

Do fishes consume plastics? If so, are they always dangerous?

Shylaja G.*, Kripa V., Sanal Ebaneezar, Sayuj P., Akhil Babu V. and Seban John

ICAR-Central Marine Fisheries Research Institute, Kochi-682 018, Kerala

*E-mail: g.shylajacmfri@gmail.com

Plastics have tremendous advantages and utility in the present world but its indiscriminate discard creates a pathway to water bodies and eventually forming a threat to aquatic organisms. The large plastics (macro plastics) can degrade and become smaller meso or micro plastics which can be ingested by fishes and invertebrates. Low density plastics (eg. Poly propylene or polyethylene) are dominant in the top layers for a certain period of their entry, may suffer biofouling causing it to sink gradually. High density plastics (PVC, Polyester and polyamides) usually sink to the bottom. Macro, Meso and Micro polymers selected for the study were polypropylene, polyethylene and polyvinyl chloride

Plastic ingestion can happen both intentionally or accidentally depending on the foraging strategy of the animal: some predatory fish might mistake plastic for food and filter-feeders might ingest them unintentionally while feeding.

In order to understand this process in a better way a laboratory experiment was designed with fishes of two size groups (length 8 ± 2 cm and 15 ± 2 cm) for a period of two weeks in triplicate under controlled conditions. Experimental fish selected was *Tilapia nilotica*, collected from the grow-out ponds of Krivigyan Kendra, Njarackal, Kerala. Fish after transportation were stocked in FRP tanks and acclimatised for one week before the commencement of the experiments, and then transferred to experimental glass tanks in the laboratory. 10 % of the water was renewed on daily basis and mild aeration was provided. The Dissolved oxygen and Ammonia levels were continuously monitored throughout the rearing period.

A basal feed was formulated with 36% crude protein and 7% lipid, which is in compliance

with the nutrient requirements of tilapia. Plastic particles namely, polypropylene beads of an average size of 4cm which comes under the category of macro plastics were incorporated with feed ingredients and hand pelleted to form a coating of the feed with the bead. Thin sheet of poly ethylene, cut into a size group below 20 mm which falls under Meso plastics, with a known level were also mixed to feed ingredients and extruded to thin pellets. On the third trail, micro plastics (fine PVC powder) with a known percentage inclusion were incorporated with feed ingredients and mixed thoroughly in a Hobart mixer, homogenized and pelletized with a Hobart pelletizer. All the feeds thus formed were dried above ambient temperature and stored. The proximate composition of the prepared feed was also determined.

Large sized fish groups were fed daily with plastic coated pellets and on critical observation it was found that fishes will spit out the bead after consuming the entire feed. Similar observation was found in polyethylene sheet mixed feed pellets also. The intake of micro plastic incorporated feed, upon feeding to both the size groups, showed a positive response, but most of the microspheres got expelled through faeces' within a period of 48 hours to post exposure. However it cannot be generalised, as several studies have already reported about the ingestion of plastics in marine habitats and its consequences thereafter.

The study reveals that every organism will have a tendency to sense their food in the natural habitat. But when consumed unintentionally, it can result in the possibility of intestinal blockage, physical damage, histopathological alterations etc. In addition, leaching of chemicals released from plastic can interfere with fish health.