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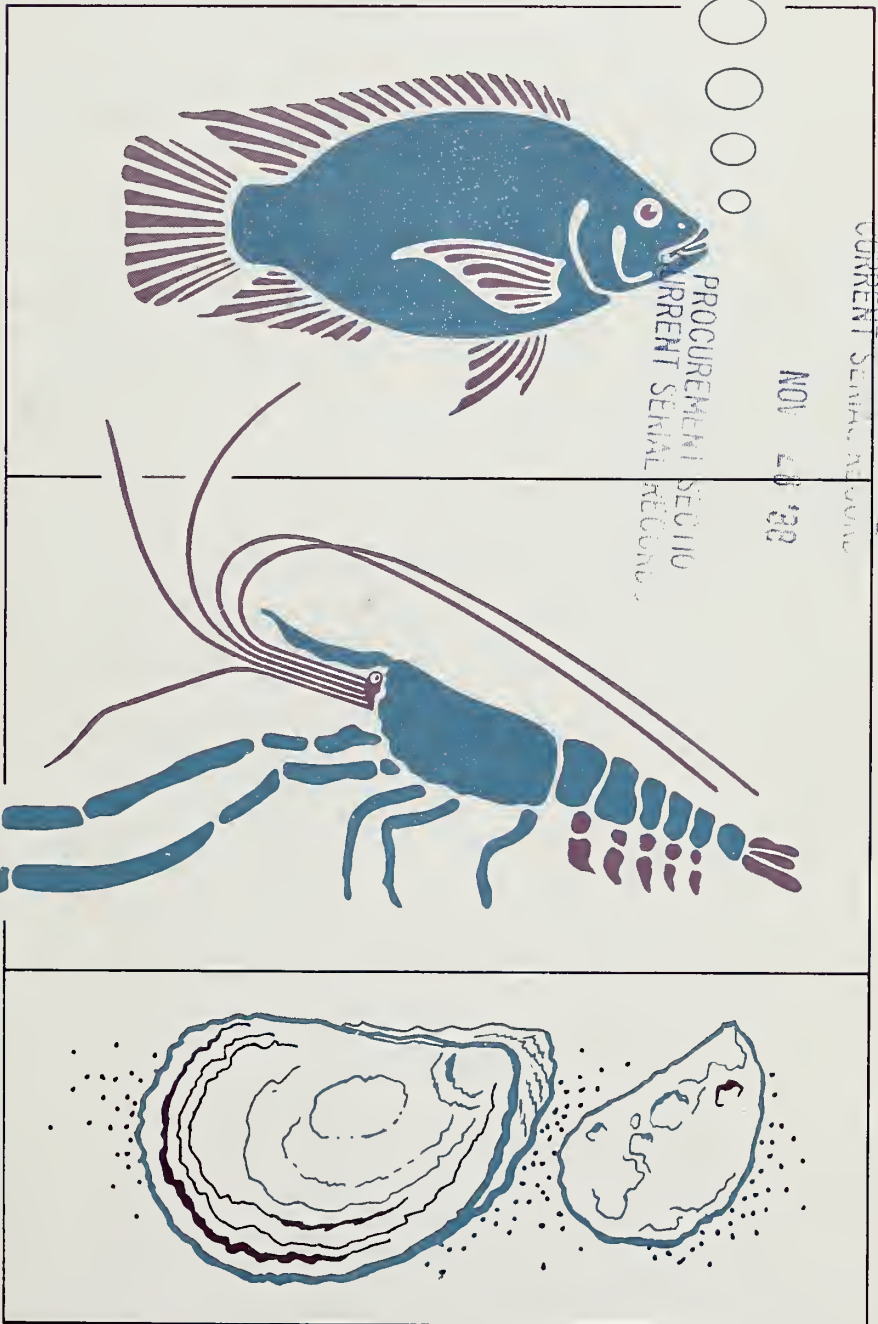


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Bibliographies and
Literature of Agriculture
Number 71

Aquaculture in The Caribbean Basin: A Bibliography



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Bibliographies and
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September 1988

Aquaculture in the Caribbean Basin: A Bibliography (1970-88)

By

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Compiled for

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In collaboration with the University of Puerto Rico
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PREFACE

This bibliography contains "selected" citations from the literature on Caribbean aquaculture. Citations date from 1970 to the present, and are arranged alphabetically by the author's surname. A subject index to common aquaculture terms (selected from the title and descriptor fields) is provided at the end of the bibliography.

Countries and sub-regional geographic areas within the Caribbean Basin were used to identify information on Caribbean aquaculture for this bibliography. Both marine and freshwater plant and animal culture were considered as topics for this publication.

Several computerized databases were searched for citations to the literature. As a result of utilizing different databases to compile this bibliography, formats for bibliographic entries may vary.

Databases accessed for relevant information include:

1) AGRICOLA (AGRICultural OnLine Access), an agricultural database produced by the National Agricultural Library (NAL), 1979-present; 2) ASFA (Aquatic Sciences and Fisheries Abstracts) database, produced for a consortium of United Nations agencies by Cambridge Scientific Abstracts (CSA), 1978-present; and 3) AQUACULTURE database, produced by the National Oceanic and Atmospheric Administration (NOAA), 1970-84.

The holdings of the National Agricultural Library are identified in the AGRICOLA database by NAL "call numbers." A call number is given for each bibliographic entry. These numbers are alphanumeric in nature (e.g., SH1.A6). The AGRICOLA database contains a wealth of material on topics related to agriculture.

Materials cited in the AQUACULTURE database represent the Virginia Institute of Marine Science (VIMS) microfiche collection on aquaculture. Through an agreement with the National Oceanic and Atmospheric Administration of the U.S. Dept. of Commerce, the National Agricultural Library of the U.S. Dept. of Agriculture maintains the VIMS microfiche for items cited in this AQUACULTURE database. Document delivery service for materials cited in this microfiche collection are provided by NAL on a cost-recovery basis. Each document is identified by its "microfiche number," which is designated at the beginning of each citation (e.g., 010566). These numbers range from 000001 to 011000.

The ASFA database includes materials on aquaculture in its coverage of the world's literature on the science, technology, and management of marine and freshwater environments and resources. This database is a cooperative effort of the Food and Agriculture Organization of the United Nations (FAO), the Intergovernmental Oceanographic Commission (IOC), the United Nations Office of Ocean Affairs and Law of the Sea (UN/OALOS),

the United Nations Environment Programme (UNEP), and a growing number of national and regional agencies. Documents may be available from your nearby public or university library or the National Agricultural Library.

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001

112-03928

Cultivo de *Tilapia nilotica* con Diferentes Densidades de Siembra
(Culture of *Tilapia nilotica* at Different Stocking Densities.).

Aguiar, R.; Bencomo, I.; Gonzalez, O.

Minist. de Industria Pesquera, Cuba

REV. LATINOAM. ACUICULT., no. 5, pp. 24-26, (1980).

LANGUAGES: Spanish

SUMMARY LANGUAGES: English; Spanish

DOC TYPE: Journal Article

Two stocking densities of *T. nilotica* were compared, with no significant difference being found between stocking of 7 fish/m² and 12 fish/m². A comparison was also made of the growth of fish in both fertilized and non-fertilized ponds, with the result that the fertilized pond revealed a higher daily increase than the nonfertilized pond. In both treatments a significant difference was discovered to exist as regards the growth of male and female specimens.

DESCRIPTORS: stocking density; fish culture; habitat improvement
(fertilization)

GEOGRAPHIC DESCRIPTORS: Cuba

TAXONOMIC DESCRIPTORS: *Tilapia nilotica*

ENVIRONMENT: Fresh

002

114-26171

Reproduction and development in the lucinid clam *Codakia orbicularis*
(Linne, 1758).

Alatalo, P.; Berg, C.J., Jr.; d'Asaro, C.N.

Mar. Biol. Lab., Woods Hole, MA 02543, USA

BULL. MAR. SCI., vol. 34, no. 3, pp. 424-434, (1984).

LANGUAGES: English

SUMMARY LANGUAGES: English

DOC TYPE: Journal Article

The tiger lucine *Codakia orbicularis* is a large edible clam being investigated as a mariculture candidate in the Bahamas Islands. Gonad development and spawning seasons were assessed by monthly sampling of *C. orbicularis* from Grand Bahama Island, Bahamas and Key Biscayne, Florida. Histological examination of clams showed most of the populations sampled to be ripe between April and November. Natural spawning probably occurs May to October. *Codakia orbicularis* is dioecious, seldom responding to standard spawning techniques, including physical and chemical stimuli. Artificial fertilization by carefully stripping gonads produced 15-20% viable embryos. Larval development within the superfamily Lucinacea is characterized by formation of a gelatinous capsule. The long planktonic development and facultative planktotrophy of *C. orbicularis* is unusual for lecithotrophic bivalve larvae.

DESCRIPTORS: spawning; sexual reproduction; larval development;
clam culture; marine aquaculture

TAXONOMIC DESCRIPTORS: *Codakia orbicularis*

ENVIRONMENT: Marine

003

82055342 81085919 Holding Library: AGL

A summary of possibilities for regional cooperation (Fisheries, marine resources, in the Caribbean).

Alexander, L.M.;

Proceedings - Gulf and Caribbean Fisheries Institute. June 1981. (33rd), June 1981. p. 171-175.

Miami, Florida, The Institute. ISSN: 0072-9019

NAL: SH1.G8

004

83130983 83032297 Holding Library: AGL

The fecundity of mullet (Pisces, Mugilidae) from Cuban waters

Alvarez-Lajonchere, L. JFIBA;

Journal of fish biology. v. 21 (6), Dec 1982. p. 607-613.

London: Academic Press. ISSN: 0022-1112

NAL: QL614.J68

Language: English

005

114-14735; NAL: SH1.G8

Field release of cultured queen conch in Puerto Rico: Implications for stock restoration. 35. Annual Gulf and Caribbean Fisheries Institute Nassau (Bahamas) Nov 1982

Appeldoorn, R.S.; Ballantine, D.L.

Dep. Mar. Sci., Univ. Puerto Rico, Mayaguez, PR 00708

PROC. GULF CARIBB. FISH. INST., no. 35

PROCEEDINGS OF THE THIRTY-FIFTH ANNUAL GULF AND CARIBBEAN FISHERIES INSTITUTE, NASSAU, BAHAMAS, NOVEMBER 1982 (pub. 1983), p. 89-98.

Higman, J.B. ed.

LANGUAGES: English SUMMARY LANGUAGES: English

DOC TYPE: Conference; Book

Laboratory-reared queen conchs, *Strombus gigas*, between 20-50 mm in length were tagged with a colored streamer and released into the field in several short-termed experiments. Sites studied were an offshore sand and algal plain, and a sheltered inshore sea grass bed. Growth of released conchs was comparable or greater than for controls maintained in tanks. Survival was highly variable between experiments, rendering site comparisons meaningless. Shell fragments recovered from dead individuals indicated that crustaceans were the dominant predators. Analysis of growth and mortality rates suggests that strong conservation measures will be required as a prerequisite for the restoration of conch population.

DESCRIPTORS: cultured organisms; stocking (organisms)

TAXONOMIC DESCRIPTORS: *Strombus gigas*; survival

ENVIRONMENT: Marine

006

115-11735

Observations on the growth and survival of laboratory-reared juvenile conchs, *Strombus gigas* and *S. costatus*

Annual Meet. National Shellfisheries Association Baltimore, MD (USA) 14 Jun 1982

Appeldoorn, R.S.; Ballantine, D.L.; Chanley, P.

Dep. Mar. Sci., Univ. Puerto Rico, Mayaguez, PR 00708, USA J. SHELLFISH RES., vol. 3, no. 1, p. 82, (1983).

LANGUAGES: English

Summary only.

DOC TYPE: Conference; Summary; Journal Article

A study of the culture and life history of the queen conch *S. gigas* in Puerto Rico has been underway since 1981. Its objective is to develop suitable methods for the large-scale culture of larvae of *S. gigas* and subsequent release of juveniles to rebuild depleted natural stocks. Although efforts have concentrated on *S. gigas*, larvae of the closely related milk conch *S. costatus* Gmelin have also been raised. Results are discussed.

DESCRIPTORS: marine aquaculture; life history; survival

TAXONOMIC DESCRIPTORS: *Strombus gigas*; *Strombus costatus*

ENVIRONMENT: Marine

007

113-19284

L'etat et l'aquaculture aux Antilles-Guyane

(State policy and aquaculture in the French West Indies and Guiana.).

(Caribbean Aquaculture Symposium) (French West Indies) 14 Dec 1981

Archambault, C.

Ministere Mer., French West Indies

JOURNEES AQUACOLES DELA CARAIBE. 14-17 DECEMBRE 1981.

(CARIBBEAN AQUACULTURE SYMPOSIUM. 14-17 DECEMBER 1981.), 1981, pp. 1-8

LANGUAGES: French

DOC TYPE: Conference; Report

Aquaculture development can be very interesting in tropical zones, because growth is faster, for transplanted as well as local species. Economic aspects also seem favorable: the final costs are not too high. The French government policy is to develop aquaculture in the West Indies and Guyana, with financial aids.

DESCRIPTORS: aquaculture development; policy

GEOGRAPHIC DESCRIPTORS: tropical zones; government; ASW, French West Indies; ASW, French Guiana

ENVIRONMENT: Marine

008

114-02045

Journees aquacoles de la Caraibe. 14-17 decembre 1981

(Caribbean Aquaculture Symposium. 14-17 December 1981.).

(Caribbean Aquaculture Symposium) (French West Indies) 14 Dec 1981

Association pour le Devel. Aquaculture Martinique, Fort-de-France (FWI)

008 (CONTINUED)

PUBL: ASSOCIATION POUR LE DEVELOPPEMENT DE L'AQUACULTURE A LA MARTINIQUE, FORT-DE-FRANCE (FRENCH WEST INDIES), 1981., vp

LANGUAGES: French

DOC TYPE: Conference; Report

The aquaculture possibilities in the French West Indies are reviewed: possible resources in the mangrove, and farming experiments. Contributions are analyzed separately.

DESCRIPTORS: marine aquaculture; aquaculture development; aquaculture enterprises; conferences

GEOGRAPHIC DESCRIPTORS: mangrove swamps; ASW, French West Indies

ENVIRONMENT: Marine

009

117-15360

K voprosu o roste i sozrevanii kanal'nogo soma

(On growth rate and maturation of channel catfish.)

Bagrov, A.M.; Chertikhin, V.G.; Benkome, I.

SB. NAUCH. TR. VNIIPRKH., no. 43

AKVAKUL'TURA LOSOSEVYKH RYB.

(CULTURE OF SALMONS.).

1984, pp. 21-25

LANGUAGES: Russian

SUMMARY LANGUAGES: English; Russian

DOC TYPE: Book

Observations were carried out on growth and gametogenesis in *Ictalurus punctatus* which was acclimatized in Cuba. At the average water temperature of 25.8 degree C the males reached maturity in the beginning of the 2nd year at the weight of 1 kg. The low weight of one-year olds was attributed to inadequate feeding conditions. It is concluded that channel catfish can be regarded as a promising object of cage and tank culture in Cuba.

DESCRIPTORS: growth; sexual maturity; gametogenesis; rearing; acclimatization; cage culture

GEOGRAPHIC DESCRIPTORS: Cuba

TAXONOMIC DESCRIPTORS: *Ictalurus punctatus*

010

114-14731; NAL: SH1.G8

Queen conch culture and future prospects in Puerto Rico. 35. Annual Gulf and Caribbean Fisheries Institute Nassau (Bahamas) Nov 1982

Ballantine, D.L.; Appeldoorn, R.S.

Dep. Mar. Sci., Univ. Puerto Rico, Mayaguez, PR 00708

PROC. GULF CARIBB. FISH. INST., no. 35

PROCEEDINGS OF THE THIRTY-FIFTH ANNUAL GULF AND CARIBBEAN FISHERIES INSTITUTE, NASSAU, BAHAMAS, NOVEMBER 1982 (pub. 1983), p. 57-63.

Higman, J.B. ed.

LANGUAGES: English

SUMMARY LANGUAGES: English

DOC TYPE: Conference; Book

010 (CONTINUED)

Conchs (*Strombus gigas*) are reared from eggs collected in the field. Following hatching, larvae are cultured in 950-l fiberglass tanks utilizing techniques adapted from bivalve culture. Veligers are fed predominately a diet of cultured phytoplankton species: *Isochrysis* (Tahitian), *Tetraselmis chui* and *Thalassiosira fluviatilis*. Larval growth averages 50 to 55 μ m/day. Larval period varies from 12 to 22 days ($x = 16.3$) from hatching, and length at metamorphosis has ranged from 1.1 to 1.8 mm with a mode of between 1.4 and 1.5 mm. As larvae become competent for metamorphosis, they are exposed to macroalgae in shallow plastic wading pools. On attaining a minimum size of 2 to 3 mm, juveniles are transferred to troughs with running seawater and are supported off the bottom on screens. Supplied with abundant macroalgae, conchs grow rapidly. Initial postmetamorphosis growth is 0.2 mm/day and increases to 0.4 mm/day through the first 200 days.

DESCRIPTORS: shellfish culture; aquaculture techniques

GEOGRAPHIC DESCRIPTORS: Puerto Rico

TAXONOMIC DESCRIPTORS: *Strombus gigas*

ENVIRONMENT: Marine

011

113-19285

Aquamar: Une ferme marine pilote

(Aquamar: A pilot marine aquaculture farm.).

(Caribbean Aquaculture Symposium) (French West Indies) 14 Dec 1981

Bally, J.

Aquamar S.A., Martinique, French West Indies

JOURNEES AQUACOLES DELA CARAIBE. 14-17 DECEMBRE 1981.

(CARIBBEAN AQUACULTURE SYMPOSIUM. 14-17 DECEMBER 1981.), 1981, pp. 1-4

LANGUAGES: French

DOC TYPE: Conference; Report

Aquamar is a farm specialized in Mediterranean species, mainly sea basses, which are to be sent to France. The final price is evaluated between 40 and 55 F per kilo. The production should be around 20 tons the first year, 100 tons the second year, and 300 tons the third year.

DESCRIPTORS: aquaculture enterprises

GEOGRAPHIC DESCRIPTORS: aquaculture development; tropical zones; ASW, Martinique

ENVIRONMENT: Marine

012

009810

CARIBBEAN MARICULTURE CONCH PROJECT DEVELOPS LOCAL MANAGEMENT TECHNIQUES BELLEVILLE, B.

AQUACULTURE MAGAZINE 8 (5), 48-50., 1982,

Descriptors: CARIBBEAN; QUEEN CONCH; MOLLUSK; MANAGEMENT; EXPORT; MARKET; HATCHING; SURVIVAL; AQUARIUM CULTURE; LARVA; JUVENILE; HATCHERY

Genus Species: *STROMBUS GIGAS*

013

82110490 82009182 Holding Library: AGL

Spirited lobster venture sparks interest in future Caribbean development
(*Homarus americanus*).

Belleville, B.;

Aquaculture magazine. v. 7 (6), Sept/Oct 1981. p. 22-27. ill.

Little Rock, Ark., Briggs Associates, Inc. ISSN: 0199-1388

NAL: SH1.C65

Language: English

014

114-17141

Laboratory culture of Bahamian bivalve molluscs: Reproduction and general
biology. General Scientific Meetings of the Marine Biological Laboratory
Woods Hole, MA (USA) 18-21 Aug 1981

Berg, C.J., Jr.; Alatalo, P.

Mar. Biol. Lab., Woods Hole, MA 02543, USA

BIOL. BULL. MAR. BIOL. LAB. WOODS HOLE., vol. 161, pp. 337-338, (1981).

LANGUAGES: English

Summary only.

DOC TYPE: Conference; Summary; Journal Article

Adult and juvenile clams transported to Woods Hole, MA, are kept in a heated flow-through seawater system at temperatures simulating those of Grand Bahama Island (22 degree -32 degree C). Despite supplemental feeding of tropical species of phytoplankton, no significant change in body length, height, depth, and wet weight occurred in most clams over 5 months. While somatic growth appeared negligible, gonad development occurred in *Asaphis deflorata* and *Codakia orbicularis* held in the laboratory. Attempts to induce spawning were unsuccessful from February until early August. In mid-August, *A. deflorata* was stimulated to spawn in response to thermal shock, and treatment with a basic solution of 5 mM hydrogen peroxide. Larvae cultured at salinities of 36 ppt., 34 ppt. and 32 ppt. and temperatures of 27 degree C and 25 degree C display similar growth rates in all salinities except for irregular increases at 27 degree C. The average daily increase is 5 μ m in shell length. On day 7, veliger ranged from 114-123 μ m.

DESCRIPTORS: mollusk culture; induced breeding; growth

TAXONOMIC DESCRIPTORS: *Asaphis deflorata*; *Codakia orbicularis*

ENVIRONMENT: Marine

015

115-18306

Mariculture potential of shallow-water Bahamian bivalves.

13. Annu. Meet. of the World Mariculture Society Charleston, SC (USA)

1 Mar 1982

Berg, C.J., Jr.; Alatalo, P.

Mar. Biol. Lab., Woods Hole, MA 02543, USA

J. WORLD MARICULT. SOC., vol. 13, pp. 294-300, (1982).

LANGUAGES: English

015 (CONTINUED)

SUMMARY LANGUAGES: English

Incl. 16 ref.

DOC TYPE: Conference; Journal Article

The general ecology and mariculture potential of *Asaphis deflorata* and *Codakia orbicularis* in the Bahamas was studied. Population studies indicate patchy but often dense (28/.25 m super(2), assemblages of *C. orbicularis*) in muddy intertidal creeks and turtle grass beds. *A. deflorata* is found in concentrations up to 64/.25 m super(2), usually in sandy gravel. Compositional analysis of *C. orbicularis* shows meats high in protein, carbohydrate, and calories, but very low in cholesterol. *C. orbicularis* exhibits peaks of gonad ripeness in spring and late fall, with a large percentage of the population remaining ripe throughout the summer. Adults of both species were induced to spawn in the laboratory and these larvae reared through metamorphosis.

