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The Pharma Innovation

ISSN (E): 2277- 7695
ISSN (P): 2349-8242
NAAS Rating: 5.23
TPI 2022; SP-11(4): 827-835

www.thepharmajournal.com
Received: 10-02-2022
Accepted: 12-03-2022

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Preliminary studies of a prototype electric dip net for fish capture

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Abstract
In the present study a conical dip net with a wide circular mouth of 0.85 m and a narrow cod end of 0.35 m made of uniform mesh of 2.8 cm (knot to knot) of multifilament nylon twine no 4, fitted with electrodes to energize the net, was used. Three sets of positive and negative electrodes (stainless steel sphere with 14 gauge bare copper wire; aluminium ring containing 8 droppers with 14 gauge bare copper wire and aluminium conduit coil with aluminium conduit hemisphere, as positive and negative electrode respectively) were used in the present study. Nine species of common Indian freshwater fishes were experimented during the study. The objective was to stimulate fishes, in and around the electrode to attract them centrally near the positive electrode for capture. A total of 16 sets of trails with electrified dip net and non-electrified dip net were conducted in a glass tank of 1.8 × 1.05 m dimension having a water depth of 0.52 m, having a water temperature of 22 to 31 ˚C and electrical resistance of 5000 to 6700 ohms/cm^2. The results revealed the superiority of electrified dip net over the conventional non-electrified net. Among nine species *L. rohita* followed by *N. Notopterus, C. punctatus, H. fossilis, and C. mrigala* was more prone towards the electrified dip net. Fishes of all varieties above 150 mm length could be easily influenced towards the electrified dip net.

Keywords: Electrified dip net, Indian freshwater fishes, electrical resistance

Introduction

The conventional dip net is either square shaped or circular shaped attached to a rigid frame. The net is operated in coastal areas (estuaries and back waters). The frames are generally made of bamboo or of metal. In India, the conventional dip nets are of 2 types. 1) Hand dip net which is operated manually by wading into shallow water. 2) The Chinese dip net which is also used in shallow waters, are operated on fixed poles over which a bamboo fulcrum is fixed. On the longest end of the bamboo fulcrum the net is attached. While in the shorter end heavy weights are attached at the base to make the fulcrum up and down so that the dip net fixed on the longest end of the fulcrum is immersed under the water to collect fish and after a suitable time is held up by pulling the heavy weight at the base of the net.

The catch per unit effort of the conventional dip net is very poor as small fishes generally assemble over the net to nibble on the submerged net or prey on smaller animals as no bait is generally put over the net.

Three stages of the response of fish to an electrical current have been identified: i) Galvano taxis or forced swimming towards the anode, ii) Galvano narcosis or muscle relaxation in an immobile sleep-like state and iii) tetany or muscle rigidity and seizures (Schreer *et al*., 2004) [10].

Fish swimming into a weak electric field may not be affected at all. Threshold values of electrical charge must be emitted into the water in order to affect the fish. To be effective, the electric field in the water must be sufficiently strong at appropriate distances from the electrodes to elicit desired responses by targeted fish. When the electrical charge in the water is sufficient to allow transport of the charge across the nerve cells in the body, then the fish's muscle undergo involuntary contractions. The contractions will lead to increased exercise of the muscle and a build-up of lactate in the blood stream. Loeb and Maxwell (1896) [7] demonstrated that these reactions were due to the stimulation of motor neurons, which were forced and not merely voluntary.

Every electrode therefore, has a near zone of high current density, which may be above the danger level. Surrounding the nearest zone is, a region in which the current density is in the effective range.

The current density gradually drops off until it is no longer large enough to cause the desirable reactions and this makes the end of what might be called the "effective zone." Beyond this distance the current density continues to drop until it is no longer even above the perception level.
Godfrey, (1956) [6] use direct current in electrical fishing in streams of Canada in 1952 to catch eels and young salmon. Pulse modulated DC electrical fishing machine was used to capture eels in New Zealand (Burnet, 1952) [4]. Many studies have reported that larger fish are more affected at lower voltages and frequencies than smaller fish (Adams *et al*., 1972; Emery 1984; Dolan and Miranda 2003) [1, 5]
In India, Biswas has developed an electrically charged seine net to catch fish from deeper waters (Biswas, 1971a) [2]. He also developed an electric fish catcher with three electrode system (one positive and two negative) and successfully caught Indian fresh water fishes (Biswas, 2017) [3].
The present study was undertaken to determine the possibility of increasing the catch per unit effort (CPUE) of a dip net by utilizing the attracting effect of the anode and frightening effect of the cathode to assemble fishes over a prototype electrical dip net and thereby increasing not only the catch per unit effort, but also to catch large sized fishes, which the conventional dip net failed to do.

