Management of Scombroid Fisheries

Editors

N.G.K. Pillai
N.G. Menon
P.P. Pillai
U. Ganga

ICAR

CENTRAL MARINE FISHERIES RESEARCH INSTITUTE
(Indian Council of Agricultural Research)
Post Box No. 1603, Tatapuram P.O.
Kochi-682 014, India

Technology upgradation in tuna fishery, diversification and changing pattern

K.K.Kunjipalu and K.Devadasan

Central Institute of Fisheries Technology, Kochi

ABSTRACT

Tuna and tuna-like fishes are under-exploited resources of Indian EEZ. Exploitation of oceanic tuna and billfishes are possible only by longlining and purse seining. Existing deep sea fishing vessels in India are mostly trawlers equipped for bottom trawling for shrimps and fishes. Most of them are stern trawlers and few are double riggers. Hence the deck layout is not suitable for either longlining or purse seining. Both longlining and purse seining for oceanic tuna and billfishes are specialized techniques which require special onboard facilities, deck layout and deck machineries like line haulers, chute, shooting and hauling accessories for longlining and special powerful purse winch, power block etc. for tuna purse seining. Free board height of these vessels should be low for longliners and purse seiners. Oceanic tuna purse seining is highly sophisticated method of fishing in the world. There are only 400-500 large purse seiners, generally known as 'Super Seiners', owned by hardly half a dozen nations in the world which are exploiting 75% of skipjack, yellowfin and other oceanic tunas. Modern super seiners may be 100-110 m OAL with 7000-9000 HP main engine developing a speed of 15-20 knots and capable of setting the seine at full speed upto 15-16 knots. Size of a tuna purse seine is also quite big, around 900-1200 m length in float line and 250-300 m in depth with a mesh size of 100-300 mm stretch with stiffened nylon twines of thicker diameter. Hitherto, main product of oceanic tuna was canned tuna. But now *Sashimi* grade tuna and other high price tuna products in Far East have been developed and are being continued to develop. This kind of value added products requires improved freezing ('Ultra'freezing) and other post-harvest technology facilities onboard itself. Exploitation of coastal tunas (minor tunas), other scombroids like seerfishes and mackerel are also mentioned.

INTRODUCTION

Tunas and billfishes are caught from the tropical seas of the three oceans mainly Pacific Ocean (60%), Atlantic Ocean (25%) and Indian Ocean (15%). As a commercially exploitable resource, tunas and related species still remain the least exploited pelagic resource from the EEZ of India (Silas and Pillai, 1982).Tuna catches have increased substantially over the years in the world largely due to tuna purse seining. For example, landings of tunas and bonitos increased by 50% from 3.1 million mt to 4.65 million mt during 1984-'93 decade (Benyami, 1997). Most of the world's tuna catches, including about 70% of skipjack and yellowfin are caught by some 400-450 large purse seiners operating worldwide with each landing on an average 4000-5000 mt/year.

Multipurpose fishing vessels

The idea of multi-purpose fishing vessels is novel, but has got its own inherent non-viability. The general deck layout of a trawler, purse seiner and longliner are different with each one having specific requirements of power, deck machineries and deck layouts. All the three designs of deck layout and machineries cannot be incorporated in one vessel and all the three operations are not feasible from one vessel in one fishing voyage/trip. As a pre-requisite of any fishing voyage, for each type of fishing like trawling, seining or longlining, deck arrangements and stacking of fishing gear on fishing deck, ready for operation, have to be arranged before sailing out from base.

Need of the hour

Our immediate requirements to exploit under-exploited oceanic tuna and bill fishes are to have modern tuna longliners and purse seiners. These are highly sophisticated fishing vessels which will never come across traditional sector, small and medium size trawlers and coastal purse seiners, ring seiners and gill netters. Modern tuna purse seiners and longliners have to be either imported or operated under joint ventures with countries like U.S.A., Japan, France, Spain, Korea or Taiwan, as the case may be.

