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MARYLAND AQUAFARMER ONLINE

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Issue 1996-01 **Winter, 1996**

In This Issue:

22nd Annual Expo Seminars Offer Production and Profit

Don Webster, Eastern Shore Area Agent

Seminars at the 22nd Annual East Coast Commercial Fishermen's and Aquaculture Trade Show will be the best in the long history of the show. They include informative speakers and topics to help watermen and aquaculturists keep more dollars in their pockets and remain up to date on topics affecting the industry. Seminars are planned with input from industry and are sponsored by the Sea Grant Marine Extension Programs of the Mid Atlantic States, Maryland Aquaculture Association, Maryland Office of Aquaculture, and others.

The program begins at 10 am on Saturday, January 20 with a session on Tilapia Production and Seafood Marketing. Speakers are producers of tilapia, a tropical fish with great potential in domestic markets. The fish are raised in indoor systems in this region because cold winters will kill them. Explaining "how to do it" will be Doug Burdette of Maryland Pride Farms, Jerry Redden of Aquamar Industries, and John Foltz of Aquafarm Products in Delaware. Roy Castle will moderate the session.

Producers will be followed by technical experts. Steve Hughes will cover nutrition, Tom Handwerker will cover hatcheries, and Frank Wills will tell you how to keep your fish healthy. These speakers are from the University of Maryland's Eastern Shore campus.

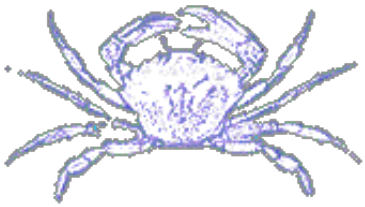
During the afternoon, the subject will shift to marketing seafood. Captain Thomas Chou will talk about the growing wholesale markets for live fish. William Chang of Dynasty Restaurant in Wheaton will discuss marketing to Asian restaurants, and Tim Sughrue of Louis Foehrkolb, Inc. from Jessup Wholesale Fish Market, will cover wholesale markets.

Concurrent with this program will be another with topics geared towards watermen. The Oyster Recovery Partnership has been active this year replenishing our shrinking oyster populations. Innovative work has been done by watermen, scientists, resource managers, environmentalists, and students. At 11 am Saturday, Bob Pfieffer of the Oyster Recovery Partnership will join Ken Paynter and Don Meritt from the University of Maryland to show you what has been done during 1995 and the projects planned for 1996.

Watermen who work the Bay know that it can be an unforgiving place which can take a life in a

moment. Keeping safe is a constant job. At noon, safety experts from Vane Brothers Marine Safety will show you the latest equipment designed to keep you alive. They will also cover procedures to use to ensure safety for you and your crew as you work the water.

Quality seafood has always been the hallmark of our industry. Tom Rippen, Seafood Technology Specialist with the University of Maryland, will chair a program at 1 pm on Saturday. It will tell you what you need to know to keep up with federal and state regulations and use quality as your advantage to gain and keep better markets. Tom will lead off with new regulations and how they may impact your business. Bill Sieling, the head of Maryland's Seafood Marketing Program will tell you about the voluntary grading program for crabmeat and other products. Jack Fox of Venture Packaging will show the new tamper-evident seafood container designed to assure product quality. Tom will finish up the program by covering on board seafood handling and quality. Seafood quality begins on the boat and consumers are demanding assurance that the products they buy are the best.



1995 brought a lot of controversy throughout the Chesapeake Bay states as the future of the blue crab was high on the list of news stories. Mike Oesterling of the Virginia Institute of Marine Science has planned a terrific program which will allow watermen to ask questions of the resource managers who make the decisions that affect this important industry. Beth Gillelan of the National Marine Fisheries Service will show you what the scientists have found out about the blue crab populations. Jack Travelstead of the Virginia Marine Resources Commission and Pete Jensen of the Maryland Department of Natural Resources will give the state perspective on what has occurred and what is planned for the next year. These managers have always been willing to talk with the industry about complex problems and this year will be no different. We're sure that you will find this session of interest.