Materials and Methods
A conical dip net with a wide circular mouth of 0.85 m and narrow cod end of 0.35 m made of 2.8 cm stretched mesh (knot to knot) webbings made of multifilament nylon twine no.4.
Three electrodes (positive and negative) were used to create an electric field in and around the net. The first one was a stainless steel hollow sphere of 9 cm diameter to act as positive electrode, which was kept immersed under the water surface. The hollow globe was filled with measured quantity of water to obtain neutral buoyancy, so that the round globe can remain immersed over the center of the wide mouth of the dip net at the surface. Two one meter 14 gauge bare copper wire in the shape of hemispheres were attached along the diameter of the wide mouth (0.85m) and connected to each other which served as negative electrode.
In the second set of experiment only positive electrode was changed to an aluminium ring with 8 vertical droppers and the same 14 gauge copper wire hemispheres was used as cathode. Aluminium ring of 5mm thickness having a diameter of 14.3 cm was electrically connected with equally spaced 8 vertical aluminium rods of 20 cm length (droppers).
The third set of electrodes consisted of one 20 cm diameter aluminium conduit coil. The outer diameter of conduit was 1.2 cm, which was kept immersed under the surface of water centrally over the dip net opening. Two one meter bent aluminium conduit in the shape of hemispheres were attached along the mouth of the dip net, electrically connected, which served as negative electrode (Figure 1).
The conventional dip net used in the study for comparison with electric dip net was the same experimental dip net without energizing the electrodes.
A glass tank of 1.8 x 1.05 m dimensions filled with water to a depth of 0.52 m was used for the fishing trails. The water temperature of the experimental tank during experiment was 22^0 to 31 ^{0}C and electrical resistance of 5000 to 6700 ohms/cm^2.A 0.5 kVA AC to DC inverter capable of supplying 40 to 230 volt direct current was used to energize the dip net. An electronic pulser of low frequency (1/sec to 3/sec) was connected between the inverter input and the electrodes to obtain pulsed direct current (PDC).
Nine species of commonly available Indian fresh water fishes were undertaken for the study. They were *Labeo rohita, Cirrhinus mrigala, Labeo bata, Notopterus notopterus, Labeo calbasu, Channa punctatus, Heteropneustes fossilis, Cyprinus carpio* and *Oreochromis niloticus.* A known number of multiple species as mentioned above were put in the experimental tank and the conventional dip net was used for 30 minutes with respect to the catch per unit effort (CPUE).
At the beginning of the experiment, the water temperature and electrical resistance of the water was measured and recorded for each set of experiments. The conventional dip net was lowered vertically at the center of the tank bottom, so that the wide mouth of the dip net settle at the bottom. The net is allowed to remain in the bottom of the tank for 30 minutes for the fish to acclimatize with the presence of the net. After 30 minutes the net was lifted with the help of a stick to which the rim of the net was tied. The net was lifted suddenly above the water surface so that the fish over the net could be caught on surprise. The catch was then counted, measured for length species wise and the fishes were released back in the tank for the next step of experiment.
The electrodes were connected to a DC power source (DC inverter) and regulated voltage was supplied between the electrodes (positive and negative electrodes). Energizing the electrodes with the DC power source, an elliptical electric field was created, the intensity of which depend on the potential difference applied between the electrodes.
After setting the experimental net in the tank bottom current was allowed to flow through the electrodes around the net, where fishes within the effective range of electric field were found to swim over and near the positive electrode get immobilized. The flow of current in the net was switched off as soon as the positive electrode was out of water. Fishes collected in the net was counted, measured for length, species wise and released back in the tank with heavily aerating the water with a powerful air pump. When the fishes were fully recovered from the stress (normally within an hour), the experiments were repeated with different electrical strength. Three trials in a day was made with varying field intensity (starting from lower to higher order) and the fishes were given a rest period of minimum 48 hours before the next trial.
Electrical parameters like voltage gradient, density of current and input voltage were measured by probes in Avometer, model – 8 and Sanwa – P – 2.