DESCRIPTORS: marine aquaculture; potential resources; mollusk culture

GEOGRAPHIC DESCRIPTORS: ASW, Bahama I.

TAXONOMIC DESCRIPTORS: *Asaphis deflorata*; *Codakia orbicularis*

ENVIRONMENT: Marine

016

114-14738

Report of the evaluation team on conch mariculture. 35. Annual Gulf and Caribbean Fisheries Institute Nassau (Bahamas) Nov 1982

Berg, C.J., Jr.; Chakalall, B.; Avila, M.H.; Olsen, D.

Mar. Biol. Lab., Woods Hole, MA, USA

PROC. GULF CARIBB. FISH. INST., no. 35

PROCEEDINGS OF THE THIRTY-FIFTH ANNUAL GULF AND CARIBBEAN FISHERIES INSTITUTE, NASSAU, BAHAMAS, NOVEMBER 1982.

Higman, J.B. ed., 1983., p. 135

LANGUAGES: English

DOC TYPE: Conference; Book

It is imperative that countries in the Caribbean improve their gathering of information on conch stocks and fisheries statistics, for more factual understanding of the fishery for each country. Adequate fishing data should be obtained before a commitment to an extensive restocking program is made. Extreme caution must be taken throughout the region to effectively manage conch resources in order to perpetuate the availability of conch for local benefits generated from employment, income and/or stable food supply.

DESCRIPTORS: shellfish culture; resource management

GEOGRAPHIC DESCRIPTORS: ASW, Caribbean; evaluation

TAXONOMIC DESCRIPTORS: *Strombus gigas* ENVIRONMENT: Marine

017

82043260 81075417 Holding Library: AGL

Cayman turtle farms suffers from ban on giant green sea turtle imports

Bingner, A.;

Aquaculture magazine. v. 7 (4), May/June 1981. p. 8-10. ill.

Little Rock, Ark., Briggs Associates, Inc. ISSN: 0199-1388

NAL: SH1.C65

018

005195

TROPICAL FISH FARMING.

BOOZER, D.

AMER. FISH FARMER WORLD AQUACULT. NEWS 4(8), 4-5., 1973,

SOME OF THE TROPICAL FISH INDUSTRY'S PROBLEMS INCLUDE THE ADVERSE EFFECT OF THE PROTEIN SHORTAGE, INCREASING FEED COSTS, AND SOME UNFAIR SELLING AND PRICING POLICIES WITHIN THE INDUSTRY. SALES OF ORNAMENTAL FISH ACCOUNT FOR MORE THAN \$200 MILLION IN RETAIL SALES IN THE UNITED STATES. SOME 20% OF THE FISH ARE IMPORTED MAINLY FROM THE CARIBBEAN AND SOUTH AMERICA. THE REST IS RAISED DOMESTICALLY. ABOUT 150,000 RETAIL OUTLETS SELL TROPICAL FISH; A MINIMUM OF 20% OF THE OVER 7,000 PET SHOPS DEAL EXCLUSIVELY IN FISH. TROPICAL FISH REPRESENT THE SECOND LARGEST HOBBY IN THE U.S. AS 20 TO 26 MILLION HOUSEHOLDS HAVE AQUARIUMS. APPROXIMATELY 500 MILLION TROPICAL FISH ARE OWNED BY HOUSEHOLDS. A SURVEY CITED GIVES FIGURES SHOWING THAT THE LIKELIHOOD OF HAVING AN AQUARIUM INCREASES WITH FAMILY SIZE.

Descriptors: TROPICAL FISH; ORNAMENTAL FISH; GENERAL DESCRIPTION; CONSUMPTION DATA; SURVEY DATA

Genus Species: OSTEICHTHYES

019

008710

MASS REARING OF QUEEN CONCH UNDER CONTROLLED CONDITIONS BECOMES REALITY
BRIGGS, P.

AQUACULTURE MAGAZINE 7 (3), 4., 1981,

Descriptors: QUEEN CONCH; MOLLUSK; HATCHING; LARVA; AQUARIUM CULTURE; ALGAE; CARIBBEAN; CAGE CULTURE; HATCHERY; RESTORATION; JUVENILE

Genus Species: STROMBUS GIGAS

020

010854

QUEEN CONCH - A CARIBBEAN CULTURE CANDIDATE

BROWN, J.

FISH FARMING INTERNATIONAL 9 (9), 8-9., 1982,

Descriptors: SPECIES SELECTION; CARIBBEAN; WEST INDIES; QUEEN CONCH; MOLLUSK; MARKET; HATCHERY; PILOT PROGRAM; ENERGY; WIND; SOLAR ENERGY; AQUARIUM CULTURE; BROOD STOCK; WATER QUALITY; ALGAE CULTURE; RESTORATION; PLANNING

Genus Species: STROMBUS GIGAS

021

113-07489

Growth rates of the mangrove oyster (*Crassostrea rhizophorae*) under culture conditions.

15. Meet. of the Association of Island Marine Laboratories of the Caribbean Runaway Bay (Jamaica) 7 Jan 1980

Brown, R.

021 (CONTINUED)

Oysterculture (Jamaica) Proj., Zool. Dep., Univ. West Indies, Jamaica
PROC. ASSOC. ISL. MAR. LAB. CARIBB., vol. 15, p. 28, (1980).

LANGUAGES: English

Summary only.

DOC TYPE: Conference; Summary; Journal Article

A multivariate analysis of factors affecting growth of the mangrove oyster, *C. rhizophorae*, revealed that depth was the most important factor and that individuals in the more brackish and nutrient-rich surface layers grew faster. Other important factors were initial size and the spacing of the cultch, where increased spacing produced faster growth. It is believed that, although economic considerations in oyster farming may override the importance of these factors, overcrowding of individuals is likely to be detrimental to the survival and growth of cultivated oysters.

DESCRIPTORS: growth; oyster culture; environmental effects

GEOGRAPHIC DESCRIPTORS: ASW, Jamaica

TAXONOMIC DESCRIPTORS: *Crassostrea rhizophorae*

ENVIRONMENT: Brackish

022

112-07796

The Biology, Fisheries, and Management of the Queen Conch, *Strombus gigas*.

Brownell, W.N.; Stevely, J.M.

New Hampshire Univ., Complex Systems Res. Cent., Durham, NH 03824, USA

MAR. FISH. REV., vol. 43, no. 7, pp. 1-12, (1981).

LANGUAGES: English

SUMMARY LANGUAGES: English

DOC TYPE: Journal Article

Available information on the biology, fisheries, and culture of the queen conch, *Strombus gigas*, throughout its geographic range, is reviewed. Beginning in the early 1970's, development of a lucrative frozen conch meat market in the United States dramatically increased the economic significance of the queen conch. However, the current condition of several conch fisheries indicates that these stocks are insufficient to meet demand. Some conservation measures have been implemented, but lack of fisheries biology data and fisheries personnel hamper development of comprehensive management plan. Problems with stock depletion have focused attention on the possibility of conch culture and/or stocking. In recent years a number of small, local research projects have been initiated to study queen conch biology and larval rearing. However, expanded research is needed to develop larval culture techniques applicable to pilot scale hatchery operation.

DESCRIPTORS: mollusk culture; biology; fisheries; stocking (organisms)

GEOGRAPHIC DESCRIPTORS: ASW, Caribbean

TAXONOMIC DESCRIPTORS: *Strombus gigas*

023

006350

CUBA EXPANDS HER AQUACULTURE INDUSTRY

BUENO, P.G.

ASIAN AQUACULTURE 1 (6), 3, 7., 1978,

Descriptors: CUBA; PRODUCTION; PLANNING; STOCKING; OYSTER; MOLLUSK;
TILAPIA; FRESH WATER FISH; SILVER CARP; GRASS CARP; BASS; BIGHEAD
CARP; MULLET; MARINE FISH; RESEARCH

Genus Species: HYPOPTHALMICHTHYS MOLITRIX; HYPOPTHALMICHTHYS NOBILIS;
CTENOPHARYNGODON IDELLUS

024

112-05204

Cultivo Experimental de Lisas (Mugil curema M. liza y M. trichodon) en Estanques

(Experimental Culture of the Mulletts (Mugil curema, M. liza and M. trichodon) in Artificial Ponds.)

Bustamante, G.; Enomoto, Y

Address Not Stated

INF. CIENT.-TEC. INST. OCEANOL. ACAD. CIENC. CUBA., no. 158

PUBL: ACADEMIA DE CIENCIAS DE CUBA, HAVANA (CUBA), 1981, 13 pp

LANGUAGES: Spanish

SUMMARY LANGUAGES: English; Spanish

Results are presented on the cultivation of the three most abundant mullet species of the Cuban shelf, Mugil liza, M. curema, and M. trichodon in artificial ponds with and without, rice bran as supplemental food (5-10% of the fishes' weight daily). Average sizes attained after a year by each species were: M. liza, 270 g M. curema, 50-105 g and M. trichodon, 30 g. The survival rate of the mullet crop was 24-78%, and the productivity varied from 154 (M. curema, without supplemental feeding) to 951 kg/ha-year (mixed culture of M. liza and M. curema and supplemental feeding). Catching, transportation, and stocking methods are described, as well as the water conditions of the ponds and the other organisms reared in them.

DESCRIPTORS: ponds; fish culture; artificial feeding; stocking (organisms); yield

GEOGRAPHIC DESCRIPTORS: Cuba

TAXONOMIC DESCRIPTORS: Mugil; Mugil curema; Mugil liza; Mugil trichodon

ENVIRONMENT: Marine

025

115-20521

El Centro Internacional de Investigaciones para el Desarrollo (CIID) y su Programa Regional de Pesquerias

(The International Developmental Research Center (IDRC) and its Fisheries Regional Program.)

Buzeta, R.

Int. Dev. Res. Cent., Ap. Aereo 53016, Bogota, Colombia

AN. INST. INVEST. MAR. PUNTA DE BETIN., no. suppl. 2, pp. 37-44, (1983).

025 (CONTINUED)

LANGUAGES: Spanish

DOC TYPE: Journal Article

The IDRC is an autonomous public organization created by the Canadian parliament (1970) to support surveys that benefit the developing countries. The Fishery Program that the IDRC has in Latin America consists of 14 operative projects in 13 South American and Caribbean countries. The projects include: aquaculture, mariculture and fishery aspects. The strategy for the Latinoamerican Fishery Development includes: future feeding requirements update economical crisis and developmental tendencies of the sector. The general objectives in the developmental strategy are: obtain a maximum marine and freshwater productivity quality improvement to optimize the relation cost/benefit and development of the exploitation and aquaculture product production. The IDRC should stimulate the research on polyculture systems of high value species (aquaculture) and prospection programs to identify new resources (marine fisheries).

DESCRIPTORS: international organizations; research programmes; development projects; aquaculture; fishery development; resource surveys; developing countries

026

112-03917

Cultivo de Larvas y Alevinos de Amura Blanca (*Ctenopharyngodon idella*) en Cuba

(The Culture of *Ctenopharyngodon idella* Larvae in Cuba.).

Presented at: 2. Seminario Nacional de Acuicultura Varadero, Matanzas (Cuba) 1979

Camejo, Z.; Bogueruk, A.; Ovinnikova, V.; Gonzalez, O.

Address Not Stated

REV. LATINOAM. ACUICULT., no. 4, pp. 28-35, (1980).

LANGUAGES: Spanish

SUMMARY LANGUAGES: English; Spanish

DOC TYPE: Journal Article

A study on survival of larvae and fingerlings of the "white amur" (*Ctenopharyngodon idella*), in nine cement and earth ponds, under the influence of different factors (stocking density, feeding and rate of dissolved oxygen). Tests were carried out at "El Dique" station, from March to May 1979, and the results showed that, among other things, it was advisable to provide incentives for secondary production in the ponds before larvae stocking (at densities not lower than 2 to 3 gr/m super(3)) and to avoid having dissolved oxygen rates lower than 4 mg/liter. Larvae stocking at a concentration on the order of 1.5 million individuals per hectare, is recommended in order to obtain a high yield, when there is no limit placed on the breeding periods.

DESCRIPTORS: fish larvae; fish culture; stocking (organisms); pond culture; survival

GEOGRAPHIC DESCRIPTORS: Cuba

TAXONOMIC DESCRIPTORS: *Ctenopharyngodon idella*

ENVIRONMENT: Fresh

IDENTIFIERS: environmental effects

027

116-05818

Macrobrachium rosenbergii (de Man 1879) and rice culture in Puerto Rico.
Cepeda, E.

Puerto Rico Univ., Mayaguez (Puerto Rico). Dep. of Marine Sciences
1982, 71 pp

LANGUAGES: English

Thesis (M. S. Degree).

DOC TYPE: Thesis; Book

Macrobrachium rosenbergii was cultured in 0.05 ha rice fields at the Lajas Center of Research and Development of the University of Puerto Rico. Three treatments with different stocking densities of 86 day-old prawns were used. Temperature, oxygen concentration and water level were monitored twice a day for the duration of the experiment. Average rice yields in ponds with and without prawns, were 1,140 and 1,050 kg/ha, respectively. Prawn capture rates showed no significant differences between the 2 treatments of prawn used. Total average prawn production was low with 5.4 kg/ha and 25% capture. The main reasons for the low capture rate could be attributed to an inadequate harvest technique and the rice row alignment of each pond. Rice production was apparently not affected by the presence of the prawns. Reproduction and spawning of *M. rosenbergii* can take place in the rice field environment if an adequate supply of oxygen and water level is provided.

DESCRIPTORS: prawn culture; agropisciculture; rice field aquaculture

GEOGRAPHIC DESCRIPTORS: Puerto Rico

TAXONOMIC DESCRIPTORS: *Macrobrachium rosenbergii*

ENVIRONMENT: Fresh

028

114-14588; NAL: SH1.G8

History and status of commercial Tilapia farming in Jamaica. 35. Annual Gulf and Caribbean Fisheries Institute Nassau (Bahamas) Nov 1982

Cooke, S.M.E.; Mooyoung, R.R.

Inland Fish. Project, Minist. Agric., Kingston, Jamaica

PROC. GULF CARIBB. FISH. INST., no. 35

PROCEEDINGS OF THE THIRTY-FIFTH ANNUAL GULF AND CARIBBEAN FISHERIES INSTITUTE, NASSAU, BAHAMAS, NOVEMBER 1982 (pub. 1983), p. 33-36.

Higman, J.B. ed.

LANGUAGES: English

SUMMARY LANGUAGES: English

DOC TYPE: Conference; Book

Fish farming began in Jamaica in the early 1950's when the Fisheries Division of the Ministry of Agriculture commenced a small-scale research and breeding program for *Tilapia mossambica*. Fish produced from the program were stocked extensively in most of the country's rivers and indigenous ponds. A large-scale commercial tilapia farming program was initiated in 1976, with the Government of Jamaica/USAID Inland Fisheries Development Project. *T. mossambica* was replaced by *T. nilotica*, and a specially prepared, locally manufactured fish feed was used. During this project, by June 1982, over 74,000 kg of food-fish were produced by the private sector.

028 (CONTINUED)

DESCRIPTORS: fish culture; freshwater aquaculture
GEOGRAPHIC DESCRIPTORS: Jamaica
TAXONOMIC DESCRIPTORS: Tilapia mossambica; Tilapia nilotica
ENVIRONMENT: Fresh
IDENTIFIERS: historical account; evaluation

029

114-14590; NAL: SH1.G8

Production of uniform-age male Tilapia nilotica fingerlings in nursery ponds. 35. Annual Gulf and Caribbean Fisheries Institute Nassau (Bahamas) Nov 1982

Cooper, A.P.; Chambers, S.; Boyd, N.

MOA/USAID Fish Production Syst. Dev. Proj., Minist. Agric., Kingston, Jamaica

PROC. GULF CARIBB. FISH. INST., no. 35

PROCEEDINGS OF THE THIRTY-FIFTH ANNUAL GULF AND CARIBBEAN FISHERIES INSTITUTE, NASSAU, BAHAMAS, NOVEMBER 1982 (pub. 1983), p. 37-41.

Higman, J.B. ed.

LANGUAGES: English

SUMMARY LANGUAGES: English

DOC TYPE: Conference; Book

Ten nursery ponds (0.12 to 0.28 ha) at the government-owned facilities at Mitchell Town and Twickenham Park in Jamaica were used for experimental rearing of Tilapia nilotica fingerlings. These fish were subsequently hand-sexed for stocking in privately-owned monosex food-fish production ponds. When mixed-sex fry weighing 1 g each were stocked at a rate of 150,000 to 190,000 per ha and fed a locally produced fish feed, an average of 37,100 males per ha per 9-week cycle were produced. Assuming that the female fingerlings had no economic value, production cost for the male fingerlings, with an average weight of 24 g, was US \$2.66 per kg or \$0.06 per individual. Fry to stock the nursery ponds were taken from three brood ponds with a combined area of 0.7 ha that had been stocked at a density of 7,500 to 10,000/ha (3 females:1 male).

DESCRIPTORS: freshwater aquaculture; fingerlings; age composition

GEOGRAPHIC DESCRIPTORS: Jamaica

TAXONOMIC DESCRIPTORS: Tilapia nilotica

ENVIRONMENT: Fresh

030

114-12075

Viabilidad economica del cultivo de peces en estanques rurales de poco tamano en Puerto Rico

(Economic viability of fish culture in small rural ponds in Puerto Rico.).

14. Meeting of the Association of Island Marine Laboratories of the Caribbean Santo Domingo (Dominican Republic) 20 Nov 1978

Cortes Maldonado, R.; Ruiz Oliveras, W.; Pagan, F.A.

Dep. Cienc. Mar., Univ. Puerto Rico, PR, USA

PROC. ASSOC. ISL. MAR. LAB. CARIBB., vol. 14, p. 38, (1979).

030 (CONTINUED)

LANGUAGES: Spanish

DOC TYPE: Conference; Summary; Journal Article

Three different types of fish culture were evaluated in 8 earthen ponds in western Puerto Rico: 1) monoculture of channel catfish (*Ictalurus punctatus*) 2) monoculture of *Sarotherodon* hybrids and 3) polyculture of the two. Results showed all 3 types to be economically viable.

DESCRIPTORS: fish culture; pond culture; polyculture; hybrids; aquaculture economics

GEOGRAPHIC DESCRIPTORS: Puerto Rico

TAXONOMIC DESCRIPTORS: *Sarotherodon*; *Ictalurus punctatus*

ENVIRONMENT: Fresh

031

114-12073

Evaluacion de policultivo en piscinas plasticas utilizando el barge de canal (*Ictalurus punctatus* Rafinesque) y la tilapia azul (*Sarotherodon aureus* Steindachner) alimentados con alimento para aves

(Evaluation of polyculture in plastic fishponds utilizing the channel catfish (*Ictalurus punctatus*) and blue tilapia (*Sarotherodon aureus*) fed with bird food.)

14. Meeting of the Association of Island Marine Laboratories of the Caribbean Santo Domingo (Dominican Republic) 20 Nov 1978

Cortes Maldonado, R.C.; Pagan-Font, F.A.

Address not stated

PROC. ASSOC. ISL. MAR. LAB. CARIBB., vol. 14, p. 36, (1979).

LANGUAGES: Spanish

DOC TYPE: Conference; Summary; Journal Article

An experiment was undertaken evaluating the polyculture of channel catfish (*Ictalurus punctatus*) and tilapia (*Sarotherodon aureus*) fed with a commercial food preparation for birds, containing 17% protein. Results agree with those of other workers, that fish polyculture is more productive than monoculture. A greater production is obtained using less food and a greater density with less mortality.

DESCRIPTORS: fish culture; polyculture; diets; artificial diets

TAXONOMIC DESCRIPTORS: *Ictalurus punctatus*; *Sarotherodon aureus*

ENVIRONMENT: Fresh

032

83082845 82112657 Holding Library: AGL

Barbados' new marine reserve

Cotter, P.J.;

Parks. v. 7 (1), Apr/June 1982. p. 8-11. ill., map.

Washington, International Union for Conservation of Nature and Natural Resources ISSN: 0363-0617

NAL: S900.P3

Language: English

033

113-19556

L'algue spiruline: De la recherche au developpement industriel
(The Spirulina algae: From research to industrial development.).
(Caribbean Aquaculture Symposium) (French West Indies) 14 Dec 1981
Crestor, R.

Address not stated

JOURNEES AQUACOLES DELA CARAIBE. 14-17 DECEMBRE 1981.

(CARIBBEAN AQUACULTURE SYMPOSIUM. 14-17 DECEMBER 1981.), 1981, pp. 1-5

LANGUAGES: French

DOC TYPE: Conference; Report

The Spirulina microscopic algae (Cyanophyceae) can be found in tropical zones, and can be of interest because of its high rate of proteins (70% of the dry weight), and pigments. The production rate can be very high, as is shown by an experimental culture in Ste Anne (Martinique), which has a production of 40-45 tons/ha.

DESCRIPTORS: marine aquaculture

GEOGRAPHIC DESCRIPTORS: phytoplankton culture; production cost; aquaculture enterprises; ASW, Martinique

TAXONOMIC DESCRIPTORS: Spirulina; Cyanophyceae; Algae

ENVIRONMENT: Marine

034

110-18634

Cultivo del escalar (*Pterophyllum scalaris*) Lichtenstein 1823) en estanques de cemento y fibrocemento.

Culture of *Pterophyllum scalaris*) (Lichtenstein, 1823) in cement and fibrocement tanks.

Damas, T.; Kamio, H.

Address not stated

Rev. Cub. Invest. Pesq., 3(20), 34-47, (1978)

LANGUAGES: Spanish

DOC TYPE: Journal Article

A new method for the culture of *P. scalaris*, was devised. A profitable reproduction rate was obtained using cement and fibrocement tanks without special attention to their nutrition as mentioned by other authors.

DESCRIPTORS: ornamental fish; fish culture

GEOGRAPHIC DESCRIPTORS: Cuba

TAXONOMIC DESCRIPTORS: *Pterophyllum scalaris*

IDENTIFIERS: culture tanks; Cichlidae; Pisces

035

114-14733; NAL: SH1.G8

Third World level conch mariculture in the Turks and Caicos islands. 35. Annual Gulf and Caribbean Fisheries Institute Nassau (Bahamas) Nov 1982

Davis, M.; Hesse, C.

