

Assessing the fungal pathogen *Stagonospora tauntonense* as a biocontrol agent against rat's tail grasses

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Summary *Stagonospora tauntonense* is a recently discovered fungal species, pathogenic on *Sporobolus natalensis*, commonly known as Giant Rat's Tail (GRT) grass. *S. natalensis* is one of five weedy *Sporobolus* grass (WSGs) species, which also include *S. pyramidalis*, *S. fertilis*, *S. jacquemontii* and *S. africanus*, all being weeds of significance in natural and agricultural systems. Previous surveys of fungal pathogens of these grasses show that *Stagonospora* is a favourable biological control agent (BCA) candidate; it has a large geographic distribution, is observed to cause a range of diseases in GRTs, has been successfully used as a BCA previously (*S. convolvuli* against large Bindweed) and has shown high levels of pathogenicity in initial bioassays. This investigation thoroughly explores the feasibility of this pathogen as a BCA, through systematic assessment of the plant-pathogen interaction between the 29 *Stagonospora tauntonense* strains and the 5 WSGs. The assessment begins with observation and ranking of the pathogenicity of each strain in bioassays (charcoal agar), to generate a complete and quantitative dataset regarding the disease interaction. DNA and RNA testing will be considered, to understand the biochemical

underpinning of plant defence and pathogenesis pathways. Host-specificity, an integral feature of BCAs, will be assessed, specifically for native, agricultural and amenity species from the plant sub-family Chloridoideae. Life cycle testing will be carried out to identify optimal application timing, method and conditions, ideally using a shortlist of favourable strains. A key, overarching focus is enhancing sporulation, to improve production, commercialisation and application success. Thus far, it has not been successfully achieved in vitro, however factors of abiotic stressors, photoperiodism, nutrient/metabolite levels, substrate and pH are yet to be methodically investigated. This remains a challenging task, given the broad range of potential, and rather specific, conditions required by fungi for sporulation. In this investigation, we aim to better understand of the host-pathogen-environment interaction and pathways, and potentially for the development of an efficacious and sustainable replacement for traditional chemical herbicides, to control an invasive and damaging weed.

Keywords Rat's tail grass, biocontrol, biological control, *Stagonospora tauntonense*, sporobolous