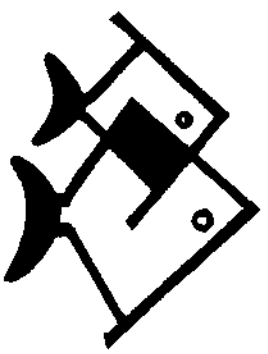
INDIAN FISHERIES

1947 – 1977



ISSUED ON THE OCCASION OF THE FIFTH SESSION OF
THE INDIAN OCEAN FISHERY COMMISSION HELD AT COCHIN FROM
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4

Aquatic Weeds and Their Control

Some aquatic weeds reproduce and grow to menacing proportions and they choke the water areas posing serious problems to pisciculturists as the weeds cause de-oxygenation and eutrophication.

The common weeds infesting our inland and estuarine waters are: *Salvinia auriculata, S. natans, Eichhornia crassipes, Pisita stratiotes, Lemna minor, Utricularia vulgaris, Myriophyllum spicatum, Hydrilla verticillata* and species of *Najas, Vallisneria, Nymphea, Colocasia* and *Panicum*.

A large percentage of the inland fresh water areas in India is rendered useless for the cultivation of fish on account of large infestation of weeds. Profuse growth of the aquatic vegetation in the water bodies cause imbalance in the nutrient and oxygen content, limits living space for fish, upsets the physico-chemical equilibrium of the water, restricts plankton production, promotes accumulation of deposits leading to silting, increase the turbidity of waters, provides shelter to predators and obstructs fishing operations.

The common methods adopted for control and eradication of aquatic weeds are manual, mechanical, chemical and biological.

Physical control

Physical removal of weeds is the oldest and the most common method used all over the world. However, the equipments used for this purpose have undergone

considerable improvements. Physical control of aquatic weeds is free from residue of pollution problems. However, repeated removal of massive quantities of vegetation from a water body removes large quantities of nutrients from it. This may reduce food production in the primary as well as secondary trophic levels. Physical weeding is a non-selective process so that the chances of establishment of a specific weed are remote. Mowing, crushing, raking, burning and mechanical chaining, dredging and netting are some of the well known physical methods. Recently in some advanced countries, underwater weed cutters and ditch-bank movers have replaced older methods.

In India where labour is cheap, manual methods are often employed to remove weeds. In small water bodies, traditional methods of hand picking, uprooting of emergent and marginal weeds and cutting them with scythes are considered suitable. In West Bengal weed cutting launches having 'V' shaped sickles have been used for cutting *Colocasia* and other tall weeds in shallow waters. Power winches are employed in Assam to clear shallow waters thickly infested with water hyacinth. Recently diesel operated winches are used in Orissa to eradicate dense rooted submerged vegetation. Marginal weeds could also be controlled by grazing and deepening of the marginal shelves; floating weeds can be prevented from spreading by draining, desilting and by erecting barriers.

Chemical control

Chemicals can provide an efficient means of reducing or eliminating the growth of undesirable aquatic weeds. A single herbicide that controls the weeds and at the same time is absolutely safe to all the water uses is yet to be developed. The main considerations in the use of herbicides in fihsery waters are that they should be (i) effective in killing weeds at reasonably low rates of application, (ii) cheap and easily available, (iii) non-toxic to human and stock animals and (iv) should not pollute the treated water or have any adverse effect on the water and soil. However, the advantage of chemical control is that the chemicals can reach the weeds otherwise inaccessible to mechanical or other methods of control. Unlike the mechanical control, chemical control sinks the weed growth to the bottom avoiding thus loss of plant nutrients from the water bodies. The common herbicides widely used are: Copper sulphate pentahydrate (CSP), Acrolein, Silex (Fenoprop or 2,4,6-TP), Simazine, Diuron, Monuron, Endothall, Dalapon, ATA (amitrol) and so on.

In our country, hyacinth, lotus, lillies, cyperus, *Typha* and *Ipomea* are controlled by the use of herbicides such as 2, 4-D sodium salt, hormone weedicide, which are easily available at cheap rates. Taficide 80, in combination with detergent 'Surf' at 0.25% concentration kills water hyacinth as well as Simazine at the rate of 5 kg per ha. sprayed in aqueous emulsion. Dalapon is effective against aquatic grass, *Panicum*. Other floating weeds such as, *Pistia* and *Salvinia* have been controlled by H. S. D. and Powerine. Gramoxone has been found to clear more than 90% of Pistia infestation. Taficide 80, Tafopon and 2, 4-D are effective against marginal weeds. Copper sulphate alone or in combination with ammonium sulphate has been used for controlling *Chara*, *Hydrilla* and *Vallisneria*. Sodium aresenite at 5–6 ppm, superphosphate at 500 ppm and urea at 50–100 ppm are quite effective in killing submerged weeds. Ammonia is toxic to all aquatic vegetation; though it kills fish, economic forms can be saved by sectional treatment. Simazine at 0.5 – 1.0 ppm could effectively control algal blooms. Noxious blooms of *Peridinium* sp. could be cleared by aqueous ammonia (2 ppm). Blooms of blue green algae *Microcystis* could be controlled by Diuron herbicide at about 0.3 ppm.

Biological control of aquatic weeds

A paucity of natural enemies is one of the main reasons for the abundance and aggressive nature of the weeds. Introduction of a suitable bio-agent can restore a desirable balance in the aquatic ecosystem by reducing weed growth without polluting the water. Bio-control is relatively permanent in its effect since the aquatic flora (the host) and the bio-agent tend to remain in a cyclic equilibrium.

Certain weeds can be controlled by selected varieties of herbivorous fishes such as grass carp, common carp, silver carp, Tilapia and silver dollar fish. Aquatic birds, mammals and some species of snails are also effective in bio-control. Certain insects like flea, beetle are specific feeders of the aligator weed.

The menace of 'African Payal'

In many areas of Kerala and Tamil Nadu, inland water masses, estuariecs and also inshore regions of the sea are infested on a large scale during certain seasons by the weed commonly known as 'African Payal' (*Salvinia* spp). This weed grows and spreads very fast and it affects pisciculturists, as well as paddy cultivators. The weed also affects movements of inland transport. Fish culture ponds, farms and paddy fields when infested with this weed creates de-oxygenation and mortality to fish fauna. Sluice gates, fishnets, and tackles are clogged by this weed. The propeller and other mechanical parts of fishing and transport vessels are choked by this weed resulting in obstruction to their free movement. During tidal movements especially in the backwaters and estuaries, the large quantities of these weeds are transported to the inshore regions of the sea and they pollute the beaches and intertidal zones thus affecting the littoral fauna. The inshore benthic community is also affected to a great extent by the settlement of dead and decaying *Salvinia*. The control of this weed has been engaging the attention of research institutes since 1966. The CIFT has developed two types of harvesting machines one for eradicating submerged weeds and the other for removal of both submerged and floating weeds. The area occupied by *Salvinia* at times is so vast that physical removal involves considerable labour and cost. Chemical control would involve the use of large quantities of chemicals which may pose a threat to the inland and estuarine fauna. Methods of controlling this weed by biological means such as using the insect *Polynea* sp. or a Hymenopteran has not made much headway. The control of this weed needs co-ordinated efforts by research institutions, other government agencies, and the public.

It may also be necessary to investigate whether *Salvinia* could be put to some use. The resources are said to be insufficient to support an industry such as the manufacture of coarse packing boards.