Insect herbivores associated with *Lycium ferocissimum* (Solanaceae) in South Africa and their potential as biological control agents in Australia

L.D. Chari[1*§], E.V. Mauda[2], G.D. Martin[1] & S. Raghu[2]

[1]*Centre for Biological Control, Department of Zoology and Entomology, Rhodes University, Makhanda, 6140 South Africa*

[2]*CSIRO, Ecosciences Precinct, GPO Box 2583, Brisbane, Queensland, 4001 Australia*

Lycium ferocissimum Miers (Solanaceae) is an indigenous shrub in South Africa but has become invasive in several countries including Australia, where chemical and mechanical control methods have proved costly and unsustainable. In Australia, biological control is being considered as a management option, but the herbivorous insects associated with the plant in its native range are not well known. The aim of this study was to survey the phytophagous insects associated with *L. ferocissimum* in South Africa and prioritise promising biological control agents. In South Africa, the plant occurs in two geographically distinct areas, the Eastern and Western Cape provinces. Surveys for phytophagous insects on *L. ferocissimum* were carried out repeatedly over a two-year period in these two regions. The number of insect species found in the Eastern Cape Province (55) was higher than that in the Western Cape Province (41), but insect diversity based on Shannon indices was highest in the Western Cape Province. Indicator species analysis revealed eight insect herbivore species driving the differences in the herbivore communities between the two provinces. Based on insect distribution, abundance, feeding preference and available literature, three species were prioritised as potential biological control agents. These include the leaf-chewing beetles *Cassida distinguenda* Spaeth (Chrysomelidae) and *Cleta eckloni* Mulsant (Coccinellidae) and the leaf-mining weevil *Neoplatygaster serietuberculata* Gyllenhal (Curculionidae).

Key words: invasive plants, weed biocontrol, native range surveys, phytophagous insects, agent prioritisation.

INTRODUCTION

Many weed biological control programmes have been based on limited and *ad hoc* surveys that considered only the most damaging and abundant insect species, often resulting in mixed outcomes (Goolsby *et al*. 2006). Biological control programmes can be greatly facilitated by a comprehensive understanding of the natural enemies associated with the target plant in its region of origin (Syrett *et al*. 2000; Goolsby *et al*. 2006). Having an extensive suite of potential agents to choose from allows researchers to make informed decisions about the most appropriate agent for the target weed, ultimately reducing the risk of introducing unsuitable, ineffective agents (Balciunas 2004; Goolsby *et al*. 2006). Such a focus on agent prioritisation/selection is increasingly being advocated and practised in weed biological control (Morin *et al*. 2009).

Lycium ferocissimum Miers, known as African boxthorn, is a woody plant belonging to the Solanaceae family that includes several important agricultural and environmental species (Haegi 1976; Arnold & Wet 1993). The genus *Lycium* L. consists of small to large shrubs with a wide distribution in arid to semi-arid and temperate to subtropical regions of the world (Minne *et al*. 1994). Although *L. ferocissimum* is indigenous to the Western and Eastern Cape provinces of South Africa (Arnold & Wet 1993; Venter 2000), the species comprises two distinct populations that are separated by a 200 km geographic barrier, comprising a combination of the Cape Fold Mountains and the Knysna Forest (Fig. 1; Venter 2000). As a result of the plant's ability to grow in diverse environments, it has become invasive in some countries.

In the 19th century, *L. ferocissimum* was used in Australia as a hedge plant and wind-break but has

*Author for correspondence. E-mail: lenychari@gmail.com

Received 25 November 2019. Accepted 2 March 2020

ISSN 1021-3589 [Print]; 2224-8854 [Online]
DOI: https://doi.org/10.4001/003.028.0359

African Entomology **28**(2): 359–373 (2020)