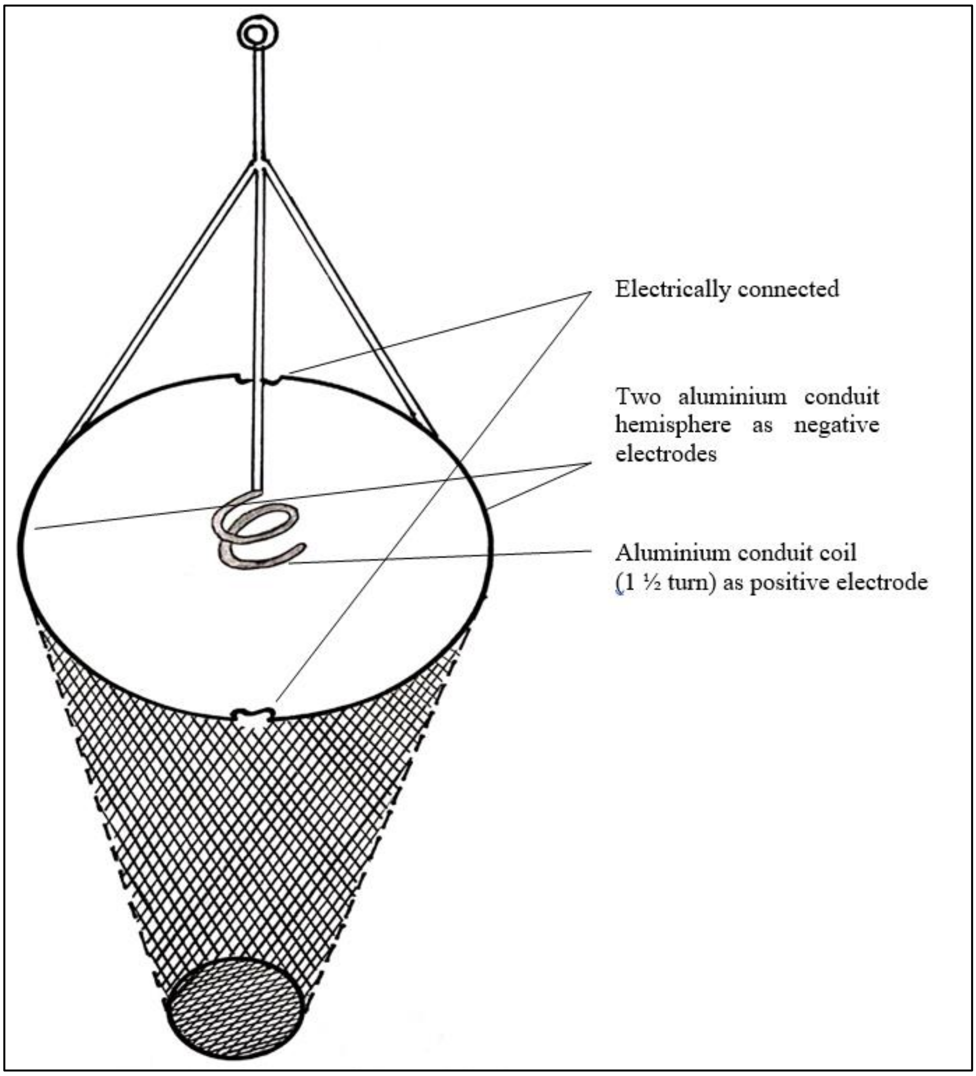

Fig 1: Schematic diagram of electrified dip net showing aluminium helix coil as positive electrode (Not to scale)

Statistical analysis

Efficiency of the newly design and fabricated electrified dip nets with three different electrodes was judged after carrying out one way ANCOVA test.

Tests were also carried out to compare the effectiveness of three electrodes used in the experiments. The relationship between fish affected (caught) and effectiveness of three electrodes was analyzed by using linear regression model. There is no significant difference of affected fish catch between the three electrodes {$F (2, 35) = 0.357$, $p=.702$}

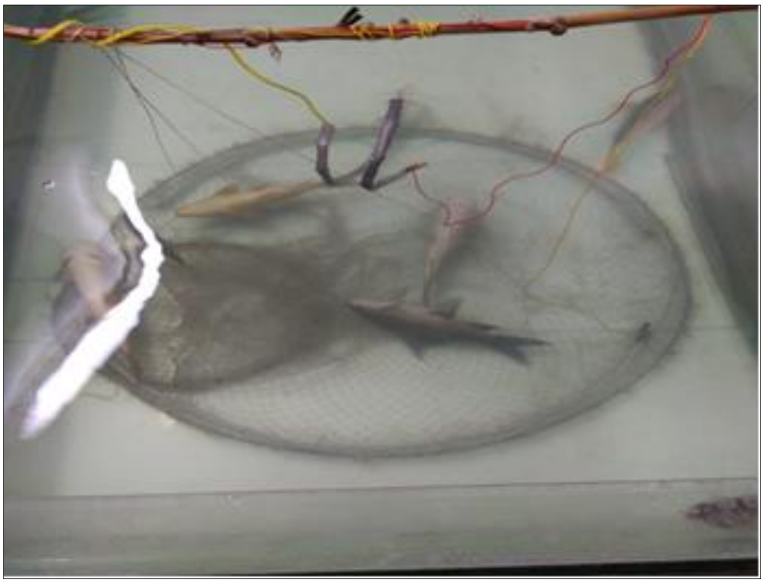

Fig 2: Fish catch in electrified dip net when aluminium conduit coil is used as positive electrode.

