

# Stainless steel sinker: An alternative to conventional lead sinker

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Lead is used as a sinker in fishing nets from time immemorial. Lead is a heavy metal which is denser than most commonly available materials, and could be used as sinkers. The specific gravity of lead is about  $11.34 \text{ kg/m}^3$ , because of which it sinks very fast in the water column. This is a desirable characteristic of many encircling gears like seine nets. Because of its heavy weight per unit volume it acts as a good material to use as sinkers. It is soft and malleable, relatively low melting point ( $327^\circ\text{C}$ ) facilitating it easier casting to acquire the required shape. The casting cost is very low and it is widely available. These all criteria make lead a prime choice for sinkers of fishing net and elsewhere, viz. in batteries, weights, solders, paints, gasoline, radiation shielding etc. Most of the fishing gears use sinkers as it is one of the most important accessories which helps fishing gear to go down in water column. Depending upon type of gear such as trawl, seine nets, gillnets, lines etc. and their type of operation sinker used are of different shapes and sizes. Lead is normally unreactive metal but slow oxidation results in the formation of lead oxide which turns the metal grey, while in use. According to trawl fishermen, the total weight of the sinkers is reduced to one-third within one year due to abrasion, which affects the performance of bottom trawls significantly. The leached-out product of lead is a neurotoxin (Dart *et al.*, 2004; Needleman, 2004) which slowly accumulates in living tissue and creates several health problems (Merill *et al.*, 2007). The other problem associated with lead is ingestion by marine mammals and birds (Carrier, 2012). Many times, lead sinker imitates with food items which is ingested by marine scheduled animal

causes choking in the gastro-intestinal tract which further leads to death of the animal. There are several other types of sinkers used in fishing gear which are made of different materials, viz. concrete, cement, clay, stone, iron bars, iron chain etc (Fig. 1,2,3 and 4). These sinkers are used by fishermen, mainly in artisanal and small-scale sectors. Though these sinkers are cheap, and easy to fabricate and rig over the nets, the major disadvantage associated with these sinkers is strength. They are highly fragile and there is every chance to lose while operating. The bars and chain sinkers (tickler chains) made of iron are highly susceptible to corrosion (Tateda *et al.*, 2014).

With this background, there is a need to develop sinkers made of materials which can overcome these problems. In this regard, ICAR-CIFT has taken a study to develop eco-friendly sinkers for fishing gear. Initially, stainless steel was selected for developing sinkers for bottom trawls. These sinkers are having numerous advantages over the lead and conventional sinkers (Fig 5.). Marine grade stainless steel is rust-proof and also it does not leach to the marine environment. In this regard, it helps in preventing hazardous chemicals accumulating in the marine ecosystem. The strength of stainless steel is higher than the lead so while the operation of fishing nets, the chances of wear and tear are almost nil. There are some drawbacks associated with stainless steel sinkers. Among them, cost of production is the most important one. Due to its high melting point ( $1400-1450^\circ\text{C}$ ) the casting of the sinker is cumbersome and require an expensive facility which makes

higher cost of production. Though the unit price of stainless-steel sinkers is higher than the lead sinker, to make the marine environment cleaner and also to enhance the life of sinkers, stainless steel sinkers can be an alternative. Application of a strong coating on the surface of lead sinkers used in trawl

is another possible method for preventing abrasion and leaching of lead. The Fishing Technology Division of ICAR-CIFT has also taken a study for the development of the best surface coating for lead sinkers.



*Fig.1 and 2 Sinkers made of concrete and stone*



*Fig.3 Sinkers made of Iron chain*



*Fig.4 Sinkers made of Lead*



**Fig.5** Prototype of stainless steel sinkers made for bottom trawls

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