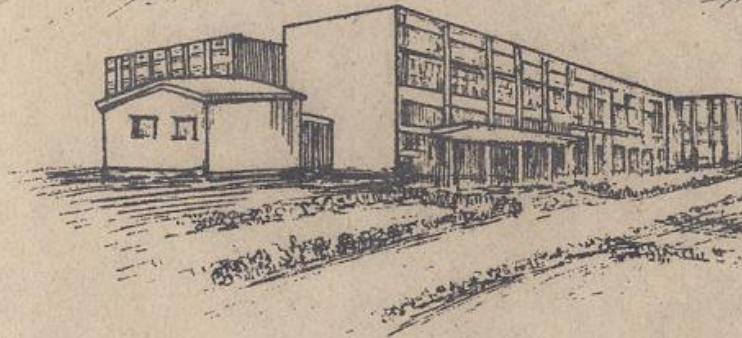


Bulletin No.2
December, 1963

REPORT ON THE INFESTATION OF WATER HYACINTH IN MARIKOLONG
BHEEL (NOWGONG, ASSAM), WITH RECOMMENDATIONS FOR
ITS ERADICATION

By

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I N D I A.

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INTRODUCTION

Marikollong Bheel is the cut-out loop of the Killong river, approximately 86 hectares (212 acres) in area, fully choked with water-hyacinth. Due to continuous accumulation of organic debris from the weed mass and without the possibility of this organic sediment being fully utilized for fish-production in the present weed-choked condition of the water surface, there is a real danger of the existing fishery being ruined in course of time. Unless the weed mass covering the water surface is removed and the water exposed to sunlight, no useful production can start. If such a production is started, the fair nutrient level (available P-1.32 mg/100 gms, available N-10.4 mg/100 gms and Mg. Carbon-5.7%) of the bottom sediment may be expected to keep it up at a high level.

The methods and techniques that may be employed for weed clearance have to take into consideration the special features of the specific case and exploit any of them that may lend themselves to such exploitation. With this end in view, a three-week long investigation and small-scale trials were carried out, based on the results of which the present report is drawn up.

TOPOGRAPHICAL FEATURES

The bheel is located in the close vicinity of Nowgong town, with a large number of houses on both the banks all along its entire length. During dry season, the shallower areas are reclaimed and cultivated mainly for bananas and vegetables.

The bheel is on an average about 107 meters (360 ft) broad in the dry season and may expand to considerably over 122 m (400 ft) breadth during the flood season. The depth during the dry season is about 1.5 m (5 ft) generally and may become as great as 7.5 m (25 ft) or 9 m (30 ft) during the floods. Small islets are exposed during dry season and people lay out even foot paths across the bheel at shallow portions.

The dry hot summer season is of short duration, lasting for about two months only over March and April.

Condition of weed-infestation

The water surface is thoroughly choked up with water-hyacinth. From a distance, the infestation looks uniform but at several places

there are depressions containing shorter plants. At present the entire area looks brown due to the dry dead leaves, which are taller. A close examination, however, reveals a large bulk of green leaves lower down. It is reported that the drying of older leaves starts during winter and that just after the onset of rains, the green leaves come up and the entire infestation looks lush green till the beginning of winter. In each clump of weeds most of the dead leaves belong to the parent plant from which several younger plants are already sprouting and growing vigorously. The infestation is dense enough to enable a man walk over a bamboo pole laid on top of it. The data given below will convey an idea of the condition of the weeds and the magnitude of infestation.

(a) Nearer to shore at 0.75 m (2½ ft) depth

Number of weed clumps per sq m - 36 (per sq yd - 30)

Total weight of weeds per sq m - 115 kg (213 lbs per sq yd)

Buoyancy of the infestation - 146 kg/sq m (30 lbs per sq ft)

(b) Samples from 1.22 m (4 ft) depth (average of 12 clumps studied)

Weight of the Clump.	No. of young plants in each clump.	No. of green leaves per clump.	No. of dead leaves/ clump.	Height of dead leaves.	Hight of green leaves.	Length of bulk of roots.
4.3 kg (9½ lbs)	10	43	8	66 cm (26")	23 cm (9")	46 cm (18")

On the basis of the above study, it is clear that there are at least 92000 tons of weeds in the entire bheel at present. Also there is clear evidence that they are growing vigorously and during the flood season, with the prospect of the present area increasing by about 20.2 hectares (50 acres), the magnitude of the problem is likely to increase correspondingly.

