

EXPLORING ENVIRONMENTAL HEALTH AND CONTAMINANTS USING COMMON DUCKWEED (LEMNA MINOR) AS A MODEL SYSTEM

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Common, also known as lesser duckweed (*Lemna minor*) is an aquatic plant from the family Lemnaceae, found on the surface of freshwater ponds and lakes worldwide. It is characterized by rapid growth and high biomass accumulation, making it an important food source for aquatic organisms such as fish and invertebrates.

Lemna minor is a model organism widely used in ecology and plant biotechnology research. In addition, it plays an important role in wastewater treatment, as it effectively accumulates heavy metals and other pollutants. Due to its high nutrient content, it is also being researched as a potential source of protein for both humans and animals.

MORPHOLOGICAL CHARACTERISTICS

Common duckweed grows in small floating fronds. Fronds are elliptical or oval, measuring 2–6 mm in length. Each plant has 1–8 leaf-like structures connected with each other by a thin, thread-like structure. The roots of *Lemna minor* are white and 0.5–15 cm in length. This simple structure contributes to its fast growth and adaptability.

ENVIRONMENTAL FACTORS AFFECTING ITS GROWTH

Temperature plays a crucial role, with optimal growth occurring at around 26 °C, while higher temperatures can inhibit development.

Light intensity directly affects the rate of photosynthesis, and increased light availability generally promotes faster growth and biomass accumulation.

Nutrient availability, particularly the ratio of nitrogen to phosphorus, is essential for proper growth and metabolic balance, as *Lemna minor* depends on external nitrogen sources for development.

Changes in **pH**, **salinity**, and **osmotic conditions** can act as stress factors, influencing physiological processes and limiting growth under unfavorable conditions.

Lemna minor reproduces mainly asexually by budding, allowing extremely rapid population growth. Its biomass can double every 48–72 hours and each plant can produce up to 18 daughter plants. Under unfavorable conditions, common duckweed forms turions, specialized, dormant, starch-rich vegetative buds or shoots with the capability to grow into a complete plant, which sink and survive until conditions improve.

APPLICATIONS

Lemna minor grows rapidly and is widely used in research, water purification, and sustainable food production, with potential as a future protein source. It supports ecosystems by producing oxygen, providing habitat, and absorbing nutrients and pollutants to improve water quality. It also accumulates heavy metals, making it valuable for phytoremediation and as a model organism for monitoring environmental stress and water quality.

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- Pictures: (a) <https://en.wikipedia.org/wiki/Lemna> (b) <https://www.lemna.farm/technology> (c) https://bgflora.net/families/lemnaceae/lemna/lemna_minor/lemna_minor_3_en.html (d) <https://eu.poughkeepsiejournal.com/story/tech/science/environment/2015/09/24/algal-blooms-duckweed-fall/72410944/>

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