and bear typical Fe-oxide characteristics (e.g. Fe<sub>d</sub> and Fe<sub>o</sub>/Fe<sub>t</sub>). The common name for these soils is terra rossa. The Croatian classification puts terra rossa in the class of cambic soils. Terra rossa fills cracks and sinkholes, and forms a discontinuous surface layer up to 2.5 m thick.

The nature and relationship of terra rossa to underlying carbonates is a long-standing problem which has resulted in different opinions with respect to the parent material and origin of terra rossa in Istria. Dominant clay mineral phase in the insoluble residue of limestones and dolomites is illitic material. Mixed-layer clay minerals and kaolinite are sporadically present. Dominant clay mineral phases in terra rossa are kaolinite and illitic material. Vermiculite, low-charged vermiculite or high charged smectite, chlorite and mixed-layer clay minerals are present in subordinate amounts. In all analysed terra rossa samples hydroxy-interlayered vermiculite was not identified. However, some brown cambic soils developed on limestones and dolomites also contain this mineral as one of the dominant clay mineral phases.

Neither the content and particle size distribution nor the bulk and clay mineralogy of the insoluble residue of limestone and dolomite support development of terra rossa entirely by dissolution of carbonate rock. If terra rossa has developed only from the insoluble residue of limestone and dolomite, its clay content, due to weathering should be higher than that in the insoluble residues which is not the case. Plagioclase was found only in one insoluble residue while all terra rossa samples contain this mineral. Moreover, insoluble residues do not contain vermiculite which was observed in small amounts in clay fraction of all terra rossa samples.

Based on clay mineralogy it was concluded that materials other than the insoluble residue of limestones and dolomites which have contributed as parent materials to terra rossa are loess sediments, whose deposition was a very important recurrent process in Istria probably since the early Middle Pleistocene, and flysch sediments which extended much more southwards from its present position.

Kaolinite which does not form intercalation compounds with DMSO is the dominant mineral phase in fine clay of terra rossa and is considered predominantly authigenic rather than inherited from parent materials. The origin of hydroxy-interlayered vermiculite which is found in brown cambic soils near terra rossa is subject of current research.