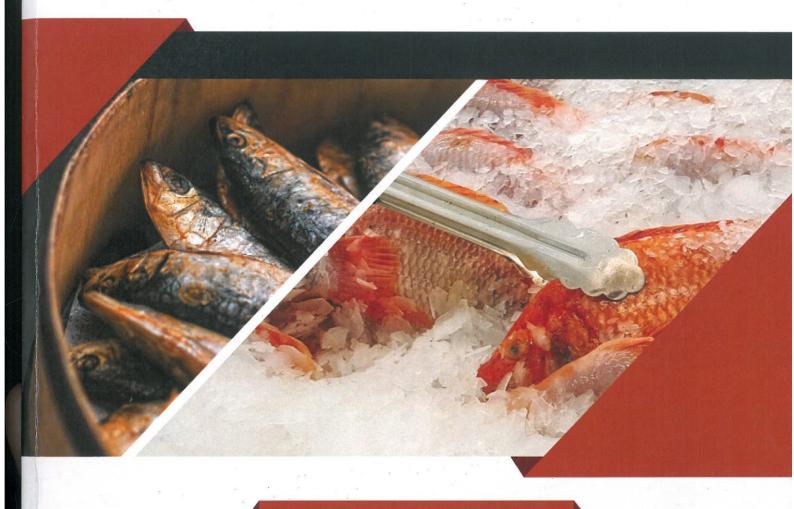
MODEL TRAINING COURSE

or

Advanced Fish Drying and Chilling Technology



Sponsored by



Directorate of Extension
Ministry of Agriculture & Farmers' Welfare, Govt. of India



Organized by

ICAR - CENTRAL INSTITUTE OF FISHERIES TECHNOLOGY

Matsyapuri P.O., Willingdon Island, Cochin - 682029, Kerala, India



Model Training Course

On

ADVANCED FISH DRYING AND CHILLING TECHNOLOGY

Date: 19 - 26 August 2019

Venue: ICAR-Central Institute of Fisheries Technology, Kochi

Sponsored by

Directorate of Extension, Ministry of Agriculture & Farmers Welfare

Govt. of India

Course Directors

Dr. Manoj P Samuel Dr. Ashok Kumar K

Course Coordinators

Dr. Bindu J
Dr C O Mohan
Dr Sarika K
Dr. Murali S
Dr. Aniesrani Delfiya D S
Er. Alfiya P V



ICAR-Central Institute of Fisheries Technology

(An ISO/IEC 17025: 2005 NABL accredited & ISO 9001:2015 certified) CIFT Junction, Willingdon Island, Kochi - 682 029, Kerala Ph: 0484-2412300; Fax: 091-484-2668212 E - mail: aris.cift@gmail.com; cift@ciftmail.org



Published by: Dr. Ravishankar C.N., Director, ICAR-CIFT, Kochi

Compiled and Edited by:

Dr. Manoj P Samuel

Dr. Murali S

Dr. Aniesrani Delfiya D.S

Er. Alfiya P. V

Smt. Shyma P.K

For citing entire book:

Manoj P. Samuel., Murali, S., Aniesrani Delfiya, D. S., Alfiya, P.V., Shyma, P.K. (eds) (2019). Advanced fish drying and chilling technology, ICAR-Central Institute of Fisheries Technology, Kochi, India.

Example for citing a chapter in the book:

Mohan, C.O. and Bindu, J (2019) Advances in fish processing technology. *In:* Manoj P. Samuel., Murali, S., Aniesrani Delfiya, D. S., Alfiya, P.V., Shyma, P.K. (eds). *Advanced fish drying and chilling technology*. Kochi, India, ICAR-Central Institute of Fisheries Technology, pp. 1-11

Design and Cover page: Smt. Razia Mohamed

Printed at: PrintExpress, Kaloor, Cochin

© 2019 ICAR - Central Institute of Fisheries Technology, Kochi-29



Message from Director

India fisheries sector emerged as an important economic entity with diverse resources and potentials. Apart from engaging about 14.5 million people in different activities, the sector plays a significant role in meeting the nutritional security of the country. However, minimising post-harvest losses is of great concern in terms of assuring increased revenues and accomplishing food security. Improved fish handling practices and processing measures involving cold storage lines during storage and transportation, drying and value addition offers a solution to the problem. Thus, technological advances in the areas of drying and chilling can be an appropriate solution for the stakeholders in the sector. ICAR - CIFT is actively involved in the design and development of cost-effective hybrid solar dryers, fish descaling machines, ergonomic and gender friendly refrigeration enabled mobile fish vending kiosks, fish freshness sensor, and energy & water optimization protocols for seafood industry. In this context I am very happy that Directorate of Extension, Ministry of Agriculture & Farmers Welfare, Govt. of India has sponsored an 8 days Model Training Course (MTC) on Advanced Fish Drying and Chilling Technology during 19 - 26 August 2019. On behalf of ICAR-CIFT, I congratulate the participants of the MTC. I hope the training programme would initiate deliberations on latest advances in fish drying and chilling for the overall development of post-harvest fisheries sector.