PROBLEM OF CLEARANCE

As already pointed out, this has to be tackled in a special way taking into consideration every relevant point, and after putting all possible methods to actual field trials to assess the comparative feasibility and economics.

This being a local problem in a limited sense, the pros and cons of all possible methods were thoroughly discussed with local fishery officers, agricultural engineers, the Plant Protection Officer, labourers and laymen. Several suggestions and points of view emerged, but the time available was too short and weather conditions too unfavourable to put every one of them to a field test. Even so, the following assessment of different methods was made, based upon all possible available data.

The possible methods could be broadly classified as under :-

- A. Physical removal - By manual labour
- B. Chemical eradication
 1. 2,4-D Compounds.
 - (a) 'Taficide' - 2,4-D-80% Sodium salt (Tata-Fison).
 - (b) 'Fernoxone' - 2,4-D 80% Sodium salt (ICI).
 - (c) 'Metanol' - 2,4-D 55% free acid (Bayer).
 2. Triazine derivatives.
 - (a) 'Simazine' - 50% active ingredient, Wetttable powder.
 - (b) 'Simazine' - 25% active ingredient, paste.

A. Physical removal

Methods of physical removal simply envisage clearing the water surface, without providing for the safe disposal of the 92000 tons of dead organic matter in an inhabited locality. It has been suggested that the heaped up weed mass could be burnt after drying, but due to insufficiency of space over greater part of the length along the water margin for this purpose, re-infestation by the live plants heaped ashore may overtake the process of drying. Another important point against physical removal is the loss to the fishery of the huge quantity of vital nutrients (nitrogen, phosphorus, calcium and potassium), which have been robbed from the fishery by the weeds.

1. In addition to clearance methods by manual labour, for which a field trial was carried out (vide infra), mechanical-cum-manual clearance methods were also thought of. One of the suggestions that emerged out of discussions with an agricultural engineer was that a bulldozer working a power winch could be used for the purpose of roping in and dragging ashore large masses of weeds. The following cost estimate was given by the engineer. The machine, working

for 8 hours per day at a cost of Rs.20/- per hour and with about 10 attendant labourers to remove the weed masses brought ashore and for other sundry jobs, could clear about 1.62 ha (4 acres) a day. With contrivances of pulleys and ropes, the machine could be operated from anywhere on the shore. This would mean that the winch would bring up about 1840 tons of weeds, which should be removed from the winch in a day by the 10 labourers at a rate of 184 tons per man per day. This does not sound feasible. Any estimate of the cost of this operation has got to be based on a field trial.

B. Chemical methods

Even though there are innumerable published records to prove beyond doubt the thorough efficacy of patented chemical weedicides, particularly formulations of the 2,4-Dichlorophenoxyacetic acid (2,4-D), against water hyacinth, it is surprising to find a wide range of conflicting opinions, not only among laymen, but among knowledgeable circles also about their ability to do the job. The fault in cases of failures might be traced mainly to lack of thoroughness and uniformity in spraying the chemicals. The main causes of failure are adduced below.

1. Improper machine

It is very important to work out the volume of solution needed to cover an unit area by the particular spraying outfit to be used for the actual job. It is obvious that the time needed to cover the unit area under actual field conditions is also to be considered. For instance, a power sprayer outfit may spray out 250 litres in about an hour's time. However, manipulation of the spraying boom over one hectare of weed-choked water to achieve uniform coverage takes, say, 8 hours. It is clear that 2000 litres of weedicide solution would be necessary to achieve uniform coverage with that particular spraying outfit for that particular area. Now again, the question of effective concentration may arise. As far as possible it is advisable to follow, within reasonable limits, the manufacturer's instructions in this matter. In the example above, if the manufacturers have advised a dose of 10 kg per hectare in 1000 litres, diluting the quantity to 2000 litres to suit the particular sprayer outfit is clearly unwise, unless based on the result of a trial or practical experience. It is better to choose a less powerful sprayer which will deliver only 125 litres per hour, so that 1 hectare area could be covered with 1000 litres of solution (Containing 10 kg of weedicide) as advised by manufacturers, in 8 hours' time.

2. Improper concentration

The other alternative of dissolving 20 kg in 2000 litres and spraying it over 1 hectare is also, besides being uneconomical, risky. For, an over-dose of translocated weedicides, such as 2,4-D formulation, may kill the contacted parts of the plants too quickly, as a result of which efficient translocation of the poison through the entire plant body may be hampered.