On Sunday, January 21, we will begin our seminars with a program on Catch and Release Fishing in the Mid Atlantic. Anglers are finding that they can catch the same fish many times and charter boats are finding that fishermen are developing a new ethic where they don't always measure a fishing experience by the number of fish in the cooler. Rich Bohn of Maryland's Sea Grant Extension Program will man the microphone as he introduces the speakers, who are from Maryland's Department of Natural Resources. Bob Lundsford will give you an introduction to catch and release fishing including current regulations and scientific information. John Jacobs will discuss local species and how they respond to repeated catch. Dr. Eric May will show you how types of fishing impact the stocks and Keith Lockwood will cover safe handling tips. Come hear how to make money out of catching the same fish many times over.

During 1994, the Maryland legislature authorized experimental use of open water sites for fish and shellfish aquaculture. At noon on Sunday, January 21, Richard Pelz of Circle C Oyster Ranches, Joe Moore of Pintail Point Farm, and David Chamberlain of Great Eastern Shellfish Company present their experiences in getting permits and starting aquaculture businesses in the tidal waters of the state. The program will be led by Roy Castle of Maryland's Aquaculture Office. Watermen can share the experiences and opportunities that are available for production in the Chesapeake and seaside bays.

We finish Sundays seminar program at 1 pm with a public issue affecting watermen. During the 1990's commercial fishermen have found themselves legislated out of access to some traditional species. In several states, exclusive fishing rights and bans on traditional fishing gear have led to fishermen out of work or placed increased pressure on remaining stocks. Gef Flimlin of the New Jersey Sea Grant Advisory Program will introduce Steve Carnahan, Executive Director of the Cape May Seafood Processors Association to give you the commercial fisherman's perception of sportfishing interests in fisheries management and offer ways in which commercial fishermen can work with management groups to retain fair access to stocks. Judy Widerstrom, Executive Director of the New Jersey Baitfish and Menhaden Alliance will discuss the impact of non-food species as sport fishing interests try to prevent or limit harvest of bait. To finish off the session, Dr. Bonnie J. McCay of the Department of Human Ecology at Cook College will give you a program on how to participate in the management process to influence decisions affecting your industry. Dr. McCay has written a publication entitled "Fish or Cut Bait: The Management Process and How to Influence It" and all those who attend the seminar will receive a copy of this informative publication.

The Maryland Sea Grant Extension Program will have a booth at the show. Please stop by to talk with us about aquaculture and how we can help you find information for you to consider it a business opportunity. For further information on the Expo, including registration and hours of

operation, contact the Sea Grant Extension Area Agents listed in the newsletter.

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Expo Seminar Schedule at a Glance

Don Webster, Eastern Shore Area Agent

Saturday, January 20, 1996
10 am - Noon and 1 pm - 4 pm
RAISING AND SELLING TILAPIA AND SEAFOOD PRODUCTS
Moderator, Roy Castle, Md Depart of Agriculture
Speakers will cover the production systems and biological needs of the fish for successful production of tilapia, a tropical fish which has seen commercial success in the US fish market. Afternoon session will cover the importance of marketing and sales and the future possibilities for successfully getting your farm raised or wild caught products into the marketplace.

- 10:00 -- Introduction--Roy Castle, MDA
- 10:15 -- Basic Tilapia Culture Panel
  - Doug Burdette, Maryland Pride Farms
  - Jerry Redden, Aquamar Industries, Inc
  - John Foltz, Aqua Farm Products, Inc
- 12:00 -- Break
- 1:00 -- Advanced Tilapia
  - Nutrition - Dr. Steve Hughes, National Biological Service
  - Hatchery - Dr. Tom Handwerker, UMES
  - Disease - Dr. Frank Wills, National Biological Service
- 2:30 -- Break
- 2:45 -- Selling Your Catch or Products
  - Wholesale Live Markets-Capt. Thomas Chou
  - Asian Restaurants-William Chang, Dynasty Restaurant
  - On-Ice Wholesale Market-Tim Sughrue, Louis Foehrkolb, Inc
- 3:45 -- Final Comments and Questions

11 am
OYSTER RECOVERY PARTNERSHIP
Don Meritt, moderator, University of Maryland Horn Point Environmental Lab Maryland
Don organized a coalition of commercial, scientific, and environmental representatives to look at ways to bring back the oyster industry in the Chesapeake Bay. The Partnership has raised funds, organized groups, and developed demonstration projects to further knowledge about oyster culture and management in the region. This program will give you an update on what's been happening during the past year.