Foundation for PRIDE, Miami, FL 33173, USA

035 (CONTINUED)

PROC. GULF CARIBB. FISH. INST., no. 35
PROCEEDINGS OF THE THIRTY-FIFTH ANNUAL GULF AND CARIBBEAN FISHERIES
INSTITUTE, NASSAU, BAHAMAS, NOVEMBER 1982 (pub. 1983), p. 73-82.
Higman, J.B., ed.
LANGUAGES: English
SUMMARY LANGUAGES: English
DOC TYPE: Conference; Book

The Foundation for the Protection of Reefs and Islands from Degradation and Exploitation (PRIDE) has developed facilities and hatchery techniques for conch mariculture on Pine Cay in the Turks and Caicos Islands, a remote Third World site. Efforts have focused on the participation of local people and ways to reduce the energy costs of the hatchery through the use of alternate energy devices. In 1981-1982 PRIDE established and monitored an enclosed breeding population of Queen Conch, *Strombus gigas*. A conch mariculture facility incorporating simple, economical and energy efficient systems appropriate in a developing country, has been developed.

DESCRIPTORS: shellfish culture; developing countries
GEOGRAPHIC DESCRIPTORS: Caicos I.; Turks I.
TAXONOMIC DESCRIPTORS: *Strombus gigas*
ENVIRONMENT: Marine

036

118-07428

Breeding behavior of the queen conch *Strombus gigas* Linne held in a natural enclosed habitat.

Davis, M.; Mitchell, B.A.; Brown, J.L.
Found. for PRIDE, 7600 SW 87th Ave., Miami, FL 33173, USA
J. SHELLFISH RES., vol. 4, no. 1, pp. 17-21, (1984).
LANGUAGES: English
SUMMARY LANGUAGES: English
Rec'd May 1987. Incl. 8 ref.
DOC TYPE: Journal Article

An enclosed, natural breeding habitat for the queen conch *Strombus gigas* was established and monitored during the 1981 and 1982 breeding seasons in the Turks and Caicos Islands. Breeding behavior of conchs was studied at a site from which egg masses were collected for mariculture research. The egg-laying season extended from late March to early September, with a distinct seasonal variation in the number of egg masses produced. The mean numbers of egg masses produced per female per month for 1981 and 1982 were 1.2 and 1.7, respectively.

DESCRIPTORS: mollusk culture; aquaculture techniques; breeding; enclosures; marine aquaculture
GEOGRAPHIC DESCRIPTORS: ASW, Turks I.; ASW, Caicos I.
TAXONOMIC DESCRIPTORS: *Strombus gigas*
ENVIRONMENT: Marine

037

113-19509

La realite du grossissement de *Macrobrachium rosenbergii* a la Martinique
(Induced growth of *Macrobrachium rosenbergii* in Martinique: The reality.).
(Caribbean Aquaculture Symposium) (French West Indies) 14 Dec 1981

Elizabeth-Mesnager, D.

Address not stated

JOURNEES AQUACOLES DELA CARAIBE. 14-17 DECEMBRE 1981.

(CARIBBEAN AQUACULTURE SYMPOSIUM. 14-17 DECEMBER 1981.), 1981, pp. 1-8

LANGUAGES: French

DOC TYPE: Conference; Report

Aquaculture experiments have been realized in Martinique with *Macrobrachium rosenbergii*. Technical details like water quality, nutrition, growth observations, are given, and the costs are evaluated for a farm of 1 ha.

DESCRIPTORS: prawn culture; aquaculture economics

GEOGRAPHIC DESCRIPTORS: growth; tropical zones; Martinique

TAXONOMIC DESCRIPTORS: Malacostraca; *Macrobrachium rosenbergii*

ENVIRONMENT: Fresh

038

002516

FISH CULTURE AND FISHERY MANAGEMENT

ERDMAN, D.S.

PUERTO RICO DEPARTMENT OF AGRICULTURE, FEDERAL AID PROJ. F-1-20, 4 (2),
16-20., 1972,

Descriptors: FISHERY MANAGEMENT; PUERTO RICO; AQUACULTURE

039

83064803 82097981 Holding Library: AGL

Stylochus megalops (Platyhelminthes: Turbellaria), a new oyster predator
in Cuba (Natural enemy).

(*Stylochus megalops* (Platyhelminthes: Turbellaria), nuevo depredador del
ostion en Cuba)

Espinosa, J.;

Poeyana. Dec 15, 1981. (228), Dec 15, 1981. 5 p.

La Habana, Cuba, Instituto de Zoologia, Academia de Ciencias de Cuba.

NAL: QL1.P6

Language: Spanish ; English

040

112-03931

Tricodinos y Apiosomas en *Tilapia* sp. y Formas de Combatirla
(Tricodinia and Apiosomia in *Tilapia* sp. and Control Methods).

Fajer, E.; Prieto, A.

Empresa Nacional de Acuicultura, Cuba

REV. LATINOAM. ACUICULT., no. 6, pp. 19-24, (1980).

040 (CONTINUED)

LANGUAGES: Spanish

SUMMARY LANGUAGES: English; Spanish

DOC TYPE: Journal Article

From studies carried out on Tilapia sp. at the Empresa Nacional de Acuicultura (Dique) fingerling hatchery, a frequent and combined infestation by Tricodina sp. and Apiosoma sp. has been found. Analysis for intensity and extent characteristics of the above mentioned parasitic infestation are being performed. It was observed that these animals can withstand the common salt. They were subjected to a 50,000 ppm concentrations bath, for a curative dip so as to attack these parasites. However, other procedures using malachite green alone and also in conjunction with formaline, are being experimented with in order to find out a possible way for the fish to recover from that sickness. Suggestions on how to attack this disease in Cuban Tilapia hatcheries and on prophylactic measures are also available in the literature.

DESCRIPTORS: ectoparasites; parasite control; fish culture

GEOGRAPHIC DESCRIPTORS: Cuba

TAXONOMIC DESCRIPTORS: Tilapia

ENVIRONMENT: Fresh

041

118-02922

Informe de la Cuarta Reunion de la Comision de Pesca Continental para America Latina La Habana Cuba 20-25 de enero de 1986

(Report of the Fourth Session of the Commission for Inland Fisheries of Latin America, Havana, Cuba, 20-25 January 1986.)

4. Sess. of the Commission for Inland Fisheries of Latin America (COPESCAL) Havana (Cuba) 20 Jan 1986

FAO, Rome (Italy)

FAO FISH. REP. FAO INF. PESCA., no. 356, 1986, 42 pp

LANGUAGES: English; Spanish

SUMMARY LANGUAGES: English; Spanish

DOC TYPE: Conference; Book

REPORT NO.: FAO FIPL/R356(Es/En)

The final formal report of the Fourth Session of the Commission for Inland Fisheries of Latin America held in Havana, Cuba, from 20 to 25 Jan. 1986, is presented. Major topics discussed during the session refer to: (1) progress achieved during the intersessional period, (2) fishery resources in lakes and rivers (3) activities of the Regional Latin American Aquaculture Centre (4) fishing gears and methods for artisanal fisheries in continental waters (5) fish utilization and marketing, and (6) follow-up to the FAO World Conference on Fisheries Management and Development. A minisymposium on extensive aquaculture in ponds and small reservoirs was held in conjunction with the Fourth Session. The lists of delegates and observers, of documents and of main decisions and recommendations of the Session are given in annexes.

DESCRIPTORS: inland fisheries; fishery development; aquaculture development; fishing gear; fishery economics; artisanal fisheries

GEOGRAPHIC DESCRIPTORS: Latin America

ENVIRONMENT: Fresh

IDENTIFIERS: conferences

042

113-10824

Actas del Simposio sobre Desarrollo y Explotacion de Lagos Artificiales Santo Domingo Republica Dominicana 30 de noviembre - 1 de diciembre de 1981 (Proceedings of the Symposium on the Development and Exploitation of Artificial Lakes, Santo Domingo, Dominican Republic, 30 November - December 1981).

Symp. on the Development and Exploitation of Artificial Lakes Santo Domingo (Dominican Republic) 30 Nov 1981

FAO Comm. for Inland Fisheries of Latin America, Rome (Italy)

FAO FISH. REP. FAO INF. PESCA.

PUBL: FAO, ROME (ITALY), 1982, 17 pp

LANGUAGES: English; Spanish

SUMMARY LANGUAGES: English; Spanish

ISBN 92-5001246-2.

DOC TYPE: Conference; Book

REPORT NO.: FAO FIRI/R273

Discussions centered on four main topics: (1) ecology of fish populations in reservoirs (2) effects of dams on downstream fish populations (3) planning and developing fisheries in reservoirs and (4) management of small reservoirs and aquaculture. As annexes, the programme, list of documents and list of participants are included.

DESCRIPTORS: artificial lakes; reservoir fisheries; fishery development; freshwater aquaculture; conferences; reservoirs (water)

ENVIRONMENT: Fresh

043

114-19100

A policy for development of aquaculture in Jamaica. Report of a government of Jamaica/ADCP study group January - February 1983.

FAO/UNDP Aquaculture Development and Coord. Programme, Rome (Italy)

PUBL: FAO/UNDP, ROME (ITALY), 1983., 115 pp

LANGUAGES: English

SUMMARY LANGUAGES: English

FAO/UNDP ADCP/MR/83/22.

DOC TYPE: Numerical data; Book

The report describes a Government policy intended to stimulate development of aquaculture in Jamaica. The study group, which identified the policy, suggests that tilapia and fresh water prawn be made the principal species for future development efforts, and goes on to propose some modifications of the conditions under which aquaculturists have access to land, water, feed and other factors of production. In order to ensure efficiency in the Government's development efforts, the study group suggests that a "National Aquaculture Development Committee" be formed and that the Government create an "Aquaculture Promotion Ltd." to be managed as a commercial firm. The report ends with some suggestions for what Government might do to implement the proposed policy.

DESCRIPTORS: aquaculture development; fish culture; shrimp culture; prawn culture

GEOGRAPHIC DESCRIPTORS: government policy; Jamaica; ASW, Jamaica

TAXONOMIC DESCRIPTORS: Tilapia; Macrobrachium

ENVIRONMENT: Marine; Brackish; Fresh

044

113-08997

Regional cooperation for aquaculture development in the Caribbean. Report of a Working Group meeting in Freeport, Bahamas, 12-16 October 1981.

Working Group on the Development of Mariculture in the Smaller Islands of the Caribbean Region Freeport (Bahamas) 12 Oct 1981

FAO/UNDP Aquaculture Development and Coord. Program., Rome (Italy)

PUBL: FAO/UNDP, ROME (ITALY), 1981, 21 pp

LANGUAGES: English

DOC TYPE: Conference; Book

REPORT NO.: ADCP/MR/81/14

Aquaculture activities in some of the Caribbean Islands are reviewed briefly and some aquaculture technologies (groupers, snappers and dolphin fish being priority species for cage culture) discussed. Based on the observations made by the Working Group, the developmental prospects in the Caribbean as a whole are summarized. It is concluded that great potential exists within the region for the establishment of a significant aquaculture industry. Concentrated research, development and training efforts could result in the establishment of an aquaculture industry that could contribute significantly to the provision of jobs and business opportunities, the establishment of self-sufficiency in food production and the earning of foreign exchange.

DESCRIPTORS: aquaculture development; aquaculture techniques; regional planning

GEOGRAPHIC DESCRIPTORS: ASW, Caribbean Is.

ENVIRONMENT: Marine

045

110-11034

Monoculture yield trials of an all-male hybrid tilapia in small farm ponds in Puerto Rico.

Fram, M.J.; Pagan-Font, F.A.

Flaming Rainbow Univ., Tahlequah, OK, USA

Puerto Rico Univ., Mayaguez (USA). Dep. of Marine Sciences

Compl. Rep. P. R. Dep. Agric.

Puerto Rico Department of Agriculture Cabo Rojo, PR (USA)., Sep 1979, 10 p.

LANGUAGES: English

SUMMARY LANGUAGES: English

DOC TYPE: Report

The use of an all-male tilapia hybrid in monoculture was tested in two earthen farm ponds near Mayaguez, in western Puerto Rico, from January to June 1976. Hybrid fingerlings were first produced in plastic-lined pools from crosses between female *Tilapia nilotica* and male *T. hornorum* and stocked in the ponds at a rate equivalent to 1000/ha. A pelleted supplementary feed (30% protein) was offered five to seven days per week at rates 2-5% of body weight. Fingerlings of both sexes of *T. nilotica* were similarly stocked and fed in a third pond as a control. Water quality was monitored throughout the 120-day culture periods. The results showed that the all-male hybrid is a promising solution to the overcrowding problem common to tilapia cultures. There was no evidence of successful spawning in the ponds stocked with hybrids, although introduction of a few wild females apparently occurred.

045 (CONTINUED)

DESCRIPTORS: pond culture; hybrid culture
GEOGRAPHIC DESCRIPTORS: USA, Puerto Rico
TAXONOMIC DESCRIPTORS: Tilapia nilotica; Tilapia hornorum
ENVIRONMENT: Fresh
IDENTIFIERS: hybrids

046

004666

MONOCULTURE YIELD TRIALS OF AN ALL-MALE HYBRID TILAPIA (FEMALE TILAPIA NILOTICA X MALE TILAPIA HORNORUM) IN SMALL FARM PONDS IN PUERTO RICO
FRAM, M.J.; PAGAN-FONT, F.A.

SYMPOSIUM ON CULTURE OF EXOTIC FISHES. FISH CULTURE SECTION, AMERICAN FISHERIES SOCIETY. AUBURN, ALABAMA. 53-64., 1978,

Descriptors: TILAPIA; FRESH WATER FISH; POND CULTURE; PUERTO RICO; HYBRID; STOCK DENSITY; FEEDING; WATER QUALITY; SURVIVAL; FOOD CONVERSION; REPRODUCTION; DIET; PELLET; COST; WEIGHT; LENGTH; PRODUCTION; SEX; PRODUCTION; GROWTH Genus Species: TILAPIA NILOTICA; TILAPIA HORNORUM

047

114-12074

Evaluation of male hybrids of Sarotherodon spp. in polyculture with channel catfish (*Ictalurus punctatus* Rafinesque) in earthen ponds in Puerto Rico.

14. Meeting of the Association of Island Marine Laboratories of the Caribbean Santo Domingo (Dominican Republic) 20 Nov 1978

Gallegos, S.

Dep. Cien. Mar., Recinto Univ. Mayaguez, PR, USA

PROC. ASSOC. ISL. MAR. LAB. CARIBB., vol. 14, p. 37, (1979).

LANGUAGES: English

DOC TYPE: Conference; Summary; Journal Article

An experiment was conducted to evaluate the efficiency of all-male hybrids of *Sarotherodon* spp. in polyculture with channel catfish (*Ictalurus punctatus*) in earthen ponds in Puerto Rico. The results show the practicality of stocking hybrid males of *Sarotherodon* spp. along with channel catfish in a polyculture system. The hybrids had better growth increments, A sub(t) values, survival rates and feeding conversions than previous polyculture experiments. Growth of the channel catfish was influenced by: *Sarotherodon* hybrid density, competition for feed by the hybrid, water quality and partial harvesting.

DESCRIPTORS: fish culture; polyculture; hybrids

GEOGRAPHIC DESCRIPTORS: Puerto Rico

TAXONOMIC DESCRIPTORS: *Sarotherodon*; *Ictalurus punctatus*

ENVIRONMENT: Fresh

048

117-07348

Principales pathologies observees dans les elevages marins a la Martinique
(Main diseases observed in marine cultures in Martinique.)

1. International Colloquium on Pathology in Marine Aquaculture Montpellier
(France) 11-14 Sep 1984

Gallet de Saint Aurin, D.; Picollier, A.; Haffner, Ph.

IFREMER, CNEXO, France-Aquacult., Pointe-Fort, F-97231 Le Robert,
Martinique

SPEC. PUBL. EUR. AQUACULT. SOC., no. 9

PATHOLOGIE EN AQUACULTURE MARINE. PAMAQ 1.

PATHOLOGY IN MARINE AQUACULTURE. PAMAQ 1.

Vivares, C.P.; Bonami, J.-R.; Jaspers, E.; eds.

1986, pp. 61-70

LANGUAGES: French

SUMMARY LANGUAGES: English; French

DOC TYPE: Conference; Book

The main diseases (infectious and noninfectious) of lutjanid culture in
Martinique are reviewed.

DESCRIPTORS: pathology; marine aquaculture; bacterial diseases; protozoan
diseases

GEOGRAPHIC DESCRIPTORS: ASW, Martinique

TAXONOMIC DESCRIPTORS: Lutjanidae

ENVIRONMENT: Marine

049

112-04436

Resultados Preliminares del Desove Inducido de Lisa (Mugil curema
valenciennes) en Cuba

(Preliminary Results on Induced Spawning in the Mullet (Mugil curema
valenciennes) in Cuba.).

Garcia, A.; Bustamante, G.

Address Not Stated

INF. CIENT.-TEC. INST. OCEANOL. ACAD. CIENC. CUBA., no. 158

PUBL: ACADEMIA DE CIENCIAS DE CUBA, HAVANA (CUBA), 1981, 10 pp

LANGUAGES: Spanish

SUMMARY LANGUAGES: English; Spanish

DOC TYPE: Book

Results of the induced spawning of the mullet (Mugil curema 0, using
hypofisary hormones (carp and mullet pituitaries and partially purified
GS-G100 salmon gonadotropine), are presented. The hormones produced the
maturation and spawning of females with diameter of oocytes larger than 600
mu m clear yolk mass, and 1-3 oil globules. The diameter of the eggs was
930-950 mu m of the oil globules, 320-370 mu m. The embryonic development
lasted 40 hours at 24-26 degree C. Temperature found to be a critical factor
for the success of the artificial breeding of female M. curema 24-26 degree
C being the optimal range.

DESCRIPTORS: induced breeding; sexual maturity; fish culture; hormones;
temperature effects; development (biological)

GEOGRAPHIC DESCRIPTORS: Cuba

TAXONOMIC DESCRIPTORS: Mugil curema

ENVIRONMENT: Marine

050

114-19089; 214-06863

Ocean Thermal Energy Conversion mission analysis study. Phase 2.
General Electric Co., Washington, DC (USA). TEMPO Cent. for Advanced
Studies

1978, 204 pp

LANGUAGES: English

SUMMARY LANGUAGES: English

NTIS Order No.: DSE-2421-T1. Contract EX-76-C-01-2421.

DOC TYPE: Report

The market potential for OTEC has been identified as being electricity, and electrical energy-intensive products (such as ammonia and aluminum). Market penetration scenarios are derived for electrical utilities and energy-intensive industries in Southern and Southeastern United States, Puerto Rico/Virgin Islands and Hawaii. In addition, the production of hydrogen for aircraft fuel and the potential of an electrochemical bridge to provide peak power at locations remote from OTEC sites are considered, along with the feasibility of open-ocean mariculture as an adjunct to OTEC power production. The economic impact on overall energy costs from sales of by-product shellfish protein is analyzed.

DESCRIPTORS: OTEC; byproducts; economic analysis; electricity; aluminum; ammonia; marine aquaculture

ENVIRONMENT: Marine

051

113-14878; VIMS Microfiche #009802

French Caribbean islands enter world of aquaculture producers.

Girin, M.

AQUACULT. MAG., vol. 8, no. 5, pp. 28-30, (1982).

LANGUAGES: English

DOC TYPE: Journal Article

The development of aquaculture in the French Caribbean is outlined. Giant freshwater prawn *Macrobrachium rosenbergii* and European Sea bass (*Dicentrarchus labrax*) culture are discussed in detail.

DESCRIPTORS: aquaculture development; fish culture; shrimp culture

GEOGRAPHIC DESCRIPTORS: ASW, Martinique

TAXONOMIC DESCRIPTORS: *Macrobrachium rosenbergii*; *Dicentrarchus labrax*

ENVIRONMENT: Fresh

052

007716

SPECIES PLAN FOR FRESHWATER PRAWNS OF THE GENUS *MACROBRACHIUM*

GLUDE, J.B.; SHLESER, R.A.; BLEDSOE, L.J.

UNPUBLISHED, 89 PP., 1977,

Descriptors: FRESH WATER PRAWN; CRUSTACEAN; PLANNING; GIANT FRESHWATER PRAWN; INTENSIVE CULTURE; LOW DENSITY CULTURE; GROWTH; TEMPERATURE; SALINITY; WATER QUALITY; PESTICIDE; POISON; NUTRITION; DISEASE; MORTALITY; DEVELOPMENT; REPRODUCTION; GENETICS; BEHAVIOR; ECOLOGY;

052 (CONTINUED)

SITE SELECTION; POND CULTURE; LABOR; MARKET; LEGAL ASPECTS; SEED;
RECIRCULATED WATER; AQUARIUM CULTURE; SURVIVAL; ALGAE CULTURE;
PROBLEMS; PRODUCTION; HARVESTING; DIET; FEEDING; BRINE SHRIMP;
PROCESSING; ECONOMICS; UNITED STATES; PUERTO RICO; HAWAII; EDUCATION;
INFORMATION; INVESTMENT; HATCHERY; SHRIMP

Genus Species: MACROBRACHIUM ROSENBERGII; MACROBRACHIUM ACANTHURUS;
MACROBRACHIUM TENELLUM; MACROBRACHIUM CARCINUS; MACROBRACHIUM OHIONE;
MACROBRACHIUM LAR; MACROBRACHIUM AMERICANUM

053

115-22067

Diagnostico de la piscicultura en El Salvador
(Pisciculture diagnosis in El Salvador.)

Godinez, G.J.F.

