SOLUTIONS IN THE LAND

CROP PROFILE

DUCKWEED

Lemna Minor
Member of the Lemnaceae family

History

Duckweeds are among the smallest flowering plants in the world, occurring naturally across North America, Europe, Asia, and Africa. Duckweed has served as a key model in plant biology since the 1950s, helping scientists explore aspects of proteins, nucleic acids, and processes such as photosynthesis and nutrient cycling. Its ability to reproduce clonally, along with the compact genomes of some species, made it especially useful for genetic studies beginning in the 1970s. However, scientific interest in the Lemnaceae family dates back even further, with one of the earliest studies published in 1839 by botanist Matthias J. Schleiden, a pioneer of cell theory.

Climate Needs

Duckweed is adapted to a wide range of climates but is most productive in regions with moderate precipitation, stable water levels. Species are uncommon in areas with extremely high or extremely low precipitation. Duckweed tolerates light salinity as small amounts of salt may stimulate growth; however, high salinity acts as a stressor. Plants survive chilly conditions but do not tolerate freezing water.

Duckweed Description

Individual duckweed plants are called fronds. Each frond consists of a small, green, floating body with a single root extending from the underside into the water. Fronds are typically 6–12 mm long, oblong to lanceolate and connected by elongated stipes, giving them a canoe-paddle appearance. Roots are solitary or absent and range from 5–30 mm in length. Veins are faint, typically three in number. Duckweeds flower rarely, particularly in northern regions such as Wisconsin. Duckweed reproduces rapidly by vegetative division, forming dense mats that can cover large areas of water. It is highly adaptable and can thrive in a wide range of growing conditions, including manure-rich or eutrophic waters. Duckweed is consumed by ducks, geese, fish, and some aquatic invertebrates and contains high levels of protein and fat. In cold regions, duckweed survives winter by forming dense clusters that sink to the bottom of water bodies in the fall. In spring, fronds float back to the surface and resume rapid growth.

Soil

Duckweed is an aquatic perennial that grows in still or slow-moving freshwater. It prefers moderate temperatures and grows best in well-lit conditions without excessive direct sunlight. Water pH around 5.8 is ideal, though duckweed tolerates a range of fresh to slightly alkaline or mildly saline waters. Duckweed thrives in wet environments with high nutrient availability, including ponds, lakes, marshes, dams, and aquaculture systems. Plants grown in shaded conditions may reach nearly twice the size of those grown in full sun. Some species can double their population in 24 hours under ideal conditions.

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Seeding
Duckweed does not require soil or seedbed preparation. It reproduces almost entirely through vegetative division, where daughter fronds develop from the parent plant and eventually separate. Propagation can be managed by manually dividing dense mats into smaller sections and redistributing them across the water surface. This improves access to light and nutrients and encourages uniform growth.

Highlights

Duckweed plays an important ecological role by absorbing excess nutrients such as phosphorus and ammonia, reducing suspended solids and biochemical oxygen demand in surface waters.

Pest & Disease Managment
Duckweed has few significant pest or disease issues. Healthy populations are generally resilient, though water quality imbalances—such as extreme nutrient loading or poor oxygenation—can reduce plant vigor.

Fertility
Duckweed responds strongly to nutrient availability. Growth is enhanced in nutrient-rich waters, including dilute hydroponic solutions such as Hoagland's medium or stable aquarium systems. In managed systems, apply a diluted liquid aquatic fertilizer at quarter-strength every two to four weeks during active growth in spring and summer. Reduce fertilization during winter or periods of slow growth. Excessive fertilization should be avoided, as it can degrade water quality and promote algal blooms.

Weed Control
Duckweed itself can act as a dominant surface plant and may suppress other aquatic vegetation by limiting light penetration. Population density can be controlled through periodic harvesting or physical removal to prevent excessive surface coverage.

Harvest
Duckweed is easily harvested by skimming or netting dense surface mats from the water. Regular harvesting encourages continued growth, prevents overcrowding, and removes nutrients from the system.

Cleaning & Storage
Harvested duckweed should be rinsed with clean water to remove debris or contaminants. For short-term use, it may be fed fresh. For storage, duckweed can be dried or processed according to its intended use, ensuring moisture is reduced sufficiently to prevent spoilage.

Risk
Duckweed grows rapidly and can quickly cover entire water surfaces if unmanaged, potentially reducing oxygen exchange and light penetration.

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Rating any crop's production opportunity or risk is subjective and depends on the region where the crop is to be raised. Genetic advancement for pathogen tolerance and adverse weather condition has been more significant for popular, high seed sales crops such as corn and soybeans. The below table lists some of the issues of producing specific crops and helps guide your process of selecting your cropping choice.

Average rating: 3.66

Issue	1	2	3	4	5
Seed availability			X		
Scouting requirements					X
Drought tolerance	X				
Waterlogged soil tolerance					X
Disease pressure				X	
Wildlife concerns				X	
Yield swings					X
Harvest ability				X	
Field loss				X	
Market demand			X		
Soil regeneration					X
Residue value			X		
Storability				X	
Benefit for following crop					X

1- very low 2- low 3- average 4- moderately high 5- very high

Seed availability – Price, lead time, and required lot size are consideration for these issues
Scouting requirements – What frequency does someone need to look at the crop?
Drought tolerance – Rainfall patterns are requiring crops go longer between rainfall events.
Waterlogged soil tolerance – Rainfall events tend to produce higher volumes than historical averages.
Disease pressure – Plant stress has increased with the rise of daytime temperatures
Wildlife concerns – Deer, rabbits, voles, resident geese, and others can destroy fragile crops.
Yield swings – How predictable will the income be when this crop goes to market?
Harvest ability – Do we need plans B & C if adverse conditions affect the harvest?
Field loss – How much will be left in the field and can we monetize field loss?
Market demand – Does this crop have an elastic delivery window and are there timing penalties?
Profitability – Is there potential for higher margins needed for a shrinking land base?
Soil regeneration – Does this crop support the next crop?
Residue value – What remains after the target crop? Can we monetize the residue?
Storability – How long can we hold this crop? Will quality be challenging to maintain?