- Robert Pfeiffer, Oyster Recovery Partnership
- Dr. Kennedy Paynter, University of Maryland

Noon
SAFETY AT SEA
Representative from Vane Brothers Marine Safety, Inc
Safety equipment and procedures and demonstrations of gear useful in saving lives and property in marine emergencies. Come and see the latest in lifesaving innovations for the industry.

1 pm
SEAFOOD QUALITY FOR WATERMEN
Tom Rippen, moderator, University of Maryland Sea Grant Extension Program
Seafood quality issues will affect harvesters, as well as growers, shippers, processors, and others in the production and distribution chain in future years. Quality can also be used to gain access to new markets and offer consumers a secure food product, resulting in better sales and more

consistent demand. Speakers on this program will discuss safety issues that will affect your business and how to use them to your advantage in the marketplace. Topics will include:

- 1:00 -- Pending Quality and Safety Regulationsand How They May Impact Watermen
  Tom Rippen, Md Sea Grant
- 1:20 -- Advantages of a Maryland Voluntary Grading Program for Crabmeat and Other Products
  Bill Sieling, Maryland Dept. Of Agriculture
- 1:40 -- A New Tamper-evident Seafood Container
  Jack Fox, Venture Packaging
- 1:45 -- On-board Seafood Handling and Quality
  Tom Rippen, Md Sea Grant

2 pm
CRAB RESOURCES IN THE CHESAPEAKE
Mike Oesterling, moderator, Virginia Institute of Marine Science
The crab industry in the Chesapeake Bay has been under fire for the potential of over harvest and depletion of this important resource. Scientists and resource managers will present current information about what's known about the crab resources and what current and future management measures may result.

- Elizabeth Gillelan, NOAA, National Marine Fisheries Service
- Jack Travelstead, Virginia Marine Resources Commission
- Pete Jensen, Maryland Department of Natural Resources

Sunday, January 21, 1996
11 am
STATUS OF CATCH AND RELEASE FISHING IN THE MID ATLANTIC
Rich Bohn, moderator, University of Maryland Sea Grant Extension Program

- Introduction to Catch and Release Including Current Regulations and Scientific Information
  Eric May and Bob Lundsford, MDNR
- Information on Major and Minor Species in the Region
  John Jacobs, MDNR
- Types of Fishing and Their Impacts on Fish Stocks
  Eric May, MDNR
- General Safe Handling Tips
  Keith Lockwood, MDNR

Noon
TIDEWATER AQUACULTURE OPPORTUNITIES FOR COMMERCIAL FISHERMEN
Roy Castle, moderator, Maryland Department of Agriculture
During 1994 Maryland authorized the experimental use of sites in open water for finfish and shellfish aquaculture. Several of the participants will present their experiences in getting permits and starting aquaculture businesses in the tidal waters of the state so that others can share their experiences and look at the opportunities that are available for production in the Chesapeake and seaside bays.

- Richard Pelz, Circle C Oyster Ranches
- Joe Moore, Pintail Point Farm
- David Chamberlain, Great Eastern Shellfish Company

1 pm
FISH AND POLITICS: COMMERCIAL AND RECREATIONAL ALLOCATIONS OF FISHERY

RESOURCES
Gef Flimlin, moderator, New Jersey Sea Grant Extension Program
During the 1990's commercial fishermen have found themselves being legislated out of traditional species by recreational interests. In several states, exclusive fishing rights and bans on traditional fishing gear have led to displaced fishermen and increased pressure on remaining stocks. Speakers will discuss action in their states over gear restrictions and recreational designations for certain fish and offer ways in which commercial fishermen can work with management groups to retain fair access to stocks.

