THE RESEARCH AND DEVELOPMENT CENTER (RDC) passed the ISO 9001-2008 Stage 2 Audit on December 1-3, 2010.

The TUV SUD PSB Philippines Stage 2 Auditors were Mr. Xavier Lance Y. Dy, Zenaida A. Leonor and Jayme A. Boehnert. For the R&D Stage 2 Audit, the interview of Dr. Arnulfo M. Mascariñas, RDC Director together with Prof. Ronnel R. Dioneda, RDC Assistant Director and key staff of the Center by Mr. Dy on December 1, 2010 showed no findings of non-compliance. The Stage 2 Audit focused on actions done by BURDC to address the minor non-conformities found during Stage 1 Audit. The supporting documents presented included the BURDC’s plan of actions to address the minor non-conformities, the schedule of monitoring activities and other related activities by the PMDU, the workshop on monitoring and evaluation to be conducted, and the updated monitoring report.

Last November 17, 2010, Mr. Dy, the ISO 9001-2008 Lead Auditor, determined the conformance of BU Research and Development Center to the work instruction and achievement of the key result areas. The facility tour at the Center was conducted on November 16, 2010 while the scrutiny of the documents and interview of the BURDC Quality Management Representatives took place on November 17.

The highlights of the ISO Stage 1 audit for the research...
Protection for the Researchers

The researchers represent one core group that performs a main function of the university, that is, research and knowledge-generation. Without the significant contributions of the researchers who invest time and talent to the university as an advanced and higher education institution, Bicol University cannot fulfill its mandate in research.

Like any profession, conducting a research involves hazards. The hazards are many and varied, from the trip to the actual gathering of data. In agriculture and fisheries, the researchers either need to dive into the sea or work in a far-flung farm to ensure that the data gathered are firsthand and reliable. In science and technology undertakings, handling substances or manipulating gadgets or device may cause danger to health and physical well-being. In social and educational researchers, being in different research sites like those in remote barrios or towns to conduct survey or interview or make immersions may involve hazards, physical and/or psychological.

In the Basic Education Resources Survey, a recent research undertaking of the University in collaboration with UP Engineering Research and Development Foundation, Inc. (UPERDF), the researchers including the research assistants or enumerators are given insurance. This is just a smidgen compared to the enormous task, just a bit compared to the significant contributions of these researchers.

Unfortunately, the University does not have a policy of giving insurance to both researchers and research assistants. It has been the clamor of BU researchers for a long time, but it seems that this grievance have fallen on deaf ears. In fact, in the open forum during the 2010 BU In-House Review of On-going and Completed Researches on July 22-23, 2010, the concern about the insurance of the researchers, a concern which has been raised for a long time now, was fervidly discussed.

Is there a need to remind the administration that ensuring the safety of researchers must be given utmost priority? Is there a need for a mishap to any of the BU researchers and research assistants before the administration put a paramount concern on their welfare? Should the project or study leaders make it their personal concern to apply for group insurance, or should it be a concern that must advertently emanate from the administration?

It is now time to listen to such clamor, and do something about it. No need for debates. Otherwise many able and committed researchers may choose to swerve away from research, the road less travelled by BU academicians.
BU Launches Intellectual Property Rights Unit, Sponsors IPR Training-Workshop

BU, TRAILBLAZER of intellectual property rights protection in HEIs in Bicol Region.

In an effort to manage an Intellectual Property System that stimulates creativity and innovation, Bicol University through the Research and Development Center (RDC) launched the Intellectual Property Rights Unit (IPRU) on August 4, 2010 at the BUCS Auditorium, Legazpi City.

The ceremony on the launching of the BU-IPRU included the presentation of the first IPRU Head, Prof. Nestor W. Dullesco together with the video presentation on the rationale of the creation of the BU-IPRU, messages from Atty. Ricardo Blancoflor, Director General, IP Philippines, Dr. Tomas Biñas, Director of the Department of Science and Technology V (DOST), Dir. Rodrigo Aguilar, Provincial Director of Department of Trade and Industry, and Dr. Fay Lea Patricia M. Lauraya, BU President.

