

Plant research could benefit wastewater treatment, biofuels and antibiotics

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Duckweed growing. Credit: Paul Fourounjian/Rutgers University

Chinese and Rutgers scientists have discovered how aquatic plants cope

with water pollution, a major ecological question that could help boost their use in wastewater treatment, biofuels, antibiotics and other applications.

The study is in the journal *Proceedings of the National Academy of Sciences*.

The researchers used a new DNA sequencing approach to study the genome of *Spirodela polyrhiza*, one of 37 species of [duckweed](#), which are small, fast-growing [aquatic plants](#) found worldwide.

The scientists discovered how the immune system of *Spirodela polyrhiza* adapts to a polluted environment in a way that differs from land [plants](#). They identified the species' powerful genes that protect against a wide range of harmful microbes and pests, including waterborne fungi and bacteria.

The study could help lead to the use of duckweed strains for bioreactors that recycle wastes, and to make drugs and other products, treat agricultural and industrial wastewater and make biofuels such as ethanol for automobiles. Duckweed could also be used to generate electricity.

"The new gene sequencing approach is a major step forward for the analysis of entire genomes in plants and could lead to many societal benefits," said co-author Joachim Messing, Distinguished University Professor and director of the Waksman Institute of Microbiology at Rutgers University-New Brunswick.

Duckweed can also serve as protein- and mineral-rich food for people, farmed fish, chickens and livestock, especially in developing countries, according to Eric Lam, a Distinguished Professor in Rutgers' School of Environmental and Biological Sciences who was not part of this study. Lam's lab is at the vanguard of duckweed farming research and

development. His team houses the [world's largest collection](#) of duckweed species and their 900-plus strains.

The lead author was in Messing's laboratory and now has her own laboratory at Shanghai Jiao Tong University in China. Scientists at the Chinese Academy of Sciences and Chinese Academy of Agricultural Sciences contributed to the study.

More information: Dong An et al, Plant evolution and environmental adaptation unveiled by long-read whole-genome sequencing of *Spirodela*, *Proceedings of the National Academy of Sciences* (2019). [DOI: 10.1073/pnas.1910401116](#)

Provided by Rutgers University

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