- The Commercial Fisherman's Perception of Sportfishing Interests in Fisheries Management
  Steve Carnahan, Executive Director, Cape May Seafood Processors Association
- The Impact on Non-food Fish Species of Sport Fishing Interests in Fisheries Management Decisions
  Judy Widerstrom, Executive Director, New Jersey Baitfish and Menhaden Alliance
- How to participate in the management process to influence decisions affecting commercial fishing interests
  Dr. Bonnie J. McCay, Department of Human Ecology Cook College. Dr. McCay will have copies of her publication entitled "Fish or Cut Bait: The Management Process and How to Influence It" available at the seminar.

Seminar programs for the East Coast Commercial Fishermen's and Aquaculture Trade Expo are planned and sponsored by The Sea Grant Programs of the Mid Atlantic States, The Maryland Department of Agriculture, and the Maryland Aquaculture Association. They are open to all persons regardless of race, color, religion, age, sex, handicap, or national origin and are offered as part of the trade show to registered attendees.

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Paying for Risk in Aquaculture
Doug Lipton, Marine Economics Specialist

Aquaculture, like other business investments, has its share of risk. However, risk may be magnified in aquaculture because, with the exception of a few older establishments, it is a relatively new type of enterprise in this region. The two main sources of risk in your aquaculture enterprise will be production risk and price risk.

Production risk means that there is a probability that you will not meet your production goals due to mortality from disease or other causes such as poor planning. Production risk could also result from higher unforseen costs such as equipment breakdown. Price risk is due to the probability that prices will be lower than expected in your business planning. Of course, if production and prices can vary, then there is also the probability that they will both be higher than expectations.

Although they should, rarely do business plans look at the range of expected outcomes. Instead, they focus on an average outcome, which is almost never obtained. Using net present value as the economic indicator, there is a great deal of difference in a business plan that states the net present value is expected to be $100,000 from a business plan that has a calculated net present value with a mean of $100,000, but ranges from -$50,000 to $150,000. Note that in the latter plan, with the range of values, there is a probability that the enterprise will lose money. An even better analysis would quantify the probability of loss (e.g., there is a 20% chance that the net present value will be negative).

Each individual aquaculture investor has to determine the amount of risk they are willing to take. For the amount of money you are investing, a guaranteed $100,000 net present value may be sufficient for you to move forward with the investment, but are you willing to invest the same amount of money when there is a 20% chance of losing some or all of it? The expected return should be higher for a risky investment compared with a relatively guaranteed return. For the risky investment, perhaps a mean of $120,000 is high enough to compensate you for the added risk. The $20,000 difference between the guaranteed and risky investment is known as the risk premium.

Thus, in order to determine if you are being adequately compensated for your investment in aquaculture, it is essential that you have some idea of the probability of different financial outcomes and compare these with other investments that are less risky. Make sure you are being

paid for the risk that you are undertaking.

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Planning a Part-Time Aquaculture Business

Dan Terlizzi, Water Quality Specialist

Aquaculture is the fastest growing segment of US agriculture and has been successfully used on small farms as many owners of underutilized water resources like ponds and springs find that it can be profitable with careful planning and marketing. Success requires appropriate production methods and species. Production methods can include open ponds, cages, raceways, or recirculation systems. Species for this area include trout, hybrid striped bass, tilapia, ornamental fish and plants.

Marketing begins with species selection based on your water resources and location. For example, a good quality spring located near a population center might be suited for trout in raceways with direct retail sales. A pond located away from population centers but near outdoor recreation areas might be suited to fee fishing. In planning, it is important to know your potential customers and their needs. What fish products do they prefer, what type of processing is required, and how much are they likely to purchase and at what price?

Small producers in this region have used a variety of outlets to market their products including direct retail sales from the farm, farmers markets, grocery chains, and restaurants. In addition there has been success in the development of value added products like smoked trout and direct sale through fee fishing ponds. Fish grown on small farms may be sold whole to be processed by the buyer or as dressed whole fish or fillets. As part of your planning it is important to consider health department regulations for any processing required to market your product.

