

# AQUANEWS



Sustainable Aquaculture  
for a Secure Future

POND DYNAMICS/AQUACULTURE COLLABORATIVE RESEARCH SUPPORT PROGRAM NEWSLETTER

Volume 18, Number 2/Spring 2003

pdacrsp.oregonstate.edu

ISSN 1062-4996

## Outreach Program in Mexico Captivates Schoolchildren

by *Ulises Hernández-Vidal, Rafael Martínez-García, Wilfrido Contreras-Sánchez and Gabriel Márquez-Couturier, Universidad Juárez Autónoma de Tabasco*

In southeastern Mexico the tropical gar (*Atractosteus tropicus*) is a fish of economic and cultural significance. The species is a culinary icon in the region—a factor that has created an enormous demand. Wild gar populations have been severely affected by the absence of catch regulations and the loss or degradation of spawning and nursery grounds. To address the problem, starting in the mid-1980s the Laboratory of Aquaculture at UJAT developed research programs to acquire information on the gar's biology and its culture requirements. The PD/A CRSP has supported some of the latest projects.

GUSTAVO PEREZ MENDOZA



Fourth grade students from Dr. Tomás Díaz Bartlett School during a gar adoption day in Villahermosa, Tabasco, in Southeastern Mexico.

Two years ago, our laboratory started educational outreach to provide information about problems the tropical gar faces. The "Adopt-a-Gar" program primarily includes children from elementary and middle school. It

teaches students about the gar's role in wetland ecology, its life history, evolution, distribution, and fishery situation. Each participating child receives two juvenile gars and a

...continued on p. 4

## Third Farmer-Collaborators' Meeting Held at Central Luzon State University

by *Remedios Bolivar, Central Luzon State University*


On 15 November 2002, tilapia farmer-collaborators involved in the PD/A CRSP-funded on-farm research in the Philippines met at Central Luzon State University (CLSU). The aim of the meeting was to discuss the next stage of experiments designed to test the efficiency of ration reduction by feeding on alternate days. This feeding strategy is the

JOAN BULACSO



fourth to be evaluated under a project collaboratively implemented by Florida International University and CLSU. The project's goal is to establish effective means of providing practical

technical support to rural farmers. This will be achieved by helping them attain self-sufficiency through the development and adoption of appropriate farming technologies in tilapia grow-out production.

Remedios Bolivar (Project Host Country Principal Investigator) presented the concept and methods for the new trial and results of previous trials. Attended by 19 participants the meeting gave an opportunity for interaction and resolved issues concerning time of feeding and kind of feeds to be used in the study. 

## PD/A CRSP Principal Investigator Contributes to Sub-Saharan Africa Workshop

Nancy Gitonga, a PD/A CRSP Principal Investigator and head of the Kenya Department of Fisheries, accepted an invitation from the Forum for Agricultural Research in Africa (FARA) to attend the sub-Saharan Africa Challenge Program (SSA CP) Formulation Workshop 10–13 March 2003 in Accra, Ghana.

“Challenge Programs” in a wide range of fields are initiatives funded by the CGIAR (Consultative Group on International Agricultural Research) that are intended to “address global constraints to poverty alleviation and natural resource management.”

FARAs pre-proposal, entitled “Improving Livelihoods and Natural Resource Management in Sub-Saharan Africa,” was approved for full development in October 2002. The FARA Challenge Program will facilitate new


partnerships between national agricultural research and extension systems, the CGIAR centers, advanced research institutes, nongovernmental organizations, farmer organizations and private enterprise. Program managers are taking the next step now—developing the full proposal. FARAs comprehensive approach to engaging stakeholders includes the Program Formulation workshop as one component.

The broad aim of FARAs proposal is to break “the unsustainability spiral that dominates agricultural development in sub-Saharan Africa at the individual farmer’s level, local level and regional level.”

This goal closely matches those of the PD/A CRSP. Gitonga contributed significantly towards meeting the objectives of the workshop, which was entitled “Securing the Future For Africa’s Children.” Specifically, she was invited to prepare a position paper as a member of the FARA SSA CP taskforce. The draft

position paper proposed hypotheses in three areas:

- integrated natural resource management;
- sustainable market chains; and
- aquaculture.

