

Eurasian Watermilfoil — A New Menace to Oklahoma Waters

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INTRODUCTION

Eurasian watermilfoil (*Myriophyllum spicatum* L.) is spreading at an alarming rate in the United States. It was first identified and reported in this country during the latter part of the 19th century. In the last decade the plant has established itself as a serious menace to the aquatic resources of this country. Characteristically it is a submersed vascular aquatic plant producing a mat of vegetation several feet in thickness. The process of rapid growth, fragmentation, migration and establishment provides the plant the ability to dominate large areas in short periods of time.

In Tennessee, heavy infestations of Eurasian watermilfoil have: depressed real estate values; eliminated recreational activities such as boating, fishing, skiing and swimming; clogged municipal water supply intakes and screens at industrial plants; hindered small boat navigation; curtailed commercial fishing activities; and provided extensive breeding areas for mosquitoes in surface mats from July to midwinter (Smith, Hall, and Stanley, 1967).

In recent years Eurasian watermilfoil has invaded over 200,000 acres of the Chesapeake Bay, 5,000 acres in the TVA reservoirs and 87,000 acres of Currituck Sound, North Carolina (Blackburn and Weldon, 1967). The wide spectrum tolerance of this plant to salinity, water depth and temperature enables it to establish dense populations in varied ecological habitats.

IDENTIFICATION

Three species of *Myriophyllum* have been reported in Oklahoma waters (Waterfall, 1960). Characteristics and ecology of Eurasian watermilfoil and related species in Oklahoma are as follows:

Eurasian watermilfoil, *M. spicatum*, is a perennial submersed plant that spreads very rapidly by vegetative reproduction and seed. Leaves are whorled and have 10 to 14 finely dissected segments on each side. Spikes are emergent 2 to 4 inches above the water surface and are without leaves. Eurasian watermilfoil can be distinguished from other species found in Oklahoma by this characteristic.

Parrot feather, *Myriophyllum brasiliense* Camb., is a perennial rooted aquatic having stout stems that are sparingly branched. Upon maturation the emergent tips extend 3 to 12 inches above the water surface. Leaves are whorled and have 10 to 18 narrow segments on either side of the midrib. Flowers are formed in axils of submerged leaves. The fruit is 1.5 to 2 mm in length. This plant can be classified as an emergent in shallow water. Good growth occurs in lakes and slow-moving streams having neutral or slightly alkaline waters. A native of South America, it is a common aquarium plant, the spread of which to natural waters has been facilitated through introductions by aquarists.

Broadleaf watermilfoil, *M. heterophyllum* Michx., is a rooted perennial with most of its foliage submersed. Stems are variable in width (5 to 10 mm), but are generally stouter than in other species of this group. Leaves are usually whorled in groups of 4 to 6. Submersed leaves usually have 6 to 10 pairs of dissected segments. Upon maturation the emergent tips extend 3 to 6 inches above the water surface. Emergent leaves are 1.5 to 5 mm wide and up to 2 cm in length with margins somewhat

serrated. Fruits are formed on emerged spikes in leaf axils. Widespread in the United States and common in lakes and slow-moving streams, this species has become a problem in some areas.

M. scabratum Michx. [*M. pinnatum* (Walt.)] is a rooted perennial with no common name. The stems are stout with alternate (sometimes partly whorled) leaves of two types. Submersed leaves with about 5 pairs of capillary divisions, the emerged ones linear to oblanceolate, pectinate or serrate. Fruits are formed on axils of emerged leaves and have a flat to concave, longitudinal, tuberculate-bordered ridge on the back of each mericarp (Muenscher, 1944; Waterfall, 1960).

BIONOMICS

Eurasian watermilfoil has become widespread in the Northeastern United States during the past 10 years. Recent reports indicate that it now occurs in North Carolina, Florida, Georgia, Tennessee, Louisiana, Texas, Wisconsin, Illinois and California. It was reportedly planted by an aquarist in Watts Bar Lake, Tennessee in 1953 and began escaping from an embayment in the lake in 1960. By 1966 the plant was reported in Wilson Lake (281 river miles below Watts Bar) and was abundant in the reservoir formed by the Guntersville Dam (191 river miles below Watts Bar).

In Lake Seminole, Florida, Eurasian watermilfoil is believed to have been introduced in 1965. By September, 1966, it had infested over 500 acres. In April, 1967, the infestation had spread over an estimated 1,200 acres (Blackburn and Weldon, 1967).

The vertical distribution of anchored *M. spicatum* varies with the particular body of water in which it occurs. It is generally found in water 1 to 9 ft deep but has infested water up to 15 ft maximum depth in Watts Bar Reservoir, Tennessee (Smith, Hall, and Stanley, 1967).

