Endophytes Associated with *Cirsium arvense* and their Influence on its Biological Control

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Abstract

The fungal plant pathogen *Sclerotinia sclerotiorum* (Libert) de Bary was investigated as a potential biocontrol agent for the pasture weed Californian thistle, *Cirsium arvense* (L.) Scop., in New Zealand. However, its biocontrol activity was found to be inconsistent. Three reactions were observed when spores of the pathogen were applied in high numbers: the pathogen (1) killed the plant, (2) killed the aerial tissues, but the plant resprouted, or (3) it had no effect on the plant. Evans (2008) proposed the endophyte-enemy release hypothesis (E-ERH), predicting that the presence or absence of co-evolved host plant resident microbes (endophytes) makes the plant either more resistant or more susceptible to attack by a pathogen. It was therefore hypothesised that the observed inconsistency of *Sclerotinia* to control Californian thistle was attributed to variation in the presence/absence of key endophyte populations. To test this, we first assessed which endophytes were present in Californian thistle plants and how much they varied within a plant and between plants at varying distances. Both culturing methods and the molecular technique DGGE were employed to identify endophyte populations. Results indicate the endophyte populations are not influenced by individual plants or fields, but may be influenced by their location in the plant (i.e. leaf, root, seed and seed pappus). Key endophytes were identified, selected and tested to determine if they had a significant impact on the pathogenic activity of *Sclerotinia* on Californian thistle. Preliminary results indicate endophytes can influence the success/failure of this weed biocontrol agent.