Attending the workshop were farmers’ groups, universities, and research organizations. The first two days of the meeting were occupied with discussion on how various interests were to be represented in the full proposal. Gitonga actively promoted the agenda for fisheries, including aquaculture, and is committed to ensuring that fisheries and aquaculture remain significant features of the final proposal. 

## WAS Annual Meeting Features Many CRSP Presenters

The World Aquaculture Society annual meeting, “New Frontiers in Aquaculture” Aquaculture America 2003, was held in Louisville, Kentucky, 18–21 February. The CRSP was amply represented, with many program participants authoring papers or posters on CRSP research:

- Alcantara, F., C. Chávez, L. Rodríguez, C. Kohler, W. Camargo, and M. Colace. Gamitana (*Colossoma macropomum*) and Paco (*Piaractus brachypomus*) Culture in Floating Cages in the Peruvian Amazon.
- Bolivar, R., C.L. Brown, and E.B.T. Jimenez. Feeding Strategies to Optimize Tilapia Production in Ponds.
- Bolivar, R., W. Contreras, Y. Yi, and K. Fitzsimmons. Environmental and Economic Impacts of Tilapia and Shrimp Polycultures.
- Boyd, C.E. Issues Related to Pond Water Management Quality.
- Chu-Koo, F., C. Kohler, W. Camargo, J. Ríos, and F. Alcantara. Evidence of the Seed Dispersal Role of *Colossoma macropomum* Reared in Aquaculture in the Peruvian Amazon.
- Ernst, D.H. Aquafarm: Software for Aquaculture Planning and Design.
- Knud-Hansen, C.F. The Algal Bioassay Fertilization Strategy: An Ecological Approach for Efficient Pond Fertilization.
- Martinez, P., J. Molnar, E. Trejos, T. Popma, S. Triminio, D. Meyer, W. Tollner, and B. Verma. An Economic Assessment of Medium-scale Successful Tilapia Culture in Honduras: Olancho Case Study.
- Meyer, D., A. Suazo, R. Trejo, and S. Triminio. Combined Cage and Pond Culture of Tilapia with Intensive and Integrated Management Protocols.
- Neira, I., C. Engle, and K. Quagrainie. Analyses of the Potential Restaurant Markets for Farm-raised Tilapia in Nicaragua.
- Ngugi, C.C., J. Amadiva, K.L.

...continued on p. 3



GWYN NEWCOMBE

Nancy Gitonga, head of the Kenya Department of Fisheries and a PD/A CRSP principal investigator.

## PD/A CRSP Highlights 20 Years of Accomplishments at WAS

Kentucky may be famous for horses, but the recent Louisville World Aquaculture Society (WAS) conference 18–21 February 2003 placed it firmly on the aquaculture map. PD/A CRSP Assistant Director of Research Steve Sempier and Graduate Assistant Ian Courter presented a poster at the conference, which was well attended by aquaculture enthusiasts worldwide. The PD/A CRSP poster highlighted two decades of achievements and leadership in aquaculture research support.

Much interest was shown in the poster, titled “The PD/A Collaborative Research Support Program: Enhancing World Food Security for Twenty Years.” Its focus was on the history of the PD/A CRSP, the benefits it has provided over the years, and the people who have participated in its training programs.

The poster was also presented at the annual American Fisheries Society Oregon Chapter meeting, held 26–28 February in Eugene, Oregon.

The CRSP website at <pdacrsp.oregonstate.edu/pubs/WASposter/WASposter.html> features the poster online.



PHOTO CONTRIBUTED BY FRED CHU

William Camargo, Steve Sempier, Ian Courter, and Fred Chukoo at WAS in Louisville.

## Tilapia Facts

The value of tilapia imports into the US increased 36% in 2002, to \$174 million. The poundage of tilapia production required to supply the US market was 274 million pounds of live fish. Unlike salmon and shrimp imports, the average prices for tilapia increased in 2002. The volume of tilapia imports increased in all product categories; however, much of the increase can be attributed to a 66% increase in imports of frozen fillets.



