

THE CURLY-LEAVED PONDWEED PROBLEM AT REELFOOT LAKE

EUGENE CYPERT

U. S. Bureau of Sport Fisheries and Wildlife
Samburg, Tennessee

INTRODUCTION

The encroachment of curly-leaved pondweed (*Potamogeton crispus* L.) in Reelfoot Lake in northwest Tennessee has been a matter of considerable concern to the U. S. Bureau of Sport Fisheries and Wildlife, The Tennessee Game and Fish Commission and fishermen and resort operators on the lake. It is a European plant which was introduced on this continent probably more than a century ago. Apparently it is of recent occurrence in Reelfoot Lake, a small patch having been first noticed near Gray's Landing on the west side of the lake in 1959. Since then it has shown an aggressiveness typical of exotics introduced into favorable environments. It has spread rapidly and, in places, has crowded out other submerged aquatic plants. It is estimated that about 2,000 acres in Reelfoot Lake are now involved.

The reproductive capacity of the pondweed is tremendous. This was demonstrated by Yeo (1966) who planted one turion on April 1, 1963. At the end of one growing season, 23,520 turions and 960 seeds had been produced.

At Reelfoot Lake, curly-leaved pondweed initiates annual growth in the fall, thrives through the winter, grows most vigorously in late winter and early spring, and becomes dormant in late spring and early summer. It fruits infrequently at Reelfoot Lake but was found to be flowering profusely in the shallow water of the borrow pit of the highway along the south side of the lake in the spring of 1965. This is compatible with the findings of Hunt and Lutz (1959) that fruiting could be induced in curly-leaved pondweed by lowering the water level to a depth of from 3 to 12 inches after the last killing frost.

UNDESIRABLE CHARACTERISTICS

Apprehension has been expressed about the introduction of curly-leaved pondweed into Reelfoot Lake. Some reasons for this apprehension are expressed in this section.

From March through May the plant forms semi-floating mats that may completely block boat travel in places. In the late spring die-off, plants rise to the surface of the water, making boat travel especially difficult at the height of the sport fishing season. Visitors to the boat docks and resorts bordering Upper Blue Basin were almost entirely cut off from access to the lake during the peak of the spring fishing season in 1964. If this condition should become general and occur annually, the serious effects on the economy of the Reelfoot community are obvious.

As curly-leaved pondweed is so aggressive, it is feared that it will crowd out other more desirable

aquatics such as sago pondweed (*Potamogeton pectinatus*), narrow-leaved pondweed (*Potamogeton pectinatus*), naiad (*Najas guadalupensis*), horned pondweed (*Zanichellia palustris*), and watershield (*Brasenia schreberii*). The plant appears to be better adapted to cooler climates and does not compete seriously with the native plants during the season of their most vigorous growth. However, if it should become better adapted and maintain its vigorous growth through the summer, it would indeed be a serious competitor of established aquatics.

It has been suspected that curly-leaved pondweed may pose a threat to the fish in Reelfoot Lake. It has been claimed that as vast mats of pondweed die in early summer, an oxygen deficiency will occur that will result in a fish kill. It has also been claimed that the pondweed will cause an overpopulation of fish because it would afford inordinate protection to young fish.

VALUE FOR WATERFOWL

At Reelfoot Lake the plant may be a desirable food plant for waterfowl. Ducks, both dabblers and divers, and coots eat the vegetative parts of the plant. The seeds may also be eaten, but since it seeds infrequently at Reelfoot, this may not be important. There is also a possibility that animal life found in the leaf and stem masses may be important as food for waterfowl. In most areas the curly-leaved pondweed has been considered undesirable as a food plant for waterfowl. Martin and Uhler (1939) and Martin (1951) classed it as of little or no value. Hunt and Lutz (1959) considered it a desirable food plant when seed production could be induced by water manipulation, but apparently considered the vegetative parts of the plant of negligible value. The persistence with which ducks and coots have used the curly-leaf beds at Reelfoot suggests very strongly that it is a favored food. This conclusion is based upon many observations by personnel of Reelfoot National Wildlife Refuge and of professional guides. No stomach analyses have yet been made from ducks and coots taken from the curly-leaf beds, nor have the plants been analyzed chemically to determine their nutritive value.

