

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

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Final response to referee 3 - General comments The MS deals with a relevant issue in soil bioengineering techniques application: the biotechnical properties of vegetation for riverbank stabilisation. The idea to introduce the angle of flexibility in order to evaluate such properties is valuable. The structure of the MS, the elaboration of results and the discussion, however, must be improved. The Authors are invited to rethink the MS and to make major revision

- Specific comments The abstract doesn't give a proper idea of the contents of the paper, in particular there is no reference to the use of vegetation in riverbank and reference to the obtained results have to be expanded. –

C1023

RESPONSE: The abstract was revised:

- The introduction is too concise; it is not clear what is the focus of the paper. The issue of the relationship between mechanical properties of vegetation and the hydraulic roughness should be better articulated. The same holds for the mechanical properties, which also need references. Few words on the role of plants on riverbank stability, finally, should complete the section. – The description of parameters should be more concise referencing to books of material science

RESPONSE: The introduction was revised to work out in detail the focus of the paper and to clarify the relationship between plant properties and hydraulic roughness.

- Result and discussion are frequently mixed, my advice is to expose the results and then to discuss them in a separate section.

RESPONSE: We have revised the sub-chapters to obtain a clear order – first results and second discussion.

- The Authors, implicitly, suggest the adoption of the angle of flexibility as an indicator of the aptitude of a species to be used in riverbank stabilisation works. The relationship between the angle of flexibility and the hydraulic resistance, however, is not discussed and any indication for acceptable values of such angle is provided.

RESPONSE: The referee addresses a quite important link on the one hand the knowledge and determination of plant properties and on the other hand the hydraulic impact of plants in terms of hydraulic resistance. This research work focus on the plant properties of selected species, acceptable values depend on the specific local conditions of rivers (hydrology, morphology, slope,...)

- Due to the variability of stem diameter respect to the plant age, the reliability of figure 8 is questionable. A sensitivity analysis could be useful to have an idea of the relevance of the issue.

RESPONSE: The referee addresses the complexity of the growing process of plants.

C1024

The authors are aware that relationship of the growing process (diameter/height) and age is variable and an approximation to the real conditions. For that reason we give an outlook for further research design to develop engineering solutions to these kinds of problems.

- In section 3.3 the message of the first sentence is not clear.

RESPONSE: We have revised the whole subchapter to make it more clear and understandable.

- Moreover, the authors don't consider that the rupture of the stems can create obstructions in river and also in agricultural canals.

RESPONSE: The referee addresses another reason for research work to gain knowledge about plant properties to assess near nature river sections at high flood conditions.

- In Figure 4 the entire lines should be drawn.

RESPONSE: This graph was revised (see fig. 1):

The sentence at pg 1470 lns23-27 seems to be incomplete; what is the consequence of the statement?

RESPONSE: The sentence was revised: The diagram shows that *Phyllanthus sellowianus* forms a larger angle of inflection at the point of rupture than the other species. For example, while a branch ($d = 20$ mm) of *Phyllanthus sellowianus* shape a maximum angle of 45° inflection before breaking, a branch of *Salix* rubens of the same diameter reaches a maximum angle of 24° before breaking.

- statements at pg 1470 ln 28 -pg 1471 ln 1,

RESPONSE: Revised: The load required to reach the point of rupture increases with larger diameter, whereas the angle of inflection at point of rupture decreases.

C1025

- pg 1472 lns12-18 are quite obvious - pg 1472 lns 10-11: stem flexibility is not the only property relevant for riverbank stability

RESPONSE: Revised: The angle of inflection is a useful criterion to identify a plant's capacity to stabilise river banks. High flexibility means that stressed plants are able to bend down reducing turbulence effects and acting as a protection layer against bank erosion.

- more than the half of reference are in German and/or difficult to find, the Authors should make an effort to provide more accessible references

RESPONSE: The revised manuscript provides more accessible references

Technical corrections - Pg 1461 Ln 15: practival?

RESPONSE: Revised

Pg 1462 ln 14 and pg 1474 ln 23: Righetti instead of Rhigetti

RESPONSE: Revised

- Pg 1472 ln 2 fig. 8 instead of fig. 9?

RESPONSE: Revised

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C1026

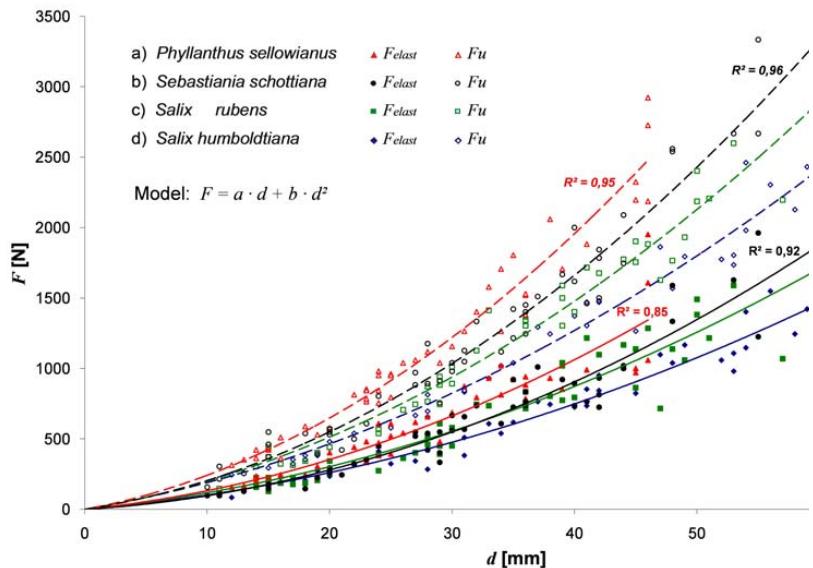


Fig. 3: Relationship between diameter (d) and load (F). Solid line: F_{elast} at the pr dashed line: F_u at the point of rupture.

C1027