PD/A CRSP ARCHIVES

*Oreochromis niloticus*

Frozen whole fish rose by 5% and accounted for 61% of all tilapia imports. Imports of fresh fillets totaled 31 million pounds, 39% higher than in the previous year. Although frozen whole tilapia dominates imports on a quantity basis, imports of fresh and frozen fillets have been growing rapidly and, on a value basis, accounted for 75% of all tilapia imports. The fresh fillet market had big increases in both the total quantity of shipments and their total value. Even though the quantity of imports rose by 6 million pounds (36%), the average price remained strong at \$2.61 a pound.

By comparison Atlantic salmon imports held an average price for imported fillets of \$2.78 a pound. The average for catfish was \$2.07 a pound. The average price per pound of imported shrimp declined to \$3.62. In 2003, tilapia imports are expected to increase to between 292 million and 300 million pounds on a live-weight basis. (USDA, March 2003)

## CRSP at WAS

...from p. 2

- |   |   |  |
|---|---|--|
| <p>Veverica, J. Bowman, S. Imende, B. Nyandat, and G. Matolla. Yield Verification Trials in Western Kenya Changes Attitudes of Farmers and Extensionists.</p> <ul style="list-style-type: none"> <li>• Osure, G.O., and R.P. Phelps. Evaluation of Growth and Reproductive Performance of Four Strains of Nile Tilapia.</li> <li>• Palacios, M.E., K. Dabrowski, K.J. Lee, and C. Kohler. Effect of Diets Formulated with Native Peruvian Plants on Growth and Feeding</li> </ul> | <p>Efficiency of Juveniles of Pacu (<i>Piaractus brachyomus</i>).</p> <ul style="list-style-type: none"> <li>• Queiroz, J.F. Aquaculture in Brazil: Research Priorities and Potential for Further International Collaboration.</li> <li>• Rodriguez, G., K. Dabrowski, K.J. Lee, M.A. Abiado, and M. Teresk. Protective Potential by Interaction of Quercetin and Vitamin C to Ultraviolet Irradiation Exposure in Tilapia (<i>Oreochromis niloticus</i>).</li> <li>• Sempier, S.H., R.J. Harris, I.I.</li> </ul> | <p>Courter. PD/A Collaborative Research Support Program: Enhancing World Food Security for Twenty Years.</p> <ul style="list-style-type: none"> <li>• Silapajarn, K., and T. Thunjai. Aquaculture Research in Thailand.</li> <li>• Trejos, E., J. Molnar, P. Martinez, T. Popma, S. Triminio, D. Meyer, W. Tollner, and B. Verma. Socio-economic Factors for the Successful Adoption of Tilapia Culture by Subsistence Farmers in Honduras: Santa Barbara Case Studies.</li> </ul> |
|---|---|--|

## Mexico Outreach

...from p. 1

month's supply of fish food. They also get information on how to care for the gars. A small contribution is requested to help support the program. The children are then invited to events where they release their gars in various lagoons located in and around the city of Villahermosa. (Invariably, a few children at each release event are understandably reluctant to release their beautiful adoptees.)

In 2002, over 3,000 gars were adopted. We consider the program a success because students learn about the species and its plight. We believe the program has a strong impact, since many families have expressed a desire to adopt these valuable—and beautiful—fish.

GUSTAVO PEREZ MENDOZA



Jorge Abdo Francis, Rector of UJAT, giving gars to fourth grade students during a gar adoption day at Dr. Tomás Díaz Bartlett School in Villahermosa, Tabasco.



GUSTAVO PEREZ MENDOZA

Students from the Jean Piaget School before the gar release day at Laguna de las Ilusiones, Villahermosa, Tabasco, in Southeastern Mexico.

## Yet Another Reason to Eat Fish

Scientists have long been aware of health benefits from eating fish but have rarely been able to translate this into practical advice for nutrition. Now, a paper in the December 2002 issue of the *Journal of the American Medical Association* (288: 3130-3136) reports that even a small amount of fish in the diet is enough to protect against certain types of stroke, the third leading cause of death in the US.