Atty. Blancoflor emphasized in his address that innovation is a key driver in the economic growth of a country, that people’s talent will drive the economy. He discussed innovation economy which is a fusion of technology and economics creating global wealth, prosperity and power.

IP Philippines officials such as Engr. Eric C. Paden, Area Manager of the IP Satellite Office in the Visayas Area, Ms. Rosa M. Fernandez, Area Manager of the IP Satellite Office in the Mindanao Area, Mr. Luwin M. Dela Concha, IPR Specialist II, Technology Transfer Division, IPO graced the said occasion.

BU officials such as Dr. Helen M. Llenaresas, VPAA, Atty Eduardo M. Loria, VPA, Dr. Arnulfo M. Mascariñas, RDC Director, academic deans and directors, BU personnel and students, faculty from other SUCs, and local media personalities also attended the said historical event.

After the ceremony on the launching of the BU-IPRU, a brief media conference was held. Local media personalities and BU researchers raised issues related to patent, copyright, and trademarks, which the IP Officials and others guests answered or clarified.

The IPR Training-Workshop immediately followed the media conference. The three-day Seminar-Workshop aimed to equip the researchers with the basic skills on patent search and patent drafting, and to present the BU Intellectual Property Rights Policy Guidelines (BU-IPRPG) to researchers and student representatives for critiquing.


The participants in the seminar-workshop were the deans and directors, legal officer, research coordinators, BU business manager, faculty researchers, RDC staff, students and faculty from other SUCs. (RROB)

BU Completes Basic Education Resources Survey

THE BASIC EDUCATION Resources Survey (BERS) for Bicol Region was completed in August 2010. As a culmination of the data gathering, a focus group discussion (FGD) was conducted on October 12, 2010 at Bicol University, Legazpi City to validate the data generated through the survey.

Organized Research and Development Center in coordination with UP Engineering Research and Development Foundation, Inc., the focus group discussion involved various stakeholders of basic education such as policy makers like mayor or his representative, Local School Board member, DepEd Regional Planning Officer and Division/District Planning Officer, Representative from DepEd Office of Planning Service, DepEd Regional Director/Representative, DepEd Supervisor, ALS Supervisors/Representatives from the Regional Office and DepEd Division Office, ALS Head/Coordinator, school heads both of the public and private schools, parents, and students across levels.

After the focus group discussion, the Site Team Leader, Dr. Arnulfo M. Mascariñas will report the experiences and difficulties encountered by the BERS Bicol Team.

The BERS was conducted in collaboration with the UP Engineering Research and Development Foundation, Inc. (UPERDF). The project commenced with the conduct of the Orientation of the Field supervisors and Enumerators on March 23, 2010.

The Bicol Team was composed of one Site Team Leader, six field supervisors and 17 enumerators from RDC staff and BU/BE faculty and staff. (RROB)
45 Papers Presented at 22nd BU In-House Review

A TOTAL of 45 papers were presented during the 22nd BU In-House Review of Completed and On-going Researches held on August 22-23, 2010 at Coastal View Resort in Sto. Domingo, Albay.


Similarly, awarded as the first best poster was Sea Urchin (Tripnuestes gratilla) Resource Enhancement Project Along Lagonoy Gulf by Plutomeo M. Nieves, Skorzeny C. de Jesus, Antonio B. Mendoza, Jr. and Aldrin Mel Macale. The poster entitled Early-Life History of the Folk-tail Siganid Argenteus Inferred from Otolith by Victor S. Soliman, H. Yamada and K. Yamaoka, and Population Dynamics of the Scallop Decatopecten Striatus in Asid Gulf, Masbate by Victor S. Soliman, Jonel M. Corral, Sheila B. Belen and J.C. de Chavez won as second and third best posters, respectively.

The review was dominated by the discipline cluster Agriculture and Fisheries with 22 papers. The papers presented in other disciplines are the following: nine papers for Technology, Architecture, Engineering and Sciences; five for Social Science; five for Business and Entrepreneurship; three for Medical and Health; and one for Education.