One-way ANCOVA

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	7050.046[a]	3	2350.015	4.517	.009
Intercept	1145.808	1	1145.808	2.202	.147
Voltage	6314.071	1	6314.071	12.136	.001
Electrode	371.537	2	185.769	.357	.702
Error	18209.435	35	520.270		
Total	187078.540	39			
Corrected Total	25259.481	38			
a. R Squared = .279 (Adjusted R Squared = .217)					

Regression results

Electrodes – Steel sphere (anode) and copper wire hemisphere (cathode).

Coefficients					
	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
Total Population	1.086	.331	.757	3.278	.011
(Constant)	-7.719	6.380		-1.210	.261
	$R^2 = 0.573$	Adjusted $R^2 = 0.520$			

Effected catch= -7.719+(1.086×Totalpopulation)

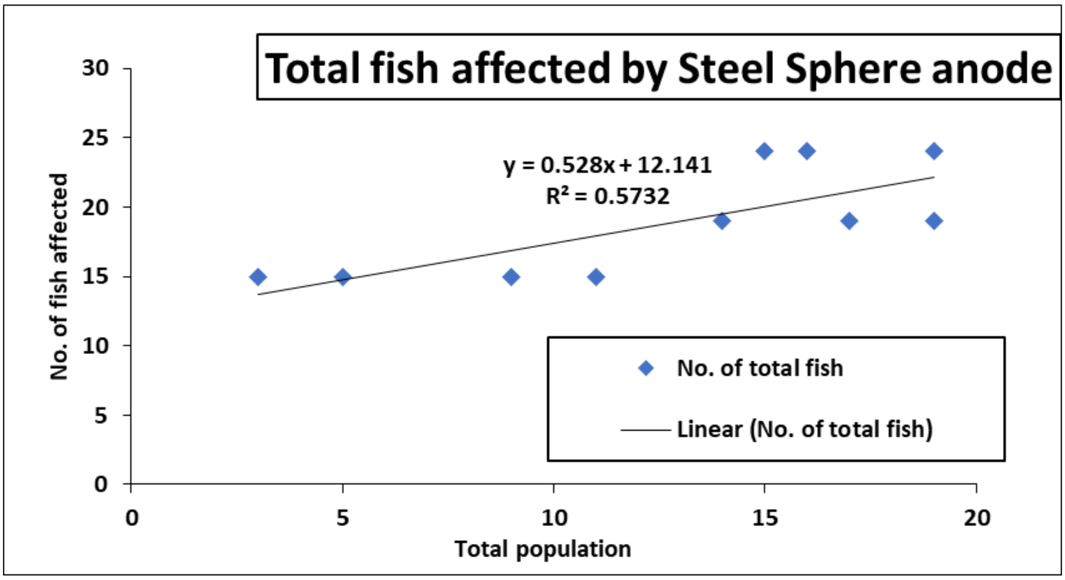

Fig 3: Linear regression for steel sphere (anode) and copper wire hemisphere (cathode) used in electrical dip net.

Electrodes – Aluminium ring with droppers (anode) and copper wire hemisphere (cathode).

Coefficients					
	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
Total Population	.467	.110	.718	4.249	.001
(Constant)	2.393	2.390		1.001	.331
	$R^2 = 0.283$	Adjusted $R^2 = 0.193$			