The Harvard team, led by Ka He, studied over 50,000 US males aged 41 to 75 in this 12-year investigation. The number of participants places it among the biggest investigations of the effects of fish on health. The researchers found that men who ate fish 1 to 3 times a month had up to 40% lower rates of ischemic stroke compared with men who ate fish less than once a month. That is, eating as little as one portion of fish a month will significantly protect against ischemic stroke. (Ischemic stroke occurs when a blood vessel in the brain is blocked by a clot or similar obstruction; ischemic strokes account for 80% of stroke cases.)

Conclusion? Eating as little as one portion of fish per month can dramatically lower the risk of stroke.

## Kudos

A number of PD/A CRSP participants deserve special mention in this issue of *Aquanews*.

Host Country Principal Investigators Charles Ngugi and Mucai Muchiri are both faculty members at collaborating host country institution Moi University in Eldoret, Kenya. Last December Charles Ngugi was appointed Head of the Moi University Department of Fisheries; Mucai Muchiri was promoted to the position of Dean of the Faculty of Forest Resources and Wildlife Management.

Claude Boyd, an Auburn University Principal Investigator, was recently appointed to the Board of Directors of the Aquaculture Certification Council in St. Louis, Missouri.

Remedios Bolivar, the CRSP's Philippines Project Host Country Principal Investigator, was promoted to Dean of the College of Fisheries of the Central Luzon State University in January of this year.

Wilfrido Contreras-Sánchez, Mexico Project Host Country Principal Investigator, has been named Director of the Biological Sciences Division at Universidad Juárez Autónoma de Tabasco, Mexico.

## Graduate Student Profile: Bernardita Campos Campos

By Ian Courter

As an undergraduate Bernardita Campos Campos studied biology at the Universidad Juárez Autónoma de Tabasco (UJAT), where she finished her degree in 1990. She gratefully acknowledges the support and mentoring received from Blanca Priego during that time.

In 1998 she began her research as a University faculty member. Three years later, through her previous

relationships with PD/A CRSP principal investigators, she started her current project: "Studies on Fate of Methyltestosterone and Its Metabolites in Tilapia and on the Use of Phytochemicals as an Alternative Method to Produce a Monosex Population of Tilapia." This study addresses concerns of environmental and human health effects caused by the use of orally administered testosterone to fish. Hormones used on fish are often incompletely metabolized, and little is known about the effects of excess hormones in water effluent and fish meat. Therefore, scientists are interested in finding alternative methods of sex-reversal of fish.

Campos was inspired by Leandra Salvadores of UJAT to pursue a graduate education. Her interest in Environmental Engineering enticed her to stay at UJAT. Once accepted to the Masters program at UJAT, she joined Wilfrido Contreras-Sánchez at UJAT's Laboratory of Aquaculture; Contreras-Sánchez serves as her advisor.

In the early stages of her degree at UJAT in Environmental Engineering, Campos found her work challenging because of her incongruous background in biology. She noted that it is often frustrating that

the equipment necessary for valuable procedures, such as radioimmunoassay, is not readily available in Mexico. Conversely, the success of her experiments thus far have been encouraging and exciting. In fact, Campos plans to stay in the academic arena, perhaps at UJAT, when she has finished, but a PhD is not in her immediate plans. She also hopes to have the opportunity to study the effects of ultraviolet light on the elimination of methyltestosterone in masculinization systems.

As a native to Tabasco, Campos knows a lot about the status of aquaculture in Mexico. In particular, she advocates further investment of resources into the industry as well as more technical support for the farmers. Although she acknowledges that some shortcomings exist for the aquaculture industry in Mexico, Campos feels that southeastern Mexico has good potential because of its vast water resources in the form of rivers and lagoons. Furthermore, Campos sees national and global benefits of expanding the aquaculture industry to provide high quality foods to growing populations.

