

## ***Interactive comment on “Flexural behaviour of selected plants under static load” by F. J. Sutili et al.***

**F. J. Sutili et al.**

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Final response to referee 4:

Anonymous Referee #4 Received and published: 30 March 2010 General comments: The MS deals with the mechanical properties of vegetation in order to stabilize river-bank. The main point of the MS is the introduction of the angle of flexibility as an indicator of such properties. Most of time, the MS is not very clear and some important elements for the reader are missing (citations, global context of the study). Moreover, many citations are in German and so, not easily readable by the international community. The authors are invited to make major correction in the MS.

C1028

Specific comments: - Abstract / Introduction: These points are not precise enough particularly to explain: the link between the flexibility and the control of erosion (Is it as important as root anchorage for example).

RESPONSE: The referee addresses two differences from a variety of technical and biological properties of plants which fulfill the basic requirements for bioengineering purposes. Such properties include vegetative reproduction, root penetration and anchoring, resistance against coarse sediment deposition, tolerance of submersion, elasticity, bending strength, pulling up resistance, and compound strength. All of them are relevant for soil bioengineering and have to be assessed to develop engineering standards for the application of soil bioengineering techniques. 2 specific aspects to the addressed function (flexibility and anchoring): Whereas the root anchoring function is responsible for the capacity of plants for erosion control, parameters used for the determination of the flexibility are helpful for dimensioning of plants as hydraulic roughness. Furthermore the maximum load up to the point of rupture is helpful for engineers to evaluate the potential of log jams. Finally both of them are relevant for soil bioengineering depending on the processes of a river or slope.

- why the static point of view is adapted to solve a dynamical problem. the link between mechanical parameters of a single tree with mechanical parameters of a stand (A stand would dissipate more energy than a single tree, is the porosity of a stand important ?).

RESPONSE: The referee addresses another limitation of this approach. Even the results cannot be transferred to single tree due to the complex tree architecture. Quite more complex is the situation of a stand. We absolutely agree with the referee that other and additional issues have to be taken into account. The authors are aware about the limitations and simplifications of a static point approach. We point out in the conclusions and suggest improvements of the design to come closer to the “real conditions”. However the applied approach is helpful for engineers to indicate a relative comparison of the selected species.

C1029

- Could you introduce citations after “knowledge about the interaction” ?

RESPONSE: The introduction was revised.

- number the equation

RESPONSE: Done

- The angle of flexibility is the main point of this part. The relevance of this parameter is depending of how you will use it to study control of erosion. Perhaps, you can explain more the global context of work in the introduction in order to convince the reader about the pertinence of the angle of flexibility as an indicator.

RESPONSE: The introduction was revised.

- Most of time mechanical rupture studies is based on the rupture deformation (which is depending on  $f, l, d$  as flexibility angle). The interest of flexibility angle could be argue by comparison with the deformation. Citations after “right after flooding”, “able to regenerate”. Results: The figure 8 is very good. However, how do you make this figure e.g. how do you take care about the variability of your measurement ?

RESPONSE: Discussing this figure we have to mention about the variability of the relationship of diameter and age which depends on specific local environmental conditions of growing factors.

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Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 7, 1459, 2010.