

The effect of soil water content on tree anchorage of young *Pinus Pinaster*

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Recent evidence suggests that wind damage, which currently accounts for more than 50% by volume of forest damage in Europe, could double by the end of the century due to climate change. Most trees during storms are uprooted. Anchorage strength is expected to be reduced by water-logging and heavy rain during storms as soil strength decreases with soil water content. Our paper is focused on the maritime pine cultivated on sandy soil, as a representative species of the forêt des Landes in the Aquitaine region (France). This study aims at providing knowledge on the effects of soil conditions (soil saturation) on root anchorage. Static pulling experiments were performed to measure the critical bending moment of 13-year old maritime pines (DBH= 18 cm), submitted to wet and saturated soil conditions. Deformation of the root-soil system was measured using inclinometers positioned on the trunk. A magnetic field digitizing technique was used to characterize the three-dimensional architecture of root systems. The change in soil conditions as function of climatic conditions was measured and modeled from laboratory mechanical measurements over a range of soil water content and soil structure. This study will allow the impact of soil conditions on anchorage efficiency to be evaluated, in comparison to the root system.