Effected catch= 2.393+(0.467×Totalpopulation

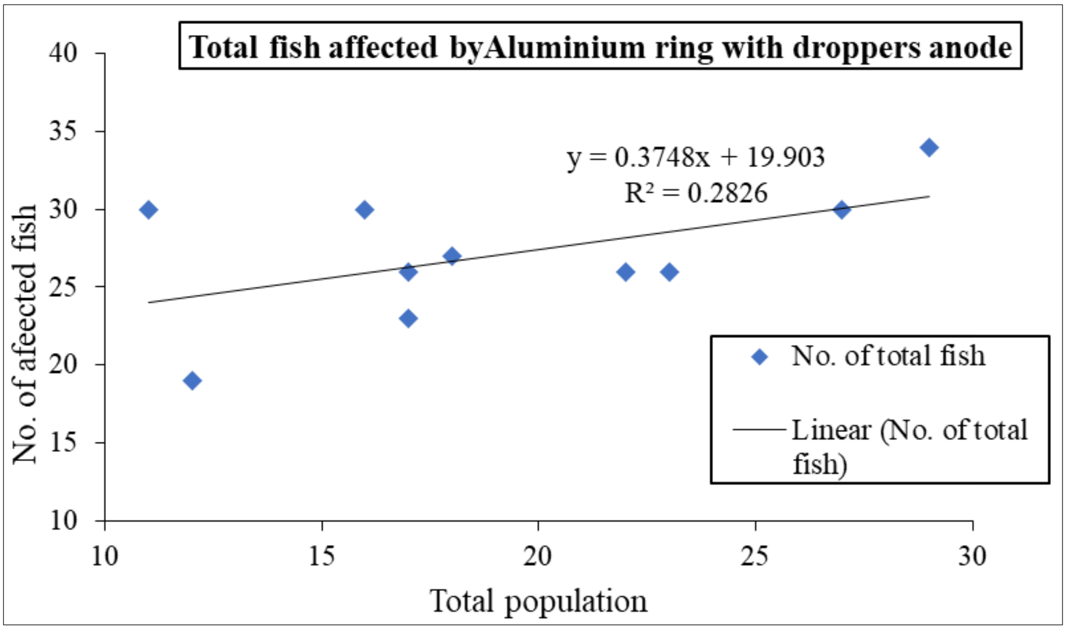

Fig 4: Linear regression for aluminium ring with droppers (anode) and copper wire hemisphere (cathode) used in electrical dip net.

Electrodes – Aluminium conduit coil (anode) and aluminium conduit hemisphere (cathode).

Coefficients					
	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
Total Population	.754	.425	.532	1.775	.114
(Constant)	-1.232	11.633		-.106	.918
	R^2 = 0.515	Adjusted R^2 = 0.487			

Effected catch= -1.232+(0.754×Totalpopulation)

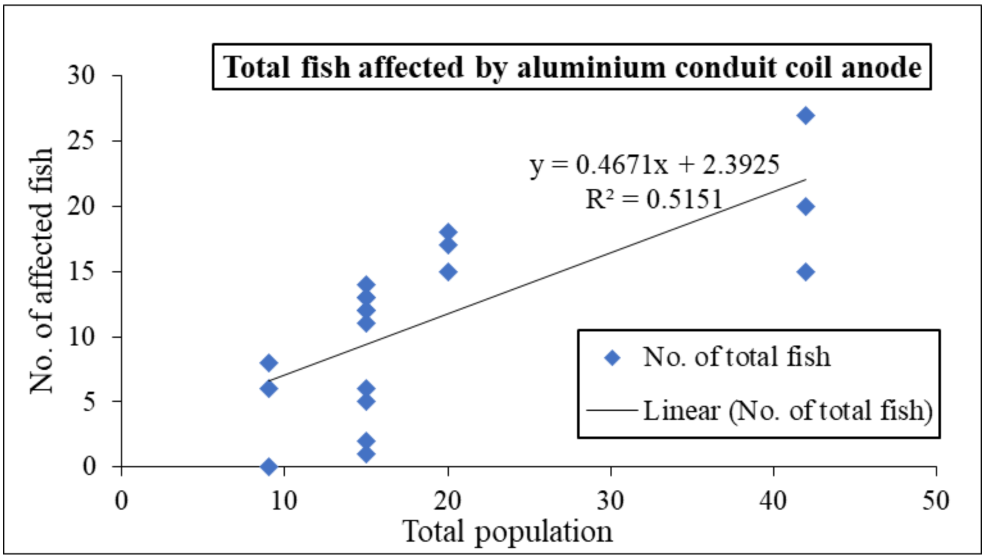

Fig 5: Linear regression for aluminium conduit coil (anode) and aluminium conduit hemisphere (cathode) used in electrical dip net.

Observations and Results

The electric field patterns created in the experimental tank at an input voltage of 100 V was measured with the help of a probe with respect to 3 electrode combinations, namely steel sphere anode and copper wire ring cathode with aluminium ring and 8 droppers anode and copper wire cathode and aluminium coil anode and aluminium conduit hemisphere cathode and the voltage gradient from both at horizontal and vertical distances from positive electrode was measured and recorded in (Table 1).

It has been found that with the increase of distance from the positive electrode vertically and horizontally the voltage gradient reduced from 33.1V/cm to 9 V/cm, when distance increased from 4 cm to 41cm from positive electrode vertically and from 10 cm to 60 cm from positive electrode horizontally.