Producers report a diverse customer base ranging from those curious about farmed fish to the health conscious or those with dietary restrictions. Growers often find they develop a regular clientele who place orders for fish are they are being grown. Competition is inevitable and even several small producers in an area can lower prices however, high quality products grown locally and carefully marketed can usually be sold profitable. Growers closer to urban area report that demand for fish often exceeds their supply.

Getting Started properly is very important. Early in the planning it is important to answer questions of what to grow, where and how to grow it, and who it is being grown for. Species selection is important and should be made only after thorough evaluation of markets, facilities, and skills. Personal interests should be considered. For example, growers with traditional agricultural backgrounds might be more interested in production of food fish while those with horticultural backgrounds might be more interested in producing ornamental aquatic plants.

What to grow will be influenced by resources. A small pond in a suburban area might be best suited to production of ornamental plants, while a large spring in a rural area might be best suited for rainbow trout production. In food fish, five acres of ponds is generally considered the minimum for small scale commercial aquaculture while a large spring on five acres of land could be developed into a full time business. Even without water resources on your property you can consider aquaculture. A production method referred to as water reuse or recirculation aquaculture has been used in tanks, troughs, and pools to raise fish or plants, however these methods can be expensive and difficult to operate successfully. After evaluating water resources, location, and business goals , some find that their existing facilities are not suitable for aquaculture and look for alternate locations.

Water Resources, as we have mentioned, are critical to success. In an aquaculture business water source, quality, and supply are critical considerations. Sources include groundwater, surface water and fully contained recirculation systems that purify and reuse culture water. Groundwater may be used via natural springs and well systems. Springs and wells are usually a good source of

pure water, however pumping requirements for wells make springs a more attractive choice. Surface waters including ponds and streams tend to vary in chemical and physical characteristics. Most aquaculture species are tolerant or some environmental fluctuation and it is important to note that the successful catfish industry is based upon pond culture. Aquaculture operations using streams are likely to be limited by discharge and water appropriation permits. In addition, they can be exposed to contamination from upstream so the grower has limited control over his most valuable asset--water quality. Let's look at some of the features of water sources and culture methods:

Pond culture -- This is the most widely practiced form of aquaculture in the US. Ponds are well suited for the production of a variety of species. Existing ponds can often be used without modification. Cage or pen culture is a technique in which fish are grown in enclosures and permits production in ponds that are not well suited for fish culture, such as where seines cannot be easily used to recover fish. They also allow for multiple uses of ponds such as for recreation, irrigation, or livestock watering. New pond construction can be very costly and the returns from a small scale aquaculture business may not justify construction costs for a new pond. Aquaculture ponds are aquatic systems managed for production that depend on the naturally occurring microbial populations of bacteria and algae for elimination of fish wastes and water purification. Production levels of 2,000 pounds per surface acre are common and increased production can be obtained with more intensive management.

Flow through -- Includes raceways and tanks with water from a spring or other high quality source continually flowing through. Fish wastes are flushed through the system by water flow. Increasingly, treatment of discharge is required to remove wastes before release into the environment. Many high yielding springs have already been adapted for fish culture and new technology makes the production rates from smaller springs attractive to those interested in a small or part time aquaculture business. Yields of up to 100 pounds per gallon of flow per minute can be obtained with the best conditions and management.

Recirculation and reuse systems -- Closed or recirculating systems consist of tanks, particulate filters to remove fish wastes and feed particles, and biological filters to convert toxic ammonia from fish excretion to nitrate which is considered harmless. Oxygen is critical due to typically high fish density or recirculation systems and is supplied by mechanical aerators or liquid oxygen. In recirculation systems water is purified and used continually; fresh water is added only to compensate for evaporation and losses in the removal of waste particles. Water reuse systems use a percentage or their water several times before discharge. The flow of water through a series of tanks or raceways where each unit is receiving discharge from the preceding one is an example of reuse that is often used in trout culture. Reuse systems may also use particle and biological filters with aeration to improve water quality. Recirculation systems are often considered in areas with limited water resources, stringent discharge requirements, or unfavorable environments for species. Although this is exciting and promising technology, the economics of production have, in many cases, resulted in limited success. Both recirculation and reuse systems require the grower to have advanced technical skills.

