Laboratoire Curie, Paris) reported variations of the fluorescence quantum yield of the three aromatic amino acids with excitation wavelength. For all three, the yields, based on both quinine sulphate and sodium salicylate as wavelength-independent quantum counters, were constant in the longwave absorption bands, then fell abruptly to lower constant values in the shortwave absorption bands. The discussion provoked by her findings was about equally divided between explaining it away as due to experimental artefacts or inadequacy of the quantum yield standards, and in accepting them as correct and proposing possible explanations.

From the rather small number of communications concerned with small peptides and polypeptides, that by Ph. Wahl (Centre de Biophysique Moléculaire, Orléans) on the pulse fluorometry of tryptophyldiketopiperazine may be noted. He concluded that quenching of tryptophan fluorescence by the peptide bond only occurs in a folded conformer. The equilibrium constant relating the folded and unfolded conformations seems to be different in the excited and ground states; the ground state value is available from nuclear magnetic resonance studies.

An indication of new spectroscopic techniques was the inclusion of contributions on magnetic circular fluorescence and fluorescence polarisation and on magnetic circular dichroism in the near infrared. The shorter papers on visual pigments were concerned with problems of singlet-triplet intersystem transfer and *cis–trans* isomerisation of polyenes, and in the large number of communications on photochemical reactors, the roles of singlet and triplet oxygen were frequently discussed.

Management of aquatic weeds

from Peter D. Moore
Plant Ecology Correspondent

AT the close of the International Hydrological Decade it is only natural that the world of waterweeds and the problems associated with their control should be receiving some attention in the scientific literature. It is natural too that the problems of the developing countries should receive greatest prominence, for here many essential programmes of irrigation are being set back by the luxuriant and rapid growth of aquatic vegetation in tropical climates. India, most especially, has been at the fore in a series of recent publications on this subject.

Gupta has summarised many of the Indian problems and some of their solutions in his booklet *Aquatic Weed Control* (Rajasthan College of Agriculture, Udaipur, 1973). In Rajasthan the development of a canal system is relieving a serious problem of water distribution; many women were forced to walk several kilometres to fetch pitchers of water from surface ponds. The canal projects, however, have suffered severely because of the growth of aquatic weeds, particularly water hyacinth, *Eichornia*, and the water ferns *Azola*, *Wolfia* and *Salvinia*. From April to June the canals are closed so that clearance by hand can take place, but this control method is ineffective in the long term. Only one mechanical weed cutter operates in Rajasthan but biological control using Chinese carp is being attempted; the use of chemical herbicides is prohibitively expensive. The same sad picture of India's plight emerges from the recent UNESCO symposium held in New Delhi and reported by Tinker (*New Scientist*, **61**, 747; 1974).

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Water channel in India infested with the water hyacinth *Eichornia*.

A very full review of the entire problem has now been published by UNESCO (*Aquatic Vegetation and its Use and Control*, edit. by D. S. Mitchell, Paris, 1974). Although the theoretical consideration of the mathematics of waterweed population growth and the technique of mechanical, chemical and biological control of waterweeds are undoubtedly important as short term approaches to the aquatic vegetation problem, data presented by Boyd (University of Auburn, Alabama) in this collection of papers provide hope for a more permanent solution. The explosive growth of aquatics is itself an indication of eutrophication and nutrient wastage which can ill be afforded, especially in countries such as India. Boyd considers ways in which waterweeds could assist in the retrieval of these last elements.

Many waterweeds provide a better feed for livestock than dried alfalfa hay. Generally they contain rather less crude protein and fibre, but more ash and fat than this commodity. Inorganic ion concentration in aquatics falls within the range generally accepted for crop plants; ash values of more than 25% of the dry weight are recorded, the noxious weed of many Indian waterways, *Hydrilla verticillata*, being responsible for some of the higher figures.

Before these nutrients can be re-used by crops they must be released from the organic tissues of the water plants, and decomposition is not always rapid. *Eichornia* compost takes about 3 months of fermentation before it is suitable for use as a fertiliser. Nevertheless, when it is considered that eutrophicated waters can support a standing crop of 29 t ha^{-1} (dry weight) of *Eichornia* containing 157 kg ha^{-1} of phosphorous and 693 kg ha^{-1} of nitrogen, this process must be considered an important means of cutting nutrient losses.

In the developed countries the cost of retrieving lost nutrients from solution usually exceeds the cost of supplying new ones. In countries such as India, where manual harvesting is cheap and where the foreign exchange needed for chemical fertilisers is in short supply, the use of aquatic vegetation for nutrient recovery may prove to be economically feasible.

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Pistia stratiotes.