

FISH DISEASES & HEALTH MANAGEMENT



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Preface

Fisheries sector occupies a very important place in the socio-economic development of the country. It has been recognized as a powerful income and employment generator as it stimulates growth of a number of subsidiary industries and is a source of cheap and nutritious food besides being a foreign exchange earner. Most importantly, it is the source of livelihood for a large section of economically backward population of the country.

The book entitled "Fish Diseases & Health Management" has been written with the intention to meet the needs of fisheries graduate and post-graduate students working on various aspects of aquaculture especially fish diseases. In this book, concise descriptions of the topics, introduction to fresh water aquaculture, importance of soil and water in fish health management, fish health management, an introduction to bacterial fish, prawn and cat fish diseases in India, fish disease control, use of probiotic in fish disease abatement, fish immunology and status of fish vaccines in aquaculture that is suitable for teaching the fundamental concepts of fisheries. We are sure that this book will serve the purpose of research work for beginners and entrepreneurs, who would like to take up fish culture. This may also serve as a useful tool for the students and researcher in understanding intricacies of aquatic ecosystem and effect on fish health.

We acknowledge our gratitude to the authors of different books and research papers, which were used as reference tool in the preparation of this book. We extend our hearty thanks to Dr. R.C. Sihag (Professor, Zoology and Aquaculture, CCS HAU, Hisar), Dr. Sunil Kumar Saini (Asstt. Professor, CCS HAU, Hissar) for all needed co-operation and moral support. We owe our gratitude to our parents & all family members, who inspired us for writing & assisted in various ways. We are also thankful to Dr L.L.Somani of Agrotech Publishing Academy for his help in timely publication of this book.

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About The Book

The technology of culturing fish has attracted investors to the aquaculture industry. More often, however, the significant impact of disease outbreaks is overlooked. It is only when occurrence of mortalities, retarded growth, reduced fecundity or lesioned fish alarmingly reduces profit that the fish farmer become aware of disease problems. Unfortunately, the disease may be at an advanced stage by the time diagnosis is attempted.

Aquaculture production in Asia has grown rapidly. Unfortunately, a number of infectious diseases have emerged as well owing to deteriorating conditions in farms not practicing sound culture management. To aid the industry in dealing with its problems in diseases, the present book " Fish Diseases and Health Management" is prepared. This book provides ten research articles of reputed researchers in the field of fish health management. Articles cover topics of environmental, bacterial, fungal and viral diseases. Beside, these the three most important and new topics -(i) Probiotics in aquaculture(ii) Fish immunology & (iii) Status of Fish Vaccines are the main attraction of the book. The objective of this book is to acquaint the fish farmers and students with the basic knowledge on disease causation and development among cultured fish and the management of major fish diseases. This book will be very useful for UG and PG students, personal and research libraries because it gives current literature of many aspects of fish health management in one volume.

About The Authors

Ravi Kant Verma (CSIR NET-JRF) is research scholar in NRCE, Hisar, (Haryana). He did his M.Sc. in 2006 and is pursuing his Ph.D. in the same department. He has published several research publications on fish biotechnology and pathology in reputed journals. He is the member of SOFTI Cochin. His fields of interest are fish biotechnology, pathology, immunology and fish health management.

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Dr. V.P. Saini (Scientist- SS) Aquaculture Research Unit, Directorate of Research, Maharana Pratap University of Agriculture & Technology, Udaipur, had his M.Sc. (1990) and

Ph.D. (1994) in Limnology and Fisheries from Rajasthan Agricultural University, Bikaner (Rajasthan). In 1998 he did certificate course - CES (Certificate in Environmental Studies) from Indira Gandhi Open University, New Delhi. Beginning his professional career in 1994, Dr. Saini has worked at RTADCF, Udaipur as Hatchery Development Officer. In 1996 Dr. Saini joined University services as scientist fisheries. For the last over 15 years, he has been actively engaged in research and teaching. Dr. Saini has published over 40 research papers in reputed journals & five books on fisheries science. He has also developed two water samplers and one field kit for microbiological analysis of water. Dr Saini had been to Philippines (SEAFDC) for fish breeding training. In 2009, he was awarded NAIP (ICAR) fellowship for international training in fish molecular breeding techniques at Institute of Aquaculture, University of Stirling, Scotland, UK. Presently he is attached with Non-Plan research project on fisheries & working/completed 11 projects on different aspects of aquaculture.