In addition to the culture system, various items of equipment are required for operation. Water testing equipment is essential to proper water quality management. Treatment chemicals are often required to maintain water quality and can include lime, bicarbonate, gypsum, calcium chloride, permanganate, and others. Smaller growers can often use inexpensive test kits for their water analysis. More sophisticated testing is required in larger operations and particularly in reuse or recirculation systems. Other items include aeration, nets for harvest, processing equipment, scales, and feeding equipment.

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Sizing A Remote Setting System

Don Meritt, Shellfish Aquaculture Specialist

Remote setting is a method of producing oyster seed using hatchery reared larvae. Eyed larvae (those ready to undergo metamorphosis) are placed in a system where they change from a free swimming larval form to an attached spat or juvenile oyster. The process is called settlement or setting. Settlement can be enhanced by controlling temperature, salinity, aeration, and food

supply. We will address these issues in future newsletters and a manual outlining the entire remote setting process is being produced by the Maryland Sea Grant Extension Program.

Some of the most frequently asked questions about remote setting concern the actual construction of the setting system. Questions regarding the size and shape of the tank or what it should be made of are often the first to be asked by potential producers. However, these are really among the last questions that should be asked.

It is imperative to understand several factors prior to beginning any setting system design. First, the grower must determine if there are environmental conditions at the site that are right for setting. The presence of oysters growing naturally in the area is a good first indication, but is not necessarily indicative of good areas for setting to occur. Once again, a more complete understanding of these conditions will be found in the Sea Grant Remote Setting Manual.

Once the oyster grower has determined that the site is acceptable, production goals need to be computed. Will you be simply producing a few oysters for your own interest or to have a personal supply for the year, or is the intention to produce a large number of spat for growout and subsequent sale? These are two different situations and require very different approached. The small producer or hobbyist can set oysters with little equipment. However, it is probably more economical, and certainly easier, to purchase the spat required from other producers.

Large growers have several options. The following example should be used to allow a potential producer to properly size a system to meet his or her needs. Figures used are only for illustration and will vary from site to site. Once a grower has completed the exercise, it will be easier to decide on the final design of the setting system.

The following information is required:

1. How many acres of oyster bottom are to be planted each year?
2. How many spat per acre are desired?
3. How often do you wish to set?
4. What type of cultch material will you use?
5. How many spat per unit of cultch material do you want to produce?

Once these questions have been answered, you can begin to size your system. For the sake of this exercise, let's use the following data for the questions. An oyster planter has ten acres to be planted each year and wishes to plant approximately one million spat per acre. His work schedule dictates that he can only set during eight weeks in June and July. He will be using oyster shell as cultch material. By using the following formula, we can determine a good starting point for designing the system:

number of acres to plant X planting density / number of spat per unit of cultch / number of weeks to set = bushels of cultch per tank

So, for this example:
10 X 1,000,000 / 2,000 / 8 = 625 bushels of cultch

This system needs to be able to handle 625 bushels of cultch (in this case oyster shell) per week. It takes about a week to do an individual setting run. This can be produced in one large tank or several smaller tanks depending upon the situation and the setting site. Tanks should be designed to accommodate the cultch material as efficiently as possible. Every effort should be made to containerize the cultch to make handling as easy as possible and allow the tank to be loaded and unloaded quickly. By changing any of the factors in the equation, it is possible to estimate the tank requirements for any setting system.

Remote setting systems can also be used to produce cultchless oysters for use in tray culture or for other specialized uses. Oyster growers wanting to construct systems for use with cultchless spat should contact the Sea Grant Extension Program representative in their area for assistance.