Address not stated

PUBL: MINIST. AGRICULTURA Y GANADERIA, SAN SALVADOR (EL SALVADOR),
1984, 80 pp

LANGUAGES: Spanish

DOC TYPE: Book

The fish culture activities from 1948 to 1982 in El Salvador are:
1958-1972: the fish culture development was planned and included a survey on
species that could be cultured, design and construction of ponds. In 1975,
400-500 ponds (52.5 hectarias) already existed. The average productivity in
this period was of 4879.2 Kg/Ha/year for the ponds that received technical
assistance and 1232.6 Kg/Ha/year for those that didn't receive it in the
1973-1982 period the program of communal ponds was developed, its objective
was the production of animal protein. This program had a pond area of 46.46
hectareas. In 1978-1983 a loan for the construction of an area of 30
hectareas for pisciculture ponds for fish production at a commercial level
was obtained. 7.4 hectareas have been constructed. The fishculture area of
each geographical region, is presented and based on this, the real and
potential production and the fish fry potential demand of each region, is
determined.

DESCRIPTORS: fish culture; fish ponds

GEOGRAPHIC DESCRIPTORS: El Salvador

ENVIRONMENT: Fresh

054

003629

WANT TO RAISE FRESHWATER PRAWNS? IT'S TOUGH, BUT HERE'S SOME ADVICE
GOODWIN, H.L.

THE COMMERCIAL FISH FARMER AND AQUACULTURE NEWS 3 (2), 12-14., 1977,

Descriptors: GIANT FRESHWATER PRAWN; SHRIMP; CRUSTACEAN; MANAGEMENT;
LEGAL ASPECT; AQUAFARM; PUERTO RICO; CENTRAL AMERICA; MIXED CULTURE;
CATFISH; POND CULTURE; SIZE; HARVESTING; MARKET; NUTRITION; HANDLING;
TEMPERATURE; INVESTMENT

Genus Species: MACROBRACHIUM ROSENBERGII

055

114-14728; NAL: SH1.G8

Overview of conch fisheries and culture. 35. Annual Gulf and Caribbean Fisheries Institute Nassau (Bahamas) Nov 1982

Goodwin, M.H.

Environ. Res. Proj., Grenada, West Indies

PROC. GULF CARIBB. FISH. INST., no. 35

PROCEEDINGS OF THE THIRTY-FIFTH ANNUAL GULF AND CARIBBEAN FISHERIES INSTITUTE, NASSAU, BAHAMAS, NOVEMBER 1982 (pub. 1983), p. 43-45.

Higman, J.B., ed.

LANGUAGES: English

SUMMARY LANGUAGES: English

DOC TYPE: Conference; Book

This paper deals with four general questions: (1) What are the general characteristics of conch *Strombus gigas* fisheries within the region? (2) What are the common needs related to using conch resources? (3) How may conch mariculture affect these needs? and (4) What needs to be done to develop and extend conch mariculture within the Caribbean region?

DESCRIPTORS: gastropod fisheries; shellfish culture; resource development

GEOGRAPHIC DESCRIPTORS: ASW, Caribbean

TAXONOMIC DESCRIPTORS: *Strombus gigas*

ENVIRONMENT: Marine

056

82055328 81085905 Holding Library: AGL

Status of conch (*Strombus gigas*) mariculture as a management tool in the Grenadines (Caribbean region).

Goodwin, M.H.;

Proceedings - Gulf and Caribbean Fisheries Institute. June 1981. (33rd), June 1981. p. 22-29. ill.

Miami, Florida, The Institute. ISSN: 0072-9019

NAL: SH1.G8

057

118-05967

Cuba. Recomendaciones para el manejo de la planta de desove de ostion en Cayo Libertad. Informe preparado por el Proyecto Desove Inducido de Ostiones (Cuba. Recommendations for the management of an oyster hatchery in Cayo Libertad (1987). Report prepared for the Project Induced Spawning of Oysters.)

Guerrero Valero, S.

FAO Technical Coop. Programme, Rome (Italy)

PUBL: FAO, ROME (ITALY), 1987, 6 pp

LANGUAGES: Spanish

FAO FI/TCP/CUB/4512-doc-trabajo-1.

DOC TYPE: Report

Details are given of project activities conducted regarding the setting up and operation of a hatchery at Cayo Libertad, Cuba, for the rearing of oyster spat (*Crassostrea rizophorae*). Recommendations for the biological management of the hatchery are included.

057 (CONTINUED)

DESCRIPTORS: oyster culture; hatcheries; induced breeding; rearing; development projects

GEOGRAPHIC DESCRIPTORS: Cuba

TAXONOMIC DESCRIPTORS: Crassostrea rizophorae

ENVIRONMENT: Marine

058

115-06784

Cuba. Recomendaciones para un programa de desarrollo de la ostricultura. Informe preparado por el Proyecto Mejoramiento de la Ostricultura (Cuba. Recommendations for the Oysterculture Development Program. Report prepared for the Oysterculture Improvement Project.).

Guerrero Valero, S.

FAO Technical Coop. Program, Rome (Italy)

PUBL: FAO, ROME (ITALY), 1984, 29 pp

LANGUAGES: Spanish

FAO FI/TCP/CUB/2312-doc-Trabajo 1.

DOC TYPE: Book

The consultant's terms of reference were: 1) to draw up the plans for an aquaculture installation capable of feeding and maintaining oyster larvae 2) to define equipment necessary for the installation and 3) to select the site for the installation. This report contains the results of the consultants work and his recommendations.

DESCRIPTORS: oyster culture; development projects; aquaculture development

GEOGRAPHIC DESCRIPTORS: Cuba

ENVIRONMENT: Marine; Brackish

059

113-17415

La mangrove de Guadeloupe et sa zone cotiere

(The Guadeloupe mangrove and its coastal zone.).

(Caribbean Aquaculture Symposium) (French West Indies) 14 Dec 1981

Guyard, A.

Address not stated

JOURNEES AQUACOLES DELA CARAIBE. 14-17 DECEMBRE 1981.

(CARIBBEAN AQUACULTURE SYMPOSIUM. 14-17 DECEMBER 1981.), 1981, pp. 1-38

LANGUAGES: French

SUMMARY LANGUAGES: English; Spanish; French

DOC TYPE: Conference; Report

The main problems of the Guadeloupe mangrove are those of its maintenance, its suppression, its management, and its use by man. The research programme on "mangroves and coastal zones" proposes to collect all information on the mangroves processes and structure, and the possible use by man of the different components. The mangrove structure will be studied as a function of ecological parameters (distribution of benthic communities), with emphasis on the possible economic resources.

059 (CONTINUED)

DESCRIPTORS: mangrove swamps; research programs
GEOGRAPHIC DESCRIPTORS: ecosystems; brackish water pollution; ASW,
Guadeloupe
ENVIRONMENT: Marine; Brackish

060

114-12262

Use of the seaweed *Hypnea musciformis* (Rhodophyta) in treating oil refinery wastes. 12. Meeting of the Association of Island Marine Laboratories of the Caribbean Curacao (Netherlands Antilles) 22 Sep 1976

Haines, K.C.; Monahan, R.K.
Univ. Texas Mar. Sci. Inst., St. Croix Marine Stn., St. Croix, VI, USA
PROC. ASSOC. ISL. MAR. LAB. CARIBB., vol. 12, p. 12, (1977).

LANGUAGES: English

DOC TYPE: Conference; Summary; Journal Article

The carrageenan-producing red seaweed *Hypnea musciformis* (Wulfen) Lamaroux was tested in batch cultures for its ability to grow in various mixtures of surface seawater and two oil refinery waste effluents entering oxidation ponds. The effluent from the west refinery was more toxic to *Hypnea* than was the effluent from the east refinery: 60% dilution of the west refinery effluent with seawater was required before growth occurred, while only 20% dilution of the east refinery effluent was required for growth to occur. Growth rates generally increased with increased dilution, indicating reduction of toxicity due to some factor(s). Growth rates equal to 49% and 76% of that observed in an optimal culture medium were observed in 5% refinery effluent/95% seawater mixtures.

DESCRIPTORS: oil wastes; waste treatment; seaweed culture; toxicity

TAXONOMIC DESCRIPTORS: *Hypnea musciformis*

ENVIRONMENT: Marine

061

114-12254

Growth and feed conversion efficiency of young green turtles, *Chelonia mydas* (Linnaeus), in seawater and dilute seawater. 14. Meeting of the Association of Island Marine Laboratories of the Caribbean Santo Domingo (Dominican Republic) 20 Nov 1978

Hawk, E.G.

Dep. Mar. Sci., Univ. Puerto Rico, Mayaguez, PR 00708, USA
PROC. ASSOC. ISL. MAR. LAB. CARIBB., vol. 14, p. 39, (1979).

LANGUAGES: English

DOC TYPE: Conference; Summary; Journal Article

A study was undertaken to examine the techniques involved in rearing green turtles (*Chelonia mydas*) to one year of age first-year growth rates of green turtles fed primarily a dry pelleted diet were determined and growth of turtles in 35 ppt. salinity seawater were compared with growth of turtles in diluted seawater. Two dry, proprietary pelleted feeds of 25% and 30% protein content were tested for one year with a group of days-old green

061 (CONTINUED)

turtle hatchlings. Weekly feed conversion coefficients were calculated for 10 turtles in freshwater dilutions of seawater. Results of the study are discussed.

DESCRIPTORS: turtle culture; rearing; feed efficiency

TAXONOMIC DESCRIPTORS: aquaculture techniques; Chelonia mydas

ENVIRONMENT: Marine

062

114-14725; NAL: SH1.G8

Potential for penaeid shrimp culture in the Bahamas. 35. Annual Gulf and Caribbean Fisheries Institute Nassau (Bahamas) Nov 1982

Haxby, R.E.

Morton Salt Co., Matthew Town, Inagua, Bahamas

PROC. GULF CARIBB. FISH. INST., no. 35

PROCEEDINGS OF THE THIRTY-FIFTH ANNUAL GULF AND CARIBBEAN FISHERIES INSTITUTE, NASSAU, BAHAMAS, NOVEMBER 1982 (pub. 1983), p. 19-26.

Higman, J.B., ed.

LANGUAGES: English SUMMARY LANGUAGES: English

DOC TYPE: Conference; Book

This paper outlines the recent developments in penaeid shrimp culture and discusses the environmental requirements for commercialization. With its clean, unpolluted water and tropical climate the Bahama Islands offer suitable sites for commercial ventures in shrimp mariculture. A stable, democratic government which encourages foreign investment makes The Bahamas even more attractive. By enumerating each of these issues and developing them as they relate to The Bahamas, the author shall illustrate the potential for penaeid shrimp culture in The Bahamas.

DESCRIPTORS: shellfish culture; aquaculture techniques

GEOGRAPHIC DESCRIPTORS: Bahama I.

TAXONOMIC DESCRIPTORS: Penaeidae

ENVIRONMENT: Marine

063

84084820 83119705 Holding Library: AGL

Jamaican blue-green algae collections of J.C. Strickland (List of species and habitat)

Hayden, W.J.

Rhodora. v. 85 (843), July 1983. p. 381-383.

Cambridge: New England Botanical Club. ISSN: 0035-4902

NAL: 450 R34

Language: English

064

85099626 84095729 Holding Library: AGL

Fish ponds and agricultural production in Haiti

Hedstrom, W.E.

Paper - American Society of Agricultural Engineers (Microfiche collection).
1983. (fiche no. 83-5506), 1983. 1 microfiche: ill. St. Joseph, Mich.: The
Society.

NAL: FICHE S-72

Language: English

065

114-14730; NAL: SH1.G8

Queen conch management and culture in the Netherlands Antilles. 35.

Annual Gulf and Caribbean Fisheries Institute Nassau (Bahamas) Nov 1982

Hensen, R.R.

Dep. Agric. and Fish., Bonaire, Netherlands Antilles

PROC. GULF CARIBB. FISH. INST., no. 35

PROCEEDINGS OF THE THIRTY-FIFTH ANNUAL GULF AND CARIBBEAN FISHERIES
INSTITUTE, NASSAU, BAHAMAS, NOVEMBER 1982 (pub. 1983), p. 53-56.

Higman, J.B., ed.

LANGUAGES: English

DOC TYPE: Conference; Book

Several institutions throughout the Caribbean have recently started
mariculture schemes with the express purpose of cultivating queen conch,
Strombus gigas. One aim is to produce large numbers of juveniles to plant in
areas where conch have been fished out. By rearing larval and juvenile conch
to a size suitable for seeding in the natural environment, together with
some proper management, it is hoped that stocks can be restored to some
harvestable level.

DESCRIPTORS: shellfish culture; resource management

GEOGRAPHIC DESCRIPTORS: Netherlands Antilles

TAXONOMIC DESCRIPTORS: *Strombus gigas*

ENVIRONMENT: Marine

066

114-14562

Report of the Evaluation Team on Opportunities for Caribbean Mariculture.

35. Annual Gulf and Caribbean Fisheries Institute Nassau (Bahamas) Nov 1982

Higgs, C.; Das, N.; Usher, R.L.; Luckhurst, B.; Bizzell, P.

Minist. Agric., Fish. and Local Govern., Nassau, Bahamas

PROC. GULF CARIBB. FISH. INST., no. 35

PROCEEDINGS OF THE THIRTY-FIFTH ANNUAL GULF AND CARIBBEAN FISHERIES
INSTITUTE, NASSAU, BAHAMAS, NOVEMBER 1982.

Higman, J.B. ed., 1983, p. 42

LANGUAGES: English

DOC TYPE: Conference; Book

It is evident that there is increased interest in development of
aquaculture by GCFI member countries. The Evaluation Team for the

066 (CONTINUED)

Aquaculture session at the 34th Annual GCFI held in Puerto Rico, Nov. 1981, recommends that at each annual meeting an overview report on aquaculture development be presented thereby monitoring the progress of the industry within the region for the benefit of its members. This report should include: major impediments and constraints as they relate to the industry, update on all projects in the region and comments on future prospects. With respect to future presentation of papers, the Team urges that speakers be encouraged to provide a conceptual and theoretical framework into which their current research fits and spend less time on presenting detailed technical information which can be made available in the published proceedings. The Evaluation Team is cognizant of the fact that aquaculture development should not only be aimed at developing high technology commercial ventures, but also include small scale local aquaculture ventures aimed at self-sufficiency and local markets.

DESCRIPTORS: aquaculture development; small scale aquaculture; aquaculture enterprises

GEOGRAPHIC DESCRIPTORS: ASW, Caribbean

ENVIRONMENT: Marine

IDENTIFIERS: evaluation

067

008484

PROGRAMME TO PRODUCE ELECTRICITY, FRESHWATER AND FARMED FISH

HJUL, P.

FISH FARMING INTERNATIONAL 7 (4), 18-20., 1980,

Descriptors: FRESH WATER FISH; ENERGY; CARIBBEAN; SEAWEED;
DESALINATION; WATER TREATMENT; COST; SPECIES SELECTION; MOLLUSK;
PLANNING; COMMERCIAL FIRM; ECONOMICS

068

110-09215

Progress report on fisheries development in El Salvador, August 1974-May 1976.

Hughes, D.G.

Auburn Univ., AL (USA). Int. Center for Aquaculture

Res. Dev. Ser. Int. Cent. Aquacult., (no. 15), Oct 1977, 16 p.

LANGUAGES: English

Includes bibliography: p. 14-16.

DOC TYPE: Bibliography; Book

This report presents information on marine and freshwater fisheries, and on aquaculture development, updating earlier work, in the period when the author acted as resident fisheries adviser under an AID Project. Information is given about the administration and financial inputs to the fisheries, renovation and new construction of fisheries stations at Santo Cruz, Porrillo and Izalco, on fish culture research (especially the introduction of new fish species, the rearing of all-male tilapia, nutrition experiments with tilapia using agricultural by-products, the economic evaluation of

068 (CONTINUED)

tilapia stocked at four densities, tilapia production in salt ponds and the culture of fish in cages), on fish culture extension, technical assistance, and the 1973/1974 fish marketing survey. A list of fisheries publications completed or newly published since 1973 is included.

DESCRIPTORS: fishery development; aquaculture development; fish culture

GEOGRAPHIC DESCRIPTORS: El Salvador

TAXONOMIC DESCRIPTORS: Tilapia

ENVIRONMENT: Marine; Brackish; Fresh

IDENTIFIERS: Cichlidae; Pisces; nutritional requirements

069

114-14734; NAL: SH1.G8

Feasibility of increasing Bahamian conch production by mariculture.

35. Annual Gulf and Caribbean Fisheries Institute Nassau (Bahamas) Nov 1982

Inversen [Iversen], E.S.

Div. Biol. and Living Resour., Rosenstiel Sch. Mar. Atmos. Sci., Univ. Miami, Miami, FL 33149, USA

PROC. GULF CARIBB. FISH. INST., no. 35

PROCEEDINGS OF THE THIRTY-FIFTH ANNUAL GULF AND CARIBBEAN FISHERIES INSTITUTE, NASSAU, BAHAMAS, NOVEMBER 1982 (pub. 1983), p. 83-88.

Higman, J.B., ed.

LANGUAGES: English

SUMMARY LANGUAGES: English

DOC TYPE: Conference; Book

The major objective of field studies of the queen conch (*Strombus gigas*) was to obtain basic biological information on the species in the Bahamas to assess the ability of hatchery produced conchs to grow and survive in captivity and when planted in natural habitats. A second objective was to make information on conch biology available to assist managers of conch stocks. In this report emphasis is on the evaluation of these data for possible applications to intensive and extensive mariculture. Conchs collected in the wild from the Berry Islands were reared in pens and cages of different sizes and at various stocking densities, to obtain data on growth and survival. Similar data were collected on wild populations. Growth as related to time of year, density of conchs and food availability is discussed.

DESCRIPTORS: shellfish culture; hatcheries; growth; survival

GEOGRAPHIC DESCRIPTORS: feasibility studies; Bahama I.

TAXONOMIC DESCRIPTORS: *Strombus gigas*

ENVIRONMENT: Marine

070

81120424 81020607 Holding Library: AGL

The OTEC (Ocean Thermal Energy Conversion) project in Curacao: programme to produce electricity, freshwater and farmed fish.

Jacques, J.M.; Beavis, A.M.; Meyer, C.P. de.

Fish farming international. v. 7 (4), Dec 1980. p. 18-20. ill., maps.

070 (CONTINUED)

London, Arthur J. Heighway.

NAL: SH151.F5

071

113-07474

Artemia de Punta Salinas Bahia de las Calderas y su uso potencial en Republica Dominicana

Artemia from Punta Salinas, Bahia de las Calderas and its potential use in the Dominican Republic.

15. Meet. of the Association of Island Marine Laboratories of the Caribbean Runaway Bay (Jamaica) 7 Jan 1980

Jakowska, S.; Bonnelly de Calventi, I.; Pugibet, E.

Cent. Invest. de Biol. Mar., Univ. Autonoma de Santo Domingo

PROC. ASSOC. ISL. MAR. LAB. CARIBB., vol. 15, p. 29, (1980).

LANGUAGES: Spanish

Summary only.

DOC TYPE: Conference; Summary; Journal Article

Cysts, larvae adults of Artemia were isolated in Nov. 1978 from canals connecting artificial water bodies used for salt production in Punta Salinas. A plan of rational exploitation of Artemia as a subproduct of the salt industry in Punta Salinas and the establishment of intensive culture of this strain for use in aquaculture are proposed.

DESCRIPTORS: crustacean culture; aquaculture development; saline water; byproducts

TAXONOMIC DESCRIPTORS: Artemia

ENVIRONMENT: Brackish

IDENTIFIERS: Dominican Republic, Punta Salinas; salt industry

072

114-09654

Evaluacion del programa: Estanques piscicolas comunales en su primer periodo 1973-1975

(Program evaluation: Communal pisciculture reservoirs in their first period 1973-1975.).

Jimenez, N.F.

INF. TEC. SERV. RECURS. PESQ. DIR. GEN. RECURS. NAT. RENOV. (EL SALVADOR)., vol. 5, no. 4

PUBL: MINIST. AGRIC. GANAD., SOYAPANGO (EL SALVADOR), 1978, 38 pp

LANGUAGES: Spanish

SUMMARY LANGUAGES: Spanish

DOC TYPE: Book

The project "Construction of communal Pisciculture Ponds" was initiated by the El Salvador government in 1973. The project's objective was the construction (at a national level) of 100 pisciculture ponds (2,000 m super(2) each) to provide the rural communities that have the appropriate natural conditions and land so that they could commence with commercial fish production. The project was divided in 3 successive periods: 1) 1973-1975 2)

072 (CONTINUED)

1976 to first months of 1977 and 3) from 1977 on. By 1975, 41 ponds had been constructed. These provide an area of water of 12.68 ha. Some 56% of these, reservoirs, are located in the western part, 15% in the central part, 7% near the central part and 22% in the eastern part of the country. Some 16 ponds (39%) are empty and the others function poorly.

DESCRIPTORS: fish culture; development projects

GEOGRAPHIC DESCRIPTORS: aquaculture development; construction; ponds; aquaculture techniques; El Salvador

ENVIRONMENT: Fresh

073

113-14758

Opening address. 34. Annu. Gulf and Caribbean Fisheries Institute Mayaguez, PR (USA) Nov 1981

Kronmiller, T.G.

Dep. State, Oceans & Fish., Washington, DC, USA

PROC. GULF CARIBB. FISH. INST., no. 34

PROCEEDINGS OF THE THIRTY-FOURTH ANNUAL GULF AND CARIBBEAN FISHERIES INSTITUTE, MAYAGUEZ, PUERTO RICO, NOVEMBER 1981, 1982, pp. 2-4

LANGUAGES: English

DOC TYPE: Conference; Book

The themes chosen for this meeting addressed both development and management questions. Keeping in mind the natural restraints on ocean productivity in the region, it is particularly appropriate that time was devoted to aquaculture. There is particular value in the emphasis that is placed on approaches successfully adopted in commercial aquaculture and investment in such operations. There were sessions on utilization of the discarded bycatch of trawl fisheries and on alternative resources for small, local fishing operations. Still other discussions focused on problems of fishery management, especially those faced by the Caribbean participants.