The current density between the anode and cathode of the electric dip net was found to be the function of increasing the input voltage. An input voltage of 6 volt could give rise a current density of 0.2 δ which progressively increased to 85 δ when input voltage is 220 V in an electrode combination of aluminium conduit and hemisphere (Table 2).

Table 3 exhibited the % of forced movement of 6 species of fishes (*L. rohita, C. mrigala, L. bata, O. niloticus, H. fossils, and C. punctatus)* to the positive electrode and caught in electric dip net when 3 sets of electrodes were used. The range of current density with aluminium conduit and hemisphere registered was 0.2 - 1.65 δ for 70 – 100% forced movement to positive electrode of the dip net, when aluminium was used both for anode and cathode. Of these *L. bata* responded in lowest range of current density of 0.2 – 0.25 δ followed by *C. mrigala* (0.75 – 1.5 δ) and *L. rohita* (0.2 – 1.5 δ) for forced movement to positive electrode and capture in electric dip net. *O. niloticus* required the highest current density of 1.6 – 1.65 δ for 100% capture.

The position has been changed when the electrodes of aluminium conduit was replace with steel sphere as anode and 14 gauge copper wire as cathode, where 75 – 100% of *L. rohita, C. mrigala, O. niloticus, H. fossils, C. punctatus* were caught in electric dip net.

Changing over the anode with aluminium ring with 8 droppers and cathode as 14 gauge copper wire, 73% *L. rohita* and 100% of *C. punctatus* were influenced at a current density of 0.45 - 0.95 δ. *O. niloticus* however required a higher current density of 1.0 – 1.5 for 70% capture (Table 3).

As regards the group reaction of the 6 species namely (*L. rohita, C. mrigala, L. bata, O. niloticus, H. fossils* and *C. punctatus*) in 2 sets of electrodes (steel sphere as anode and copper wire as cathode; aluminium conduit coil and aluminium conduit hemisphere as cathode), 75 – 100% fishes were caught in electric dip net at a current density of 0.05 – 1.25 in steel sphere and copper wire electrode combination. The only exception was of *O. niloticus* where 25% was caught and 75% escaped out of the net in the same electrode combination. But when the electrode combination was changed to aluminium conduit coil as anode and aluminium conduit hemisphere as cathode, 100% of *O. niloticus* was attracted to the positive electrode of the net and captured in electric dip net at a current density of 0.6 – 0.7 δ. The other varieties (*L. rohita, C. mrigala, L. bata*) 50 – 100% of *L. rohita, C. mrigala, L. bata* were captured in electric dip net (Table 4).

As regards the performance of 9 species in DC field (Table 5), individually among the % of total population captured in 3 electrode systems it has been found that 27 – 100% of fish captured in steel sphere anode and copper wire cathode. Among the ring with droppers anode and copper wire cathode 53 – 90% of the total population was captured in electric dip net while in aluminium conduit coil as anode and conduit hemisphere as cathode 73 – 90% were caught in electric dip net (Figure-2) and (Table 5). As such aluminium as electrodes were found to be more effective than the other 2 electrode systems where the lowest effective current density was 0.5δ and the highest being 11 δ. In other 2 electrode systems the range was 6 – 75 δ in steel sphere and copper wire and 15 – 30 δ in ring with droppers and copper wire. Regards the specific influence *L. rohita* exhibited 25 – 66% capture in steel sphere and cathode wire combination, while 58 – 72% in ring with droppers and copper wire combination and 28 – 62% in aluminium conduit coil combination. 9 – 23% *C. mrigala*, 15 – 27% *L. bata*, 7-9% *N. notopterus*, 21 – 27% C. carpio 18 – 21% of *L. calbasu* were captured in conduit coil and conduit hemisphere combination. In ring with droppers and copper wire combination besides 68 - 72% *L.rohita*, 4 - 6% *N. notopterus*, 4 – 16% *O. niloticus*, 8 - 12% *C. punctatus* and 6 – 12% *H. fossilis* were caught in electric dip net. The electric dip net with steel sphere and copper wire combination 18 – 35% *H. fossilis*, 7 – 30% *C. punctatus*, 12 – 34% *O. niloticus*, 17%*N. notopterus* and 25 – 66% *L. rohita* were influenced and caught in the electric dip net (Table 5).

