

CMFRI scientists unearth genome secrets of 'Indian oil sardine' fish



Kochi: In a major breakthrough in marine fisheries research, a team of scientists at the ICAR-Central Marine Fisheries Research Institute (CMFRI) has decoded the whole genome of the Indian oil sardine, a popular food fish. This is the first time that the genome of a marine fish species from the Indian subcontinent has been decoded, a CMFRI statement said here.

CMFRI Director Dr A Gopalakrishnan described this development as a 'milestone' in Indian marine fisheries, saying that the decoded genome will be a valuable resource for understanding the biology, ecology and evolution of the oil sardine (*Sardinella longiceps*)

This is the first time that the genome of a marine fish species from the Indian subcontinent has been decoded, a CMFRI statement said. The decoded genome is 1.077 Gb in size and contains a total of 46316 protein coding genes. This landmark research accomplishment was achieved through the cutting-edge Next Generation Sequencing technology by a group of researchers led by Dr Sandhya Sukumaran, Principal Scientist at Marine Biotechnology division of the CMFRI. This research has been published in the high-impact journal *Scientific Data* of the Nature Group.

Indian oil sardine is a vital fisheries resource in the Indian subcontinent, contributing substantially, approximately 10 per cent, to the total marine fisheries industry in India. "This fish is a trans-boundary resource and the whole genome information can also be utilised for certification of the fishery and identification of the origin of catch for monitoring clandestine trade and tracking the movement of this enigmatic fish," Dr Gopalakrishnan said. Small pelagic fishes like the Indian oil sardines can be considered as model organisms to study the climatic as well as fishing impacts on the Indian Ocean resources, as they respond to variations in environmental and oceanographic parameters, he said.

Sardines are an ecologically important part of the marine ecosystem, as they form an intermediate link in the food web and serve as prey for larger predators. The genome assembly of the sardines is a valuable tool for studying how fish adapt to climate change, the CMFRI director added. Genetic and genomic investigations found that Indian oil sardines exist in two highly distinct stocks, one in Indian waters and another in the Gulf of Oman. "Understanding these genetic differences could help researchers comprehend how environmental and oceanographic conditions impact this species in different regions of the Northern Indian Ocean," he said.

The CMFRI statement said the researchers have also identified the genes involved in the biosynthesis of polyunsaturated fatty acids (PUFA) of the oil sardine, offering insights into the genomic mechanisms behind the high nutritional quality of these sardines. Oil sardines are a good source of these fatty acids, which play a crucial role in maintaining human health.

The researchers behind the achievement are of the view that their findings could support scientists in finding critical leads in nutritional research and developing new dietary supplements or fortified foods that are high in PUFAs. "Further, it supports studies on synthesising PUFAs through transgenesis or gene editing techniques in organisms of choice to improve nutritional quality," Dr Sandhya Sukumaran said.