DESCRIPTORS: conferences; marine aquaculture; by catch; fish utilization; fishery management

GEOGRAPHIC DESCRIPTORS: ASW, Caribbean

ENVIRONMENT: Marine

074

116-17894

L'aquaculture du *Macrobrachium rosenbergii* aux Antilles Francaises
(The aquaculture of *Macrobrachium rosenbergii* in French Antilles.) Bases
Biologiques de l'Aquaculture Montpellier (France) 12 Dec 1983

Lacroix, D.

Inst. Fr. Rech. Exploit. Mer, Pointe-Fort, 97231 Le Robert,
Martinique

ACTES COLLOQ. IFREMER., no. 1

BASES BIOLOGIQUES DE L'AQUACULTURE MONTPELLIER 12-16 DECEMBRE 1983.

(BIOLOGICAL BASIS IN AQUACULTURE, MONTPELLIER, 12-16 DECEMBER 1983.)

Amanieux, M.; Laubier, L.; Guille, A.; eds.

1985, pp. 263-276

074 (CONTINUED)

LANGUAGES: French

SUMMARY LANGUAGES: English; French

Societe d'Interet Collectif Agricole Ecrevisses, Fort de France (Martinique).

DOC TYPE: Conference; Book

The aquaculture of *Macrobrachium rosenbergii* is launched in Martinique by the regional council in 1976. A first "green water" type hatchery is built and provides juveniles to the first ponds. In 1978, CNEXO is asked to cooperate in scientific assistance. A new hatchery is built with COP "clear water" system and produces in 1980. The development of ponds (20 ha) needs the increase of the hatcheries capacity, which is now done with one single method and intensive larval first stage (7-8 millions PL. cap). In Guadeloupe, the first ponds started in 1978. Two cooperatives and 11 ha of ponds at this time have determined the construction of CNEXO in the construction of a regional hatchery. A small light one is already under production since July 83.

DESCRIPTORS: aquaculture development; aquaculture systems; growth; hatcheries

GEOGRAPHIC DESCRIPTORS: French West Indies

TAXONOMIC DESCRIPTORS: Malacostraca; *Macrobrachium rosenbergii*

ENVIRONMENT: Fresh

075

008451

ARTIFICIAL UPWELLING PROGRESS - 1976-1977

LAURENCE, S.; HAINES, K.C.; VAN HEMELRYCK, L.; ROELS, O.E.

THE UNIVERSITY OF TEXAS AT AUSTIN, TSU-Q-78-001, 1-184. (REPORT), 1980

Descriptors: ARTIFICIAL UPWELLING; PILOT PROGRAM; PHYTOPLANKTON; DESIGN; HATCHERY; AQUARIUM CULTURE; SHORT NECKED CLAM; MOLLUSK; GROWTH; CHEMISTRY; ECOLOGY; DEEP SEA WATER; NUTRIENT; MORTALITY; FOOD CONVERSION; BACTERIA; SPECIES SELECTION; ANTIBIOTIC; FEEDING; PROTEIN; KELP; VIRGIN ISLANDS; BROWN ALGAE; SEAWEED
Genus Species: CHAETOCEROS CURVISETUS; TAPES JAPONICA; HYPNEA MUSCIFORMIS; MACROCYSTIS

076

003350

WET AND DRY SEASON COMPARISON OF TILAPIA AUREA PRODUCTION IN EL SALVADOR IN NEW FERTILIZED AND UNFERTILIZED EARTHEN PONDS

LEDGERWOOD, R.D.; HUGHES, D.G.; ORTIZ, M.V.

PROCEEDINGS OF THE EIGHTH ANNUAL WORKSHOP WORLD MARICULTURE SOCIETY, SAN JOSE, COSTA RICA. 25P., 1977,

Descriptors: SEASON; FRESH WATER FISH; TILAPIA; FERTILIZER; POND CULTURE; MANURING; PRODUCTION

Genus Species: TILAPIA AUREA

077

010286

THE GIANT MALAYSIAN PRAWN, *MACROBRACHIUM ROSENBERGII*, A POTENCIAL PREDATOR FOR CONTROLLING THE SPREAD OF SCHISTOSOME VECTOR SNAILS IN FISH PONDS

LEE, P.G.; RODRICK, G.E.; SODEMAN, W.A., JR.; BLAKE, N.J.

AQUACULTURE 28 (3,4), 293-301., 1982,

Descriptors: GIANT FRESHWATER PRAWN; CRUSTACEAN; SNAIL; MOLLUSK; BIOCONTROL; SHRIMP; POND CULTURE; AQUARIUM CULTURE; JUVENILE; SOUTH AMERICA; PUERTO RICO; HEALTH; FEEDING

Genus Species: *MACROBRACHIUM ROSENBERGII*

078

113-19779

Faune ichthyologique et potentiel aquacole dans les mangroves de Guadeloupe (Ichthyological fauna and aquaculture possibilities in the Guadeloupe mangroves.).

(Caribbean Aquaculture Symposium) (French West Indies) 14 Dec 1981

Louis, M.

Cent. Univ. Antilles-Guyane, Lab. Biol. Anim., BP 592, 97167

Pointe-a-Pitre, Guadeloupe (French West Indies)

JOURNEES AQUACOLES DELA CARAIBE. 14-17 DECEMBRE 1981.

(CARIBBEAN AQUACULTURE SYMPOSIUM. 14-17 DECEMBER 1981), 1981, pp. 1-13

LANGUAGES: French

DOC TYPE: Conference; Report

The ichthyological fauna has been collected in the mangrove of the Grand-Cul-de-Sac-Marin (Guadeloupe) from 1978 to 1980: 62 species have been identified. Fish stocks have been evaluated. Four species might be interesting for aquaculture: *Bairdiella ronchus*, *Archosargus rhomboidalis*, *Caranx latus*, and *Diapterus rhombeus*.

DESCRIPTORS: stock assessment; aquaculture development

GEOGRAPHIC DESCRIPTORS: biological surveys; check lists; mangrove swamps; ASW, Guadeloupe

TAXONOMIC DESCRIPTORS: Pisces; *Bairdiella ronchus*; *Archosargus rhomboidalis*; *Caranx latus*; *Diapterus rhombeus*

ENVIRONMENT: Brackish

079

118-06409

Contribution a l'etude de la biologie de la reproduction d'un poisson d'eau douce guyanais: *Myleus ternetzi*

(Contribution to the biological study of reproduction of a Guianese freshwater fish: *Myleus ternetzi*.)

Margeridon, A.

Rennes-1 Univ. (France)

PUBL: LABORATOIRE DE PHYSIOLOGIE DES POISSONS, INRA, RENNES

(FRANCE), 1986, 48 pp

LANGUAGES: French

DOC TYPE: Book

079 (CONTINUED)

This study underlines a certain number of interesting facts for rearing *Myleinae*. From 200g, sexual morphological determination can be made without error. On the other hand, *Myleus ternetzi* reproduces all round the year female fecundity is high (10,000 oocytes/spawning/kg). If this biological characteristic could be extrapolated to other species, the *Myleus* would present a real interest for aquaculture. Thus it is necessary to start the culture of this species. From a fundamental point of view, this work revealed that *Myleus ternetzi* could be a good model for the study of differentiation and evolution of Leydig cells in teleost testes.

DESCRIPTORS: freshwater fish; gametogenesis; sexual reproduction; aquaculture economics

GEOGRAPHIC DESCRIPTORS: French Guiana

TAXONOMIC DESCRIPTORS: Pisces; Serrasalminae; *Myleus ternetzi*

ENVIRONMENT: Fresh

080

010565

SEAWEED CULTIVATION: A REVIEW

MATHIESON, A.C.

NOAA TECHNICAL REPORT NMFS CIRCULAR 442, PROCEEDINGS OF THE SIXTH U.S.-JAPAN MEETING ON AQUACULTURE, SANTA BARBARA, CALIFORNIA, AUGUST 27-28, 1977, 25-66., 1982,

Descriptors: SEAWEED; PROBLEMS; ECOLOGY; MANAGEMENT; NORTH AMERICA; CANADA; UNITED STATES; PHILIPPINES; PACIFIC OCEAN; RED ALGAE; BROWN ALGAE; KELP; WASTE WATER AQUACULTURE; VIRGIN ISLANDS; ARTIFICIAL UPWELLING; IRISH MOSS; AQUARIUM CULTURE; RACK CULTURE; OFF BOTTOM CULTURE; POND CULTURE; ROPE CULTURE; FLORIDA; MARKET; SPORE; DULSE; LAVER; SUGAR WRACK; CALIFORNIA; HARVESTING; MIXED CULTURE; RECOMMENDATIONS
Genus Species: CHONDRUS CRISPUS; EUCHEUMA; GRACILARIA; HYPNEA; IRIDAEA; GIGARTINA; GELIDIUM; PTEROCLADIA; PALMARIA PALMATA; PORPHYRA; LAMINARIA; MACROCYSTIS

081

115-11693

Effects of predation by tucunare (*Cichla ocellaris*) on *Tilapia nilotica* in ponds.

McGinty, A.S.

Dep. Mar. Sci., Univ. Puerto Rico, Mayaguez, Puerto Rico

J. AGRIC. UNIV. P.R., vol. 68, no. 1, pp. 101-106, (1984).

LANGUAGES: English

SUMMARY LANGUAGES: English

DOC TYPE: Journal Article

Three ponds were stocked with 3,000 *T. nilotica* (6-7 cm total length) per hectare, and 17 days later with tucunare (2-3 cm total length) at 380, 380, or 790 fish/ha. After 124 days, survival of tucunare was 26-30% and they averaged 191 g, 21 g, and 17 g, respectively. Growth of tucunare was related

081 (CONTINUED)

to availability of prey, i.e., tilapia recruits, and density of predators. Tucunare in two ponds had equal densities at harvest but grew at substantially different rates probably because of differential rates of mortality. Total fish production was 71% less in the pond with the largest tucunare than in the other two ponds. The decrease in tilapia biomass by predation resulted in a decrease in total fish production.

DESCRIPTORS: pond culture; stocking density; food availability

GEOGRAPHIC DESCRIPTORS: growth; survival; Puerto Rico

TAXONOMIC DESCRIPTORS: *Cichla ocellaris*

ENVIRONMENT: Fresh

082

000893

POSSIBILITIES OF MOLLUSCAN CULTIVATION IN THE CARIBBEAN

MENZEL, R.W.

FAO, FISHERIES REPORTS, 71.2. 183-200., 1971,

Descriptors: SHELLFISH; MOLLUSK; CARIBBEAN; OYSTER; SITE SELECTION; FERTILIZER; DISEASE CONTROL; PREDATION; PARASITE; FUNGUS; CHEMCONTROL; WATER REQUIREMENT; INDUCED SPAWNING; CLAM; SELECTIVE BREEDING; HYBRID; QUEEN CONCH; TOPSHELL; GASTROPOD

Genus Species: CRASSOSTREA; MERCENARIA; STROMBUS GIGAS

083

115-23774

La acuicultura en Cuba

(Aquaculture in Cuba.)

Ministerio de la Ind. Pesquera, Havana (Cuba). Empresa Nac. de Acuicultura
FAO INF. PESCA., no. 294 supl

INFORMES NACIONALES SOBRE EL DESARROLLO DE LA ACUICULTURA EN AMERICA LATINA. (NATIONAL REPORTS ON THE DEVELOPMENT OF AQUACULTURE IN LATIN AMERICA.) Fernando-Criado, M.P.; ed.

1984, pp. 19-22

LANGUAGES: Spanish

Monogr. Corp. Auth.: FAO, Rome (Italy).

DOC TYPE: Book

An account is given of aquaculture in Cuba, describing area covered, species cultured, public and private financing and problems to be resolved regarding development.

DESCRIPTORS: aquaculture development

GEOGRAPHIC DESCRIPTORS: Cuba

ENVIRONMENT: Marine; Fresh

084

117-13797; 217-07820

Potential for application of marine biological solar energy conversion technology in the Caribbean. 17. Meet. of the Association of Island Marine Laboratories of the Caribbean Miami, FL (USA) 16 May 1983

Mitsui, A.

Rosenstiel Sch. Mar. and Atmos. Sci., Univ. Miami, 4600 Rickenbacker Causeway, Miami, FL 33149, USA

PROC. ASSOC. ISL. MAR. LAB. CARIBB., vol. 17, p. 9, (1983).

LANGUAGES: English

Rec'd 1987. Summary only.

DOC TYPE: Conference; Summary; Journal Article

Many strains of marine photosynthetic organisms collected from the Caribbean have application for food and energy production. The N-fixing marine blue-green algae could provide total food requirements for fish, shrimp, and shellfish. This N-fixing ability reduces the contamination of pathogenic species and reduces the need for fertilizer in aquaculture. Hydrogen-producing blue-green algal strains provide a clean fuel which does not pollute the environment. Some marine photosynthetic bacteria produce hydrogen using organic and sulfide waste. Some of these algae and bacteria produce substances with medical, nutritional, or industrial chemical applications and all productions are pollution free. The Caribbean area receives high solar energy and has plenty of warm sea water. Marine solar energy conversion technology could be used in this area while keeping the environment clean.

DESCRIPTORS: biotechnology; marine aquaculture; potential resources; energy resources; food resources; algal culture; microbiological culture; hydrogen; renewable resources; medicine; pollution control; industrial products; wastewater aquaculture; solar power; chemical engineering; photosynthesis

GEOGRAPHIC DESCRIPTORS: ASW, Caribbean

TAXONOMIC DESCRIPTORS: algae; Cyanophyta; bacteria

ENVIRONMENT: Marine

085

114-14737

Prospects for the commercial cultivation of giant clams (*Bivalvia*: *Tridacnidae*). 35. Annual Gulf and Caribbean Fisheries Institute Nassau (Bahamas) Nov 1982

Munro, J.L.; Heslinga, G.A.

ICLARM, MCC P.O. Box 1501, Makati, Metro Manila, Philippines

PROC. GULF CARIBB. FISH. INST., no. 35

PROCEEDINGS OF THE THIRTY-FIFTH ANNUAL GULF AND CARIBBEAN FISHERIES INSTITUTE, NASSAU, BAHAMAS, NOVEMBER 1982.

Higman, J.B. ed., 1983., pp. 122-134

LANGUAGES: English

SUMMARY LANGUAGES: English

DOC TYPE: Conference; Book

The status of tridacnid clam resources in the Indo-Pacific region and studies of their basic biology and ecology, including life histories, growth

085 (CONTINUED)

rates and phototrophic capabilities, spawning induction and larval and juvenile rearing are reviewed. They are the only phototrophic potential farm animals known to mankind. It is concluded that large-scale extensive mariculture operations are now technically feasible and could make a major contribution to the economies of Indo-Pacific countries, particularly the island states. The possibility of introducing tridacnid clams to parts of the Indo-Pacific outside their present ranges and to the Caribbean Sea should be seriously considered. *Tridacna gigas* is currently being re-introduced to Guam where the species has undergone recent extinction.

DESCRIPTORS: aquaculture enterprises; aquaculture development

GEOGRAPHIC DESCRIPTORS: feasibility studies; I, Indo-Pacific

TAXONOMIC DESCRIPTORS: *Tridacna gigas*

ENVIRONMENT: Marine

086

118-07141

Future economic outlook for aquaculture and related assistance needs.

Nash, C.E.

FAO/UNDP Aquaculture Development and Coord. Programme, Rome (Italy)

PUBL: FAO, ROME (ITALY), 1987, 14 pp

LANGUAGES: English

FAO/UNDP ADCP/REP/87/25.

DOC TYPE: Numerical data; Book

An outline is given of economic prospects for the aquaculture industry in order to aid donors in setting priorities for planning purposes. Trends and developments prospects are examined individually for the following areas: Africa, Asia, Latin America, Mediterranean and Near East, Caribbean and Oceania. Future assistance to aquaculture has to be highly selective it will be most valuable when provided in conjunction with development of biotechnical and socio-economical in-country policy and management skills.

DESCRIPTORS: aquaculture development; aquaculture economics

GEOGRAPHIC DESCRIPTORS: World Waters

087

110-09332; VIMS Microfiche #006482

The feasibility of farming *Macrobrachium* in Dominica, West Indies.

Presented at: 9. Annu. Meet. World Mariculture Society Atlanta, GA (USA) 3 Jan 1978.

New, M.B.; Sanders, S.; Brown, R.L.; Cole, R.C.

Kelvin Hughes Aquacult. Serv., Wroxton Lodge, Institute Rd., Marlow SL7 1BJ, UK Proc. Annu. Meet. World Maricult. Soc.

In: Proceedings of the ninth annual meeting of the World Mariculture Society, held at Atlanta, Georgia, January 3-6 1978, p 67-81.

Avault, J.W., Jr., ed.

PUBL: World Mariculture Society, Baton Rouge, LA (USA), 1978.

LANGUAGES: English

SUMMARY LANGUAGES: English

087 (CONTINUED)

DOC TYPE: Conference; Book

The technical feasibility of freshwater prawn farming in the Windward Island of Dominica is reviewed in the light of environmental, topographic, economic and marketing conditions. Although environmental conditions are good for the culture of *Macrobrachium* spp in Dominica, the nature of the terrain precludes the construction of large farms. However, small farms supplied with stock from a government hatchery should be economically viable. Despite the need to import at least part of the feedstuff requirement, freshwater prawn farming would have a favourable effect on balance of payments due to the export market available in the neighbouring French Departments of Martinique and Guadeloupe.

GEOGRAPHIC DESCRIPTORS: Dominica

TAXONOMIC DESCRIPTORS: *Macrobrachium*; *Macrobrachium rosenbergii*

ENVIRONMENT: Fresh

IDENTIFIERS: freshwater aquaculture; crustacean culture; Malacostraca

088

114-09712

La respuesta de machos hibridos de tilapia (*Tilapia hornorum* macho x *Tilapia nilotica* hembra) a cuatro niveles de proteina cruda en dietas isocaloricas

(Response of tilapia hybrid males (*Tilapia hornorum* male x *Tilapia nilotica* female) to four levels of gross protein in isocaloric diets.).

Newman, M.W.; Huezco, H.E.

Peace Corps, USA

INF. TEC. SERV. RECURS. PESQ. DIR. GEN. RECURS. NAT. RENOV. (EL SALVADOR)., vol. 4, no. 3

PUBL: MINIST. AGRIC. GANAD., SOYAPANGO (EL SALVADOR), 1977, 30 pp

LANGUAGES: Spanish

SUMMARY LANGUAGES: English; Spanish

DOC TYPE: Book

Twenty, 20 m super(3) concrete ponds were stocked with all-male hybrids (*Tilapia hornorum* males x *T. nilotica* females) at a rate of 1.5 fish/m super(3). 5 treatments were made: 4 isocaloric diets containing 35, 30, 25 and 20 percent protein and a control without feeding, were tested to find the growth response of tilapia to protein quantity. No significant difference in growth was produced by any diet, however, all diets produced at least double the growth of the control treatments. It is economically better to include 20 percent protein in supplemental diets for average tilapia culture conditions than higher levels. The range of feed conversion obtained with the 4 diets was small. The 30 percent diet was more efficiently utilized than any other diet.

DESCRIPTORS: fish culture; artificial feeding; hybrids

GEOGRAPHIC DESCRIPTORS: El Salvador

TAXONOMIC DESCRIPTORS: feed composition; proteins; diets; growth; *Tilapia hornorum*; *Tilapia nilotica*

ENVIRONMENT: Fresh

089

114-09710

The response of all-male tilapia hybrids (*Tilapia hornorum* male x *Tilapia nilotica* female) to four levels of protein in isocaloric diets. Meeting of the Mariculture Society Honolulu, HI (USA) 1979

Newman, M.W.; Huevo, H.E.; Hughes, D.

Peace Corps, USA

INF. TEC. SERV. RECURS. PESQ. DIR. GEN. RECURS. NAT. RENOV. (EL SALVADOR)., vol. 5, no. 7

PUBL: MINIST. AGRIC. GANAD., SOYAPANGO (EL SALVADOR), 1978., 39 pp

LANGUAGES: English

SUMMARY LANGUAGES: English

DOC TYPE: Conference; Book

Twenty, 20 m super(3) concrete tanks with non-flowing water were stocked with all-male tilapia hybrids (*Tilapia hornorum* males x *T. nilotica* females) at a rate of 1.5 fish/m super(3). 4 diets of equal gross caloric content (isocaloric) containing 20, 25, 30 and 35 percent protein of equal quality were tested to evaluate the growth response of tilapia to protein quantity. No significant difference in growth was produced by any diet. It was more economical to use 20 percent protein in the diets than higher levels.

DESCRIPTORS: fish culture; artificial feeding; hybrids

GEOGRAPHIC DESCRIPTORS: El Salvador

TAXONOMIC DESCRIPTORS: feed composition; proteins; diets; growth; *Tilapia hornorum*; *Tilapia nilotica*

ENVIRONMENT: Fresh

090

001422

ENGINEERING AND TECHNOLOGY. 8A. AQUACULTURE

NOAA

MARINE RESEARCH 1973. NOAA., P. 621-637., 1973,

Descriptors: RESEARCH; GOVERNMENT AGENCY; MARINE FISH; CAGE CULTURE; WASTE WATER AQUACULTURE; MARINE RESOURCES; MARINE ALGAE; DUNGENESS CRAB; AMERICAN LOBSTER; CRUSTACEAN; SHELLFISH; POND CULTURE; THERMAL POLLUTION; POWER STATION EFFLUENT; CLOSED SYSTEM; OYSTER; MOLLUSK; FUSARIOSIS; SEA TURTLE; TECHNOLOGY; COASTAL WATER; SHRIMP; TROPICAL FISH; FEASIBILITY STUDY; OPEN WATER CULTURE; PILOT PROGRAM; RACEWAY CULTURE; AQUARIUM CULTURE; PRODUCTION; BRACKISH WATER; IMPOUNDMENT; DIET; PIPELINE CANAL; WATER TEMPERATURE; MAINE; RAFT CULTURE; POLLUTION CONTROL; PARASITE; DISEASE; UPWELLING; DOLPHIN; HATCHERY; CLAM; ABALONE; PUERTO RICO; ECONOMICS; BIOFILTER; PATHOLOGY; FIELD EQUIPMENT; TEXAS; MANAGEMENT; HANDLING FACILITY; BEHAVIOR; PHYSIOLOGY; AQUAFARM; SALMON; TROUT

091

113-15381; NAL: SH1.G8

Aquaculture: Investment opportunities in Puerto Rico.

