Flooding dependent growth and oxygen dynamics of different soil protecting plant species of the Yangtzekiang riverside

Introduction
Because of the new Three Gorges Dam in south-west China, the water conditions on the upper river will change. The amplitude of water level alternation in the reservoir will be about 40 m in the 683 km long and circa 430 km² big area of the Three Gorges Reservoir (Franken, 1998). It is also expected, that the flooding time changes from summer to winter (Fig. 1). Furthermore the soil will become more anoxic because of the reduced water flow rate in the Three Gorges Reservoir. The government of China still has big problems with the stabilization of the banks (Fig. 3), the erosion control (Fig. 4) and the water quality (Cao, 2007).

Aims
Which actually growing plant species of the Three Gorges Reservoir is the most capable to adhere the soil particles of the riverside and to mitigate erosion? Which plant species of the Three Gorges Reservoir is the best adapted to the new long flooding pulses in winter and the anoxic soil conditions?

The Plants

First results
The root analysis shows that A. anomala and S. variegata produce the highest root biomass in relation to the whole biomass. The root length investigations shows, that A. anomala and H. spec. produce most of the roots.

Growth of shoots of A. philoxeroides (Fig. 11) and the roots of S. variegata (Fig. 12) occurs also during flooding.

Conclusion
The results indicate that A. anomala, C. dactylon and H. spec could be good candidates to mitigate erosion. They have the ability to survive long flooding times and produce a lot of roots to adhere the soil particles. S. variegata produces 40 % of biomass as root biomass but just has short roots. S. variegata is also most times found on stony ground. The oxygen measurements (Data not shown) show that the soils become anoxic. But the graphs of the moved pots of H. compressa and soil shows, that the sediments are very permeable. The slow current by moving the pots imports oxygen in the sediments. After stopping the moving of the pot of H. compressa its oxygen concentration in the rhizosphere drops quite slowly. The results of the growth analyses show, that A. philoxeroides is able to elongate its shoots to come up to the water surface. It even produces new nodes. But the leaves of the internodes are depauperate and small because of the lack of oxygen. Salix variegata on the other hand starts to produce new roots in the upper parts of the soil surface. These roots are supposed produced with reserve energy to reach the upper soil and the water with higher oxygen concentrations. Following these first tests, we will continue our investigations in 2008 and 2009.

Literature:

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Team: Norbert Tenten, Christina Schreiber, Bo Zeng and Marian Kazda

Contact
Arbeitsgruppe Prof. Kazda
Dipl.-Biol. Norbert Tenten, Phone: 0731 5022699, E-Mail: Norbert.Tenten@gmx.de
Prof. Kazda, Phone: 0731 5022702, E-Mail: marian.kazda@gmx.de

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