Tuna purse seiners

Tuna purse seiners and gear are the costliest fishing vessels and gears in the world which are used to fish tuna, especially oceanic species, in the sub-surface waters, about 100 m from the surface. Modern "Super Seiners" are of size 100-110 m OAL, over 16 m breadth, with a draught of 7 m and fitted with main engines of 7000-9000 HP in order to achieve the highest speed of 15-20 knots. They are equipped with two radar sets for navigation and to track birds which feed on same small fish as tuna; two echosounders, a sonar to monitor the tuna shoals, radio direction finders, autopilot, radiotelephone communication sets and satellite navigation systems. The cost of a modern tuna purse seiner may be about Rs. 50-100 crores. For fishing with FADs, radio buoys and radar reflectors are used. Use of environmental information on sea temperature and weather is monitored via satellite. Tunas and related species have distinct behaviour pattern in relation to temperature, oxygen, salinity etc. and understanding of the ocean parameters by space borne observing systems is helpful in predicting and monitoring tuna fishery (Meenakumari and Ravindran, 2000). Most tunas tend to aggregate near floating objects, fish aggregating devices (FADs) or even large, surface swimming animals such as porpoises, dolphins and whales. Fishing ground and environmental information is often shared among seiners.

The American purse seines are of one-boat type with a length rang-

ing from 900-1200 m with depth of 250-300 m while Japanese type two-boat purse seines are of size 2000-2300 m x 250-300 m. Cost of a modern American tuna purse seine is over U.S.$ 10,00,000 which will last 8-10 years with good maintenance.

Tuna purse seine manufacturers are rather secretive about the actual design of the tuna nets. Mesh size which varies from 100-300 mm stretch may be less for small tunas (coastal tunas). A special tar treatment of the netting prevents soaking and improves abrasion resistance. Sinking speed of the net and fishing depth are of particular importance when fishing for skipjack.

The tuna purse seine is set at full speed of upto 15-16 knots. The sinking speed averages about 10 m/minute. Tunas can escape out of the seine before the impoundage is complete and it is very important to purse the seine quickly. Fast pursing and hauling operations depend on deck machineries like the purse winch, power block or Triplex net winch. Triplex net winches are more efficient and safer in rough weather than the high-up hanging huge power blocks. Power skiffs, bow and stern thrusters are used to keep the seiner's stern away from the seine. Each fishing operation (setting, pursing and hauling) takes about an hour. Brailing large catch onboard can take several hours.

Tuna-dolphin issue

Setting of tuna purse seines on dolphin-associated schools caused massive mortality of dolphins/porpoises. It caused a major public outcry which resulted in the decline of the U.S. purse seining fleet a few years back. Presently dolphin escaping devices have been developed by the tuna purse seine fleet.

Tuna in floating cages

Purse seine caught young bluefin tuna are kept in floating cages and fed until they gain weight about 30% for *Sushi* market (*Sashimi* tuna). It is a part of large offshore cage culture practised in Japan and Australia.

Post harvest technology of tuna

Main product of tuna was canned tuna. But now *Sashimi* tuna and other high price tuna products in Far East have been developed and are being continued to develop. This requires improved freezing and other post-harvest technologies onboard. Following are the range of tuna products.

Top quality products include *Sashimi* (White meat of yellow fin and bluefin tuna) and means much more than 'raw seafood'. Japanese are very particular about the freshness and quality of raw tuna used by *Sashimi* and *Sushi* markets. A pre-requisite for the *Sashimi* and *Sushi* grade tuna is that the fish should be frozen onboard itself at -60 ° C and stored at -55 ° C.

Other products include *Akami* tuna (red meat of yellowfin and bluefin) which is marketed as small blocks of tuna meat (*Saku*) through *Sushi* shops in Hong Kong and China and *Toro* Tuna which is a big block of fatty meat of yellowfin or other oceanic tunas. Market rates are HK$ 30-40/100 g for *Saku* and Yen 15,000 – 20,000/kg for *Toro* tuna.

Improvements in tuna longlining

Introduction of 'Monolines' (nylon monofilament) for branch lines and main lines and autoline system for shooting and hauling of longlines are recent introductions to improve the performance of tuna longlining.

Other fishing methods for scombroid fishes

Troll lines and pole and line fishing are the existing methods in Lakshadweep waters, Andaman Sea and coastal waters of the Indian mainland for catching tunas, especially skipjack, seerfishes and billfishes. The occurrence of mackerel in demersal trawl catches from deeper waters (70-100 m depth) have been reported by various authors indicating the semi-pelagic habitat of mackerel in Indian EEZ. Drift gill nets in the coastal waters have been practised for the exploitation of coastal tunas, seerfishes and mackerel. Introduction of nylon twines and monofilaments for fabrication of gill nets are some of the improvements effected in the last two to three decades in the country. Optimum mesh size and twine size for *Scomberomorus commerson, S.guttatus* and *Rastrelliger kanagurta* and effectiveness of artificial jigs for troll lining have been worked out at Central Institute of Fisheries Technology.

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