Geophysical Research Abstracts, Vol. 8, 04599, 2006
SRef-ID: 1607-7962/gra/EGU06-A-04599

Soil quality changes caused by forest transformation into vineyard

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Galician winegrowing sector acquired great importance in the last two decades, mainly the Rías Baixas origin denomination. Several management practices are necessary to transform the soil use from forest into vineyard, but these practices can affect negatively to physical, chemical and biological soil properties. The knowledge of soils quality dedicated to the crop of *Vitis vinifera* L. (Albariño variety), as well as intrinsic and extrinsic limiting factors for the vine production is extraordinarily important. Tomiño (Galicia, Spain) climate area is unique in Europe. Winters and summers are mildness practically without frosts, with high humidity and sunshine adequate for vineyard growth. These facts make the area very favourable for *Vitis Vinifera* L (Albariño variety) growth and for the production of grapes with enough sugar content. Present soil quality is unknown and analytical data about degradation level caused by vineyard monocrop are not available.

The high increase of the hectares dedicated to vineyard monocrop in this area does necessary to know soil quality and to determine its evolution comparing it with the one of original forest soils. It is necessary to determine the use handling practices that allow to maintain the sustainability and to optimize the production. In this study, the soil quality of the forest soil and the vineyard soil along the three years were compared. The research objectives were to quantify changes on physical and chemical soil properties, as well to determine soil quality indicators and to estimate the limiting factors for the vine production. The research site was located in Tomiño (Galicia, Spain). The study was carried out in 2003, 2004 and 2005 in a zone where approximately 80 hectares of forest were transformed into vineyard. Twenty vineyard plots and five sampling points in not transformed adjacent forest zones (controls) were selected. Sampling zones were chosen based on different topographic characteristics,

proximity to communication routes, different handling, etc. A systematic sampling every four months has been made, taking the 30-35 first cm from the superficial layer. The samples were analysed for particle size distribution, stoniness, density, porosity, pH, nitrogen, organic carbon, effective cationic exchange capacity (CECe) and exchangeable cations. For every one of the physical or chemical parameters some critic values were assigned, following the Soil Fertility Capability Classification model and they were assigned too soil quality indicators. Several common quantitative soil characteristics directly relatedto the ecological functions of environmental protection of thesoil were used as indicators to infer soil quality.

Results indicated that management practices and elimination of vegetable cover contributed to increases soil erodibility. A large quantity of topsoils was losing due to both rainfall and runoff. Soil texture predominant is loam-sandy and there is high stones percentage. Soil reaction in native forest soil is faintly acid, while pH values increase in the vineyard soil due to limestone amendments application. Some soil chemical properties were affected negatively by the management practices used. Organic matter, total and available N and others nutrients content (P, K, etc) declined from forest soils to vineyard soils. $CECe_{(+)}$values are very low as a consequence of the low clay and organic matter content. Most of the studied plots have high Mg rather levels due to high doses of Mg limestone added. Therefore the principal limitations are stoniness, susceptibility to hydric erosion, low organic matter content, low $CECe_{(+)}$and Mg excesses, which presents imbalance in front of Ca and K. Limiting factors for grapevine varied throughout the period of study, it intensified the deficit of N and P and the excess of Mg.

Acknowledgements: This research was supported by Project PGIDIT04RAG017E from Xunta de Galicia (Spain).