Woody vegetation for gully erosion control in Tigray, Ethiopia.

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In the north Ethiopian highlands, land degradation and associated gully erosion are significant. Although the protective role of vegetation has been demonstrated in many studies, efforts previously made in using woody species for erosion control in the research area are very limited, and when applied, survival of the planted seedlings was very low. Lack of experience and fundamental knowledge on species suitability and establishment techniques are two important bottlenecks.

Therefore, the objectives of this research were to collect more relevant autecological information on woody species selected for gully stabilization, and to study the factors determining their successful plant establishment in different gully positions. To evaluate these, a field trial was set up for seedlings of *Acacia etbaica*, *Sesbania sesban* and *Dodonaea angustifolia*. Plant establishment and growth were evaluated as a function of growth conditions and management. The experiment was established at two sites characterized by specific topographic and edaphic conditions (Vertisol and sand colluviums). At each site, seedlings were subjected to different treatments of watering, sheltering and gully position (gully floor, sidewall and shoulder bordering the gully channel).

Sesbania grew fastest but was negatively affected by different pests. Plants at the (nutrient-rich) Vertisol site had a higher survival rate and overall better performance than plants at the sandy colluvium site. Treatment effects differed by species and the specific soil and environmental conditions. This appeared to be especially true for gully position, with a high variability in optimal position depending on the species and growth site. Generally, *Acacia* performed best on gully shoulder and wall, *Sesbania* in the gully floor and *Dodonaea* on shoulder positions. Shelters protected the seedlings, resulting in a significantly higher survival and generally an increase in height growth compared to survival and growth of unsheltered plants.