OBSERVATIONS ON CONTROL OF PISTIA STRATIOTES LINN. IN FISH PONDS BY "GRAMOXONE"

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Received May 24, 1971

(Communicated by Dr. B. S. Bhimachar, F.A.Sc.)

ABSTRACT

An account is given of the yard and field trials conducted at Cuttack which showed that 'Gramoxone' (20% paraquat) at 0.1 to 0.2 kg/ha. (a.i.) gave complete control of Pistia stratiotes in one to two weeks' time. The cost of clearance by the weedicide worked out to Rs. 64–93/ha as against Rs. 168–178/ha. for manual clearance. Treatment in instalments is recommended to avoid oxygen depletion due to rotting of treated weed mass and consequent fish mortality.

INTRODUCTION

The water lettuce, Pistia stratiotes Linn., is widely distributed in inland freshwaters, especially along the coasts of India. Some aspects of its morphology, taxonomy, ecology and distribution of the plant have been studied by Arber (1920), Biswas and Calder (1955), Subramanyam (1962), Mitra (1966), Singh et al. (1967) and Philipose et al. (1970). Among the publications on control of water lettuce besides other water weeds in India and Ceylon, the work of Parija (1934), Thomas and Srinivasan (1949), Dassanayake and Chow (1954), Singh (1962), Ramachandran and Ramaprabhu (1968), Philipose (1968) and Misra and Das (1969) are worthy of mention. Considerable work has been done on paraquat in U.S.A. and U.K. (Blackburn, 1968; Brian, 1966; Parker, 1966). Weldon et al. (1963) stated that 1.2 kg./ha. of paraquat was effective for the control of water lettuce. Lawrence et al. (1963) reported that paraquat is non-toxic to fish at concentrations even much greater than what is recommended for aquatic weed control. Investigations on the use of 'Gramoxone' (20% paraquat), against Pistia stratiotes undertaken at Cuttack, Orissa, during 1967–70 and the observations on its efficacy and economics are given in the present paper. 'Gramoxone'
a product marketed by I.C.I. (India), is a bipyridylium herbicide containing 20 per cent of paraquat ion.

**EXPERIMENTAL DETAILS AND RESULTS**

_Yard experiments._—Four series of experiments were conducted and the results are given in Table I. Fresh _Pistia_ plants were collected and grown in earthen pots (surface area 0.166 sq.m.). After a week when the plants were well established the calculated quantity of the weedicide was sprayed by a small hand sprayer keeping two replicates for each rate tried and for untreated controls. In all cases the plants lost their natural colour and started wilting 4-5 hours after spraying. The leaves gradually turned from yellow to brown and later whitish and the disintegration of the plants began by the fourth or fifth day. The affected plants rotted and floated as a pulpy mass before sinking. During this process the dissolved oxygen (D.O.) of the water ranged from traces to 0.62 ppm. The entire process of death and disintegration in the first and second experiments conducted during winter (December and February) took 14 and 9 days respectively, whereas, in the third and fourth experiments conducted during summer (May) it took 7-8 days only. In the fourth experiment addition of a 0.1 per cent solution of a detergent (Surf) gave comparatively better results. The slightly quicker decomposition in the third and fourth experiments could be due to comparatively higher temperature and humidity in summer (Table I) as also reported by Brian (1966).

_Field experiments._—The field experiments were carried out in 6 ponds at Cuttack ranging from 0.13–0.46 ha. which were choked with _Pistia_. The results are presented in Table II. The weed infestation was divided with rope into plots of 10 m. breadth for convenience of thorough spraying from both sides.

In trial 1, spraying of the entire pond at the rate of 0.3 kg./ha. (a.i.) was done with a knapsack sprayer having cone jet nozzle, from the rear end of a small tin boat (2 m length) dragged through the infestation. Rotting of the plants started seven days after spraying. Some dead specimens of the fishes _Barbus ticto_ and _Mystus vittatus_ were observed floating while other fishes and some murrels were observed at the surface possibly due to a sudden fall of D.O. to almost nil. The D.O. increased to 1.4 ppm. by the thirteenth day and no further mortality of fish was observed. After two weeks all the dead weeds settled to the bottom. As seen from Table II, above 97 per cent. clearance was achieved. As a result of disintegration of the weed the phosphate level of water increased from 0.4 ppm. to 0.85 ppm.