Eurasian watermilfoil can reproduce by two methods. Seeds are formed on the emerged spike from mid-July to late September and can withstand the coldest winters. However, the most efficient method of reproduction and dissemination is by fragmentation of stems and abscission of plant tips. The broken portions will float for a period of time and will be carried by wind or water currents to new areas. Small portions eventually lose buoyancy and settle to the bottom. They then produce roots and commence growth. A single 2-inch fragment may take root and grow 4 ft or more in a single season. During the second year, multiple stems arise from the rooted base and may be seen throughout the year, but observations suggest that peak breakups occur during spring and fall.

This plant is often spread to new lakes by the inadvertent assistance of fishermen, boaters, and skiers. Often fragments of Eurasian watermilfoil are carried to a new lake on fishing plugs, outboard motor propellers and other equipment. Since the fragments are very hardy, they can withstand drying up to 21 days.

ESTABLISHMENT OF EURASIAN WATERMILFOIL IN OKLAHOMA

Infestations of Eurasian watermilfoil have been observed and identified in two locations in Oklahoma. The first recognized population was found during the summer of 1964 in Lake Humphreys (a 900-acre impoundment owned by the city of Duncan) near Mariow, Oklahoma. By 1965, it inhabited all water of less than 10 ft in depth in 50% of the lake. In 1966 and 1967, the population continued its growth. The expected infestation did not occur in 1968, but observation indicates that ample sources of the plant exist to reinfest the lake in the future (Beck, personal communication).

A second infestation occurred in 1968 in Medicine Creek, Comanche County, in the area immediately below Lake Lawtonka. This infestation curtailed recreation in this heavily used area throughout the summer.

Two other populations of watermilfoil were noted in the state during 1968. Shawnee Lake, Pottawatomie County, and Chandler Lake, Lincoln County, both had an abundance of watermilfoil. Although no fruiting bodies were produced in these two lakes, there are definite indications that these populations are *M. spicatum*. Both populations inhabit large amounts of water of 15 ft or less in depth. Both have been examined by competent fishery biologists and appear to be Eurasian watermilfoil (Collins, personal communication). Both infestations spread rapidly.

DISCUSSION

Eurasian watermilfoil is apparently established in both major watersheds in Oklahoma. Chandler and Shawnee Lakes are in the Arkansas River watershed and Lake Humphreys and Medicine Creek are in the Red River watershed. Although only four populations have been reported at present it is possible that many other lakes have been infested, and more lakes will likely become infested in future years.

Due to the rapid invasion and reproductive properties of Eurasian watermilfoil, partial control is not desirable. Reinfestation would occur so rapidly that annual treatments would become necessary. Complete eradication of the plant is possible with chemicals now available. In 1966, the Tennessee Valley Authority studied 34 combinations of herbicides for use in the control of the species. A formulation of 20% granular 2,4-D was selected as the most economical and effective chemical control. Helicopters were used to apply the chemical directly on mats of vegetation during 1966. A total of 888 tons of the bulk material or 355,200 pounds of 2,4-D acid equivalent was applied to approximately 8,000 acres of watermilfoil in seven reservoirs. Estimated field cost of the program was \$484,000. Treatment rates ranged from 40 to 100 lb. of acid equivalent per acre, depending on the amount of watermilfoil in the treatment area. This program, plus a follow-up program of hand treatments and water-level manipulation has virtually eliminated the plant from the area (Smith, 1968).

Water level depression is helpful in controlling the plant. If plants are left dry for 21 days or more they will not reinfest the area (Smith, Hall, and Stanley, 1967). This method alone was used in Chickamauga Lake, Tennessee, with 90% control; however, re-infestation was rapid due to growth in unexposed areas.

Elser (1957) described two unrelated pathological conditions that greatly reduced the abundance of Eurasian watermilfoil in Chesapeake Bay, Maryland. One disease, in an isolated case, reduced the population from 100% coverage to 10% in two years. The other disease completely eliminated a lush growth of watermilfoil within two months after the condition was first noted. More study of this condition could possibly provide an economical biological control for watermilfoil.

RECOMMENDATIONS

1. Determine the agency or agencies responsible for the study and control of plant problems.
2. Organize and conduct a complete survey of the State of Oklahoma for the presence of Eurasian watermilfoil.
3. Inform the public of the problem and describe ways the plant is spread.

4. Determine the most economical control measures for use in Oklahoma waters.
5. Conduct a control program.
6. Maintain a surveillance system to study the results and watch for re-infestation.
7. Report on program to assist other states in eliminating this undesirable plant species.

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