

Scientific name	<i>Hydrocotyle ranunculoides</i>
Common name	Floating pennywort
Broad group	Plant
Number of and countries wherein the species is currently established	9: BE, DE, ES, FR, IE, IT, NL, PT, UK
Risk Assessment Method	EPPO, GB NNRA
Links	http://www.eppo.int/QUARANTINE/Pest_Risk_Analysis/PRAdocs_plants/09-15108%20PRA%20Hydrocotyle%20ranunculoides%20rev.doc http://www.eppo.int/QUARANTINE/Pest_Risk_Analysis/PRAdocs_plants/09-15161%20PRA%20Report%20Hydrocotyle%20ranunculoides.doc https://secure.fera.defra.gov.uk/nonnativespecies/downloadDocument.cfm?id=240
1. Description (Taxonomy, invasion history, distribution range (native and introduced), geographic scope, socio-economic benefits)	<i>Hydrocotyle ranunculoides</i> was traded and imported for ornamental purposes. However, it is now restricted in several European countries as a consequence of trade regulation or codes of conduct designed to decrease invasion risks (Brunel, 2009).
6. Can broadly assess environmental impact with respect to ecosystem services	This plant may affect provisioning, regulating and cultural services by fouling of water supply systems and drainage, crowding of recreational waterways, effect on angling, watersports and boating where it makes dense populations (Hassan & Ricciardi, 2014).
8. Includes status (threatened or protected) of species or habitat under threat	Impact on threatened species and habitats: form dense populations in Natura 2000 habitats (Robert <i>et al.</i> , 2013b).
9. Includes possible effects of climate change in the foreseeable future	No change predicted in Atlantic regions (Kelly <i>et al.</i> , 2014). According to the Climex simulation, the Atlantic and Mediterranean areas of the EPPO region that are characterized by mild winters are the most at risk. According to the climatic prediction, additional countries are at risk (e.g.: Mediterranean countries, Black Sea area).

	<p>In Europe, plants grow slowly in spring and form small, up to 10 cm² large leaves. The plants flower and produce fruits between May and October. The maximal growth rate is reached during June and July (Hussner & Lösch, 2007). The species is reported to tolerate a wide range of temperatures, from 0°C up to 30°C of water temperatures.</p> <p>According to the climate calculations of Ackerly lab California Flora Climate Database (http://loarie.stanford.edu/calflora/index.php) which are based on mean climatic data where the species is recorded, the following information are available for temperatures:</p> <ul style="list-style-type: none"> - mean daily air temperature (Annual based on 18-year mean) = 14.31 °C - minimum daily air temperature (Annual based on 18-year mean) = 1.58 °C - maximum daily air temperature (Annual based on 18-year mean) = 30.82 °C <p>According to Hussner and Lösch (2007), optimal CO₂ exchange (linked with photosynthesis) is between 25 and 32°C, meaning that optimal growth would occur at these temperatures; at 35°C, the gas exchanges dropped. Its presence in tropical America, in Africa and western Asia (Lebanon, Syria) shows however that <i>H. ranunculoides</i> could be present at higher temperatures. In Western Europe populations may be strongly reduced during cold winters, but recovery occurs quickly in the following season.</p>
<p>11. Documents information sources</p>	<p>Brunel S. 2009. Pathway analysis: aquatic plants imported in 10 EPPO countries. <i>EPPO Bulletin</i> 39: 201-213.</p> <p>Hassan A, Ricciardi A. 2014. Are non-native species more likely to become pests? Influence of biogeographic origin on the impacts of freshwater organisms 3. <i>Frontiers in Ecology and the Environment</i> 12: 218-223.</p> <p>Hussner A, Lösch R. 2007. Growth and photosynthesis of <i>Hydrocotyle ranunculoides</i> L. fil. in Central Europe. <i>Flora-Morphology, Distribution, Functional Ecology of Plants</i> 202: 653-660.</p> <p>Kelly R, Leach K, Cameron A, Maggs CA, Reid N. 2014. Combining global climate and regional landscape models to improve prediction of invasion risk. <i>Diversity and Distributions</i>.</p> <p>Robert H, Lafontaine R-M, Beudels-Jamar RC, Delsinne T. 2013. Risk analysis of the Water Pennywort <i>Hydrocotyle ranunculoides</i> (L.F., 1781). - Risk analysis report of non-native organisms in Belgium from the Royal Belgian Institute of Natural Sciences for the Federal Public Service Health, Food chain safety and Environment. 59 p.</p>

	<p>See also:</p> <ul style="list-style-type: none"> - The Belgian risk analysis report - The Irish risk analysis report
Main experts	<p>Johan van Valkenburg Etienne Branquart</p>
Other contributing experts	<p>Belinda Gallardo</p>
Notes	<p>EPPO DSS and GB NNRA: high risk in the Atlantic and Mediterranean areas.</p> <p>Area at risk: Atlantic, Mediterranean and Black Sea regions. Some countries not yet invaded in relevant bioregions.</p>
Outcome	<p>Compliant</p>