BIOLOGICAL CONTROL OF EUROPEAN FROGBIT IN NORTH

AMERICA

Locations Canada, United States

Dates 01/01/2024 - Ongoing

Summary

European frogbit, *Hydrocharis morsus-ranae*, is a free-floating aquatic plant with heart-shaped leaves. Native to Europe and parts of temperate Asia and Africa, this plant is considered invasive due to its socio-economic and environmental impacts. European frogbit was introduced into North America as an ornamental plant and has since spread to rivers, lakes and inland waters. CABI is exploring potential biological control agents that can be used to help reduce the expansion of European frogbit through North America.

The problem

European frogbit, *Hydrocharis morsus-ranae*, is a free-floating aquatic plant with leathery, heart-shaped leaves that are often purple underneath. It produces a single white flower. It can be found in slow-moving waters and is native to Europe and parts of temperate Asia and Africa.

In its native range of western and central Europe, European frogbit has declined or is locally extinct due to habitat destruction, but is still a conservation concern in several areas. While in North America, European frogbit was introduced as an ornamental plant approximately 100 years ago. Since, it has expanded with the highest abundance in the Northeast, and some records on the West Coast as well. It continues to expand its range, becoming more abundant, and is considered invasive with socio-economic and environmental impacts.

In the invaded range, it is fast-growing, forming dense mats which negatively impact native plant species, biodiversity, water quality and flow, irrigation pumps, recreational activities, and aesthetic value. As with many aquatic plants, once established, it can be extremely difficult to control.

There are currently no effective control techniques available.

What we are doing

With funding from the US Army Corps of Engineers, a biological control project was initiated at CABI in 2024. The project aims to collect plant genetics from across the native and introduced ranges of European frogbit to find the region of origin of the invasive population in North America. The initial introduction into Ottawa in 1932 is supposed to originate from the Zurich Botanical Garden, Switzerland.

CABI is exploring the herbivore complex of invertebrates and pathogens associated with European frogbit in its native range of Europe to find specific natural enemies and assess their suitability as biological control agents in North America.

The goal is to reduce European frogbit expansion through North America. Promising biological control candidates are required to be very specific to the target plant, European frogbit, due to the diversity of Hydrocharitaceae (a flowering plant family) in North America.

A literature review revealed several herbivores feeding on European frogbit. However, many are reported to be polyphagous (feed on several different species of plant). Some presumed monophagous (feed on one plant species) herbivores include the weevil, *Bagous puncticollis,* and a complex of *Hydrellia*

flies. The leaf spot pathogen, *Tracya hydrocharidis*, is an interesting candidate too.

During surveys in Europe, we are also planning to study the herbivore complex of water soldier, *Stratiotes aloides*, another introduced invasive plant in North America, closely related and often found together with European frogbit. Water soldier is a rooted aquatic plant with serrated leaves native to Europe. In North America, water soldier appears on prohibited and restricted invasive lists due to its capacity to invade water systems.

Results so far

Starting in Switzerland, sites of both European frogbit and water soldier were selected radiating mainly north but also the east and west. So far, we have visited over 50 different sites in eleven countries: Switzerland, France, Germany, Italy, the Netherlands, Czech Republic, Hungary, Serbia, Slovenia, Slovakia and Greece, with European frogbit or water soldier or both present. We plan to continue the search, exploring more regions of the native range, including Scandinavia and the United Kingdom.

The weevil, *Bagous puncticollis*, has been identified as a potential biocontrol agent for European frogbit. However, both *Hydrocharis* and *Stratiotes* are recorded as hosts for this weevil. In May 2024, we found a single specimen on a site in Hungary. More weevils were collected in June 2024 in Germany in a pond where water soldier was dominating. However, these turned out to be *Bagous subcarinatus*, a weevil known to be associated with *Ceratophyllum* species, also recorded from the pond. In May 2025, we recorded three additional locations where the weevil was collected in Slovenia, Slovakia and Hungary.

According to the literature, several *Hydrellia* flies are recorded to develop on European frogbit and water soldier. We found leaves mined by *Hydrellia* flies at virtually every site. We are currently establishing a fly rearing facility at CABI's centre in Switzerland to start studying their biology and exploring the host range. Adults lay eggs on leaves, larvae hatch within a few days and then mine in the leaves. Puparia are found after about two weeks in petioles, but also in or on the underside of leaves.

Donors US Army Corps of Engineers (USACE)

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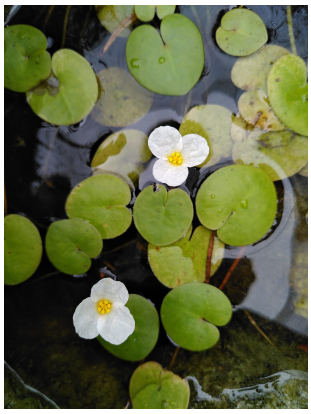


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