From oil to soil: reducing raw material dependence through waste revaluation of invasive alien species (IAS).

The case of *Pennisetum setaceum (Forsk.) Chiov* in the Canary Islands

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The Canary Islands: biodiversity and tourism

Spanish archipelago located in the NW coast of Africa in the Atlantic Ocean (1). Its volcanic origin and subtropical climate leads to a great biodiversity: 4 national parks, some biosphere reserves and world heritage areas declared by Unesco, make the islands a major tourist destination, being visited every year by nearly 12 millions of people.

Fragile Ecosystems to IAS

One of the most aggressive IAS is the grass *Pennisetum setaceum (Forsk.) Chiov* (2), introduced in the 40's as an ornamental plant. This is both an environmental and an economic problem, spending public budget for its eradication, unsuccessfully (3).

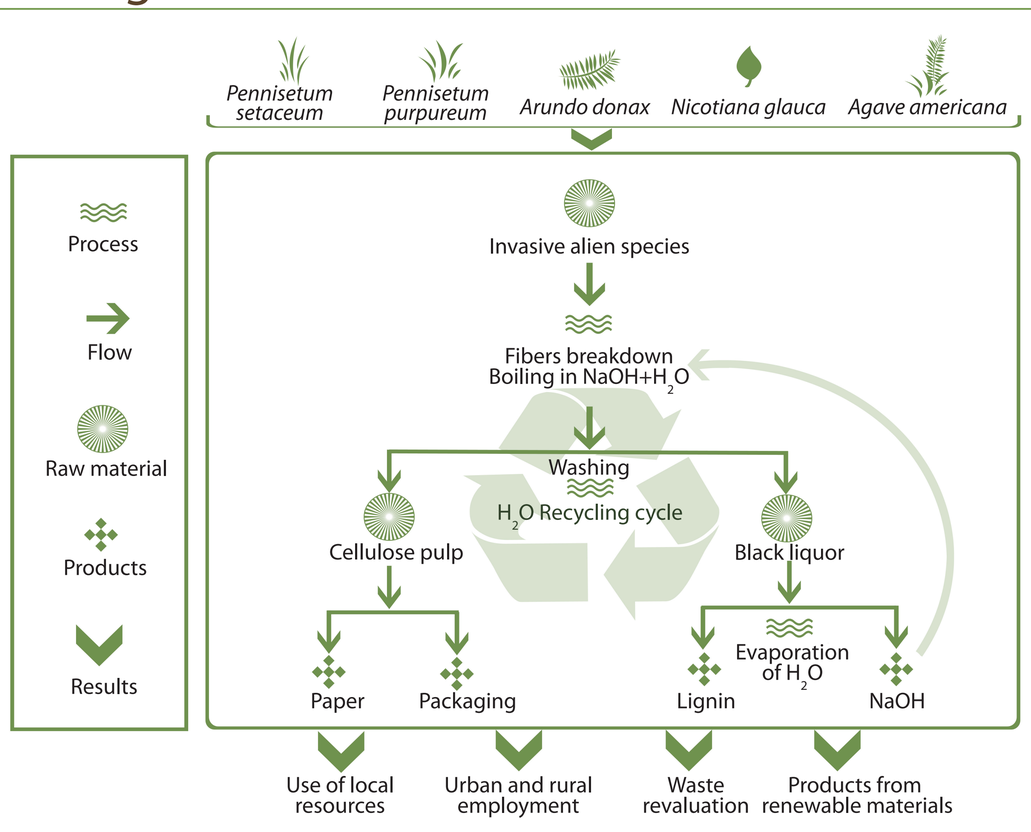
External dependence and soil degradation

This is determined by its geographical constraints and a development model mainly based on massive tourism. The radical shift from a primary to a tertiary economy has caused a gradual abandonment of rural areas, landscape transformation, and soil degradation (3). This affects food sovereignty and availability of raw materials.

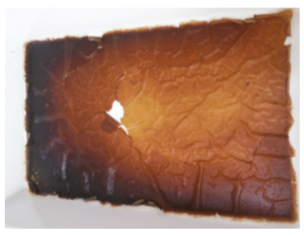
An strategic design approach to close cycles

From ULL we launched PROCEDER (PROCEED), "Canary Program in Ecodesign for Sustainable Local Development", being the revaluation of IAS residues one of its main research lines (4). Thus, its cellulose content becomes raw material (5) for new products such as packaging, replacing the entry of paper to the island.

Flow diagram



From promising samples to uncertain horizons



Black liquor (lignin) could be valorized as bioplastic

Bricks to store the raw material and for several promising appliances

Stationery

Packaging

Others

The resulting paper has a coarse texture and toasted colour. Good performance in appliances for stationery and packaging. In many cases, it could replace plastics and imported paper.

The collaboration between researchers in chemistry, botany and design, aims to industrialize the process while tending to zero emissions, through the creation of a closed water cycle and reusing plant residues as substrate for the cultivation of edible mushrooms in order to promote shuffled local agricultural industry. These are humble steps towards a sustainable local industry and new sources of employment from waste revaluation, assuming that around 206 Tons of IAS/year are thrown into landfills; 90% is *Pennisetum Setaceum*.

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