

Tiny mite shows promise as control agent to fight Australian swamp stonecrop in UK and Europe

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Aculus crassulae induced galls on *Crassula*. Credit: CABI

A new study led by CABI scientists has confirmed that a tiny mite, *Aculus crassulae*, shows promise to be used as a more environmentally-friendly biological control agent against the aquatic weed *Crassula helmsii* in the UK and Europe.

The research, published in the journal *Biological Control*, reveals that *A. crassulae* favors *C. helmsii*—otherwise known as Australian swamp stonecrop or New Zealand pigmyweed.

Dr. Sonal Varia, lead researcher, said that while the sustainable management of aquatic weeds such as *C. helmsii* can be "extremely challenging," investigations on the mite *A. crassulae* has provided evidence for its use as a classical biological control agent in the UK and possibly further afield in affected parts of North-West Europe.

This invasive semi-aquatic, succulent, perennial herb occurs in three growth forms; terrestrial, emergent and submerged, with the growth form exhibited dependent on the depth of the water in which the plant is found. It is capable of causing fluctuations in dissolved oxygen, carbon dioxide and nutrient levels in infested water bodies which can have wide-ranging impacts on aquatic species.

Dr. Varia said, "*Crassula helmsii* is a nuisance aquatic weed because it can grow in dense, monospecific mats containing many thousands of individual plants, leading to negative impacts on biodiversity, recreation, and the blocking of filters essential for water treatment.

"The host-specificity testing provides evidence that *A. crassulae* has a very narrow host range and is unlikely to pose a risk to UK flora.

"The reduction in overall vegetative growth—particularly in primary stem and secondary shoot growth—in plants colonized by mites under laboratory conditions suggests that *A. crassulae* could have a significant

impact on the growth of *C. helmsii* field populations by reducing the number of vegetative propagules available to spread to new uninvaded sites.



Aculus crassulae on *Crassula* bud. Credit: CABI

"This study has demonstrated that in the mite-colonized plants the number of leaves reduced over time, and it appeared that there was increased leaf senescence in these plants compared to control [plants](#)."

It is believed the aquatic plant was first imported into the UK from Australia sometime before 1914 and later sold as an oxygenating plant for aquaria and ponds. It was subsequently found growing in the wild in Essex, South-East England in 1956, later spreading throughout the UK where it is now naturalized, and also in parts of North-West Europe, particularly lowland regions.

However, in view of its spread and growing concern about the impacts on the native environment the sale of *C. helmsii* as a pond plant was banned in England and Wales after legislation came into force in April 2014.

In 2000, under EU legislation, the Water Framework Directive (WFD) was introduced in the UK and a central requirement of this was that waterbodies were to reach a 'good ecological status' by 2015. This included aims to reduce the abundance of invasive non-native species and the use of harmful chemicals.

In order to achieve the WFD objectives, in 2010 the UK Department for the Environment, Food and Rural Affairs (Defra) commissioned CABI to investigate the potential of controlling several non-native aquatic and riparian weeds, including *C. helmsii*, using classical biological control.

The biology and ecology of *A. crassulae* were investigated as part of an extensive risk assessment to investigate its potential as a biological control agent of *C. helmsii*. Following this process, *A. crassulae* was subsequently approved for release in England and Wales in 2018.

Dr. Varia added, "This study has demonstrated the importance of

assessing the impact of a potential biological control agent prior to release. Such studies are important in providing evidence that the biological control agent under consideration has the potential to cause significant damage in field conditions.

"Infestations of *A. crassulae* were proven to cause damage to *C. helmsii*, showing the potential to negatively affect plant growth under UK field conditions. Further research may also confirm similar results in areas of North-West Europe also affected by *A. crassulae*."

More information: S. Varia et al, Assessment of the host-range and impact of the mite, *Aculus crassulae*, a potential biological control agent for Australian swamp stonecrop, *Crassula helmsii*, *Biological Control* (2022). [DOI: 10.1016/j.biocontrol.2022.104854](https://doi.org/10.1016/j.biocontrol.2022.104854)

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