Benign Effects of a Retardant Dose of Glyphosate on the Biological Control Agents of Water Hyacinth and Amphibians

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Abstract

Water hyacinth, *Eichhornia crassipes* (Mart.) Solms-Laubach has a major impact on aquatic ecosystems in South Africa despite biological control, which remains hampered by high nutrient levels and low temperatures. Often, the biological control agents are unable to overcome rapid weed growth, necessitating intervention by herbicidal control. However, lethal doses of herbicides have harmful environmental consequences and kill the biological control agents by removing their habitat. A dose of glyphosate 0.8% retards the growth and vegetative reproduction of the weed without detrimental effects on the biological control agents. However, glyphosate is known to interfere with nitrogen (N) metabolism in plants. Depleted nitrogen resources after herbicide application have consequences for insect survival and capacity to reproduce. Moreover, glyphosate has garnered bad press for its non-target ecological impacts on amphibians. In this study, the application of 0.8% of glyphosate did not affect the nitrogen and phosphorous levels in herbicide treated water hyacinth leaves and crown samples. Moreover, water hyacinth, alone or coupled with an application of glyphosate herbicide, is potentially lethal to aquatic amphibians. All *Xenopus* larvae died in the treatments containing water hyacinth, regardless of whether they were unsprayed, or sprayed with a retardant dose or a lethal (to the plant) dose of glyphosate, while glyphosate alone was not as harmful. This study, under laboratory conditions, has shown for the first time that an invasive aquatic weed was more lethal to an aquatic vertebrate than the herbicide advocated for its control.