3. Improper condition of the plants

The very mode of action of the translocated weedicides, such as 2,4-D formulations, requires the plants to be in healthy, vigorously growing condition to achieve the maximum effect. Overaged plants in a static condition of growth cannot absorb and respond to the translocated poison as well as a young vigorously growing plant. Also, in a clump, too many dead leaves which usually stand taller than the younger live leaves may effectively protect the latter from the poison spray, particularly if the spray is not fine enough. In any case, they entail a certain amount of wastage of material.

4. Improper season

A proper season for using the chemical weedicides is as important as any of the foregoing considerations. Rainy season will be obviously unsuitable, because the rain may wash out the chemical before the plant has absorbed a lethal dose. Besides, the season is unsuitable for the men and machine working on the job. Winter season is also not the best time for the operation, for two main reasons:

- (a) The plants will not be vigorously growing and the older taller leaves start drying and protect the shorter young green leaves.
- (b) Even if the plants are ultimately killed, sinking may not take place quickly, because the process of bacterial decomposition of the dead plants will be slow in winter.

The present case (Marikollong bheel) embodies all these complexities put forth above. The difficulty of effectively covering the inner area of infestation with the spray without too much expense of time or money is the most challenging. Though every possible idea could not be tried within the brief period, a couple of more promising ones were tried and the actual difficulties in large-scale field operations assessed. Frequent unseasonal rains hampered the trials to some extent.

Before giving details of the assessment, it may be pertinent to discuss some of the fears and opinions expressed by the local people and fishery officers and the actual risks involved.

1. Silting up

The Anchalik Panchayat have expressed a fear that if the entire weed infestation is killed in the bheel itself, the deposition of the debris will silt up the entire bheel. However, actual yard trials proved that 3 months after spraying, all the plants had totally died and sunk, depositing only about one cm thick debris. Even this little amount of organic debris will be used up gradually when fish cultivation is taken up. As already pointed out, there is far greater danger of silting up, if the weed infestation is not quickly cleared.

2. Fish Mortality

Some fish may get killed by fouling of water by the rotting weed mass. The existing fish population in the area consists mainly of predatory murrels, cat-fishes and uneconomical minor weed fishes, which anyhow are better got rid off if the bheel is to be stocked with cultivable economic carps. If, however, the existing fish population is to be saved anyhow, this is possible to a great extent by clearing the infestation section by section in several instalments. That is, in the first instance, an area of, say, 5 hectares may be treated and when the weeds die and foul the water most of the fish may take refuge in uncleared area for a week or two till the water returns to normalcy. The treatment of the next section may then be taken up. The process, of course, will considerably delay the achievement of total clearance of the bheel. If the clearance of the entire bheel is well-timed, so as to begin a few months before the onset of rains and be completed just about 6 weeks before rains start, the influx of flood water may largely mitigate the possible fouling of water and loss of fish.

It is difficult to be more precise on this matter in the absence of experimental data, which can be collected only on a long term basis. The local fishery officers have been taught how to carry out miniature representative trials and collect relevant data.

Aerial Spraying

During discussions with the Central Plant Protection Officer at Gauhati, the feasibility and economics of aerial spraying were considered. Basing upon his own knowledge and experience in the matter, he was of the opinion that a helicopter or plane equipped for the purpose along with a trained pilot could be hired either from the Central Plant protectorate or from Tea cultivators' Association, but that the aerial operation would not be economical for areas smaller than about 500 hectares. It might cost approximately Rs.85 to 120 per hectare (Rs.35 to 50/acre). If the kill and clearance

of weeds is not complete or satisfactory, a second spraying may be required.

Further to being costly, this method will also involve several other difficulties. i) Since the entire area is to be treated in a single expensive operation, no small-scale trial treatment will be feasible to assess the efficacy of spraying and the result achieved, based on which all the finer important details of the operation have to be planned. If satisfactory result is not achieved due to faulty planning of details, the whole operation may have to be repeated, which will be certainly uneconomical. ii) In the immediate vicinity of the bheel there are gardens and other cultivated areas, the crops in which may be damaged by the weedicide, being carried over those areas by the wind. iii) Massive single instalment killing of the entire infestation may pollute the water very badly and make it impossible to utilise the existing stock of fish.

CLEARANCE EXPERIMENTS

(a) Physical removal by manual labour

A field trial was carried out in a plot of about 0.28 ha (0.7 acre) across the bheel at a fairly representative section and the following assessment was made on that basis.