The effective input voltage and current density towards the capture of each species were also determined as % of total catch (Table 6). The electrical parameters for the capture were determined with respect of 9 species mentioned earlier. An input voltage of 171 – 190 V generating a current density of 0.8 δ was found for 100% capture with respect to *L. rohita, C. punctatus, H. fossilis and O.niloticus*.100% of *N. notopterus* were caught at current density between 0.4 – 0.45 δ. When the input voltage was 71 – 90, 84% of *C. mrigala* were influenced and caught at current density of 0.65 – 0.7 δ and input voltage of 131 – 150 V. In the same current density and input voltage 84% *L. bata* was also caught. The highest percentage of *L. calbasu, C. carpio* 63% was caught in current density of 0.45 – 0.5 δ which was established by an input voltage of 91 – 110 V (Table 6). Thus a current density of 0.45 – 0.8 δ produced by 91 – 190 V was found to be most effective range for influencing and capture of all the 9 varieties of fishes taken for the study.

Table 1: Voltage gradient with three different sets of electrodes used in dip net.

Distance from positive electrode		Voltage gradient (V/cm)					
Vertical	Horizontal	With sphere anode and copper wire ring cathode		With aluminium ring and 8 droppers anode and copper wire ring cathode		With aluminium conduit coil anode and aluminium conduit hemisphere cathode	
		Vertical	Horizontal	Vertical	Horizontal	Vertical	Horizontal
4	-	33.1	-	25.0	-	32.0	-
8.5	-	24.0	-	-	-	-	-
10	10	-	33.1	-	25.0	-	32.0
12	-	-	-	19.5	-	20.0	-
18.5	-	16.1	-	-	-	-	-
20	20	-	24.0	16.0	19.5	15.0	20.0
28.5	-	11.5	-	-	-	-	-
30.0	30	-	16.1	12.1	16.0	10.0	15.0
38.5	-	10.0	-	-	-	-	-
39.0	-	9.0	-	-	-	-	-
40.0	40	-	11.5	11.0	12.1	9.0	10.0
41.0	-	-	-	10.0	-	8.0	-
-	50	-	10.0	-	10.0	-	9.0
-	60	-	9.0	-	9.0	-	8.0

Input voltage: 100 V
Water temperature: 29 °C
Electrical resistance of water: 5200 Ohms/cm^2

Table 2: Current density in mid-field between anode and cathode.

Input voltage(V)	Current density in mid-field between anode and cathode (δ)
6	0.2
9	1
11	1.5
15	2.5
24	4.5
32	7.5
43	8.5
58	10
80	16
120	23
130	49
135	58
155	70
220	85

Electrodes:
Anode - Aluminium conduit coil.
Cathode - Aluminium conduit hemisphere.

Table 3: Percentage of total fish population caught in non-electrified and electrified net.

Experiment No.	% of total population caught in non-electrified net	% of total fish population caught in electrified net			
		Voltage applied (V)	Current density established (mA/cm^2)	Time of electrical xposure (sec)	% of total population caught in electrified net
1	Nil	80	1.6	60	27
2	13	140	6.0	60	60
3	13	140	6.0	90	60
4	5	140	6.0	19	74
5	4	140	6.0	39	47
6	5	160	7.0	42	89
7	4	165	7.0	37	63
8	5	190	7.5	46	100
9	8	200	8.0	52	79

Electrodes:
Anode - Stainless steel sphere of 9cm diameter.
Cathode - 14-gauge copper wire of 85cm diameter
Nature of current: DC
Water temperature: 23°-25°C
Electrical resistance of water: 6500 Ohm /cm^2

Table 4: Reaction of group of fish towards the electrified dip net.

Electrodes used	Species	No. of fishes	Size range (mm)	Range of current density in which fish was subjected (δ)	Attracted to +ve electrode of the net (%)	Escaped from effective zone (%)
Anode - steel sphere & Cathode - copper wire	*L. rohita*	2	130 – 139	0.1– 0.25	100	-
		8	140 – 149	0.05 – 1.25	75	25
		6	150 – 159	0.1 – 1.25	100	-
	O. niloticus	4	140 – 149	0.1 – 0.75	25	75
		2	150 – 159	0.75 – 1.25	100	-
	C. punctatus	2	180 – 189	0.1 – 0.25	100	-
	H. fossilis	1	180 – 189	0.25	100	-
		1	220 – 229	0.75	100	-
	C. mrigala	7	110 – 129	0.1– 1.25	100	-
		1	160 - 169	1.25	100	-
Anode –Aluminium conduit coil & Cathode - Aluminium conduit hemisphere	*L. rohita*	3	180 – 189	0.2– 2.5	67	33
		3	190 – 199	0.2– 5	100	-
		2	200 – 209	0.34 – 5	50	50
		2	210 – 219	0.25	100	-
	O. niloticus	1	140 – 149	0.6	100	-
		1	150 – 159	0.6	-	100
		1	160 – 169	0.7	100	-
	C. mrigala	1	180 – 189	1.5	100	-
		1	190 – 199	2.5	100	-
		2	200 – 209	1.5 – 2.5	100	-
		2	210 – 219	0.2 – 0.25	50	50
		3	220 – 229	0.1 – 0.5	34	66