34. Annu. Gulf and Caribbean Fisheries Institute Mayaguez, PR (USA) Nov 1981
Pagan Font, F.A.

Corp. Dev. & Adm. Mar., Lacustrine & Fluvial Resour. Puerto Rico, San
Juan, PR 00903, USA

PROC. GULF CARIBB. FISH. INST., no. 34

PROCEEDINGS OF THE THIRTY-FOURTH ANNUAL GULF AND CARIBBEAN FISHERIES
INSTITUTE, MAYAGUEZ, PUERTO RICO, NOVEMBER 1981 (pub. 1982), pp. 73-75

LANGUAGES: English

SUMMARY LANGUAGES: Spanish

DOC TYPE: Conference; Book

Farming methods for tilapia, catfish and oysters are well known and aquaculture of these species has less risk than some others. The technology for raising freshwater prawn and marine shrimps is rapidly developing and this should make it easier to attract investment capital. Also, Puerto Rico has no restrictions on investment by nonresident U.S. citizens or by foreigners which broaden the source of investment capital. The Government of Puerto Rico can provide technical assistance, incentives and financial assistance to expedite the development of aquaculture. The Act of the Legislature which established CODREMAR authorizes financial assistance, loans, price guarantees and market development programs for fishing and aquaculture.

DESCRIPTORS: investments; financial resources; financial viability;
aquaculture development; government policy; aquaculture economics

GEOGRAPHIC DESCRIPTORS: USA, Puerto Rico

ENVIRONMENT: Marine; Fresh

092

010173

**PRELIMINARY EVALUATION ON THE POTENTIAL UTILIZATION OF DISTILLER'S
SOLUBLES (SLOPS) FOR THE CULTURE OF THE BLUE TILAPIA (TILAPIA AUREA)**

PAGAN-FONT, F.A.; KOHLER, C.; WEILER, D.

JOURNAL OF AGRICULTURE OF THE UNIVERSITY OF PUERTO RICO 64 (2), 181-189.
(IN ENGLISH WITH SPANISH ABSTRACT), 1980,

Descriptors: PUERTO RICO; TILAPIA; FRESH WATER FISH; FEEDING; FEED
COMPOSITION; WASTE WATER AQUACULTURE; CONSUMER ACCEPTABILITY; REPRODUCTION;
FERTILIZER; YEAST; FUNGUS; PRODUCTION; WATER QUALITY; OXYGEN; TURBIDITY; PH;
POND CULTURE; ARTIFICIAL FOOD; PELLET; INDUSTRIAL WASTE; WEIGHT; EFFLUENT

Genus Species: TILAPIA AUREA

093

115-07360

Uso de oligoquetos de agua dulce en acuicultura marina
(Use of freshwater oligochaetes in marine aquaculture.).

Perera, C.; Cruz, S.A. de la

Univ. La Habana, Cent. Invest. Mar., Havana, Cuba

REV. INVEST. MAR., vol. 5, no. 1, pp. 85-93, (1984).

LANGUAGES: Spanish

SUMMARY LANGUAGES: English; Spanish

DOC TYPE: Journal Article

The taxonomy, morphology, ecology and salinity tolerance of Tubifex sp., are presented. Also a list of 45 marine species that accepted Tubifex sp. as a food item, is included.

DESCRIPTORS: taxonomy; salinity tolerance; food organisms

GEOGRAPHIC DESCRIPTORS: Cuba

TAXONOMIC DESCRIPTORS: Tubifex

ENVIRONMENT: Marine; Fresh

IDENTIFIERS: animal morphology; ecology

094

001916

AQUACULTURE DEVELOPMENT

PILLAY, T.V.R.

FAO AQUACULTURE BULLETIN 4 (3), 6-10. FAO 20669., 1972,

Descriptors: CANADA; RAINBOW TROUT; AQUACULTURE; CHILE; BROWN TROUT; FINLAND; FRANCE; INDONESIA; IVORY COAST; NETHERLANDS; NIGERIA; NORWAY; PHILIPPINES; PUERTO RICO; FISH; UNITED STATES; PINK SHRIMP; WHITE SHRIMP; BROWN SHRIMP; CRUSTACEAN; SHELLFISH; COMMERCIAL FIRM; YUGOSLAVIA; UNITED KINGDOM

095

010346

ELEMENTS IN EVALUATING SUCCESS AND FAILURE IN AQUACULTURE PROJECTS

POLLNAC, R.B.; PETERSON, S.; SMITH, L.J.

AQUACULTURE DEVELOPMENT IN LESS DEVELOPED COUNTRIES: SOCIAL, ECONOMIC AND POLITICAL PROBLEMS, WESTVIEW PRESS, 131-143. (REPRINT), 1982,

Descriptors: PLANNING; WORLD FOOD SUPPLY; PROTEIN; MARKET; SOCIAL ASPECT; RESOURCES; FISH; COST; LABOR; ECONOMICS; PERSONNEL; INVESTMENT; ASIA; CENTRAL AMERICA; SOUTH AMERICA; CARIBBEAN; AFRICA;

MIDDLE EAST; PROGRAM; CRUSTACEAN; AQUACULTURE

096

116-05796; SH19.I5 no.31

The development of commercial farming of tilapia in Jamaica 1979-1983.

Popma, T.J.; Ross, F.E.; Nerrie, B.L.; Bowman, J.R.

Dep. Fish. and Allied Aquacult., Int. Cent. Aquacult., Auburn, AL, USA

RES. DEV. SER. INT. CENT. AQUACULT., no. 31

096 (CONTINUED)

PUBL: INTERNATIONAL CENT. FOR AQUACULTURE, AUBURN, AL (USA), 1984,
18 pp

LANGUAGES: English

DOC TYPE: Numerical data; Book

A project was initiated in 1979 in Jamaica, to stimulate the development of warmwater fish culture in the private sector, increasing food-fish production. An account is given of the growth of commercial farming of tilapia during the first 4 years of the project. Fish farming methods, fish production extension branch, food-fish production on private and public farms, economics of small-scale tilapia farming, trend toward greater independence of private producers, and the marketing of farm-raised tilapia are discussed in detail.

DESCRIPTORS: fish culture; aquaculture economics; aquaculture development

GEOGRAPHIC DESCRIPTORS: Jamaica

TAXONOMIC DESCRIPTORS: Tilapia mossambica

ENVIRONMENT: Fresh

097

118-05895

Fencing off fish.

Powles, H.

AQUACULT. MAG., vol. 13, no. 1, pp. 41-43, (1987).

LANGUAGES: English

DOC TYPE: Journal Article

Cage and pen culture of fish in developing countries is discussed. Floating cages on the Nile, cage culture in reservoirs in Turkey, projects in Sri Lanka, the Dominican Republic and Togo are examined. Details are given of the Pokhara Lakes system in Nepal as a good model to follow for the development and transfer of cage culture systems to artisanal users.

DESCRIPTORS: fish culture; cage culture; small scale aquaculture; developing countries

ENVIRONMENT: Fresh

098

118-09052

Clave para la determinacion de monogeneas parasitos de peces en cultivo intensivo de Cuba

(Key for the determination of Monogenea parasites of fish in intensive culture in Cuba.)

Prieto, A.; Vinjoy, M.

Empresa Nac. de Acuicultura, Havana (Cuba)

ACUICULTURA: BOL. TEC., no. 21

1986, 15 pp

LANGUAGES: Spanish

SUMMARY LANGUAGES: English; Spanish

DOC TYPE: Book

098 (CONTINUED)

A key for determining the species of Monogenea parasites from fishes in Cuba is presented. Opishaptor and the copulative organ were the principal taxonomic features used. Host-parasite relationships are discussed.

DESCRIPTORS: fish culture; parasites; identification keys

GEOGRAPHIC DESCRIPTORS: Cuba

TAXONOMIC DESCRIPTORS: Monogenea

ENVIRONMENT: Fresh

099

010228

DETERMINACION DEL NIVEL OPTICO DE PROTEINA CRUDA EN DIETAS PARA TILAPIA NILOTICA

PRIETO, T.S.; RODRIGUEZ, J.V.

REVIATA LATINOAMERICANA DE ACUICULTURA 6, 13-15. (IN SPANISH WITH ENGLISH ABSTRACT), 1980,

Descriptors: DIET; PROTEIN; NILE TILAPIA; FRESH WATER FISH; LARVA; FOOD CONVERSION; CUBA; GROWTH; MORTALITY; AQUARIUM CULTURE; CARIBBEAN

Genus Species: TILAPIA NILOTICA

100

001087

SOME RESULTS OF A PILOT PROJECT ON FRESHWATER PRAWN CULTURE IN JAMAICA

PROVENZANO, A.J. JR.

PROCEEDINGS OF THE FOURTH ANNUAL WORKSHOP WORLD MARICULTURE SOCIETY.

MONTERREY, MEXICO. 57-61., 1973,

Descriptors: FOOD CONVERSION; CRUSTACEAN; SHELLFISH; JAMAICA; STOCKING; POSTLARVA; ARTIFICIAL FOOD; PREDATION; PILOT PROGRAM; PREDATION; BIRD;

MORTALITY; WATER QUALITY; HARVESTING; FRESH WATER PRAWN

Genus Species: MACROBRACHIUM ROSENBERGII

101

Assessment of Aquaculture in the Eastern Caribbean... A Pilot Study of: Antigua, Barbados, Dominica, Montserrat, St. Lucia and St. Vincent

Rakocy, J.; Hargreaves, J.

College of the Virgin Islands, Agric. Exper. Sta., St. Croix, U.S. Virgin Islands

PUBL: The College of the Virgin Islands--Eastern Caribbean Center, August 1986, 28 p

102

113-14869; NAL: SH1.G8

Potential for an aquaculture industry in Trinidad and Tobago.
34. Annu. Gulf and Caribbean Fisheries Institute Mayaguez, PR (USA) Nov 1981
Ramsaroop, D.
Nat. Resour. Prog., Inst. Mar. Aff., Trinidad & Tobago
PROC. GULF CARIBB. FISH. INST., no. 34
PROCEEDINGS OF THE THIRTY-FOURTH ANNUAL GULF AND CARIBBEAN FISHERIES
INSTITUTE, MAYAGUEZ, PUERTO RICO, NOVEMBER 1981 (pub. 1982), pp. 76-80
LANGUAGES: English
SUMMARY LANGUAGES: English
DOC TYPE: Conference; Book

Aquaculture development in Trinidad and Tobago has been limited to tropical
aquarium fish. Earlier attempts to develop a food production industry using
tilapia failed, due to a lack of sustained effort by the agencies concerned
and poor marketing techniques. Aquaculture is rapidly becoming established
as a viable industry in many areas of the world and especially in third
world countries. Also, agriculture is on the decline in Trinidad and Tobago.
Recognizing this, the Institute of Marine Affairs, in cooperation with the
Ministry of Agriculture, Lands and Food Production and the Zoology
Department of the University of the West Indies, embarked on a strategy for
introducing aquaculture as an acceptable and viable food production system
in Trinidad and Tobago.

DESCRIPTORS: aquaculture development
GEOGRAPHIC DESCRIPTORS: Trinidad; Tobago
ENVIRONMENT: Marine

103

116-14808

Essais d'elevage du loup (*Dicentrarchus labrax*) de la daurade (*Sparus
auratus*) et du sar (*Diplodus sargus*) a la Martinique
(Rearing trials in sea bass (*Dicentrarchus labrax*), sea bream (*Sparus
auratus*) and sar (*Diplodus sargus*) at Martinique.)
Colloque sur l'Aquaculture du Bar (Loup) et des Sparides Sete (France) 15
Mar 1983

Rene, F.

ADAM, BP 1020, Baie du Robert, F97231 Robert, Martinique

L'AQUACULTURE DU BAR ET DES SPARIDES.

(AQUACULTURE OF SEA BASS AND SPARIDS.)

Barnabe, G.; Billard, R.; eds.

1984, pp. 403-418

LANGUAGES: French

SUMMARY LANGUAGES: English; Spanish; French; Italian

DOC TYPE: Conference; Book

Growth trials in sea bass in cages were carried out in a tropical
environment at Martinique in the French Antilles. The best results obtained
after two years of study showed that a size of 250-350 g was reached after
14 to 15 months of rearing, using fry put directly in a cage when they
weighed 0.2 g. Mortality rate was low (0.50% day) during the first 3 months
and 0.02% afterwards. Granules were distributed to satiety in 3 meals/day up

103 (CONTINUED)

to weight of 15 g and in 2 meals/day after that. The amount of food ingested in relation to body weight was 15-10% between 0.2 and 1 g, 2% between 10 and 20 g, 1.5% between 20 and 100 g and 1% over 100 g. Conversion rate was about 1 between 1 and 10 g, 1.1 between 10 and 40 g and 1.3 over 40 g. Fish load in the cages was 1 to 6 kg/m super(3) for 10 to 40 g fish and 6 to 20 kg/m super(3) for fish over 40 g. The cylindrical cages were partially rotated twice a week to avoid fouling.

DESCRIPTORS: cage culture; warm-water aquaculture; fish culture; growth; fry; animal nutrition; stocking density; food conversion

GEOGRAPHIC DESCRIPTORS: ASW, Martinique

TAXONOMIC DESCRIPTORS: Sparus aurata; Dicentrarchus labrax

ENVIRONMENT: Marine

104

113-19367

Resultats experimentaux obtenus sur les parametres de l'elevage chez le loup Dicentrarchus labrax la daurade de Sparus auratus et le sar Diplodus sargus a la Martinique (Campagne 1980-1981)

(Experimental results obtained for culture parameters for Dicentrarchus labrax, Sparus auratus, and Diplodus sargus in Martinique (1980-1981)).

(Caribbean Aquaculture Symposium) (French West Indies) 14 Dec 1981

Rene, F.

Address not stated

JOURNEES AQUACOLEES DELA CARAIBE. 14-17 DECEMBRE 1981.

(CARIBBEAN AQUACULTURE SYMPOSIUM. 14-17 DECEMBER 1981.), 1981, pp. 1-13

LANGUAGES: French

DOC TYPE: Conference; Report

The experimental culture of Dicentrarchus labrax, Sparus auratus and Diplodus sargus in Martinique gave satisfactory results. Growth is faster in a tropical environment than in a temperate zone.

DESCRIPTORS: fish culture

GEOGRAPHIC DESCRIPTORS: aquaculture development; growth; tropical zones; ASW, Martinique

TAXONOMIC DESCRIPTORS: Pisces; Dicentrarchus labrax; Sparus auratus; Diplodus sargus

105

114-14558; NAL: SH1.G8

Potential for mariculture development in the Bahamas. 35. Annual Gulf and Caribbean Fisheries Institute Nassau (Bahamas) Nov 1982

Roels, O.

Worldwide Protein Inc., Corpus Christi, TX 78412, USA

PROC. GULF CARIBB. FISH. INST., no. 35

PROCEEDINGS OF THE THIRTY-FIFTH ANNUAL GULF AND CARIBBEAN FISHERIES INSTITUTE, NASSAU, BAHAMAS, NOVEMBER 1982 (pub. 1983), p. 17-18.

Higman, J.B., ed.

LANGUAGES: English

DOC TYPE: Conference; Book

105 (CONTINUED)

The Bahamas have very large areas of flat land very near the sea and an abundance of sunshine and clean unpolluted seawater. These three factors provide the essential requirements for the development of a potentially important mariculture industry in these islands. The climate in the southern Bahamas is favorable for year round production of farmed seafood. Transportation from the Bahamas to major consumer markets in the U.S. and Europe is already well established. At least 40% of the region's population is 21 years of age and younger. The mariculture industry could provide new jobs, income and ancillary opportunities for a country which must be prepared for this rapidly growing work force with industries other than tourism.

DESCRIPTORS: marine aquaculture; aquaculture development; aquaculture enterprises

GEOGRAPHIC DESCRIPTORS: Bahama I.

ENVIRONMENT: Marine

106

114-04665

The economics of artificial upwelling mariculture.

Annu. Meet. of the National Shellfisheries Association Hyannis, MA (USA) 9 Jun 1980

Roels, O.A.

Dep. Marine Studies, Univ. Texas, Port Aransas, TX 78373, USA

J. SHELLFISH RES., vol. 1, no. 1, p. 122, (1981).

LANGUAGES: English

DOC TYPE: Conference; Summary; Journal Article

To determine the economics of artificial upwelling mariculture the clam *Tapes japonica* was grown over a 12-month period in the St. Croix system, operated in pilot-plant fashion. Seawater from a depth of 870 m was pumped continuously into ponds (100 m super(2), 1 m deep) onshore. The ponds were inoculated with the diatom *Chaetoceros curvisetus* (STX 167) which was grown in continuous culture and pumped to a *T. japonica* production line. The system produced 81 kg of phytoplankton protein, and 423 kg (whole wet weight) of clams in 12 months, corresponding to a yield of 8.1 tons plant protein, and 42.3 tons of clams per hectare per year. An aquaculture budget generator was developed to predict costs of artificial upwelling mariculture systems of different sizes.

DESCRIPTORS: marine aquaculture; artificial upwelling; aquaculture economics; clam culture

TAXONOMIC DESCRIPTORS: *Tapes japonica*

ENVIRONMENT: Marine

107

111-05987; 211-03258

From the deep sea: food, energy, and fresh water.

Roels, O.A.

Univ. Texas Mar. Sci. Inst., Port Aransas, TX, USA

Mech. Eng., 102(6), 36-43, (1980)

107 (CONTINUED)

LANGUAGES: English

SUMMARY LANGUAGES: English

DOC TYPE: Journal Article

Solar energy can be utilized to generate mechanical energy and fresh water by using the cold deep water, below about 1000 m, as the heat sink. After its use in the condenser of the power-generating or desalination plant, the deep water can be used in a mariculture system to produce plant and animal protein. In a small shore-based pilot plant on the north shore of St. Croix, US Virgin Islands, the technical feasibility of artificial upwelling mariculture has been demonstrated and its economic potential is now under evaluation. The plant protein yield per unit surface area achieved in St. Croix is 8.1 t/ha/yr. At current market prices, the gross sales value of the meat that can be obtained from a given volume of deep seawater pumped to the surface is considerably greater than that of the energy OTEC power systems presently under consideration in the US could generate from the same volume of deep water. The combined utilization of the T and the nutrient content of deep water in the tropical ocean could not only be economical, it could also contribute to alleviating current shortages of food and energy.

DESCRIPTORS: marine aquaculture; solar radiation; energy; resource exploitation; water column

GEOGRAPHIC DESCRIPTORS: ASW, US Virgin Is.

ENVIRONMENT: Marine

IDENTIFIERS: bathypelagic zone; food resources; freshwater; power plants; desalination plants; OTEC plants

108

008453

ARTIFICIAL UPWELLING PROGRESS - 1976-1977. APPENDIX B. NITROGEN BALANCE AND CLAM GROWTH IN AN ARTIFICIAL UPWELLING MARICULTURE SYSTEM AT DIFFERENT FOOD FLOW RATES AND SHELLFISH DENSITIES

ROELS, O.A.; DORSEY, T.; LAURENCE, S.; MCDONALD, P.W.; RODDE, K.

THE UNIVERSITY OF TEXAS AT AUSTIN, TXU-Q-78-001, APPENDIX B, 1-42., 1980, Descriptors: NITROGEN; MOLLUSK; ARTIFICIAL UPWELLING; SHORT NECKED CLAM;

ALGAE; PROTEIN CONVERSION; PHYTOPLANKTON; ALGAE CULTURE; DIATOM; AQUARIUM CULTURE; GROWTH; WEIGHT; VIRGIN ISLANDS; STOCK DENSITY; FLOW; DIET; LENGTH

Genus Species: CHAETOCEROS CURVIVETUS; TAPES JAPONICA

109

007178

THE UTILIZATION OF COLD, NUTRIENT-RICH DEEP OCEAN WATER FOR ENERGY AND MARICULTURE

ROELS, O.E.; LAURENCE, S.; VAN HEMELRYCK, L.

OCEAN MANAGEMENT 5 (3), 199-210., 1979,

Descriptors: OCEAN; DEEP SEA WATER; COLD WATER; ENERGY; NUTRIENT; NITRATE; PHOSPHATE; ARTIFICIAL UPWELLING; PROTEIN; POWER STATION EFFLUENT; RED

ALGAE; CARIBBEAN; DIATOM; PHYTOPLANKTON; SEAWEED; AQUARIUM CULTURE; SHORT NECKED CLAM; MOLLUSK; ALGAE; GROWTH; SURVIVAL; EUROPEAN OYSTER; JAPANESE

OYSTER; SOUTHERN QUAHOG; HYBRID; BAY SCALLOP; SPINY LOBSTER; CRUSTACEAN; CARRAGEENAN; TEMPERATURE; QUEEN CONCH; PRODUCTIVITY

109 (CONTINUED)

Genus Species: TAPES JAPONICA; OSTREA EDULIS; CRASSOSTREA GIGAS;
MERCENARIA CAMPECHIENSIS; ARGOPECTEN IRRADIANS; PINCTADA MARTENSII;
STROMBUS GIGAS; PANULIRUS ARGUS; HYPNEA MUSCIFORMIS

110

111-16928

Bivalve molluscan culture in an artificial upwelling system.

Presented at: 10. Annu. Meet. World Mariculture Society Honolulu, HI (USA)
22 Jan 1979.

Roels, O.A.; Sunderlin, J.B.; Laurence, S.

St. Croix Mar. Stn., Port Aransas Mar. Lab., Univ. Texas Mar. Sci. Inst.,
Port Aransas, TX 78373, USA

Proc. Annu. Meet. World Maricult. Soc.

In: Proceedings of the tenth annual meeting. World Mariculture Society,
Honolulu, Hawaii, January 22-26, 1979.

Avault, J.W., Jr., ed.