Campos has very little free time. When asked what she does in her spare time, she joked about not having the time to do anything except work. However, further questioning revealed that she enjoys Egyptian mythology and reading. During a rare break from the rigors of graduate school, Campos might relax by reading one of her favorite books, such as *War and Peace*, a classic Tolstoy novel. 🐟



LABORATORY OF AQUACULTURE, UJAT

Bernardita Campos Campos

## EdOp Net a Window on Opportunities

EdOp Net has come a long way since the first issue in October 1996. With a mailing list of over 500 subscribers and over 1,200 visits per month to the website, EdOp Net has grown into a preferred resource for aquaculture students and professionals interested in current educational and employment opportunities.

EdOp Net is a great way to find new graduate assistants, postdocs, interns, or people with general ex-

perience in aquaculture, and it allows you to reach potential applicants from around the world. A brand new website feature allows you to submit new opportunities directly online at <[pdacrsp.oregonstate.edu/edops/submitop.html](http://pdacrsp.oregonstate.edu/edops/submitop.html)>.

EdOp Net can be viewed online on a searchable database. It is also distributed monthly in email and paper formats. To subscribe to EdOp Net, send an email to Ian Courter at <[courteri@onid.orst.edu](mailto:courteri@onid.orst.edu)> or register online.

EdOp Net is online at <[pdacrsp.oregonstate.edu/edops/edop.html](http://pdacrsp.oregonstate.edu/edops/edop.html)>. 🐟



## Graduate's Corner

Congratulations to Taworn Thunjai on the successful defense of his Ph.D. dissertation presented 16 December 2002 at Auburn University, Auburn, Alabama. Thunjai's advisor was Claude Boyd, a long-time PD/A CRSP Principal Investigator. Thunjai first became involved with the PD/A CRSP in 1997, during one of Boyd's Thailand visits when they met. Thunjai was then working with the Thai Ministry of Agriculture and Cooperatives, Department of Fisheries. In June 1997, Thunjai moved to Auburn University. He completed two masters degrees there, based on research on pond soil samples from PD/A CRSP sites and developed an interest in the environmental aspects of aquaculture. He is particularly interested in sustainable practices and aquaculture development.

### BOTTOM SOIL QUALITY IN FISH PONDS OF DIFFERENT AGES IN THAILAND AND SUGGESTIONS FOR ITS MANAGEMENT

(condensed abstract of Taworn Thunjai's Ph.D. thesis)

This research was conducted to obtain data on bottom soil quality in ponds of different ages in Thailand. In addition, because the annual application of liming materials has been a major feature in pond management, samples of liming materials were obtained from vendors for analysis of composition and quality. C:N ratios were similar between locations. This discrepancy could not be explained from available data.

Results of this study reveal that ponds can be used annually for semi-intensive production of tilapia, and presumably other species, for many years without serious deterioration of bottom soil quality. Liming is a major management input in pond aquaculture in Thailand. Thus, farmers should base the need for liming on soil pH to prevent unnecessary application. Many of the liming materials are of low quality, and farmers should insist that vendors provide a fact sheet showing a certified analysis of their products.

## PD/A CRSP Technical Committee

The PD/A CRSP elected new members to the 2003–2004 Technical Committee earlier this year. We extend a warm welcome to new members and express our appreciation to the continuing and past members for their time in service to the PD/A CRSP. New members are shown below marked with an asterisk (\*). TC co-chairs and members serve 2- and 3-year terms, respectively. Offices are held through the conclusion of the following year's Annual Meeting.