		1	230 – 239	0.15	100	-
	L. bata	4	150 – 159	0.15 – 4.5	50	50
		5	160 – 169	0.1 – 3	60	40
		2	170 – 179	0.25 – 3	100	-

Nature of current: DC
Water temperature: 29°C
Electrical resistance of water: 5200 Ohm/cm^2

Table 5: Species wise capture in electric dip net with different electrode systems.

Electrodes used	**Field stage (V)**	**Current density (δ)**	**% of each fish species attracted to +ve electrode and caught**									**% of total population caught**
			L. rohita	***C. mrigala***	***L. bata***	***N. notopterus***	***O. niloticus***	***C. carpio***	***C. punctatus***	***L. calbasu***	***H. fossilis***	
Anode - steel sphere & Cathode -copper wire	80	16	66	-	-	-	34	-	-	-	-	
	140	6	30	-	-	-	20	-	30	-	20	27
	140	6	35	-	-	-	23	-	7	-	35	60
	140	6	28	-	-	-	12	-	12	-	18	74
	190	75	25	-	-	17	25	-	15	-	18	70
Anode - ring with droppers & Cathode - copper wire	125	15	66	-	-	6	4	-	12	-	12	53
	145	20	58	-	-	6	12	-	12	-	12	65
	175	25	66	-	-	4	16	-	8	-	6	90
	200	30	72	-	-	4	8	-	8	-	8	88
Anode –Aluminium conduit coil & cathode Aluminium conduit hemisphere	55	0.5	36	9	-	9	-	27	-		-	73
	75	1.5	28	18	-	9	-	27	-	19	-	73
	84	2.3	50	23	27	-	-	-	-	18	-	90
	100	10	30	21	-	7	-	21	-	-	-	87
	145	11	62	23	15	-	-	-	-	21	-	86

Nature of current : DC
Water temperature : 21°-31°C
Electrical resistance of water: 5000 Ohm/cm^2

Table 6: Percentage of total catch of different fish species in electrical net different input voltages and current densities.

Species	**11-30 (V) 0.2 – 0.25 (δ)**	**31-50 (V) 0.25 – 0.3 (δ)**	**51-70 (V) 0.35 – 0.4 (δ)**	**71-90 (V) 0.4 – 0.45 (δ)**	**91-110 (V) 0.45 – 0.5 (δ)**	**110-130 (V) 0.5 – 0.6 (δ)**	**131-150 (V) 0.65 – 0.7 (δ)**	**151-170 (V) 0.7 – 0.75 (δ)**	**171-190 (V) 0.8 (δ)**	**191-210 (V) 1.0 (δ)**	**210-230 (V) 1.5 (δ)**
L. rohita	20	10	34	38	32	60	87	60	100	81	-
C. punctatus	-	-	-	17	67	80	90	34	100	60	-
H. fossilis	-	-	-	34	40	64	50	84	100	67	-
O. niloticus	-	-	-	38	83	36	57	28	100	58	75
N. notopterus	50	-	75	50	100	80	55	67	-	-	-
C. mrigala	-	-	30	46	40	78	84	-	-	-	-
L. bata	-	-	-	49	31	50	84	-	-	-	-
C. calbasu	50	34	40	-	63	-	-	-	-	-	-

Nature of current : DC
Water temperature : 22°-31°C
Electrical resistance of water: 5000 - 6700 Ohm/cm^2
Percentage of total catch of different fish species

Conclusion

The prototype electrified dip net, experimented in the present study clearly indicated its superiority over the conventional non-electrified dip net with respect to attraction of fish and capture in electrified dip net.

Higher percentage of fish catch in electrified dip net was observed when aluminium conduit coil as anode and aluminium conduit hemisphere as cathode. Suggesting a greater effective zone of the electrode system, when compared with other two electrode systems.

With the experimental set up used in the present study, an effective zone of 46 cm from positive electrode was considered most effective range for immobilizing and capture of fish in electric dip net.

Among nine fishes studied the carps *L. rohita* followed by *N. notopterus*, *C. punctatus*, *H. fossilis*, *C. mrigala* was found to be susceptible towards the electric dip net indicating the possibility of selective fishing. *O. niloticus* needed higher current intensity for capture.

Fishes of all varieties above 150mm length could be easily influenced towards the electrified dip net.

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