ANTICIPATING THE WORST TROPICAL WEED WATER HYACINTH INVASION BY ASSESSING POPULATION CONTROL AND ECONOMICALLY VIABLE BIOMASS REUSE: A KEY STUDY FOR TRANSFORMING A SCOURGE INTO AN OPPORTUNITY

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Water hyacinth *(Eichhornia crassipes)* is a free-floating plant widely recognized as the world's worst aquatic weed. It has become a scourge in many parts of the world, choking waterways, leading to serious problems in navigation, irrigation, recreation and power generation. Eradication is difficult and expensive. Water hyacinth biomass can be used for several purposes. In general, an individual approach is not enough for a sustainable use of this plant. Fresh water hyacinth has been used to remove heavy metals from water bodies and the dried plant is currently used to absorb pollutants from water and soil. An international and multidisciplinary research group integrated by different public and private organizations participated in a research project (LIRIASA), founded by the FONCICyT (UE-Conacyt) to evaluate different strategies of utilization of water hyacinth based on the distribution, composition and age of the plant. Applications related to bioethanol and oligosaccharides production were technically and economically evaluated. The obtained results suggest the development of a biorefinery based on the integral utilization of water hyacinth.

The process consists of controlling the proliferation moving the plant into certain parts of the aquatic environment, in particular, nearby anthropogenic discharges to make full-use of the depurative action of the plant. The proliferation of the biomass is controlled mechanically with floating barriers and frequent harvests. The harvested biomass is separated between roots and aerial parts. Aerial parts are used to produce enzymes and high value-added molecules (patent-pending). They can also be used to produce bioethanol instead of having an energetic supply on site. The rooted part is biochemically not suitable for these applications. Depending on its metal content, it can serve for biogas production, compost production or it can be chemically processed for metal recovery. Due to the high added value of the molecules produced in pharmacology, this whole process might be economically viable. Moreover, the biorefinery can be set up nearby the invaded water bodies being energetically independent and reducing transport and storage costs. Therefore, sustainable use of water hyacinth biomass can represent a valuable solution to face the environmental problems caused by the fast growth and invasion of water hyacinth.

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