An Introduction to Fish Health Management

Tejpal Dahiya, Ravi Kant Verma and V. P. Saini

Aquaculture is the production of fish and shellfish for market under controlled or semi-controlled conditions. During the past three decades the raising of fish for human consumption has been increasing dramatically especially in the sociologically and industrially developed countries. The increased production has come about largely as a result of consumer awareness that fish and shellfish are nutritionally beneficial to health. Unfortunately, the production increase in some countries has been so great that the supply of propagated food fish has exceeded the demand in the marketplace. Attendant to the increased production of food fish under intensive culture conditions has been the increased loss of production potential through infectious and noninfectious disease processes. In many cases the episodes have been so severe that 45-55% of the numbers of fish at the beginning of the rearing process have died before they became ready for market.

For commercial success, an aquaculture operation must maintain fish at densities that greatly exceed those normally

found in nature. Under these conditions, fish must not only survive, but also grow rapidly. Regardless of the culture system used (e.g., ponds, raceways, reuse systems, cages) it is imperative that the culturist maintain an environment conducive to good fish health. A wide variety of parasites and pathogens can and do infect fish. Most disease agents are naturally present in low numbers and normally do not cause problems. The natural defense mechanisms of fish (i.e. undamaged skin, mucus covering the skin, and various components of the immune system) keep disease agents in check. However, when fish already crowded in culture operations are further stressed (e.g., by low dissolved oxygen, nutritionally inadequate feeds, excessive handling) their natural disease defense systems may be weakened and the ability of the fish to protect itself against infectious diseases maybe reduced. Disease induced catastrophic mortalities are frequently the result of, and response to, a stressful experience. Fish producers today have very limited choices for controlling fish disease problems.

A fish health prevention/maintenance program is presently recognized as a required management practice by fish producers to lessen the risk of diseases. This management approach has become particularly critical for producers using recirculating systems. Fish health prevention/maintenance programs require many elements including quarantine procedures, examination and monitoring for fish pathogens, and prophylactic treatments for parasites. Developing fish health prevention protocols are necessary to reduce likelihood of bacterial and parasitic diseases.

Fish health management is a term used in aquaculture to describe management practices which are designed to prevent fish diseases. Successful fish health management begins with prevention of disease rather than treatment. Management practices directed at limiting stress are likely to be most effective in preventing disease outbreaks.

Any manager of fish health seeks to achieve two goals:

- To maximize immunocompetence in fish populations; and
- To reduce or eliminate potential pathogens (i.e., parasites, bacteria, viruses and fungi) in culture systems.

EXTRINSIC FACTORS AFFECTING FISH HEALTH

The extrinsic or environmental factors which are known to compromise the health status of fish individually or collectively can be grouped into the following categories according to their location within the system:

- (1) water-associated
- (2) pond-associated
- (3) nutrition-associated
- (4) management-associated

(1) Water-associated factors:

Among water-related factors identified as affecting the productivity of aquaculture systems, water temperature and dissolved oxygen content have the most significant effects on fish health. They are inherent in all water supplies and are subject to fluctuations to which the fish in the system must adapt. The physiological effects of the fluctuations are very broad, ranging from a change in metabolic rate to altering the susceptibility to pathogens. In this regard, the documentation of environmental changes and the occurrence of infectious and noninfectious disease processes could be an invaluable aid in predicting the likelihood of a subsequent disease episode.

(2) Pond-associated factors:

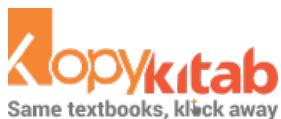
The primary effect here is requiring a particular fish to live in a pond configuration which does not meet its behavioral requirements.

(3) Nutrition-associated factors:

One would think that in this day and age of high quality commercial diets, nutritional problems would not occur, but they do, all too frequently. Growth rate is a very reliable indicator of the health of the population. Deviations of as little as 1% from the expected growth rate can be measured quite accurately and evaluated with a high degree of statistical validity. Over feeding a population is another health-compromising situation. In this case there are frequently abnormal amounts of abdominal fat and hepatic glycogen deposits. The effects are not often seen immediately, but can



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