The papers were evaluated based on these criteria: 1) Creativity, originality, and quality of work (30%), 2) Significance of findings (45%), 3) Manuscript/write-up (15%), and 4) Paper presentation (10%). The papers presented in other disciplines are the following: nine papers for Technology, Architecture, Engineering and Sciences; five for Social Science; five for Business and Entrepreneurship; three for Medical and Health; and one for Education.

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RDC Spearheads Pre-Inception Conference-Workshop with BU Researchers

TO ADDRESS the problems encountered by the BU researchers, the BURDC conducted the first Pre-Inception Conference-Workshop of the BU researchers on August 7, 2010 at the BUCS Auditorium.

The conference-workshop included discussions on the University Research Protocol, R&D Monitoring and Evaluation, and Preparing Work Plan by Prof. Yolanda Julieta B. Brugada, Program Monitoring and Data Banking Unit (PMDU) Head; and APP, PPMP and ABC Documents of the R&D Program/Project/Study: Procurement of Supplies and Services by Dr. Amelia A. Dorosan, University Bids and Awards Committee (BAC) Chairperson.

The workshop involved the program/project leaders who were trained and assisted by the PDMU staff to prepare the different forms necessary for the conduct of the research programs/projects, and for the procurement of supplies and services. Also present during the activity were the deans, administrative officers, budget officers, and bookkeepers.

Dr. Arnulfo M. Mascarinas, BURDC Director, stressed that the conference-workshop is a mechanism to expedite the implementation of the research by helping the researchers in the procurement of the supplies and services. Together with Prof. Brugada, Dr. Mascarinas, likewise gave comments and suggestions to the proposed financial requirements for approved research programs/projects presented by the BU researchers. In the closing remarks, Dr. Helen M. Llenaresas, BU VPAA, expressed her appreciation for the initiatives of the RDC as well as of the strong intent of the BU faculty to be involved in research. (RROB)
14 New Research Proposals Approved

The BU Research and Development Center endorsed 14 new proposals which were approved by the BU president as of November 30, 2010.

The proposals together with the researchers are the following:

<table>
<thead>
<tr>
<th>Title</th>
<th>Proponents/Researchers</th>
</tr>
</thead>
<tbody>
<tr>
<td>7. The Techno-Business Feasibility in Albay, Philippines of Selected Bicol University Technologies</td>
<td>Eddie S. See Ezra L. Panopio Ilona M. Mattas</td>
</tr>
<tr>
<td>8. The Effectiveness of English Plus Program of Bicol University</td>
<td>Ma. Celina Eladia G. Meneses Jocelyn I. Bartolata</td>
</tr>
<tr>
<td>9. Local Media and Government in the Promotion of Bicol Culture: The Tercentenary Celebration of Peñafrancia Festival</td>
<td>Agnes Jacob-Nepomuceno Alex B. Nepomuceno</td>
</tr>
<tr>
<td>10. The Bicol University Program for Marginalized Students</td>
<td>Helen M. Llenaresas Zenaida C. Cabrillas Jocelyn J. Paje Corazon V. Caputan Rebecca Rosario O. Bercasio Linda B. Campopos Marcia Corazon P. Rico</td>
</tr>
<tr>
<td>12. Management of Holothuria Scabra in Albay Coast</td>
<td>Skorzeny C. de Jesus</td>
</tr>
<tr>
<td>13. The Media Audience Exposure Behavior Measures of Professional Employees in Legazpi City</td>
<td>Agnes J. Nepomuceno Eufamia A. Bisa Shirley N. Maloles</td>
</tr>
</tbody>
</table>

These proposals underwent three phases of evaluation; namely, evaluation of the concept paper by external evaluators in December 2009, evaluation by the Technical In-House Review Committee (TIRCom) headed by Prof. Ida H. Revale, and evaluation by University Review Committee (URECom) composed of research and content experts from various sectors or agencies in the region held on April 28, 2010 at the Bicol University College of Science. (ROB)

**BIOLOGY FACTS & TRIVIA**

Headed by Dr. Arnulfo M. Mascarinis, the RDC and CHED-BU Zonal Research Center (ZRC) participated in the Bicol University 41st Anniversary on September 20-25, 2010.

