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SHORT COMMUNICATION

Chlorophyll fluorometry as a method of determining the effectiveness of a biological control agent in post-release evaluations

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ABSTRACT

The impact of the planthopper *Megamelus scutellaris*, a biocontrol agent of water hyacinth in South Africa, was assessed using chlorophyll fluorometry in a greenhouse study under two different eutrophic nutrient treatments and agent densities (high and low). The results indicated that plants grown in low nutrients with high densities of *M. scutellaris* showed the greatest reduction in the fluorescence parameters Fv/Fm and PI_{abs}. The successful use of chlorophyll fluorometry for the detection of subtle insect damage to water hyacinth leaves could have future application in post-release studies to measure the impact of *M. scutellaris* in the field.

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Water hyacinth; *Megamelus scutellaris*; biocontrol; chlorophyll fluorometer; photosynthesis

Post-release evaluations are fundamental to the success of classical biological control programmes of invasive weeds, yet they are often overlooked (McEvoy & Coombs, 1999). The success of a weed management programme is usually assessed by measuring the establishment and impact of the biocontrol agents following their release. However, these measures can be both imprecise and prone to variability from natural disturbances (Blossey & Skinner, 2000). Furthermore, fluctuations in weed populations may result from a wide variety of factors, including season and nutrient availability, and not from the effect of biocontrol. The aim of this study was to determine if chlorophyll fluorometry was a viable method for the measurement of herbivory by *Megamelus scutellaris* Berg. (Hemiptera: Delphacidae). *Megamelus scutellaris* is a sap-sucking planthopper from Argentina, and a biocontrol agent of water hyacinth, *Pontederia crassipes* Mart. (Pontederiaceae) in the USA, and most recently in South Africa (Tipping et al., 2014; Hill & Coetzee, 2017). The agent is considered to have established in South Africa, mostly in cooler sites (Hill & Coetzee, 2017).

Megamelus scutellaris feeds by piercing the tissues of its host plant using a needle-like rostrum. However, the injury caused to the leaf tissue by the small mouthparts makes the damage difficult to detect initially, even though photosynthetic damage may have occurred within the leaf, as planthoppers typically feed directly on the photosynthates (Zvereva, Lanta, & Kozlov, 2010). Therefore, a method was devised to measure changes in the

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