Water Chestnut
Trapa natans

Sea Grant
PENNSYLVANIA

Photo courtesy of Pennsylvania Sea Grant

Water Chestnut is a rooted aquatic plant that can dominate ponds, shallow lakes, and rivers. A single plant can produce multiple floating rosettes of leaves that grow in thick colonies, displacing native vegetation and limiting recreation and navigation. Each plant can produce up to 20 nuts, also called drupes, which have four sharp spines and can remain viable for 9 years or more in the sediment.

Species Description

Water Chestnut is a rooted annual aquatic plant consisting of submerged leaves and a buoyant rosette of floating leaves. The floating leaves are triangular or fan-shaped with noticeably toothed margins on the outer edges. They are roughly 1-3 cm (0.4-1.2 in) long and are arranged in large floating rosettes. The upper leaf surface is glossy, while the underside is covered with soft hairs. These leaves are kept afloat by spongy, inflated bladders attached to long stems called petioles, which connect the leaves to the submersed section of the plant. The submerged leaves are distinctly different and appear feathery and whorled around a cord-like stem that can reach up to 5 m (16 ft) in length. Flowers are small and white and form at the center of the stem. The fruit is a nut, or drupe, that has four short, sharp spines.

Native & Introduced Ranges

The native range of the Water Chestnut includes tropical, subtropical, and temperate climates of Europe, Asia, and Africa. It was first introduced in North America near Concord, Massachusetts in the 1870s. Since then, it has invaded waters in New England and throughout the Mid-Atlantic states. In Pennsylvania, Water Chestnut is established in both the eastern and western portions of the state.

Biology & Spread

Water Chestnut was brought to the United States by water gardeners in the 1800s and quickly became established due to aquarium release and escape from ornamental ponds. It has a high reproductive rate, with each plant producing up to 20 drupes per season, each containing a single seed that can spread by water currents and waves. Drupes may remain viable for more than 9 years, although most will germinate within the first two years. Water Chestnut can also spread vegetatively. As the rosettes of floating leaves break apart, fragments can attach to boats and trailers, or float to new locations. The sharp spines of the drupe can also get caught on other objects, birds, and animals.

Habitat

Water Chestnut can grow in any freshwater setting; however, it prefers shallow, warm, and nutrient rich waters less than 5 m (16 ft) deep in ponds, lakes, slow moving streams, and rivers.

Impacts

Threat to Biodiversity

Dense floating mats of Water Chestnut can cover nearly 100% of the water surface when conditions are favorable, limiting light and oxygen availability to aquatic plants and organisms growing below. This results in conditions more favorable for recolonization by invasive species. Studies also show that fish communities in Water Chestnut beds are less diverse and the most common fish found are those that have a wide tolerance for degraded water quality. While other organisms may feed on Water Chestnut, it offers little nutritional value compared with beneficial native plants.

Economic Costs

Water Chestnut infestations can clog waterways and make fishing, boating, and swimming nearly impossible. The sharp nuts, which are capable of tearing through a shoe, can cause painful puncture wounds if stepped on. It is also difficult and expensive to control, with the primary economic costs associated with chemical and mechanical control efforts. For example, the state of Vermont spent nearly $500,000 in 2000 to remove Water Chestnuts using mechanical harvesters and hand removal.

Prevention & Control

Since Water Chestnut is an annual plant, control requires preventing plants from blooming and setting seed. A combination of manual, mechanical, and chemical techniques is often the most effective. However, eradication requires several years of monitoring and infected waters may need to be monitored for 5-12 years to eliminate; although some infestations are so severe that total eradication may never be achieved.

(Left) Photo courtesy of Leslie J. Mehrhoff, University of Connecticut, Bugwood.org.
(Right) Photo courtesy of Steve Hurst, USDA NRCS PLANTS Database, Bugwood.org

Photo courtesy of Leslie J. Mehrhoff, University of Connecticut, Bugwood.org.

Preventing the introduction and spread of the Water Chestnut is the best way to protect natural habitats from harm.

- Know how to identify and report Water Chestnut.
- Always check for and remove plants, mud, and debris from boats, trailers, clothing, and equipment before entering a water body and before leaving a water body.
- Drain all water from bait buckets, bilges, and live wells before transporting to new areas.
- Clean all gear and equipment with hot water (140°F or 40°C) or salt water, OR let boats and equipment dry thoroughly for at least five days before entering a new water body.
- When choosing plants for a pond or water garden, purchase from a licensed nursery and choose regionally native or non-invasive plants. Check with your state natural resource agency to confirm which plants to avoid for your region.
- If you see Water Chestnut, pull it out and dispose of it far away from the water. Any plant you destroy could prevent over 100 plants from growing the next year.

Scan Now! To access additional AIS fact sheets, resources, and reporting methods. Or visit us online at https://seagrant.psu.edu/aquatic-invasive-species/

References:

USDA Plants Profile. Trapa natans L. - Waterchestnut. Natural Resources Conservation Service.

Van Driesche, R., et al. 2002. Biological Control of Invasive Plants in the Eastern United States. USDA Forest Service Publication FHTET-2002-04, 413 p. U.S. Fish and Wildlife Service. 2007. Water chestnut