The RDC and ZRC staff participated in the foot parade during the Opening Program on September 20, and during the Personnel Day held on September 21 at the BUCENG Gymnasium. After the Personnel Day Program, the staff had a get-together at the Center. (RROB)

The lightest organ in the human body is the lung. Submitted by: Michael Vincent Sotto

An ostrich egg is the largest existing single cell. Scienzational.com Submitted by: Irine

It is also the biggest egg in the world. It could take as many as 30 chicken eggs to equal its volume, and up to 2 hours to hard boil. Submitted by: Josie

A kind of jellyfish (Turritopsis nutricula) upon reaching adulthood can transform itself back to childhood by converting its cells. It may repeat this to live forever. Submitted by: Nunnally

CHED-BU ZRC endorses 4 Papers for Presentation in International Conferences

THE COMMISSION on Higher Education (CHED-BU ZRC) evaluated and favorably endorsed to CHED Main Office for travel assistance three papers for presentation in various international conferences.


CHED-BU ZRC also gave financial assistance to paper presentation to Dr. Rebecca Rosario O. Bercasio, one of its technical staff, for the paper “Integrating Gender Issues in the Teaching of Contemporary Philippine Short Stories” during the 1st Cebu International TeSOL Conference held at Cebu International Convention Center and Cebu Doctor’s University, Mandaue Campus on August 12-14, 2010.

The presenter of the paper with approved travel assistance by CHED Main Office will receive financial support which covers registration fee (waiver is encouraged), roundtrip economy fare to foreign country where the conference will held and $100 per diem per day plus one day for the duration of the conference. (ZH)
GIA-funded Researches, Reviewed by CHED-BU ZRC

THE CHED-BU Zonal Research Center conducted a year-end review of GIA-funded researches on December 14, 2010 at the Bicol University General Administration Conference Room, Legazpi City.

The year-end review included a presentation of the status reports of the eight GIA-funded researches from different higher education institutions in the region. The lead proponents presented the accomplishments of the research project/study vis a vis the objectives as stated in the approved proposals, as well as the problems met during the implementation of the research. The activity also included a discussion/open forum on the administrative issues and concerns of the researchers regarding the implementation of the research project/study.

The list of the eight ongoing researches, implementing institutions and their researcher/s, and the status of implementation of the research project/study is provided below:

<table>
<thead>
<tr>
<th>Title</th>
<th>Implementing Institutions/ Researcher/s</th>
<th>Status/Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>An Impact Assessment of Waste Management Programs of Selected HEI's in the Bicol Region</td>
<td>Ateneo de Naga University, Sheila I. Arroco</td>
<td>Collection of data</td>
</tr>
<tr>
<td>Municipal Solid Waste Management and Utilization of Sitio Puting Daga</td>
<td>Divine Word College of Legazpi, Annabel L. Medalla and Esteban Cañon</td>
<td>Will start the implementation of the project 2nd semester of this school year.</td>
</tr>
<tr>
<td>Tilapia Ectoparasites as Indicators of Water Pollution in Lake Bato, Bato, Camarines Sur</td>
<td>Camarines Sur Polytechnic Colleges, Ruby Jane-Salido Gonzales</td>
<td>Preparation for sampling</td>
</tr>
<tr>
<td>Improving Community Teachers Competencies in Region V</td>
<td>Central Bicol State University of Agriculture, Gloria B. Osea</td>
<td>Pre-testing of questionnaires. Identification of the sample respondents</td>
</tr>
<tr>
<td>Assessment of Solid Waste Management Strategies in Camarines Norte, Camarines Norte State College</td>
<td>Camarines Norte State College, Maria Christina C. Azuelo, Leah N. Babado, and Luz Menda L. Reyes</td>
<td>Project inception meeting. Procurement of supplies and materials</td>
</tr>
<tr>
<td>Level of Effectiveness of Teacher Education Program of Community Colleges in the Province of Albay</td>
<td>Bicol College, Inc., Sylvia E. Daities</td>
<td>Pre-testing of questionnaires</td>
</tr>
<tr>
<td>Medicinal Flora of Albay Province, Luzon Island, Philippines</td>
<td>Bicol University, Amelia A. Dorosan and Phil V. Morano</td>
<td>Biodiversity and household survey of common medicinal plants in Pioduran and Manito, Albay. Standardized interview schedule for the health practitioners, herbal users and teenagers.</td>
</tr>
<tr>
<td>Baseline Survey on Women’s Access to Productive Resources and Participation in Economic Activities in Cabusao, Camarines Sur</td>
<td>Ateneo de Naga University, Bernadette M. Gavino-Gumba</td>
<td>Data Collection thru survey</td>
</tr>
</tbody>
</table>