There is little doubt about the feasibility of this method for the entire area. 30 men could clear an area of about 0.105 ha (0.2582 acre), i.e., 23 m X 46 m or 75' X 150', with a maximum depth of 1.4 m (4½') in the course of about 6 actual working hours @ Rs.3/- per 6 man hours. On this basis about 300 men working from both the shores can clear the entire 6.4 km (4 miles) stretch of the bheel in about 2½ months' time, at a cost of about Rs.74,000/- (about Rs.350/- per acre) under direct supervision.

(b) Chemical eradication

i) Spraying through boat-shaped device

The most important problem to be tackled was how to effectively spray the chemical over the interior of the weed infested area. One of the most promising idea to be tried was a skipping boat-shaped device, to which the spraying boom could be attached and pulled along by ropes from either bank so as to easily skip over the top of the weed mass. Weedicide solution could be supplied from shore by the sprayer engine through a sufficiently long pressure rubber tubing or Alkathene tubing. The device was easily made with plain tin sheets (of gauge 28) at a total cost of Rs.32/-.

Though initial trials with the device did prove the feasibility of the idea, it was found necessary to choose better material (light and rigid) and to modify the design before it could be made fully operational. This aspect of the work may be entrusted to the Fisheries Engineer of the Assam Fisheries Department to whom the idea has been fully explained and discussed.

ii) Manual spraying from improvised gangways

Uniform and effective coverage of the entire area with the weedicide spray being the most crucial problem for the successful treatment of infestation in this vast area, it was evident that vertically directed, judiciously applied on-the-spot manual spraying will be the most effective method. The infestation was so dense that it had a load carrying capacity of about 146 kg/sq metre (30 lbs per sq ft). Based on this calculation, a rectangular bamboo platform of about 0.75 sq metre (8 sq ft) area was prepared and a man with a knap-sack sprayer was sent to try spraying a small area. He was provided with another similar platform to enable him proceed further and further into the area. It was soon evident that it was impossible to manoeuvre from the platform without making it tilt due to irregular shifting of the operator's weight. This trouble could be overcome by using a long stout bamboo pole of about 7.5 cm (3") average diameter and about 10 m (30') long. This provides an effective area of about 0.75 sq metre (8 sq ft) capable of supporting $0.75 \times 146 = 109$ kg (240 lbs) weight, which is sufficient for one operator carrying a fully charged knap-sack sprayer. The operator's shift in weight, necessarily being only along the length of the pole, is compensated by the mechanical advantage gained due to the length and weight of the pole. The operator could use a long bamboo stick as a prop, while standing on the bamboo gangway.

Two men could manage continuous operation. While one was engaged in laying the bamboo gangway for the next trip across the breadth, the other continued the spraying. A third man had to be engaged to attend to preparing the weedicide solution, to supply it to the operator and for other general assistance.

For this field trial a dose of 8.4 kg of 'Taficide' per hectare (7.5 lb/acre) was tried, and the amount of solution needed to cover 1 hectare with the knap-sack sprayer was about 455 litres (100 gallons). Walking along the bamboo gangway, the operator could conveniently and satisfactorily cover about 1.5 m (5') stretch on either side. To cover the entire breadth of about 116 m (380') across the bheel, he needed about 41 litres (9 gallons) of the solution which had to be supplied in three instalments, the capacity of the tank of the knap-sack sprayer used being only about 14 litres (3 gallons).

8 Longitudinal sections of 3 metre (10') breadth each were marked off with rope and each section was treated similarly in the manner described above. The total area of the section aggregated to about 0.28 ha (07 acre), which was fully treated by the three men in two day's time. There is no doubt that the entire bheel could be treated in this manner, if the density of infestation is thick enough.

Calculating on this basis, the cost of treatment approximately works out as follows :

Cost of labour	Rs.67/	ha	(Rs.27/	acre)
Cost of chemical	Rs.50/	ha	(Rs.20/	acre)
Other expenses	Rs.13/	ha	(.5/	acre)
	<u>Rs.130/</u>	ha	<u>(Rs.52/</u>	acre)

iii) Yard experiments

For a thorough check and accurate assessment of the treatment under the existing conditions of weed infestation, yard experiments and small-scale test treatments in the actual field along the shore were carried out at about the same time as the above described larger representative treatment across the entire breadth of the bheel.