PUBL: World Mariculture Soc., Baton Rouge, LA (USA)., 1979, p. 122-138.

LANGUAGES: English

SUMMARY LANGUAGES: English

DOC TYPE: Conference; Book

Since May 1972, the St. Croix Artificial Upwelling Project has utilized a constant flow of nutrient-rich water, pumped from 870 m depth in the sea into ponds (100 m SUP-2, one m deep) on the north shore of St. Croix, to produce phytoplankton. This phytoplankton suspension was pumped continuously to filter-feeding shellfish. Initial technical feasibility experiments have demonstrated that *Mercenaria campechiensis*, a hybrid of *M. mercenaria* x *M. campechiensis*, *Tapes japonica*, *Ostrea edulis*, *Crassostrea gigas*, *C. gigas* Kumamoto variety, *Argopecten irradians* and *Pinctada martensii* grew rapidly in this system. *Crassostrea virginica* and *M. mercenaria* did not grow well. From Oct 1976 to Oct 1978 the St. Croix Artificial Upwelling Mariculture system was operated in pilot-plant fashion to determine yields and provide a basis for cost estimates of the system. *T. japonica* used in the pilot plant were produced in the hatchery of the Artificial Upwelling system in St. Croix. The phytoplankton protein production achieved in the pilot plant, including the down-time of the nutrient-limited pools for cleaning and reinoculation, was equivalent to 8.1 tons/ha/year from July 1977 until July 1978. During a 12-month period of pilot plant operation (Oct 1977-Oct 1978), 423 kg of *T. japonica* were produced, corresponding to 22% conversion efficiency of phytoplankton protein to shellfish meat protein and 42.3 tons of shellfish produced/year/ha of phytoplankton pond. An economic evaluation of the pilot plant results is underway.

GEOGRAPHIC DESCRIPTORS: USA

TAXONOMIC DESCRIPTORS: Bivalvia

IDENTIFIERS: aquaculture techniques; marine aquaculture; upwelling

111

118-09063

Primer desove artificial de *Ictiobus cyprinellus* Val. en Cuba
(Induced spawning of *Ictiobus cyprinellus* Val. in Cuba.).

Salazar, O.; Gonzalez, M.A.

Empresa Nac. de Acuicultura, Havana (Cuba)

ACUICULTURA: BOL. TEC., no. 34

1986, 10 pp

LANGUAGES: Spanish

SUMMARY LANGUAGES: English; Spanish

DOC TYPE: Book

In order to induce artificial spawning of *Ictiobus cyprinellus*, injections of carp pituitary of 6 and 8 mg/kg were administered in 12-hour-intervals for each treatment. More eggs were obtained with 3 doses of 8 mg/kg, but there was not significant differences in total eggs/kg. It was found that when water temperature increases, the time between decisive doses and spawning decreases.

DESCRIPTORS: fish culture; induced breeding; hormones; aquaculture techniques

TAXONOMIC DESCRIPTORS: *Ictiobus cyprinellus*

ENVIRONMENT: Fresh

112

112-03911

El Efecto de Diferentes Tasas de Siembra y Manejo en la Produccion de Hibridos Intraespecificos del Genro *Tilapia* (*Sarotherodon*)

(The Effect of Different Stocking and Management Rates on the Production of Intraspecific Hybrids of the Genus *Tilapia* (*Sarotherodon*)).

Salgado Flores, R.

Minist. de Agricultura y Ganaderia, Serv. de Recursos Pesqueros, El Salvador

REV. LATINOAM. ACUITCULT., no. 2, pp. 29-37, (1979).

LANGUAGES: Spanish

SUMMARY LANGUAGES: English; Spanish

DOC TYPE: Journal Article

In order to obtain optimum production from fish farming ponds, tests have been made crossing *Tilapia* (*Sarotherodon*) *nilotica* females with *Tilapia* (*Sarotherodon*) *hornorum* males and with different treatments at the IZALCO Experimental Fish Farming Station in El Salvador. The main variable was the density of females in the ponds (one female per each 5, 35 and 60 m²), including one male for each two females stocked. Other parameters which were tested were the use of organic and inorganic fertilizers as well as use of the feed. The formula arrived at for feed use was 20.3 % proteins and 3250 kilocalories. Similarly, production costs were controlled.

DESCRIPTORS: hybrid culture; freshwater aquaculture; hybrids; yield; fertilizers

GEOGRAPHIC DESCRIPTORS: El Salvador

TAXONOMIC DESCRIPTORS: *Tilapia nilotica*; *Tilapia hornorum*

ENVIRONMENT: Brackish

113

82049976 81080378 Holding Library: AGL

Indian food production in the Caribbean

Sauer, C.O.;

Geographical review. v. 71 (3), July 1981. p. 272-279.

New York, American Geographical Society. ISSN: 0016-7428

NAL: 500 AM35G

114

114-14587

Mariculture of dolphin (*Coryphaena hippurus*): Is it feasible?. 35. Annual Gulf and Caribbean Fisheries Institute Nassau (Bahamas) Nov 1982

Schekter, R.C.

Div. Biol. and Living Resour., Rosenstiel Sch. Mar. Atmos. Sci., Univ. Miami, Miami, FL 33149, USA

PROC. GULF CARIBB. FISH. INST., no. 35

PROCEEDINGS OF THE THIRTY-FIFTH ANNUAL GULF AND CARIBBEAN FISHERIES INSTITUTE, NASSAU, BAHAMAS, NOVEMBER 1982.

Higman, J.B. ed., 1983, pp. 27-32

LANGUAGES: English

SUMMARY LANGUAGES: English

DOC TYPE: Conference; Book

A fast natural growth rate and spontaneous captive spawnings recorded in Japan and Hawaii suggest the dolphinfish (*Coryphaena hippurus* Linnaeus) as a potential species for mariculture. On the other hand, their adaptation to a pristine environment, with no confining solid surfaces, suggests potential difficulties in husbandry of this oceanic fish. Since 1981 a program at the University of Miami's Rosenstiel School of Marine and Atmospheric Sciences (RSMAS) has examined further the feasibility of dolphin culture. The three-phase approach included (1) a survey of the scientific literature of dolphin and current status of the dolphin culture concept, (2) an attempt to collect and rear planktonic eggs from the Florida Current and (3) the capture and transport of wild dolphin from the Florida Current and their maintenance in systems using water from Bear Cut, Florida. Relevant dolphin literature is identified and the history of dolphinfish rearing and captive spawning is summarized.

DESCRIPTORS: marine aquaculture

TAXONOMIC DESCRIPTORS: *Coryphaena hippurus*

ENVIRONMENT: Marine

IDENTIFIERS: feasibility studies; literature reviews

115

82070304 81099007 Holding Library: AGL

Mass bloom of the alga *Cladophora prolifera* in Bermuda: productivity and phosphorus accumulation

Schramm, W.; Booth, W.

Botanica marina. v. 24 (8), Aug 1981. p. 419-426. ill.

Berlin, W. de Gruyter. ISSN: 0006-8055

NAL: 450 B6582

116

85049024 84076937 Holding Library: AGL

Research in molluscan culture under the National Sea Grant Program. 2. The University of Texas-St. Croix artificial upwelling project
Shaw, W.N.

Aquaculture magazine. v. 11, i.e. 10 (2), Jan/Feb 1984. p. 39-41. ill.
Little Rock, Ark.: Briggs Associates, Inc. ISSN: 0199-1388 NAL: SH1.C65
Language: English

117

010566

THE USE OF PHYTOPLANKTON FOR AQUACULTURE NEEDS - A STATUS REPORT
SHAW, W.N.

NOAA TECHNICAL REPORT NMFS CIRCULAR 442, PROCEEDINGS OF THE SIXTH U.S.-JAPAN MEETING ON AQUACULTURE, SANTA BARBARA, CALIFORNIA, AUGUST 27-28, 1977, 19-24., 1982,

Descriptors: PHYTOPLANKTON; PLANKTON; CULTURED FOOD; HATCHERY; MOLLUSK; LARVA; ALGAE CULTURE; DELAWARE; NEW YORK; VIRGIN ISLANDS; MASSACHUSETTS; WASTE WATER AQUACULTURE; HAWAII; POND CULTURE; AQUARIUM CULTURE; CRUSTACEAN; ALASKA; SALMON; ANADROMOUS FISH; ZOOPLANKTON; FRY; MARINE FISH; VIRGINIA
Genus Species: MONOCHRYISIS LUTHERI; ISOCHRYISIS GALBANA; PYRAMIMONAS VIRGINICA; PSEUDOISOCHRYISIS PARADOXA; CHLORELLA; THALASSIOSIRA PSEUDONANA; CHAETOCEROS CURVISETUS; SKELETONEMA COSTATUM; PHAEODACTYLUM TRICORNUTUM; TETRASELMIS

118

113-15383

Shrimp farming: A business today profits and problems.

34. Annu. Gulf and Caribbean Fisheries Institute Mayaguez, PR (USA) Nov 1981
Shayne, P.

Empacadora Shayne C. Ltda. Guayaquil, Ecuador

PROC. GULF CARIBB. FISH. INST., no. 34

PROCEEDINGS OF THE THIRTY-FOURTH ANNUAL GULF AND CARIBBEAN FISHERIES INSTITUTE, MAYAGUEZ, PUERTO RICO, NOVEMBER 1981, 1982, pp. 90-94

LANGUAGES: English

DOC TYPE: Conference; Book

In Ecuador, shrimp farming is a reality with more than 40,000 hectares in production or under construction. But most of these farms are unsuccessful, and have no idea why or what it takes to make their farms profitable. There are a few good Eucadorian farms that are overwhelmingly sucessful. They are getting rich just by following a few simple rules. One of the most common errors in the history of shrimp farming was not knowing how many live animals, of the right species, you had in a pond. This in turn caused over- or under-feeding, causing a very disturbing and inconsistent line above and below the projected earnings and cash flows. Today, it is possible to predict and project the future harvest, its cash needs and cash flows, the number of animals that will be harvested within 5% at any given time during the operation. There is enough historical background now in shrimp farming to predict and control the future with certain and positive results.

118 (CONTINUED)

DESCRIPTORS: shrimp culture; aquaculture economics; aquaculture statistics
GEOGRAPHIC DESCRIPTORS: Ecuador
ENVIRONMENT: Marine

119

114-14729

Biological and economic outlook for hatchery production of juvenile queen conch. 35. Annual Gulf and Caribbean Fisheries Institute Nassau (Bahamas) Nov 1982

Siddall, S.E.

Rosenstiel Sch. Mar. and Atmos. Sci., Univ. Miami, Miami, FL 33149, USA
PROC. GULF CARIBB. FISH. INST., no. 35

PROCEEDINGS OF THE THIRTY-FIFTH ANNUAL GULF AND CARIBBEAN FISHERIES INSTITUTE, NASSAU, BAHAMAS, NOVEMBER 1982.

Higman, J.B. ed., 1983, pp. 46-52

LANGUAGES: English

SUMMARY LANGUAGES: English

DOC TYPE: Conference; Book

The objectives of the queen conch (*Strombus gigas*) research program at the Rosenstiel School of Marine and Atmospheric Science have been (1) to develop cost-effective methods for hatchery production of queen conch juveniles and (2), to investigate possibilities for intensive "grow-out" of captive queen conch populations and extensive restocking of natural queen conch populations. This paper summarizes progress made in the development of hatchery methods. While it remains to be shown conclusively that restocking natural conch populations with hatchery produced juveniles benefits the fishery, the biological and economic outlook for a large-scale queen conch hatchery is excellent.

DESCRIPTORS: shellfish culture; hatcheries; development potential; economics

TAXONOMIC DESCRIPTORS: *Strombus gigas*

ENVIRONMENT: Marine

120

115-20213

High-density hatchery production of juveniles of the queen conch *Strombus gigas* Linne.

Annu. Meet. National Shellfisheries Association Williamsburg, VA (USA) 2 Aug 1981

Siddall, S.E.; Creswell, R.L.

Rosenstiel Sch. Mar. and Atmos. Sci., Univ. Miami, Miami, FL 33149, USA
J. SHELLFISH RES., vol. 2, no. 1, p. 107, (1982).

LANGUAGES: English

Summary only.

DOC TYPE: Conference; Summary; Journal Article

In Florida, the Bahamas, and many areas of the Caribbean, populations of the queen conch *Strombus gigas* are overfished. The objective of this

120 (CONTINUED)

continuing study is to develop methods for high-density hatchery production of queen conchs for reseeding depleted natural populations or for captive growout to market size. Experimental procedures developed during the 1980 spawning season have enabled to rear several hundred larvae through metamorphosis for the first time under specific laboratory conditions. Results from more than 500 experiments with 156 cultures of larvae have identified important factors affecting production of juvenile conchs.

DESCRIPTORS: mollusk culture; hatcheries; aquaculture systems

TAXONOMIC DESCRIPTORS: *Strombus gigas*

ENVIRONMENT: Marine

121

118-08930

Assessment of the Potential for Aquaculture in Bermuda.

Proceedings of a scientific workshop hosted by the Bermuda Biological Station, October 12-15, 1983. Workshop on Assessment of the Potential for Aquaculture in Bermuda (Bermuda) 12-15 Oct 1983

Sleeter, T.D., ed.

Bermuda Biol. Stn. Res., Ferry Reach, Bermuda

SPEC. PUBL. BERMUDA BIOL. STN. RES., no. 27

1984, 201 pp

LANGUAGES: English

SUMMARY LANGUAGES: English

DOC TYPE: Book

October 12-15, 1983 the Bermuda Biological Station hosted a workshop with international participation to assess the potential for aquaculture in Bermuda. Aquaculture is the rearing and cultivation of waterbourne plants and animals. Mariculture involves the aquaculture of marine organisms. Invited participants brought a variety of experiences in aquaculture law, economics. Administration and commercial development with expertise in culturing lobster, shrimp, conch, oysters, scallops, clams, fish and seaweeds. After two days of technical presentations and discussion, all workshop participants broke into study panel groups, along with Bermudian participants and drafted guidelines and recommendations for aquaculture policy direction.

DESCRIPTORS: aquaculture; potential resources; conferences

GEOGRAPHIC DESCRIPTORS: Bermuda

IDENTIFIERS: feasibility studies

122

118-07455

A guide to seamoss cultivation in the West Indies.

Smith, A.

1986, 20 pp

LANGUAGES: English

Caribbean Conservation Assoc. St. Michael (Barbados).

DOC TYPE: Training Document; Book

122 (CONTINUED)

A description is given of techniques developed in St. Lucia regarding the culture of seamoss. Species involved are detailed and methods used outlined under the following headings: 1) propagation methods 2) seed material source 3) site selection 4) cultivation methods 5) plot maintenance 6) pests and diseases 7) harvesting 8) processing and 9) marketing.

DESCRIPTORS: seaweed culture; aquaculture techniques

GEOGRAPHIC DESCRIPTORS: ASW, St. Lucia

ENVIRONMENT: Marine

123

84033610 83790546 Holding Library: AGL; AGL

Status of fisheries development in the Dominican Republic with conclusions and recommendations / prepared by: Robert O. Smith & Patrick

H. Ramsey. -

Smith, Robert O.; Ramsey, Patrick H.

25 leaves: 1 folded map ; 28 cm.

(Washington, D.C.?) , United States International Cooperation Administration, USOM, Dominican Republic, 1960.

NAL: SH233.D6S6

Language: English

124

110-07924

An economic assessment of Jamaica's fish culture program.

Street, D.R.

Auburn Univ., AL (USA). Int. Center for Aquaculture

Res. Dev. Ser. Int. Cent. Aquacult., (no. 19), Aug 1978, 8 p.

LANGUAGES: English

DOC TYPE: Book

Fish culture has been chosen as a tool for economic development by the national government of Jamaica. The present report is based on a study conducted in early 1978, and discusses alternatives to fish culture and the development potential for fish culture in the country. A section describes some of the constraints which may limit the effectiveness of any aquaculture development program, including the problems of labour supply, availability of suitable land, of water, of managerial expertise, and marketing infrastructure. In summarising the situation, the author lists the facts required for decision-making in this area, the areas in which more information specific to Jamaica is required, and the ways in which missing information is to be obtained.

DESCRIPTORS: aquaculture development

GEOGRAPHIC DESCRIPTORS: Jamaica

IDENTIFIERS: aquaculture economics; fish culture

125

111-11448

El mar de Puerto Rico.

The sea of Puerto Rico.

Suarez Caabro, J.A.,

Univ. Puerto Rico Rio Pedras, PR (USA)., 1979.

LANGUAGES: Spanish

DOC TYPE: Book

REPORT NO.: 259 p

Marine fishes and fisheries (commercial, sport and aquaculture) of Puerto Rico.

DESCRIPTORS: marine fisheries; marine aquaculture

GEOGRAPHIC DESCRIPTORS: ASW, USA, Puerto Rico

TAXONOMIC DESCRIPTORS: Pisces

ENVIRONMENT: Marine

IDENTIFIERS: marine fish; sport fishing

126

008454

ARTIFICIAL UPWELLING PROGRESS - 1976-1977. APPENDIX C.

SUNDERLIN, J.B.; BAAB, P.T.

THE UNIVERSITY OF TEXAS AT AUSTIN, TXU-Q-78-001, APPENDIX C, 1-32., 1978,

Descriptors: ARTIFICIAL UPWELLING; BROOD STOCK; LARVA; EQUIPMENT; HATCHERY; VIRGIN ISLANDS; FEEDING; JUVENILE; SETTING; SHORT NECKED CLAM; MOLLUSK; INDUCED SPAWNING; DESIGN; HEATING; JAPANESE OYSTER; ARTIFICIAL FERTILIZATION; AQUARIUM CULTURE; SAMPLING; CLEANING; MEASUREMENT; BIOENGINEERING Genus Species: TAPES JAPONICA; CRASSOSTREA GIGAS

127

003512

GROWTH OF THE EUROPEAN OYSTER, OSTREA EDULIS LINNE, IN THE ST. CROIX ARTIFICIAL UPWELLING MARICULTURE SYSTEM AND IN NATURAL WATERS

SUNDERLIN, J.B.; TOBIAS, W.J.; ROELS, O.A.

NATIONAL SHELLFISHERIES ASSOCIATION 1974 PROCEEDINGS 65, 43-48., 1976,

Descriptors: EUROPEAN OYSTER; ARTIFICIAL UPWELLING; POND CULTURE; DIATOM; DEEP SEA WATER; SALINITY; TEMPERATURE; GROWTH; WEIGHT; SIZE; JUVENILE; SEED; MOLLUSK

Genus Species: OSTREA EDULIS

128

113-16891

Public health aspects of halophilic vibrios in Jamaica.

Tamplin, M.L.; Rodrick, G.E.; Blake, N.J.; Bundy, D.A.P.; Alexander, L.

Dep. Zool., U.W.I., Kingston 7, Jamaica

WEST INDIAN MED. J., vol. 32, no. 3, pp. 147-151, (1983).

128 (CONTINUED)

LANGUAGES: English

SUMMARY LANGUAGES: English

DOC TYPE: Journal Article

The occurrence of bacteria in oysters (*Crassostrea rhizophorae*) and seawater from Jamaican commercial oyster-culture sites was determined, using standard microbiological methods. *Vibrio vulnificus*, *V. cholerae*, *V. parahaemolyticus* and *V. alginolyticus* were identified in seawater samples, and the latter two mildly pathogenic species in oysters. The pathogenicity of halophilic vibrios is reviewed. The results suggest that correct selection of oyster-culture sites may significantly reduce the public health hazards associated with shellfish, and that more and precise information is required on the geographical and seasonal distribution of infection risk.

DESCRIPTORS: public health; pathology; oyster culture

GEOGRAPHIC DESCRIPTORS: ASW, Jamaica

TAXONOMIC DESCRIPTORS: *Vibrio*; *Crassostrea rhizophorae*

ENVIRONMENT: Marine

129

84001333 83048944 Holding Library: AGL

The Caribbean example (Pollution, energy resources, marine resources)

Thacher, P.S.; Meith, N.

Ocean yearbook. 1982. (3), 1982. p. 223-257. maps.

Chicago: University of Chicago Press.

NAL: GC1.033

Language: English

130

86119264 86865077 Holding Library: MCS; AGL

Contribution to the study of freshwater algae of French Guiana with the exclusion of diatoms

(Contribution a l'etude des algues d'eau douce de la Guyane francaise a l'exclusion des diatomees) / par Y. Therezien. --

Therezien, Y.;

275 p.: ill., map ; 23 cm. --

Vaduz, [Liechtenstein]: J. Cramer in der A.R. Ganter Verlag, 1985.

Bibliotheca phycologica ; Bd. 72

ISBN: 3768214176

DNAL CALL NO: QK564.B52 Bd.72

Language: French; Latin

131

115-02118

Identification of cultivated oysters.

Timothy, D.; Littlewood, J.

Zool. Dep., Univ. West Indies, Mona, Kingston 7, Jamaica

AQUACULTURE., vol. 40, no. 4, pp. 359-361, (1984).

131 (CONTINUED)

LANGUAGES: English

DOC TYPE: Journal Article

In Jamaica, mangrove oysters (*Crassostrea rhizophorae*) are cultivated on pieces of rejected motor vehicle tyres which serve as a substrate both for spat settlement and grow-out. The sidewalls and inner surfaces of these tyres are patterned with various ridges, numbers and lettering approximately 1 mm in relief. From such cultch, oysters have been found with "sculptured" lower (left) valves. Shells grown on this surface are indelibly imprinted as the deformation remains for life. This phenomenon may have practical applications, for example, bivalves may be grown over specific designs depicting stock numbers, potential trademarks, and marketing insignia. Quality oysters which are easily recognisable might have increased market value. The marking may also discourage praedial larceny. The impression is made on the lower left valve, which grows closely to the tyre surface. A very precise impression of the surface is made. In some cases, the upper valve has similar markings.

DESCRIPTORS: shells; oyster culture

TAXONOMIC DESCRIPTORS: *Crassostrea rhizophorae*; marking; substrata

ENVIRONMENT: Marine

IDENTIFIERS: tires

132

111-16933; VIMS Microfiche #007928

The technical feasibility of mass-culturing *Artemia salina* in the St. Croix "artificial upwelling" mariculture system.