The said activity was facilitated by the Dr. Arnulfo M. Mascariñas, ZRC Director, together with the staff, Prof. Michael Montealegre, Dr. Rebecca Rosario O. Bercasio, Ms. Mary Joy V. Chapman, and Ms. Zaira H. Gonzales. (RROB)

FYI: Applying for CHED Travel Assistance for International Paper Presentation

CHED Research Division provides financial assistance for paper presentation in International Conferences to enable local researchers to participate and present their research outputs, disseminate research findings, exchange ideas with peers at the same time learn from and contribute to the world’s pool of experts and knowledge in/on higher education which may nurture the development of higher education scholar/researchers.

This grant is open to any Filipino who is full-time faculty or researcher/scientist working in a research unit of a higher education institution in the Philippines whose paper has been accepted for oral presentation in an international conference/workshop/seminar/forum provided said paper has not been presented in another fora. The paper for presentation should be related to CHED priority areas and topics identified in the NHERA and categorized according to disciplines and higher education research thrusts.

Applications must be submitted in the prescribed format and should reach CHED at least two months before the date of the conference. (Application form for travel grants can be downloaded at the CHED website http://www.ched.gov.ph.) Applicants must submit also together with the duly accomplished application 3 sets of the following documents: the paper (full-text) to be presented at the conference, Applicant’s biodata, photocopy of the letter of invitation and acceptance letter, photocopy of the brochure about the conference, endorsement of HEI (Recommendation Letter of the President). Details of financial assistance (e.g. amount, coverage, proposed utilization) in case the applicant is expecting to get some financial assistance from other sources other than CHED.

Within one month after the return from the conference/seminar, the grantee shall submit: (a) a conference organizer’s certification or proof that the beneficiary (name) presented the approved paper during the conference (b) a travel report indicating highlights of the conference, observations, learnings and recommended follow thru actions. Within a year after the conference, the grantee shall present the paper in a local forum which is organized by CHED.

Applications for travel grant must be submitted first to the CHED-BU Zonal Research Center for the evaluation and endorsement for approval of CHED Manila. Interested applicants may visit the CHED-BU ZRC at 2nd Floor BUREPC Building, Bicol University, contact (052) 480-1325 or email buched_zrc@yahoo.com.
In recognition of the thrusts and achievements of the directors of the Bicol University Research and Development Center (BURDC), Legazpi City who have served the Bicol University with utmost dedication, integrity and efficiency, the Center deemed it fitting and proper to publish the time-line directors of the BURDC since 1969.

Since its inception, the Center had already twelve (12) directors, two of whom became presidents of a State University and College; namely, Dr. Emiliano A. Aberin, President of Bicol University and Dr. Floria P. Tagarino, President of Camarines Norte State College. Likewise, a former staff of the Center, Dr. Fay Lea Patria M. Lauraya also became the 7th President of the Bicol University, Legazpi City.

Following are the directors of the Bicol University Research and Development Center, Legazpi City.

**PROF. LEA A. SOLIMAN**
1969-1983

**Thrusts** Agriculture, Fisheries and Socio-Economics

**Accomplishments:**
2. Implemented the first Bicol Universitarian publication. This was an official publication of the students of the Bicol University, Legazpi City.
3. Implemented the The Link Publication, the official publication of the Research and Statistics Center Office, Bicol University, Legazpi City.

