



## **A pull out test to compare two riparian species, *Phyllanthus sellowianus* and *Sebastiania schottiana* in terms of root anchorage ability**

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Soil bioengineering has become manifold applied in large parts of Brazil in recent years. The first projects were realized in the region of Rio Grande do Sul within river stabilization works to protect agricultural land of small regional farmers. As result of research work the species *Sebastiania schottiana* and *Phyllanthus sellowianus* showed very adequate morpho-physiological properties and seem to be appropriate for the use in soil bioengineering.

The aim of the present study was to examine a still unknown but crucial factor, the resistance of the above mentioned species against being pulled out. The pull out resistance is an indicator for the stability of the soil-root matrix and expresses the stabilizing effects of plants on soil. Furthermore it is an applicable index to compare the qualification of the species to be used in soil bioengineering works.

Another objective was to investigate plant characteristics, which correlate to the pull out resistance of the investigated species, to be able to draft up efficient plant strategies for future restoration works on eroded river embankments. For the experiment a special apparatus was designed, which enables to implement a pull out process with a constant rate and generate a graph of the plants resistance force versus its displacement.

*P. sellowianus* showed a significant higher resistance against being pulled out than *S. schottiana*. The analyses of root and shoot properties of *P. sellowianus* showed more favorable morpho-physiological properties in terms of pull out resistance, a bigger amount of biomass, both above and below ground and also a higher amount of anchorage. The Cross-Sectional-Areas (CSA) of the shoots showed in both species the strongest correlation of the investigated shoot and root properties with the maximum resistance against being pulled out. Thus it can be concluded that the CSA can be used as a value to assess the stabilization effects of the plants. The experiments showed that some root and shoot properties do have a great impact on the pullout strength and that *P. sellowianus* can be preferred for slope stabilization works as it exhibits outstanding resistance against being pulled out.