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Analytical monitoring of soil bioengineering structures in the Tuscan Emilian Apennines of Italy

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Soil bioengineering has been an appropriate solution to deal with erosion problems and shallow landslides in the North Apennines, Italy. The objective of our research was a check about critical aspects of soil bioengineering works. We monitored the works that have been carried out in the Tuscan Emilian Apennines by testing the suitability of different plant species and analyzed in detail timber structures of wooden crib walls.
Plant species were mainly Salix alba and Salix purpurea that gave good sprouting and survival rates. However, showed some issues in growing on dry and sunny Apennine lands, where other shrubs like Spanish Broom, blackthorn, cornel-tree and Eglantine would be more indicated.
The localized analysis on wooden elements has been led gathering parts from the poles and obtaining samples in order to determine their density. The hypothetical initial density of the wood used in the structure has been estimated, then calculating the residual density. This analysis allows us to determine the general condition of the wood, highlighting the structures in worst condition (the one in Pianaccio show a residual density close to 70%, instead of 90% as found on other structures) and those whose degraded wood has undergone the greatest damage (Pianaccio here too, with 50%, followed by Campoferrario - 60% - and by Pian di Favale with 85%, a rather good value for the most degraded wood in the structure).