contact and systemic; some weeds are killed faster than others, the most resistant taking up to four weeks. Some emersed species such as arrowhead, burreed, and water-primrose will be killed with Aquathol Plus also. This formulation also leaves a margin of safety for fish.

A much more active aquatic herbicide is formed when endothall is formulated as the amine salt. The products Hydrothol 47 and Hydrothol 191 will control weeds with concentrations of 0.5 to 2.5 ppmw. The amine salts are more toxic to fish also (concentrations of 0.3 ppmw to 1 ppmw may kill them). Partial treatments with this chemical eliminate the danger because fish swim away from treated areas.

Hydrothol 47, at high rates, can be used for pond renovation. Complete kill of weeds and fish is quick and restocking can take place one or two weeks from treatment depending upon the extent of infestation.

Applicators are not expected to pick a single chemical from this partial list to do all jobs. Numerous chemicals are available and all have advantages and disadvantages depending upon what job needs to be done. From job to job, conditions will vary; desires of clients will vary widely also.

Check State Water Laws

Before any chemicals are applied to any waters, operators should seek information concerning state laws with regard to application of herbicides to water bodies. States such as Wisconsin and Minnesota require that an officer of the Water Pollution Board or the Conservation Department be present when chemicals are applied.

Some states simply require a permit, with all pertinent information submitted when the job is to be done. This information usually includes the size and location of the lake, inlets and outlets, the nature of the nuisance, the chemicals which will be applied and their concentrations. These laws make certain that contracting applicators know their business.

In the third and last installment of this series, we shall cover equipment and application techniques used in aquatic weed work. A bibliography is included with the final section, to be published next month.

Know Your Species

SAGO PONDWEED

(Potamogeton pectinatus)

Sago pondweed, one of the most costly water infesters, is also one of the most difficult to eradicate of all potamogetons.

Sago pondweed has adapted to many types of water conditions and this influences the losses it can cause. Irrigation ditches in the West are subject to infestation by sago pondweed. This rooted perennial grows so thickly that stands often block flow of water in irrigation ditches and thus damage crops needing water. Sago is the only pondweed that is resistant or tolerant to reasonable amounts of sodium arsenite. For this reason, identification must be accurate.

Sago is a very bushy pondweed with long, rounded, and many-branched stems. Stems are not upright; rather they are limp and bend with currents. Heavy infestations in lakes hinder wave action and contribute to stagnation.

Branching from stems are the slender leaves, distinctive in that they are rounded and threadlike, and taper to a point. In flowing water, groups of leaves are fanlike.

Small flowers are borne atop a spike which protrudes from the water only during blooming. It is an extension of the mainstem and does not arise from the juncture of leaf and stem. Pollen from this flower is carried by wind. The seeds of sago provide excellent duck food; this plant is protected and sometimes propagated on many waterfowl refuges.

Although sago pondweed produces an abundance of flowers with viable seeds, a major means of its spread is by root-runners or rhizomes. These runners give rise to many offshoots over a wide area. Very few plants can thoroughly infest relatively large areas. In summer, some root-runners produce tubers which overwinter and sprout new pondweeds the following spring.

Sodium arsenite, which controls other pondweeds, will not control sago pondweed. Some of the newer aquatic herbicides, such as endothall and Diquat, have proved successful and are being used against this widespread pest. Aromatic solvents and acrolein are used extensively in western irrigation canals and drainage ditches to control this nuisance plant.

Prepared in cooperation with Crops Research Division, Agricultural Research Service, United States Department of Agriculture, Beltsville, Maryland.

Drawing courtesy of the Regents of the University of Wisconsin, from N. C. Fassett, A Manual of Aquatic Plants, 1960, the University of Wisconsin Press.