	INSTITUTIONAL AFFILIATION	AREA OF REPRESENTATION
<b>CO-CHAIRS</b>		
Jim Diana 2004	The University of Michigan	
Chris Brown 2005*	Florida International University	
<b>MATERIALS &amp; METHODS SUBCOMMITTEE</b>		
Yang Yi 2004	Asian Institute of Technology	Environmental Effects
Claude Boyd 2005	Auburn University	Production Optimization
Suyapa Meyer 2006*	Escuela Agrícola Panamericana Zamorano	Social & Economic Aspects
<b>TECHNICAL PROGRESS SUBCOMMITTEE</b>		
Jim Bowman 2004	Oregon State University	Production Optimization
Joe Molnar 2005	Auburn University	Social & Economic Aspects
Bill Tollner 2006*	University of Georgia	Environmental Effects
<b>WORK PLAN &amp; BUDGET SUBCOMMITTEE</b>		
Wilfrido Contreras-Sánchez 2004*	Universidad Juárez Autónoma de Tabasco	Environmental Effects
Dan Meyer 2005	Escuela Agrícola Panamericana Zamorano	Production Optimization
Nancy Gitonga 2006	Department of Fisheries	Social & Economic Aspects
<b>EX-OFFICIO MEMBERS</b>		
Hillary Egna	Oregon State University	
Stephen Sempier	Oregon State University	
Harry Rea	USAID	

# Notice of Publication

Notices of Publication announce recently published work carried out under PD/A CRSP sponsorship. To receive a full copy of a report, please contact the author(s) directly.

## CRSP Research Report 03-188

### HYBRID CATFISH (*CLARIAS MACROCEPHALUS* × *C. GARIEPINUS*) AND NILE TILAPIA (*OREOCHROMIS NILOTICUS*) CULTURE IN AN INTEGRATED PEN-CUM-POND SYSTEM: GROWTH PERFORMANCE AND NUTRIENT BUDGETS

Yang Yi and C. Kwei Lin  
Aquaculture and Aquatic Resources Management  
Agricultural and Aquatic Systems and Engineering Program  
School of Environment, Resources and Development  
Asian Institute of Technology  
PO Box 4, Klong Luang  
Pathumthani 12120, Thailand

James S. Diana  
School of Natural Resources and Environment  
University of Michigan  
Ann Arbor, MI 48109-1115, USA


Two experiments were conducted in 200-m<sup>2</sup> earthen ponds at Asian Institute of Technology, Thailand, for 87 days to test the feasibility of an integrated pen-cum-pond system, which utilizes wastes from intensive culture of hybrid catfish (*Clarias macrocephalus* × *C. gariepinus*) as nutrients for semi-intensive culture of Nile tilapia (*Oreochromis niloticus*). This integrated pen-cum-pond system enhances nutrient utilization efficiency, minimizes environmental impacts of pond effluents, and gains extra fish production at low cost. Experiment 1 was designed to compare the integrated pen-cum-pond systems with natural and artificial water circulation. Six randomly selected 200-m<sup>2</sup> ponds were partitioned by 1.0-cm mesh plastic net into two compartments: 1/3 of pond area (67 m<sup>2</sup>) for hybrid catfish and 2/3 (133 m<sup>2</sup>) for Nile tilapia. In experiment 2, one additional pond was partitioned by 1.0-cm mesh plastic net into three equal compartments with 67 m<sup>2</sup> each. The mesh was not cleaned and thus partitions serve as three replicates for hybrid catfish culture alone (non-integrated system). Experiment 2 was designed to compare growth performance of hybrid catfish and effluent quality from intensive culture of hybrid catfish among the non-integrated system with hybrid catfish alone (non-integrated treatment) and the integrated pen-cum-pond systems (natural and artificial water circulation treatments) in the 67-m<sup>2</sup> compartments. The nutrient budgets were also compared among the three culture systems. Sex-reversed all-male Nile tilapia were stocked at 2 fish/m<sup>2</sup>, and hybrid catfish at 25 fish/m<sup>2</sup>. Hybrid catfish were fed floating pelleted feed twice daily at rates of 3–10% body weight per day. During the first month, tilapia com-

partments were fertilized weekly using urea and triple superphosphate (TSP) at rates of 28 kg N and 7 kg P/ha/week. In the artificial water circulation treatment, the water in the catfish compartment was continuously circulated by a submersed pump to the tilapia compartment at a rate of one exchange per week, starting the second month.