**DR. ROMAN N. BUCAD**
1983-1986

**Thrusts:** Fisheries, Agriculture, Socio-Economics and Institutional Researches

**Accomplishments:**
1. Enhanced the researches of the College of Agriculture and College of Fisheries.
2. Activated the faculty to do institutional researches.

**DR. EMILIANO A. ABERIN**
1986-1990

**Thrusts:** Agriculture, Fisheries, Socio-Economics and Institutional Researches

**Accomplishments:**
1. Made Policies on Research for the Center which was approved per Board Resolution No. 5, series of 1988.
2. Activated the full professors of BU to take the lead in the conduct of research.

**DR. VIRGINIA C. ORENSE**
1990-1992

**Thrusts:** Agriculture, Fisheries, Socio-Economics and Social Science Researches

**Accomplishments:**
1. Able to source funds from the Philippine Social Science Council (PSSC), Manila to finance researches on Census on Fisheries and Agriculture and Child Labor Incidence in the Philippines Survey from Department of Social Welfare and Development (DSWD).

**DR. JOSE P. LEVERIZA**
1992

**Thrusts:** Agriculture, Fisheries, Socio-Economics and Institutional Researches

**Accomplishments:**
1. Pursued socio-economic researches of the Bicol University.
2. Worked for the budget of the Center for the year 1992.

**DR. FEDERICO O. RAQUINDIN, JR.**
1993-1996

**Thrusts:** Agriculture, Fisheries and Institutional Researches

**Accomplishments:**
1. Acquisition of equipment for the Center.
2. Provided the research staff the opportunity to attend seminars in the national level.
3. Modified the items of the research personnel.
4. Worked vigorously on the budget of the Center for year 1996.
FEATURE

DR. OSCAR L. LANDAGAN
1996-1997

Thrusts: Social sciences, Agro-forestry, Agriculture, Fisheries, Physical Sciences, Engineering Technology and Institutional Researches

Accomplishments:
1. Initiated and funded periodic seminars on significant findings of studies conducted by professors on a college and university-wide basis.
2. Under his term, the Center provided financial assistance to graduate and undergraduate dissertations/theses in the form of xeroxing and supplies and materials.

DR. NINFA R. PELEA
2004-2006

Thrusts: Agriculture, Fisheries, Agro-Forestry, Education, Health, Socio-Economics, Engineering, Industrial Technology, Communication-Information Technology and Institutional Researches

Accomplishments:
1. Implemented the 1st and 2nd University Research Student Forum.
2. Under her leadership, Bicol University was identified as the best HEI R & D in the Bicol Region by Commission on Higher Education (CHED).

DR. FLORIA T. TAGARINO
1997-2000

Thrusts: Agriculture, Fisheries, Agro-Forestry Education, Health, Socio-economics, Engineering, Industrial Technology, Communication-Information Technology and Institutional Researches

Accomplishments:
2. Activated the colleges/faculty to conduct research for the University and the region.

DR. ARNULFO M. MASCARIÑAS
2007- to date

Thrusts: Agriculture, Fisheries, Agro-Forestry, Education, Health, Socio-Economics, Engineering, Industrial Technology, Communication-Information Technology and Institutional Researches

Accomplishments:
1. Re-structured the Bicol University Research and Development Center (BURDC). This is in support of the provisions of the BU COMDEV Plan and Thrusts and Directions. The RDC is reorganized to comprise three (3) special functional units and two (2) committees.
2. Organized research undertakings along certain thematic areas to enhance financial efficiency and complementation due to meager budget for R&D.
3. Published the first refereed Journal of the Research and Development Center.
4. Revived the BURDC R & D Update.
5. Under his leadership, Bicol University was recognized as the 2008 CHED Best Regional HEI Research Program Award for its research program: Sorsogon Bay Resource Management and Development Program.
6. Worked for strong collaboration with other SUCs within and outside the region.
8. Formulation of the policy on consultancy.

DR. OFELIA S. VEGA
2000-2001

Thrusts: Agriculture, Fisheries, Agro-forestry, Education, Health, Socio-economics, Engineering, Industrial Technology Communication-Information Technology and Institutional Researches

Accomplishments:
1. Worked on the conversion of positions of the technical personnel of the Center to teaching per NCC No. 15.
2. Complemented the research and extension personnel under her term.