Presented at: 10. Annu. Meet. World Mariculture Society Honolulu, HI (USA) 22 Jan 1979.

Tobias, W.J.; Sorgeloos, P.; Bossuyt [Bossuytand], E.; Roels, O.A.

Univ. Texas Mar. Sci. Inst., St. Croix Mar. Stn., Box Z, Kingshill, St. Croix, VI 00850, USA

Proc. Annu. Meet. World Maricult. Soc.

In: Proceedings of the tenth annual meeting. World Mariculture Society, Honolulu, Hawaii, January 22-26, 1979, p. 203-214.

Avault, J.W., Jr., ed.

PUBL: World Mariculture Soc., Baton Rouge, LA (USA)., 1979.

LANGUAGES: English

SUMMARY LANGUAGES: English DOC TYPE: Conference; Book

Of the various algae grown in the St. Croix Mariculture System, the diatom *Chaetoceros curvisetus* (clone STX-167) proved to be an excellent diet for culturing *Artemia nauplii* and adults. The minimum cell concentration at which *Artemia* can efficiently remove cells has been determined and appears to be constant throughout the brine shrimp's life cycle. The cell stripping efficiency, growth rate, and survival of the different larval instar stages have been studied in function of increased stocking densities and flow rates. The results obtained in 230-l raceway tanks, subsequent to the initial 190-l tank studies, and extrapolated to a 1 m SUP-3 system indicate that 15 g of cysts (4/ml animal stocking density) can be converted into 8.7 kg of fresh weight adult *Artemia* in 14 days.

132 (CONTINUED)

GEOGRAPHIC DESCRIPTORS: USA
TAXONOMIC DESCRIPTORS: Artemia salina; Chaetoceros curvisetus
ENVIRONMENT: Marine
IDENTIFIERS: raceway culture; food organisms; brine shrimps; phytoplankton culture; Algae; Branchiopoda

133

113-17148

International study on Artemia. 13. A comparison of production data of 17 geographical strains of Artemia in the St. Croix Artificial Upwelling-Mariculture System.

International Symposium on the Brine Shrimp Artemia salina Corpus Christi, TX (USA) 20 Aug 1979

Tobias, W.J.; Sorgeloos, P.; Roels, O.A.; Sharfstein, B.A.
Univ. Texas, Mar. Sci. Inst. St. Croix Mar. Stn., US Virgin Island, USA
THE BRINE SHRIMP ARTEMIA. VOLUME 3. ECOLOGY, CULTURING, USE IN AQUACULTURE. PROCEEDINGS OF THE INTERNATIONAL SYMPOSIUM ON THE BRINE SHRIMP ARTEMIA SALINA. CORPUS CHRISTI, TEXAS, USA, AUGUST 20-23, 1979.
Persoone, G.; Sorgeloos, P.; Roels, O.; Jaspers, E.; eds., 1980, pp. 383-392

LANGUAGES: English

SUMMARY LANGUAGES: English

DOC TYPE: Conference; Book

Seventeen geographical strains of Artemia, 13 bisexual and 4 parthenogenetic, were cultured through sexual maturity to select a strain which gives the best production in the St. Croix Artificial Upwelling-Mariculture System. Individual strains were compared for survival, growth, and time to sexual maturity. Dry and ash weight were determined on 100 couples (bisexual) or 200 females (parthenogenetic) from each strain. Total biomass (dry weight) production per strain has also been determined. Five strains were compared for the percent protein content of sexually mature individuals. On the basis of the results obtained, the best strains for use in the St. Croix System are the bisexual Artemia from Macau (Brazil), San Pablo Bay (California, USA), San Francisco Bay (California, USA) and Adelaide (Australia).

DESCRIPTORS: brine shrimp culture; sexual maturity; artificial upwelling

GEOGRAPHIC DESCRIPTORS: ASW, US Virgin Islands, St. Croix

TAXONOMIC DESCRIPTORS: Artemia

ENVIRONMENT: Marine

134

118-05881

Niveles de adición de alimento según peso y contenido de proteína cruda en la dieta de alevines de Oreochromis aureus (Tilapia nilotica) (Food addition levels according to body weight and raw protein content in diets for Oreochromis aureus (Nile tilapia) fingerlings.)

Toledo, J.; Cisneros, J.A.; Ortiz, E.

Est. Invest. Acuicult. Manzanillo Gramma, Cuba

134 (CONTINUED)

REV. LATINOAM. ACUICULT., no. 17, pp. 38-42, (1983).

LANGUAGES: Spanish

SUMMARY LANGUAGES: English; Spanish

DOC TYPE: Journal Article

An experiment was carried out with *Oreochromis aureus* fingerlings to find optimum raw protein levels and best percentage of added food according to body weight. Four diets were used 20, 30, 40 and 50% raw protein and 4, 6, 8% added food. A relationship between the two parameters was found increasing raw protein levels, although added food maintains constant, augments fish weight. Added food best percentage was 6% for protein levels 40-50% the best protein level was between 40-50%. The use of protein 40% combined with 6% added food is recommended.

DESCRIPTORS: feeding experiments; balanced diets; feed efficiency; fingerlings; fish culture

GEOGRAPHIC DESCRIPTORS: Cuba

TAXONOMIC DESCRIPTORS: *Oreochromis aureus*

ENVIRONMENT: Fresh

135

118-09078

Diets comerciales para el cultivo de alevines de *Oreochromis aureus*
(Commercial diets for culture of *Oreochromis aureus* alevins.)

Toledo, J.; Ortiz, E.; Santana, S.

Empresa Nac. de Acuicultura, Havana (Cuba)

ACUICULTURA: BOL. TEC., no. 1

1986, 9 pp

LANGUAGES: Spanish

SUMMARY LANGUAGES: Spanish

11 ref.

DOC TYPE: Book

A comparison was made of 11 diets currently used in Cuba in order to obtain a more efficient and economic one for the culture of *Oreochromis aureus*. Statistical analysis showed the possibility of decreasing by 25% the quantity of fish flour and eliminating or reducing other imported products such as soya and sunflower flour, and then increasing by 30% the amount of rice powder. A 45% reduction was obtained with respect to the cost.

DESCRIPTORS: fish culture; feed composition; costs

GEOGRAPHIC DESCRIPTORS: Cuba

TAXONOMIC DESCRIPTORS: *Oreochromis aureus*

ENVIRONMENT: Fresh

136

118-09067

Dietas comerciales para alevines de bagre de canal (*Ictalurus punctatus*) para cultivo en estanques

(Commercial diets of channel catfish alevins (*Ictalurus punctatus*) in pond culture.)

Toledo, J.; Santana, S.; Gonzalez, B.

Empresa Nac. de Acuicultura, Havana (Cuba)

ACUICULTURA: BOL. TEC., no. 5

1986, 13 pp

LANGUAGES: Spanish

SUMMARY LANGUAGES: Spanish

DOC TYPE: Numerical data; Book

A comparison was made between 6 new diets with the one that currently is used in Cuba for pond culture of channel catfish alevins. Results showed it possible to reduce fish flour by 15% and to substitute 20% of high cost protein sources with by-products such as a rice powder, bran, honey, thus bringing about a saving of 70 pesos/ten with respect to the control diet.

DESCRIPTORS: fish culture; feed composition; nutritional requirements; fish larvae

GEOGRAPHIC DESCRIPTORS: Cuba

TAXONOMIC DESCRIPTORS: *Ictalurus punctatus*

ENVIRONMENT: Fresh

137

0 paso de avance en nuestro desarrollo pesquero en la primera granja de camaricultura

(Another step in our fishery development in the first shrimp culture farm, Cuba.)

Ubeda, L.

Address not stated

MAR. PESCA., no. 218, pp. 20-25, (1983).

LANGUAGES: Spanish

DOC TYPE: Journal Article

The National Aquaculture Enterprise of the Ministry of Fishery Industry of Cuba was founded in 1981 in Tunas de Zaza. The purpose was to culture the shrimps *Penaeus schmitti* and *P. notialis* to obtain the spawning and shrimp larvae which would be fed with artificial diets. Also unicellular algae would be cultured. A few months after inauguration, the first individuals (caught in the sea) were placed in an earthen tank of an hectare, and approximately 5 months later the first "crop" of *P. schmitti* was obtained. Mature females are obtained by trawling and deposited in tanks where temperature, salinity and air are controlled. Spawning occurs in tanks that have filtered water, antibiotics and an optimal oxygenation. After spawning, the embryonal development starts, after 12-14 hours the embryo is formed and after 10-12 days the postlarval stage is acquired.

DESCRIPTORS: shrimp culture; experimental research; culture tanks; larval development

GEOGRAPHIC DESCRIPTORS: ASW, Cuba, Tunas de Zaza

TAXONOMIC DESCRIPTORS: *Penaeus schmitti*; *Penaeus notialis*

ENVIRONMENT: Marine

138

116-05828

El cultivo de Gracilaria domingensis (Kuetzing) Sonder ex Dickie
(The cultivation of Gracilaria domingensis (Kuetzing) Sonder ex Dickie.)
Velez Villamil, S.M.

Puerto Rico Univ., Mayaguez (Puerto Rico). Dep. of Marine Sciences
1982, 110 pp

LANGUAGES: Spanish

Thesis (M.S. Degree).

DOC TYPE: Thesis; Book

Gracilaria domingensis (Kuetzing) Sonder ex Dickie was cultured using Marine Agronomy techniques in several natural areas. The study area was divided into several stations on the Puerto Rico coast. The experiments reveal the environmental and demographic problems affecting marine agronomy cultures in the study area. Those experiments undertaken in the laboratory show that the life cycle of *G. domingensis* is characteristic of the genus. The life cycle of *Gracilaria* is triphasic iplohaplontic with haploid gametophytes, diploid carposporophytes and tetrasporophytes. The experiments on the development of the tetrasporophyte and gametophyte were done using different temperatures, light intensities and photoperiods. The effect of these parameters on the growth rate of the plants was studied.

DESCRIPTORS: algal culture; aquaculture techniques; marine aquaculture

GEOGRAPHIC DESCRIPTORS: ASW Puerto Rico

TAXONOMIC DESCRIPTORS: *Gracilaria domingensis*

ENVIRONMENT: Marine

139

87040081 87007892 Holding Library: AGL

Depredation of Tilapia fry by dragonfly nymphs and a means for control
Verdegem, M.C.J.; McGinty, A.S.

The Journal of agriculture of the University of Puerto Rico. July 1986. v. 70 (3) p. 213-216.

Mayaguez: University of Puerto Rico, Agricultural Experiment Station.

ISSN: 0041-994X CODEN: JAUPA

DNAL CALL NO: 8 P832J

Language: English Summary Language: Spanish

140

8702994 87874046 Holding Library: SBM; AGL

Proceedings of Shrimp Aquaculture in the Caribbean Basin: Prospects and Constraints / editors, F. John Vernberg ... [et al.].

Shrimp aquaculture.

Vernberg, F. John, 1925-

Shrimp Aquaculture in the Caribbean Basin: Prospects and Constraints.

(1984: Puerta Plata, Dominican Republic)

Belle W. Baruch Institute for Marine Biology and Coastal Research. Universidad Catolica Madre y Maestra.

140 (CONTINUED)

xiii, 443 p.: ill.; 24 cm.

Columbia, S.C.: Belle Baruch Institute for Marine Biology and Coastal Research, University of South Carolina, 1985.

DNAL CALL NO: SH 380.62.C27S5 1984

Language: English; Spanish

141

118-05877

Comparacion del crecimiento de la descendencia dorada y oscura de la "perca dorada" (*Sarotherodon mossambicus* var. *albina* x *Sarotherodon hornorum*)

(Growth comparison of the dark and golden progeny of the golden perch (*Sarotherodon mossambicus* var. *albina* x *Sarotherodon hornorum*.)

Visiedo Castellanos, I.; Sanchez Prieto, T.; Vazquez Rodriguez, J.; Arteaga Hernandez, J.A.

Estacion Guanimar, Alquizar, Cuba

REV. LATINOAM. ACUICULT., no. 19, pp. 12-21, (1984).

LANGUAGES: Spanish

SUMMARY LANGUAGES: English; Spanish

DOC TYPE: Journal Article

A comparison in growth rates was made between the golden and dark progeny of the golden perch (*Sarotherodon mossambicus* var. *albina* x *Sarotherodon hornorum*) in cement ponds with three different densities: 0.2, 1.0 and 1.8 fish/m super(2) and two food diets (with and without food supplement).

Initial average weight of fish fry varied from 1.8 to 11.8g. A considerable difference was found in fish color, stock density and food diet yields. The 1.8 fish/m super(2) density, dark color and food supplement combination proved to be by large the best. Using food supplement, less time is required to reach 230 g, and without using it, the maximum time required to reach that same weight with the highest density does not exceed 6 months.

DESCRIPTORS: fish culture; hybrid culture; growth; selective breeding; stocking density

GEOGRAPHIC DESCRIPTORS: Cuba

TAXONOMIC DESCRIPTORS: *Sarotherodon mossambicus* var. *albina*; *Sarotherodon hornorum*

142

82055326 81085903 Holding Library: AGL

The development of a low-technology oysterculture industry in Jamaica

Wade, B.; Brown, R.; Hanson, C.; Alexander, L.; Hubbard, R.; Lopez, B.

Proceedings - Gulf and Caribbean Fisheries Institute. June 1981. (33rd), June 1981. p. 6-18. ill., maps. Miami, Florida, The Institute. ISSN:

0072-9019

NAL: SH1.G8

Descriptors: JAMAICA; SOCIAL ASPECT; MOLLUSK; CARIBBEAN; MANGROVE OYSTER; SPAT; COLLECTING; LARVA; CULTCH; SETTING; RAFT CULTURE; OFF BOTTOM CULTURE; GROWTH; DEPTH; SURVIVAL; ECONOMICS; MARKET

Genus Species: CRASSOSTREA RHIZOPHORAE

143

113-07475

The development of oyster culture techniques for Jamaica.

15. Meet. of the Association of Island Marine Laboratories of the Caribbean Runaway Bay (Jamaica) 7 Jan 1980

Wade, B.A.; Brown, R.; Hanson, C.; Alexander, L.; Hubbard, R.; Lopez, B.

Oysterculture (Jamaica) Proj., Zoology Dep., Univ. West Indies, Jamaica PROC. ASSOC. ISL. MAR. LAB. CARIBB., vol. 15, p. 30, (1980).

LANGUAGES: English

Summary only.

DOC TYPE: Conference; Summary; Journal Article

The system of culture being investigated is based on the collection on artificial substrates (cultch) of spat produced by wild populations of the mangrove oyster, *Crassostrea rhizophorae*, and their growing out to marketable sizes while suspended subtidally from floating rafts. This method of spat production avoids the high capital outlay and technological requirements of artificial hatcheries. Subtidal growing out is considered superior to intertidal culture since the oysters remain permanently submerged, feed up to twice as long, and grow considerably faster and larger. However, competition and fouling by other sessile organisms must be controlled. Present results indicate a high feasibility for this system of oyster culture in Jamaica and encourage the development of pilot scale commercial operations during 1980.

DESCRIPTORS: oyster culture; aquaculture techniques; seed collection

GEOGRAPHIC DESCRIPTORS: ASW, Jamaica

TAXONOMIC DESCRIPTORS: *Crassostrea rhizophorae*

ENVIRONMENT: Brackish

144

116-03788

Tropical production of tilapia (*Sarotherodon aurea*) and tomatoes (*Lycopersicon esculentum*) in a small-scale recirculating water system.

Watten, B.J.; Busch, R.L.

Pennsylvania Power and Light Co., Brunner Island Aquacult. Proj., P.O. Box 221, York Haven, PA 17370, USA

AQUACULTURE., vol. 41, no. 3, pp. 271-283, (1984).

LANGUAGES: English

SUMMARY LANGUAGES: English

DOC TYPE: Journal Article

An integrated fish and hydroponic tomato production system was evaluated for use in the US Virgin Islands. The system was constructed from readily available materials, and designed to minimize capital costs, energy and water use, and the technological skill needed for operation. Tilapia (*Sarotherodon aurea*) and tomatoes (*Lycopersicon esculentum*) were cultured outdoors for 181 days in a closed system containing 7.34 m³ of water. The yield and quality of fruit produced hydroponically exceeded that produced under field trial conditions. Capital costs for the complete system were estimated to be US\$612 (1979). Electrical energy and water use were 9.12 kWh day⁻¹ and 2.6% of the total volume per day, respectively.

144 (CONTINUED)

Cost and return projections indicate the system could be operated on a profitable basis in the US Virgin Islands.

DESCRIPTORS: agropisciculture; recirculating systems
TAXONOMIC DESCRIPTORS: small-scale aquaculture; *Sarotherodon aurea*;
Lycopersicon esculentum
ENVIRONMENT: Fresh

145

002291

COMMERCIALIZATION OF RAFT OYSTER CULTURE IN PUERTO RICO

WATTERS, K.W.

NATIONAL FISH CULTURE WORKSHOP, SPRINGFIELD, MISSISSIPPI., 1976,
Descriptors: COMMERCIAL APPLICATION; SHELLFISH; RAFT CULTURE; OFF BOTTOM
CULTURE; PUERTO RICO; MANGROVE OYSTER; MOLLUSK
Genus Species: *CRASSOSTREA RHIZOPHORAE*

146

002234

INVESTIGATION ON THE AQUACULTURE POTENTIAL OF MARINE ORGANISMS IN
PUERTORICO

WATTERS, K.W.

PUERTO RICO. COMMERCIAL FISHERIES RESEARCH AND DEVELOPMENT ACT, FINAL
REPORT PROJECT 2-184-R. 37P. (UNPUBLISHED MATERIAL)., 1974,
Descriptors: PUERTO RICO; AQUACULTURE; SPECIES SELECTION; FEASIBILITY
STUDY; MARINE FISH; CRUSTACEAN; SHELLFISH; COLLECTING METHOD; MANGROVE
OYSTER; EASTERN OYSTER; JAPANESE OYSTER; MOLLUSK; OFF BOTTOM CULTURE;
MORTALITY
Genus Species: *CRASSOSTREA VIRGINICA*; *CRASSOSTREA RHIZOPHORAE*;
CRASSOSTREA GIGAS

147

003745

A METHOD FOR THE CULTIVATION OF THE MANGROVE OYSTER IN PUERTO RICO

WATTERS, K.W.; MARTINEZ, P.A.

PUERTO RICO DEPARTMENT OF AGRICULTURE. OFFICIAL PUBLICATION OF THE AREA
OF SPECIAL SERVICES 8 (1), 37P., 1976,

Descriptors: MANGROVE OYSTER; MOLLUSK; RAFT CULTURE; OFF BOTTOM CULTURE;
CULTCH; LIFE HISTORY; HARVESTING; ECONOMICS; MATERIAL; CONSTRUCTION DETAIL;
ECONOMICS; SPAT; FERTILIZATION; MANAGEMENT
Genus Species: *CRASSOSTREA RHIZOPHORAE*

148

003029

CULTURE OF THE MANGROVE OYSTER, CRASSOSTREA RHIZOPHORAE GUILDING, IN PUERTO RICO

WATTERS, K.W.; PRINSLOW, T.E.

PROCEEDINGS OF THE SIXTH ANNUAL WORKSHOP WORLD MARICULTURE SOCIETY.
SEATTLE, WASHINGTON. 221-233., 1975,

Descriptors: MANGROVE OYSTER; MOLLUSK; PUERTO RICO; CULTCH; SETTING;
GROWTH; SPAT; SALINITY; TEMPERATURE; MATERIAL; RAFT CULTURE; ROPE CULTURE;
OFF BOTTOM CULTURE; SPATFALL MONITORING

Genus Species: CRASSOSTREA RHIZOPHORAE

149

000535

THE DEVELOPMENT OF A MARICULTURAL TECHNOLOGY FOR THE PENAEID SHRIMPS OF THE GULF AND CARIBBEAN REGION

WEBBER, H.H.

HELGOLANDER WISS MEERESUNTERS 20, 455-463., 1970,

Descriptors: PENAEID SHRIMP; SHELLFISH; CRUSTACEAN; TECHNOLOGY; MARKET;
LARVA; POND CULTURE; LIFE HISTORY; LIVE FOOD; ARTIFICIAL FOOD

150

117-02726

A view of the Latin American shrimp culture industry. Part 1.

Weidner, D.M.

Branch Foreign Fish. Anal., NMFS, Washington, DC, USA

AQUACULT. MAG., vol. 11, no. 2, vp, (1985).

LANGUAGES: English

DOC TYPE: Journal Article

An account is given of the development of the penaeid shrimp culture industry in Latin America, considering in particular the current state of the industry in the Caribbean Islands.

DESCRIPTORS: shrimp culture; aquaculture development

GEOGRAPHIC DESCRIPTORS: ASW, Caribbean I.

ENVIRONMENT: Marine

151

114-06973

Thalassia testudinum Banks ex Koenig seedling success in a coral reef microcosm.

Williams, S.L.; Adey, W.H.

Mar. Res. Cent., State Univ. New York, Stony Brook, NY 11794, USA

AQUAT. BOT., vol. 16, no. 2, pp. 181-188, (1983).

LANGUAGES: English

SUMMARY LANGUAGES: English

DOC TYPE: Journal Article

151 (CONTINUED)

Thalassia seedlings collected in the Bahama Islands were transplanted into the lagoon of a coral reef microcosm where their survival and growth was monitored. Only 25% of the original number planted survived after eight months. The leaves grew a minimum of 2 cm per month. Seedling growth in the microcosm exceeded that reported from field studies. The microcosm system could be used for maintaining seedlings for use in the restoration of disturbed Thalassia beds.

DESCRIPTORS: coral reefs; seed (aquaculture); environment management

GEOGRAPHIC DESCRIPTORS: survival; growth; ASW, Bahama I.

TAXONOMIC DESCRIPTORS: Thalassia testudinum

ENVIRONMENT: Marine

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