BIOCONTROL SCIENCE AND TECHNOLOGY, 2016
VOL. 26, NO. 3, 373–385
http://dx.doi.org/10.1080/09583157.2015.1118615

Taylor & Francis
Taylor & Francis Group

RESEARCH ARTICLE

Nitrogen fertilisation improves growth of *Chromolaena odorata* (Asteraceae) and the performance of the biological control agent, *Pareuchaetes insulata* (Erebidae)†

Osariyekemwen O. Uyi[a], Costas Zachariades[b,c] and Martin P. Hill[a]

[a]Department of Zoology and Entomology, Rhodes University, Grahamstown, South Africa; [b]ARC – Plant Protection Research Institute, Hilton, South Africa; [c]School of Life Sciences, University of KwaZulu-Natal, Scottsville, South Africa

ABSTRACT

Recent studies have demonstrated, through their contrasting results, that relationships between nitrogen levels in host plants and phytophagous insect performance are not simple. This study examined the effect of varying fertilisation regimes on the invasive alien plant, *Chromolaena odorata* (L.) (Asteraceae) and the response of a specialist folivore (a biological control agent), *Pareuchaetes insulata* (Walker) (Lepidoptera: Erebidae). *C. odorata* plants were treated with 3 different levels of fertilisation and plant characteristics were measured within 2–3 months of fertiliser application. Leaves from each of the three treatments were fed to newly hatched larvae until pupation in order to determine the effect of nitrogen fertilisation on herbivore performance metrics such as survival, development time, fecundity and longevity. High and medium fertilisation significantly increased foliar nitrogen concentrations, basal stem diameter, leaf length, shoot height and above-ground biomass of *C. odorata* plants relative to low fertilisation. When individuals of *P. insulata* were fed on leaves from medium- or high-fertilisation treatments, they developed faster, grew to a larger size (by 8%) and achieved higher fecundity (19–22%) than leaves from the low-fertilisation treatment. The results suggest that in mass-rearing, increased production of this biological control agent will occur in high- or medium-fertilised plants.

ARTICLE HISTORY
Received 6 September 2015
Revised 6 November 2015
Accepted 7 November 2015

KEYWORDS
Invasive alien weed; nitrogen fertilisation; herbivore and plant performance; weed biological control; mass-rearing

1. Introduction

The role of foliar nitrogen on the life-history traits and population dynamics of insect herbivores has received a great deal of attention (van Hezewijk, De Clerck-Floate, & Moyer, 2008; Moran & Goolsby, 2014; Myers & Post, 1981; Wheeler, 2003; Zehnder & Hunter, 2009) primarily because nitrogen is considered the most limiting macronutrient for insect herbivores (Mattson, 1980; McNeill & Southwood, 1978) and is the raw material for protein synthesis (Sterner & Elser, 2002). Most plants profit from increased nitrogen

CONTACT Osariyekemwen O. Uyi osariyekemwenuyi@yahoo.com Department of Zoology and Entomology, Rhodes University, Grahamstown, South Africa

†Current address: Department of Animal and Environmental Biology, University of Benin, P.M.B. 1154, Benin City, Nigeria.