DR. EDDIE S. SEE
2002-2004

Thrusts: Fisheries, Agriculture, Gender and Development and Institutional Researches

Accomplishments:
1. During his term, the Center worked on the improvement of its linkages and its fiscal and human resources management.
2. Activated all colleges of the University by having R & D Enhancement Seminar.

The Official Publication of the Bicol University Research and Development Center
PILI, Bicol’s Pride in a Nutshell: An Overview

Dr. Arnulfo M. Mascariñas

As the main pili producing region in the country, the Bicol Region accounts for 82% of the total volume of production (2005). It also boasts of an existing area of 7,746 hectares with 221,250 fruit bearing trees. It is also the crop’s center of genetic diversity.

The pili is a plant with various uses. It makes an excellent street and border tree and a verdant shade tree for lawns. The young shoot is edible and can be used in cooking and in making green salads. The resin-rich wood makes excellent firewood, frames for houses, boxes, crates, and even musical instruments. The resin or elemi can be used as in ingredient in plasters and ointments.

The pili fruit with its many uses is the main source for commerce. Its pulp is a component of animal feed and fertilizer. The shell can be fashioned into accessories as well as a medium for orchid growing. The kernel itself is made into a variety of food items. More recently, scientists have reported that the kernel contains anti-cancer proteins.

In an age when focus is on environmental sustainability, the pili tree is indeed relevant. An organically grown tree, it requires no application of chemicals, pesticides, and fungicides for the duration of its growth, fruit production and harvest. It is one of the typhoon-resistant species and can grow and last for a century.

Despite its long history of cultivation, the pili has remained a cottage level industry. Only recently has this “tree of hope” been designated a priority crop of the Bicol Region.

Canarium ovatum Engl., as the pili is also known, has great potential to develop into a major industry. But improvement of and knowledge in efficient propagation, ecological, and cultural requirements of pili as a commercial crop, and the mechanization for commercial processing are needed.

Researches have been conducted to address these needs. Pili, Bicol’s Pride in a Nutshell documents these researches particularly those conducted by Bicol University faculty. Written in popular language, the book intends to contribute to the improvement of the potential value of the Philippine nut. Through this endeavor, information particularly the results of researches about the pili nut will be made accessible to farmers, traders, and processors involved in the industry.

The book is not just about the agricultural science of Canarium ovatum. It includes vignettes of individuals involved in the market flow of the pili products. It showcases farmers, assemblers/traders, wholesalers, and retailers whose livelihood, and lives, revolve around this tree.

The book, as conceptualized by the Bicol University Research and Development Center (BURDC), aims at popularizing the researches on pili conducted by students and faculty of the Bicol University.

Sixteen BU professors have earlier been conducting researches on the subject. Their studies which focused on post-production were undertaken as early as 1994.

Post-production practices and technologies were taken on by Prof. Marissa N. Estrella, Arnulfo P. Malinis, Sylva Elena B. Payonga, and Floria P. Tagarino. Their study touched a little on production, notably on the varieties that grow in the region, and focused on post-production operations and practices in harvesting, depulping, drying, shelling, storage, and secondary processing. Marketing was likewise studied as well as the labor practices and the persons engaged in every post-production phase. Problems were presented and analyzed; perceptions on the pili industry were evaluated. This study was capped with the identification of research and development activities.

Prof. Malinis joined Profs. Estrella A. Calpe, Sajid O. Cerdeña, and Floria P. Tagarino in their study of how best to reduce losses incurred during harvesting. They experimented with prototypes of semi-mechanical harvesting facilities and compared their efficiency with traditional methods. Picking capacity, time efficiency, harvest loss, and economics of harvesting were measured and analyzed.

