



Risk assessment to interpret the physiological host range of *Hydrellia egeriae*, a biocontrol agent for *Egeria densa*

Rosali Smith · Rosie Mangan · Julie A. Coetzee

Received: 11 September 2018 / Accepted: 19 June 2019 / Published online: 11 July 2019
© International Organization for Biological Control (IOBC) 2019

Abstract *Egeria densa* Planchon (Hydrocharitaceae) is a submerged macrophyte native to South America. It forms part of a new suite of invasive aquatic plants that has benefited from open nutrient-rich freshwater systems following the successful biological control of floating aquatic plants in South Africa. The specificity of the leaf-mining fly, *Hydrellia egeriae* Rodrigues (Diptera: Ephydriidae) was tested, using traditional laboratory host-specificity testing (i.e., no-choice and paired choice). Only one non-target species, *Lagarosiphon major* Deeming (Hydrocharitaceae) supported larval development during pair-choice tests. In order to avoid the rejection of a safe and potentially effective agent, continuation (i.e., multiple generations) tests were conducted to measure the ability of the non-target species to nutritionally support a population indefinitely. None of these species could sustain a viable agent population for more than three generations. Laboratory host-specificity tests are limited as they exempt certain insect-host behaviours. To enhance the interpretation

of host-specificity results, a risk assessment was conducted using agent preference (i.e., choice tests) and performance (i.e., choice and continuation tests) results. The feeding and reproductive risk that *H. egeriae* poses to non-target species is below 2%. Based on these findings, permission for its release in South Africa has been obtained.

Keywords Submerged aquatic weed · Ephydriidae · Continuation test · Multiple generation test

Introduction

The aquatic weed *Egeria densa* Planchon (Hydrocharitaceae) is a freshwater plant, native to Brazil and temperate and subtropical areas of Argentina and Uruguay (Cook and Urmi-König 1984). *Egeria densa* is considered a vigorous and highly invasive plant of freshwater ecosystems outside its native range, rapidly producing dense infestations and swiftly colonising previously unaffected areas (Yarrow et al. 2009; Cabrera Walsh et al. 2013; Cook and Urmi-König 1984). The successful control of aquatic invasive weeds can be difficult to achieve using traditional methods such as mechanical and chemical control, which are often only effective in the short term. The physical removal of *E. densa* from waterways using water-level drawdowns or machinery can be counter-productive, facilitating the dispersal of the weed

Handling Editor: S. Raghu

R. Smith (✉) · J. A. Coetzee
Centre for Biological Control, Rhodes University,
Makhanda, South Africa
e-mail: rosalismith2@gmail.com

R. Mangan
Biological and Environmental Sciences, University of
Stirling, Stirling, UK