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Aquatic Vegetation Management Tip

Reginal M. Harrell, Aquaculture and Biotechnology Specialist

If you have not limed your pond, now is the time to make sure you add the recommended amount and type of lime. It takes several months for the chemical reactions to work towards bringing your soil to the proper pH and you will need several months before the next plant growing season, which in Maryland usually begins in April.

Winter is also a good time to try to passively manage your excess aquatic vegetation. Most aquatic plants go dormant during the winter months with only the root systems remaining viable. By drawing down your pond to one-third to one-half of its normal depth you will expose a considerable amount of pond bottom to the freezing conditions of winter weather. Roots and stems exposed to freezing temperatures, even those under several inches of soil, will usually kill most of the plants. This will help to check spreading and control plant growth during the active season. You should not have to worry about refilling the ponds as spring rains usually take care of recharging water supply.

The key is to expose as much of the shallow areas (less than three feet deep) of the pond as possible for a long enough period to allow freezing winter temperatures to kill the unwanted dormant aquatic vegetation.

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University of Maryland to Host Course in Marine Biotechnology

Don Webster, Eastern Shore Area Agent
Reginal M. Harrell, Aquaculture and Biotechnology Specialist

The University of Maryland Sea Grant College, with a grant from NOAA's National Office of Sea Grant, is sponsoring an intensive one week course in Marine Biotechnology. It will be held during the spring of 1996 and is open to Sea Grant and Cooperative Extension agents and specialists from the Mid Atlantic. The course will be conducted by the Maryland Biotechnology Institute's Center of Marine Biotechnology (COMB) and the Maryland Sea Grant Extension Program.

The course will provide core concepts of biotechnology to extension workers so that they can educate others on issues relating to this pioneering field. It will provide instruction on opportunities in biotechnology and provide extension professionals with a working knowledge of the fundamentals of molecular biology and biotechnology.

The Center of Marine Biotechnology at the Christopher Columbus Center in Baltimore will host the session, which will be conducted from Monday, June 3 through Friday, June 7, 1996. Program faculty will be drawn from COMB and the University of Maryland Center for Environmental Science. Lectures will also be given by those from the biotechnology industry, government agencies, and scientists. Speakers will cover production, regulation, and other policy aspects.

There will be a registration fee of $75 which will cover costs of the course text, lecture notes, and other reference materials. Deadline for registration is April 5, 1996 for extension agents and specialist from the Mid Atlantic region. After that date, the course will be opened to extension personnel from other areas, and the public. Course enrollment is limited to fifteen, due to the hands-on nature of much of the work.

A number of hotels are located within walking distance of the COMB facility. Typical summer rates range from $80 to $140 per night. Efforts will be made to secure a block of rooms are reduced rate for course participants responding by registration deadline. There are many excellent restaurants in the Inner Harbor area.

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Course Overview

Marine biotechnology is a rapidly emerging area of great promise for the future. Potential benefits include advanced in aquaculture, pharmaceuticals, and bioremediation. However, the general public tends to be confused about and, at times, frightened by the possibilities of biotechnology and are largely unaware of the tremendous advantages and breakthroughs it can offer. Extension

programs have a major role to play in developing lines of communication among researchers, industry, and the public. However, to do so, extension professionals must be informed and educated.

In this intensive five day program, SGEP and CES personnel will receive a basic introduction to the concepts of molecular biology and the application to biotechnology. They will participate in short laboratory exercises demonstrating basic techniques used in the field. A major focal point for the program will be on fundamental principles and applications of bioremediation. Additional lectures will highlight relevant areas in marine biotechnology including various aspects of aquaculture and marine natural products.

For more information contact: Dr. Reginal Harrell, Professor and Specialist, Sea Grant Extension Program, Horn Point Laboratory, University of Maryland UMCES, PO Box 775, Cambridge MD 21613; telephone 410-221-8466; e-mail harrell@hpel.umd.edu, or Dr. Madilyn Fletcher, Director and Professor, Center of Marine Biotechnology, University of Maryland Biotechnology Institute, 701 East Pratt Street, Baltimore MD 21201; telephone 410-234-8883; e-mail fletcher@mdsg.umd.edu.

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