The environmental and socio-economic contribution of palm geotextiles to sustainable development and soil conservation

Field and laboratory studies suggest that geotextile mats, constructed from palm leaves, are an effective, sustainable and economically viable soil conservation technique. Geotextile mats are constructed from the leaves of black rhun palm, or borassus aethiopum, and buriti palm, or mauritia flexuosa, and comparable indigenous fibre resources.

The BORASSUS research project aimed to evaluate these palm geotextiles' characteristics through the analysis of a series of case studies in 10 countries in Africa, Europe, South America and South-East Asia. Palms had been extensively used for over 6000 years, providing some 800 resources for human exploitation. However, by the time of the BORASSUS project initiation, palm leaf was not used in the geotextile soil erosion control industry and studies had not quantified the effects of palm-mat geotextiles on water and wind erosion rates.

The project was structured in 13 distinct, yet interrelated, Work packages (WPs) which focussed on experimental field studies, laboratory and field studies and socioeconomic impacts and other issues concerning the product. Information from all three strands was subsequently integrated in a dissemination strategy which promoted the project results and contributed to educational development at multiple levels. Manufacturing and production protocols and standards were also prepared. The issues of product quality, production, durability and performance were analysed in both field and laboratory environments to identify the shearing interaction and synergy between geotextiles and different soil types and climates. This enabled a comprehensive evaluation that satisfied the scrutiny of national, European and international standards.
The project results were very positive, with direct field and laboratory evidence indicating that bio-geotextiles could significantly decrease water runoff and soil erosion. In addition, the mats assisted the conservation of soil water and decreased evaporation from soil during dry periods. These effects appeared reasonably consistent between alternative climates, ranging from humid temperate to humid and sub-humid tropical. Furthermore, they were consistent between selected land use systems, such as arable land, degraded gullied land, orchards and vineyards. The conclusions also closely accorded with results from laboratory simulations.

In summary, bio-geotextiles constructed by indigenous tropical and subtropical fibres had a strong potential as a biotechnical soil conservation method. The project results indicated that they effectively reduced soil erosion and, if properly harvested, they were highly sustainable and readily available in most humid and sub-humid bioclimatic regions. They were biodegradable, providing organic content matter to stabilise the soil and their permeability rendered them suitable for use with cohesive soils. Moreover, their manufacturing process was a low energy production procedure. Thus, when used in their natural environment, the palm geotextiles could form a cost effective method of conserving soil in developing countries, where farming techniques were scaled to low levels of disposable income.