



Re-use of invasive plants (water hyacinth) as organic fertilizer through composting and vermicomposting (Extremadura, Spain)

Juana Labrador (1), Judit Gordillo (1), Trinidad Ruiz (1), and Marta M. Moreno (2)

(1) University of Extremadura, Spain (labrador@unex.es), (2) University of Castilla-La Mancha, Spain

The water hyacinth (*Eichhornia crassipes*) is an invasive plant that is native of the Amazon basin and whose capacity for growth and propagation causes major conservation problems with considerable socioeconomic repercussions. The greatest damage due to its fast expansion has been in the middle reaches of the River Guadiana in the SW Iberian Peninsula, where was detected in the Autumn of 2004. Due to its rapid expansion, mechanical extraction was carried out by the Confederación Hidrográfica del Guadiana (CHG) of Spain's Ministry of the Environment since the affected zone is an important area of irrigation farming and hydraulic works and this alien plant weed provoked acute social alarm (Ruiz et al., 2008).

In this work we used composting and vermicomposting techniques as an environmental alternative to assess the possibilities of biotransformation of the water hyacinth biomass removed mechanically from the Guadiana River Basin (Spain).

Four compost piles 1.5 x 10 m size, mechanically tumbled and with no forced ventilation (turning windrows system), were constructed outdoor. Each compost pile was considered as a different treatment: CC1: fresh water hyacinth / wheat straw (1:1 vol/vol); CC2: fresh water hyacinth / sheep manure rich in wheat straw (1:1 vol/vol); CC3: fresh water hyacinth / sheep manure rich in wheat straw (2:1 vol/vol) + Bokashi EM Activator (200 g m⁻²) to favor the composting process; CC4: fresh water hyacinth / sheep manure rich in wheat straw (1:1 vol/vol) + Bokashi EM Activator (200 g m⁻²).

The vermicomposting process was performed on mesh coated wooden boxes (0.34 m³) covered with a shadow mesh with the aim of harmonizing the environmental conditions. The quantities of water hyacinth biomass used were identical in volume (120 l) but with different state or composition: fresh and chopped biomass (VCF); dry and chopped biomass (VCS); fresh and pre-composted biomass with sheep manure rich in wheat straw (VCP). Identical worm density, irrigation type (microaspiration), irrigation period and vermicomposting process duration (four months) were adopted.

Phytotoxicity tests were performed on *Lactuca sativa* cv. "cuatro estaciones" with the aim of finding the appropriate concentrations to be incorporated to the soil.

The composting process required water hyacinth to be crushed, because only chopping made the process very slow. The greatest effectiveness was observed with the vermicomposting trials. In the phytotoxicity tests, the vermicompost extracts did not cause any toxicity at any of the concentrations studied; however, compost extracts obtained in CC1 and CC3 caused problems in root development.

Key words: composting, vermicomposting, water hyacinth.

References

Ruiz T., Martín de Rodrigo E., Lorenzo G., Albano E., Morán R., Sánchez J.M. 2008. The Water Hyacinth, *Eichhornia crassipes*: an invasive plant in the Guadiana River Basin (Spain). *Aquatic Invasions* Volume 3, Issue 1: 42-53.