CONTROL BY HERBICIDES

Experiments conducted in the spring of 1964 by personnel of Reelfoot National Wildlife Refuge and Tennessee Game and Fish Commission showed that curly-leaved pondweed can be killed by the herbicide "Diquat." Other herbicides found effective on other species of submerged aquatic plants may also prove to be effective against this plant. But since curly-leaf has become so widely distributed in Reelfoot Lake and since it is so aggressive, eradication by the use of herbicides seems unlikely. Control by herbicides on limited areas, such as in boat trails, may prove to be practical.

BIOLOGICAL CONTROL

It has been suggested that the decline in Reelfoot Lake of the number of rough fish, principally buffalo (*Megastomatobus cyprinella*) and carp (*Cyprinus carpio*), since the deepening of the spillway ditch in 1959, has been a factor in the increase of submerged aquatics, including curly-leaved pondweed. Pressure, particularly by dock owners and commercial fishermen is being applied to alter the spillway ditch so as to permit the migration of buffalo and carp again and encourage their reproduction. It is claimed by some that, in addition to improving the catch for commercial fishermen, the activities of buffalo and carp will tend to eliminate curly-leaved pondweed and other submerged aquatics, or at least generally to improve aquatic weed conditions.

REAPPRAISAL

In view of the developments of the past year, it is questioned whether the curly-leaved pondweed should be considered an undesirable plant in Reelfoot Lake. In the winter of 1963-64 it had spread alarmingly in the northern and western side of the lake and fears of its becoming a menace to fishing and even to the waterfowl value of the lake were justified. But in the winter of 1964-65 and the following spring, the abundance of this pondweed had declined markedly.

John De Lime, Manager of Reelfoot National Wildlife Refuge, reports that the old Bayou DuChien channel south of Upper Blue Basin down to Buzzard Slough was completely filled with the pondweed in the early spring of 1964. This was not true in the spring of 1965. The area which had been plugged the year before was entirely open. There were occasionally mats of curly-leaved pondweed but this was also true of water star-grass (*Heteranthera dubia*), sago pondweed (*Potamogeton pectinatus*), watershield (*Brasenia schreberi*), and coontail (*Ceratophyllum demersum*). It is true that there were mats of curly-leaved pondweed of considerable size in places in the spring of 1965. The shallow water parts of Upper Blue Basin were plugged again, but it was generally recognized by the guides that the mats were not so large nor so troublesome as in the spring of 1964.

There are two prevalent explanations as to why the pondweed declined so markedly from one spring to the next. One very likely explanation is that the water levels from October to March were usually from four to fifteen inches higher during the fall and winter of 1964-65 than during the same period the previous year. If higher water is the explanation, we can expect that the pondweed can be kept out of the deeper areas by holding high water levels during the most vigorous growing period. In this case, however, we would expect the plant to take over the shallow areas in the clear water of the lake. This shallow water take-over could probably be prevented by a late summer drawdown if the plant proves to be a menace in shallow water.

Another possible explanation of the decline of curly-leaved pondweed in the areas mentioned is that it was literally eaten out by ducks and coots. This was the belief of the guides with whom I talked at Gray's Landing. Also Mr. DeLime found that, during the hunting season, there was heavy shooting in the Palestine Stumps area of Bayou DuChien and that, seemingly, the coots could not be gunned out. They kept returning there to feed in the curly-leaf mats in spite of the shooting. Heavy use by coots and ducks continued until migration at locations where there were curly-leaf beds.

At present it is evident that further information is needed on the growth habits of the plant, its value as a waterfowl food plant and the relation that waterfowl and fish may have on its spread in Reelfoot Lake before final conclusions are drawn concerning its proper management.

LITERATURE CITED

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