

Poster presentation

## A “MITEY” SOLUTION FOR AUSTRALIAN SWAMP STONECROP IN THE UK

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*Crassula helmsii* (Kirk) Cockayne (Crassulaceae), commonly known as Australian swamp stonecrop, is an aquatic weed introduced to the UK from Australia as an ornamental pond plant in the early 1900s. Since then, it has become widespread throughout much of the UK and is spreading in parts of Western Europe, including France, Belgium and the Netherlands. Australian swamp stonecrop is an invader of still and slow-moving water bodies, and its ability to tolerate extreme environmental conditions and produce different growth forms depending on water depth enables it to outgrow less competitive plants (Dean, 2015), alter plant species composition (Smith and Buckley, 2015) and reduce the availability of bare ground for feeding by wading birds (Dean, 2015) in these sensitive habitats. Dense infestations can also obstruct leisure activities and affect water industry processes. The control of *C. helmsii* is challenging, with mechanical control exacerbating the spread of viable plant fragments and restrictions on the use of chemicals near water bodies limiting herbicide use. To help reach ecological targets set out in the European Union Water Framework Directive, the UK government provided funds in 2011 to initiate a biological control program for *C. helmsii*. This legislation was introduced to commit EU member states to achieve good ecological status for all water bodies.

Following extensive natural enemy surveys in Australia, the mite *Aculus crassulae* Knihinicki & Petanović (Acari: Eriophyidae), which is new to science (Knihinicki et al., 2018), was prioritized for further study as a potential biological control agent for *C. helmsii*. Feeding by this species causes the development of “big bud” galls in emergent and terrestrial *C. helmsii* plants (Figure 1), resulting in a significant reduction in growth. Host-range testing of the mite was carried out against selected non-target plant species of European relevance in no-choice feeding and development tests. Of the 40 species tested, non-target feeding and oviposition occurred on one species of the same genus, but no further development occurred. Studies



**Figure 1.** *Crassula helmsii* stem with big bud galls (white arrows) infested by *Aculus crassulae*.

investigating the impact of temperature on the development and survival of the mite were also carried out, demonstrating its potential to survive and establish under UK environmental conditions. These studies were compiled in a dossier, using the EPPO (European and Mediterranean Plant Protection Organization) Pest Risk Analysis (PRA) template, which was submitted to UK regulators for the assessment of *A. crassulae* for release as a biological control agent of *C. helmsii* in 2017. The PRA was assessed by the UK government, was sent for external review by the Advisory Committee on Releases to the Environment (ACRE), underwent public consultation and was reviewed by the EU Standing Committee on Plant Health (SCOPH). Following approval by these reviewers, the PRA was formally approved by the UK government in summer 2018, and permission was granted to release the mite from quarantine. The first field releases took place in September 2018 at three sites in England, which were selected based on the availability of persistent populations of terrestrial and emergent *C. helmsii* growth forms and on ecoclimatic variability. These sites will be monitored closely for mite infection and overwintering, with further releases at these sites and at additional sites planned in 2019. These releases mark the first biological control agent released against Australian swamp stonecrop and the fourth released against a weed in the EU.

## References

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- Knihinicki, D. K., Petanović, R., Cvrković, T., Varia, S., 2018. A new species of *Aculus* mite (Acari: Eriophyidae), a potential biocontrol agent for Australian swamp stonecrop, *Crassula helmsii* (Crassulaceae). *Zootaxa* 4497, 573–585
- Smith, T., Buckley, P., 2015. The growth of the non-native *Crassula helmsii* (Crassulaceae) increases the rarity scores of aquatic macrophyte assemblages in south-eastern England. *New J. Bot.* 5, 192–199.