I wish the organizers a grand success in their endeavor.

Dr. C. N. Ravishankar Director, ICAR-CIFT

Kochi

24 August 2019

Preface

Indian fisheries sector plays important role in total food production, providing nutritional security to the food basket, contributing to the agricultural exports and engaging about 14 million people in different fisheries activities. In recent years, India has made notable advances in both marine and inland fishery sectors. Particularly, a paradigm shift has been observed in the post-harvest fisheries sector in the last one decade towards more energyefficient, cost-effective equipment and instruments, quality upgrading and green engineering interventions. In this context, technological interventions in post-harvest fisheries sector would play a greater role in reducing labour drudgery and time consumption in the area of fish processing and preservation while maintaining quality and safety of the products. The fishery engineering along with processing techniques is evolving as an important domain in view of depleting stocks on both pre and post-harvest scenarios. It will also aid in developing efficient fish processing technologies, optimizing energy and water use in seafood industries, mitigating climate change related issues and reducing carbon foot print. It is important to explore novel ways to incorporate engineering tools and techniques to obtain, quantify, and integrate industry responses towards responsible fisheries and ecosystem-based sustainable management of fish resources, value added products and affiliated industry. The technological interventions help to reduce the wastage of fishes, which is otherwise a highly perishable commodity, by preservation technologies and converting it into value added products with higher shelf life. Use of appropriate technologies along the fish value chain will help in producing better quality products and fetch more markets and higher price. This Model Training Course (MTC) is envisaged to highlight the latest developments vis-a-vis requirements of seafood industries and fishermen in drying and chilling techniques. Apart from this, recent technological advances in sensors, instruments, electronic gadgets and equipment for fish handling, fish processing, preservation and quality assessment are also covered in the MTC. We greatly acknowledge the Department of Extension, Ministry of Agriculture and Farmers' Welfare for sanctioning this MTC for the benefit of officers from state line departments and faculty of SAUs/ICAR institutions.

aly

Dr. Manoj P Samuel HOD, Engineering Division Course Director A Company

Dr. Ashok Kumar. K HOD, Fish Processing Division Course Director

Kochi 24 August 2019

CONTENTS

	was a superior of the superior	Page No.
Modu	ale I: Fish Drying	
1.	Advances in fish processing technology Mohan C.O & Bindu J	01
2.	Advances in fishery engineering Manoj P Samuel & Shyma P K	12
3.	Principles of drying and dehydration Murali S	23
4.	Design and working principles of CIFT solar hybrid dryers Alfiva P V, Murali S, Aniesrani Delfiya & Manoj P Samuel	28
5.	Advanced drying techniques for fish Aniesrani Delfiya	36
6.	Handling and pre-processing of fish for drying Sreelakshmi. K. R., Rehana Raj & Hanjambam M. D.	44
Mod	ule II: Fish Quality and Packaging	
7.	Value addition of cultivable and capture fishery resources: Present and future dimensions	48
8.	Binsi P K & Parvathy U. Biochemical analyses in seafood and seafood products – Basic concepts Fazil T S, Anandan R, Suseela Mathew	57
9.	Advances in fish packaging Mohan C O, Bindu J, Ravishankar C N.	76
10.	[생물] [12] [14] [14] [15] [15] [15] [15] [15] [15] [15] [15	90
11.		98
Mod	ule III: Chilling and Cold Storage	
12.	Advances in refrigeration and air conditioning with case studies Siddique V.K	104
13.		111
14.	Advances in Cold Preservation (Chilling, Freezing and Cold Storage) Technologies Menon Rekha Ravindra	130

Iodu	le IV: Fish Value Addition	
15.	Community Fish Smoking Kiln (COFISKI): A CIFT Technology for	137
	Hinterland Fisher Folks	
	Prasad M.M.	41
16.	Advances in food processing technologies Sinija V.R	145
17.	Drying, storing and packaging of spices Jayashree E	159
18.	Extension approaches for rural entrepreneurship development in Fisheries <i>Mohanty A.K. & Sajesh V.K.</i>	165
19.	Quality of Chilled and Dried Fish and Fishery Products Satyen Kumar Panda	182
20.	Need for Quality Improvement in Fish	201
	Prasad M.M	
Mod i 21.	Role of KVK in Agripreneurship: Successful Models Shinoj Subramannian, K.Smita Sivadasan, P.A.Vikas, Shoji Joy Edison	209
22.	Innovative extension approaches and project financing for doubling farmer's income	212
2	Manoj Kumar T.S	
Mod	ule VI: Business Incubation, Commercialization & Way Forward	
23.	Developing an operational model for Agri – incubators & Business model	215
	canvas	
	Sudheer K.P. & Prabhul Deep K.V	220
24.	Business incubation opportunities in fisheries post - harvest sector George Ninan	230
25.	CALL TO A DECEMBER OF CHARLES	240
	Sajeev M. S. & T. Krishnakumar	