

Information about chemical and biological control of *Eichhornia crassipes*

Chemical: Herbicide application is usually less expensive than mechanical control but has to be repeated on an annual basis. In addition, human and ecosystem health have to be taken into account when herbicides are applied to water supplies. The main problem is the use of a wetting agent and a penetrant necessary to increase the effectiveness of herbicides (Maricela Martínez 2003). Several factors may impact the efficiency of herbicides: warmer temperatures result in the more rapid translocation of some herbicides and older mats take longer to sink than younger plants (Sculthorpe, C.D. 1985, in Batcher Undated).

Rodeo (glyphosate) is a non-selective herbicide, which, applied at 2kg/ha, will kill water hyacinth in 8 weeks (Gopal 1987, in Batcher Undated). It is non-toxic to fish and slightly toxic to aquatic invertebrates. Aqua-Kleen (2,4-D) applied at ranges of 1-12 kg/ha by aerial spray provides effective chemical control but is moderately toxic to birds; ester formulations are toxic to fish and aquatic invertebrates. Salt formulations of 2,4-D are less toxic (Batcher Undated). Copper sulfate and copper chelate are non-selective herbicides and when applied at a rate of 3.5 mg/l they inhibit the growth of *E. crassipes*. Copper sulfate and copper chelate are toxic to fish, some mammals and aquatic and land invertebrates (particularly in acidic or soft waters). Brand names include Agritox, Basicap, Cutrine and Komeen (Batcher Undated). Spraying an entire heavy infestation can cause water hyacinth to sink and result in pollution from the rotting weed, which will use all the oxygen in the water, killing fish and wildlife. This can be avoided by spraying strips or mechanically removing as much of the weed as possible prior to spraying (Burton 2005).

Biological: The most commonly cited biological control agents are the mottled water hyacinth weevil *Neochetina eichhorniae* (Julien 1987, in Room and Fernando 1992) and the Argentine water hyacinth moth (*Niphograpta albiguttalis* or *Sameodes albiguttalis*). *N. eichhorniae* was first released in Florida in 1972, and has been established in Australia, Fiji, Honduras, India, Malaysia, Papua New Guinea, South Africa, Thailand and other countries (University of Florida 2001). *N. eichhorniae* has a generation time of 90 to 120 days, depending on temperature and other factors and gradual declines in water hyacinth infestations may become evident after 5 to 10 years (Room and Fernando 1992). *N. albiguttalis* was released and is established in Florida, Louisiana and Mississippi, as well as in Australia, South Africa and Sudan; it has a life cycle of 30 days and may retard growth in the early stages of water hyacinth mat development (University of Florida 2001). Newer biological agents such as the grasshopper *Cornops aquaticum*, petiole-mining flies *Thrypticus* spp., the delphacid *Megamelus* and the dictyopharid *Taosa* are being investigated for their notable attributes such as their ability to thrive in cooler regions and short generation times (Hill and Olckers 2001).