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Integrating shotcrete walls into the natural landscape by application of 'Green Walls'

Alexandra Medl (1) and Silvia Kikuta (2)

(1) Institute of Soil Bioengineering and Landscape Construction, University of Natural Resources and Life Sciences, Peter-Jordan-Straße 82, 1190 Vienna, Austria, (2) Institute of Botany, University of Natural Resources and Life Sciences, Gregor-Mendel-Straße 33, 1180 Vienna, Austria

Steep slopes resulting from major road infrastructure constructions are increasingly perceived as disagreeable disturbance in the landscape. Thus, a tool to consider landscape aspects and integrate these slopes into the natural environment is required. The challenge is to establish a sustainable vegetation layer despite of adverse circumstances such as inclinations of almost 90^0, exposed position of slopes near streets and lack of soil and water supply.
The objective of this study was to assess the performance of an innovative greening technology for vertical structures (shotcrete wall) in terms of vegetation development on varying plant substrates and geotextiles.
The field experiment in Steinach am Brenner, Tyrol, Austria, included testing three plant substrates on basis of nearby rocky excavation material ('Innsbrucker Quarzphyllit', 'Bündnerschiefer' and 'Zentralgneis') combined with compost. Additionally, five geotextiles (geogrid (3x4 mm), geogrid (9x10 mm), coir net, coir mat, geo mat) were applied for evaluation. All test combinations were evaluated regarding vegetation cover and biomass production from 2015 to 2016. Analyses of chemical properties were conducted for all plant substrates.
Results showed highest vegetation cover ratio on 'Bündnerschiefer' and 'Innsbrucker Quarzphyllit', which can be explained by the favorable mineral composition (nutrient storage capacity) and chemical properties of compost (lower values of electrical conductivity and C/N ratio).
In conclusion, the use of 'Green Walls' filled with 'Bündnerschiefer' or 'Innsbrucker Quarzphyllit' plant substrate in combination with netlike geotextiles proved best, since geo grid and coir net turned out as most successful one year after installation. 'Green Walls' are promising in terms of establishing an optimal vegetation cover on vertical structures and are well suited for integrating
shotcrete walls into the landscape. The use of local excavation material for greening purposes can be confirmed, whereby the admixture of high-quality compost is necessary to guarantee satisfying results.