iv) Dosage and efficacy of Chemical treatment

Since the author had to leave Assam before the effects of the above trial treatments had fully progressed, arrangements were made with the local fishery superintendent for continuance of the observations and periodical reporting. The latest position according to these reports is that in the yard experiment where representative water hyacinth plants from the bheel had been kept in a drum at near - natural conditions and thoroughly sprayed with 'Taficide' at the dose and dilution used for the field trial (8.4 kg in 1125 litres aqueous solution per hectare or 7.5 lbs in 100 gallons per acre), the weeds were very badly affected in about 6 weeks after the treatment, and settled to the bottom 3 months after, forming only about 1.3 cm thick sediment. Six weeks after the treatment it was reported that in the bigger field trials, along the lines where the bamboo gangway was laid, the weeds were not affected, obviously because they were sunk below the water level, while the operator walked over them. There seem to be other small patches in the area which, obviously, were not covered by the spray due to oversight on the part of the operator. Except for these patches, the weeds in the rest of the area were clearly affected and the effect had progressed satisfactorily. According to a report received about 6 weeks after the treatment, the rhizomes of the plants had completely rotted, but the stalks of some of them were still floating. In the dead plants

there were no live leaves and the density of infestation had been reduced to about 36% of the original density. In an area of 1 sq ft, out of 35 clumps of the weed, only 11 were still alive 6 weeks after the treatment. Even then a boat could not be pushed through. According to a second report received subsequently, just when the decaying plants were about to sink, the whole area was completely flooded and the observations were vitiated.

The Fishery Superintendent, Nowgong, had been given detailed instructions to continue the experimental spraying in small test plots (about 0.01 acre) along the shore at 3 different doses, viz. 3.4, 5.6 & 8.5 kg/hectare (3,5 & 8 lbs/acre). Another bheel (Saran bheel) infested with water hyacinth had also been treated according to detailed instructions given to the Fishery Superintendent. In the latter case, where the weed infestation was not completely choking the water surface, the spraying could be carried out from boats. The results are reported to be encouraging, and a considerable area has been cleared.

Judging from the results so far, it is felt that a thorough spraying is necessary to ensure that every plant gets a sufficient dose of the weedicide. Otherwise, plants which do not receive a sufficient dose, later tend to multiply under favourable conditions and occupy the area vacated by the dead plants. The results of these trial treatments have emphasised the need to ensure a very thorough spraying, particularly under conditions of heavy infestation and when the younger plants are partly protected from the spray by the taller dead leaves, as it happened in the present case.

In the manually cleared area also, it is reported that the weeds on the margins have rapidly multiplied and have considerably encroached into the cleared area. This emphasises the need for a very thorough clearance of the entire bheel in one instalment and subsequent thorough maintenance.

EVALUATION OF CLEARANCE METHODS

In the foregoing paragraphs only those methods have been considered which were actually tried in the present case or about which authentic information based on actual field experience could be collected. The assessment made of each will be valid only for the specific conditions of infestation, weather and environmental conditions, as encountered at the time of the present study. These conditions may, of course, change slightly or to a great extent, when the actual massive treatment of the bheel is to be undertaken and therefore the assessment made now can only be very approximate. Even allowing a wide margin for all the likely variations, the

tabulated assessment as delineated in the appendix gives a clear indication of the merits and demerits of the various methods.

RECOMMENDATIONS

As already mentioned, of the several possible methods, only two methods, viz. manual clearance and 2,4-D weedicide (TAFICIDE) spraying at 8.4 kg/ha by manual labour, could be tried in the short time available, that too under a specific set of conditions of weed infestation and weather.

Based on the results of the trials made, it can even now be said that clearance by manual labour is bound to be so expensive, that it can be thought of only as a last resort.

The full results of the chemical treatment could not be observed due to floods. As such, only very tentative and general recommendations could be made at present. Meanwhile, trial treatments are to be continued and close observations on the condition of the weeds are to be maintained for about a year till massive operations could be undertaken based upon the findings of the continued study.

- 1) The weeds must be in healthy, vigorously growing condition while subjecting them to chemical treatment, in order to achieve the maximum effect (see page 5, para 2). Monthly observations on the points mentioned under "Condition of weed infestation" are to be made.
- 2) The importance of the weather for successful operation has also been dealt with. Hence, it is suggested that regular weather forecasts and reports pertaining to Nowgong town area be obtained from the Meteorological Department.
- 3) *Trial treatments in small (50 sq metre) test plots may be carried out with 'Taficide', 'Fernozone' and 'Metanol' at the approximate doses as mentioned against each in the appendix. These trials may be carried out as frequently as possible and close detailed observations on the condition of the plants be made.

* Detailed instructions on the techniques of these field trials have been given to the Superintendent of Fisheries, Nowgong who has already treated some test plots accordingly and is continuing the observations.