There were no significant differences in growth performance of hybrid catfish among all treatments ( $P>0.05$ ). Extrapolated net tilapia yields obtained by using hybrid catfish wastes in this study were comparable to those achieved in organically and inorganically fertilized tilapia ponds. The results indicated that neither natural nor artificial water circulation between catfish and tilapia compartments improved the growth of hybrid catfish. Nile tilapia growth was not significantly different between the natural and artificial water circulation treatments ( $P>0.05$ ). However, the artificial water circulation caused mass mortality of Nile tilapia due to heavy loading of wastes. Nutrient budgets showed that total nitrogen (TN) and total phosphorus (TP) levels in pond effluents in the natural and artificial water circulation treatments were significantly lower than those in the non-integrated treatment ( $P<0.05$ ). Nile tilapia recovered 3.30% and 2.12% of TN, and 1.29% and 0.84% of TP from feed wastes and fertilizer inputs in natural and artificial water circulation treatments, respectively. Concentrations of TKN, TP and SRP were significantly lower in the natural and artificial water circulation treatments than in the non-integrated treatment ( $P<0.05$ ). This study demonstrates that the integrated pen-cum-pond system is feasible, indicates that Nile tilapia can effectively recover nutrients contained in wastewater of intensive catfish culture, and suggests that natural water circulation between catfish and tilapia compartments can reduce nutrient contents in pond effluents and is cost-effective.

This abstract was based on the original paper, which was published in *Aquaculture*, 217 (2003):395–408.

## PD/A CRSP Website Launches New Search Capability

The PD/A CRSP web site <<http://pdacrsp.oregonstate.edu>>, hosted by Oregon State University servers, features over 1,500 aquaculture-related documents. Many of these are available online as web pages, and most are available as downloadable PDF files. But how do you find that one paper you are looking for? In mid-February the PD/A CRSP installed a new Google-based search engine that enables users to enter multiple search terms to narrow down a search. Give it a try. You might be surprised at what you find! 

Pond Dynamics/ Aquaculture CRSP  
Oregon State University  
418 Snell Hall  
Corvallis OR 97331-1643



PRSRST STD  
US POSTAGE  
**PAID**  
CORVALLIS OR  
PERMIT NO 200

## PD/A CRSP CONTACT INFORMATION

PD/A CRSP publications can be accessed electronically at [pdacrsp.orst.edu/pubs/publications.html](http://pdacrsp.orst.edu/pubs/publications.html); print copies can be ordered online, by sending an email to [courteri@onid.orst.edu](mailto:courteri@onid.orst.edu), or by writing to:

Pond Dynamics/ Aquaculture CRSP  
Oregon State University  
418 Snell Hall  
Corvallis, OR 97331-1643

Contact information for other inquiries:

Assistant Director of Research  
Steve Sempier [sempiers@onid.orst.edu](mailto:sempiers@onid.orst.edu)

Director, Information Management  
Danielle Clair [claird@ucs.orst.edu](mailto:claird@ucs.orst.edu)

- My address has changed, and I have made corrections to the label. (Please mail label to address above.)
- I have discovered *Aquanews* online and no longer need to receive it on paper.
- I wish to discontinue receiving this publication.

## AQUANEWS

Program Director: Dr. Hillary S. Egna  
*Aquanews* Editor: Danielle Z. Clair  
Staff: Jeff Burrig, Ian Courter, Roger Harris, and Mary Olson

*Aquanews* is published quarterly by the Information Management & Networking Component of the Pond Dynamics/Aquaculture Collaborative Research Support Program, Oregon State University, 418 Snell Hall, Corvallis OR 97331-1643. [pdacrsp.orst.edu](http://pdacrsp.orst.edu)

The contents of this newsletter are copyright of the Pond Dynamics/Aquaculture CRSP. © 2003. All rights reserved, including mechanical and electronic reproduction.

Mention of trade names or commercial products does not constitute endorsement or recommendation for use on the part of USAID or the PD/A CRSP.

The Pond Dynamics/Aquaculture Collaborative Research Support Program is funded in part by the United States Agency for International Development under CRSP Grant No. LAG-G-00-96-90015-00 and by participating US and host country institutions.

Oregon State University is an Affirmative Action/ Equal Opportunity Employer.