Geotechnical aspects in tree stability assessment: a state of the art review, with perspective insights

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Summary

Tree stability assessment is gaining larger and larger interest in modern societies owing to an increased awareness of public opinion on several aspects, such as the importance of green areas and urban forestry in towns, the protection of natural arboreal heritage and the mitigation of risks versus people and goods associated to tree toppling collapses. All these aspects are nowadays also markedly impacted by the ongoing climate changes, with associated increase in intensity and frequency of windstorms, rainfall episodes, draught periods and other climate-related events. In this regards soil mechanics could play a pivotal role, by enriching the techniques currently adopted by professional agronomists to study the stability of a tree. The description of the mechanical inte- raction of roots with highly deformable loose soils, the effect of soil partial saturation, the mechanical characterization of vegetated soils at low burial depth, the influence of second order and large displacement effects, the response to complex and combined envi- ronmental loads (*e.g.* wind actions and watering/dewatering effects), are typical fields of investigation for geotechnical researchers that have not yet been fully explored with respect to tree stability assessment. The paper presents some recent results available in scientific literature addressing such topics, by also stressing those aspects that could represent possible (new) fields of research and application for geotechnical know-how.