4) Sufficient and efficient spraying of the weedicide being the decisive factor for complete success of the operation, a good deal of commonsense experimentation is to be carried out to work out a convenient method of reaching and spraying the interior of the weed infested area and the shorter leaves which are protected by the taller leaves. It is obvious that a vertically directed fine spray from straight above will be the most efficient for the purpose. The most up-to-date knap-sack sprayer with a sufficient tank capacity of 18-20 litres (about 4-5 gallons) and mechanical pressurisers will be available for hire from the Central Plant Protection Officer at nominal charges.

5) The conditions of infestation, weather and the method of spraying and dosage which give satisfactory clearance are to be carefully noted in detail and the large-scale operation to clear the entire bheel then undertaken, under similar conditions.

6) The operation is to be completed as quickly as possible say, within a week or two, so that the optimum conditions remain steady. Daily and weekly weather forecasts are to be studied carefully and the operation organised and timed so that rains do not hamper or wash out the spraying. For such quick spraying operation, a large number spraying units consisting of about 3 men each are to be organised and properly supervised by experienced local staff.

7) If the kill achieved is not complete or satisfactory, a follow-up second spraying or manual clearance of the left-over weed masses is to be carried out before they start regenerating. Decisions on what to do about this and how to do are to be taken depending upon the actual conditions at the time.

8) If proper disposal of the weed mass (preferably complete drying and burning on suitable areas ashore) could be ensured, a small scale trial clearance with power winches may be tried in collaboration with the Agricultural Engineering section, and assessment made.

9) If the costs and risks involved in aerial spraying, as indicated in the foregoing pages, are considered not too much, aerial spraying may be tried in consultation and collaboration with the Central Plant Protection Officer, Gauhati.

10) A separate unit consisting of experienced local fishery staff exclusively to undertake prolonged study of the problem under local conditions and to deal with it along the general lines indicated above may have to be organised to solve the problem, a large part of which consists mainly in solving the several local complexities.

It seems to be quite possible to clear the water hyacinth infestation in the entire bheel within a comparatively short time

at a reasonable cost. Every effort has been made in the present study to visualize and consider all the details and difficulties involved, but even so new difficulties may arise depending upon the varying conditions at the actual time of undertaking the operation on a large scale. The local fishery officers have been taught to carry out small-scale representative trials just before venturing upon full-scale operations. There is no doubt that every difficulty standing in the way of clearing the present weed infestation in the Marikollong bheel can be overcome. Once this is achieved and the reinfestation checked by vigilant management, the bheel can be converted into a rich source of fish for Nowgong town and adjoining areas.

ASSESSMENT OF THE METHODS OF CLEARANCE OF WATER-HYACINTH INFESTATION IN MARILONG BHEEL, NOWGONG, ASSAM.

Methods	Approximate expenses per hectare		Approximate total cost for entire bheel (86 hectares)	Approx. time required to clear entire bheel	Advantages	Disadvantages
	On weedicide material.	On labour and miscellaneous				
I. Physical Removal						
1. Manual labour						
		a) Rs. 965 (under direct supervision).	(a) Rs. 75,000	2-3 months with 300 men	Complete removal ensured	1. Loss of nutrient elements in the weeds.
		b) Rs. 1110 (on contract).	(b) Rs. 96,000		Complete removal ensured	2. Problem of safe and useful disposal of weed mass.
2. Mechanical-cum-manual	To be assessed, based on actual trials					
II. Chemical treatment.	Spraying cost		By Aerial	By Manual		
A. Weedicide			Spraying.	Spraying.		
1. 'DAPICIDE' (Tata-Fison)	Dose (a) 3.4 kg/ha					
		Rs. 50 to Rs. 120	Rs. 10,000 to Rs. 15,000	Rs. 8,000 to Rs. 11,000	Nutrients in the weed mass returned to the fishery.	1. In-efficient or insufficient spraying will give only partial kill
2. 'FERNOXONE' (I.C.I.)	Dose same doses as above.					
3. 'METANOL' (BAYER)	Dose 6.2 l/ha		Rs. 14,000 to Rs. 17,000	Rs. 12,000 to Rs. 13,000	-do-	2. Sectorial treatment necessary to avoid killing of fish by the decay of weeds. Material not easily available, besides being too expensive.
4. Triazine group weedicide 'SIMAZINE', 50% W.P.			Rs. 49,000 to Rs. 51,000	Rs. 46,000 to Rs. 47,000	-do-	