If harvesting mature pili fruits is difficult enough due to the tree’s sheer height and distribution of the fruits in the tree, removing the pulp is equally tedious and time consuming. Prof.
Malinis joined Profs. Eleanor Ll. Balute, Herminigilda N. Lizano, and Floria P. Tagarino to study how depulping can be made easy. They looked closely on what happens using the traditional methods of depulping. They put into action a depulping machine designed and developed at the BUCAF and observed if depulping can be made easier. Their study focused on the efficiency of the depulping machine. Their finding: “The mechanized system for the continuous and more rapid removal of pulp . . . offers a replacement of the traditional time consuming method . . .”.

Presently, the kernel of the pili fruit is the most popular product. It is processed into a Bicolano delicacy. But the fruit’s pulp has also more to offer than simply “tampawak” or “nilanta” (blanched pili pulp dipped in shrimp or fish sauce or sugar). The pili pulp holds the promise of being a source of dietary oil.

Prof. Ninfa R. Pelea studied the composition of the oil that can be derived from both the pulp and the kernel. Her findings: “Monosaturated oleic acid usually found in olive oil” is abundant in pili pulp. Meaning, oil derived from the pili pulp can even rival the popular virgin coconut oil. In another study on the oil which can be derived from the pulp, Prof. Pelea found that oil derived from the pulp is a “heart healthy oil.” It can prevent heart diseases. “Dietary oil from both pulp and kernel reduces cholesterol levels.”

Aside from being a delicacy and source of dietary oil, the pili pulp can be manufactured into a nutritious feed for poultry.

Prof. Teresita A. Bucad-Pequeña has come up with a pili pulp meal as a feed ingredient for broiler chickens. She says, “ . . . steps must be taken to reduce costs by utilizing non-conventional feed stuffs available locally such as the pili pulp.” When depulping the pili fruit in volume, it will be best to keep those pulp. The broilers will cackle with delight for a new kind of feed.

Prof. Bucad-Pequeña studied the depulping process, the potentials of the pulp, the growth performance of chickens fed with the pulp meal, and presented a cost and return analysis. As in any agricultural product, the pulp is not free from some natural trouble. It can be a “victim” of “tayangawon.” “Tayangawon” is a form of pili fruit deterioration, particularly in the kernel. Kernels with “tayangawon” have sunken, brown or gray to black lesions, circular to irregular in shape, causing it to lack its characteristic milky taste becoming bland and sometimes bitter. Prof. Marissa C. Nate-Estrella tried to unravel the mystery of the “tayangawon.” What brings the problem about? Prof. Estrella conducted pathogenicity tests. Her findings: It is not caused by a bacteria, neither is it caused by insects belonging to the order Coleoptera. The mystery remains.

Extracting the kernel from the shell has always been a tedious process. Manually cracking the shell demands dexterity as it has to be cut crosswise at midsection. An error can damage the kernel or even cause injury to the sheller. Besides, only an average of 40 nuts can be cracked in a minute.

Extracting whole kernels with the testa still intact and doing it at a faster rate is a challenging task. BU researchers Profs. Arnulfo P. Malinis, Marissa A. Estrella, and Alan P. Rabe have devised a machine which can economically and safely speed up kernel extraction. Their nut cracker can unshell 197 kernels in a minute, five times faster than the manual process.

When kernels have been extracted, the problem of storage processes which can preserve their freshness sets in. Raw pili kernels spoil relatively quickly due to their high fat content, which explains why they need to be immediately preserved with sugar. Besides, molds, mites, insects, and rodents are threats to the nuts kept in warehouses.

Finding appropriate packaging materials to ensure the freshness of pili kernels became a concern of Profs. Genean M. Libutan and Ma. Dulce J. Mostoles. They also looked for the most ideal level of moisture content for storage purposes. Their study is significant for the pili nut industry to stay competitive in the world market.

The development of the pili nut industry in the Bicol Region shows a happy mix of gender participation. The production phases, including harvesting and trading are performed by males while the bulk of the post-harvest work, from deshelling up to the production of pili by-products, involves females.

Profs. Marissa N. Estrella, Floria P. Tagarino, Lyn Esteves, Cherry A. Musa, and Raquel Bermundo took a closer look at the role of women in the development of the industry in the Bicol Region.

Pili, Bicol’s Pride in a Nutshell is a veritable compendium on the prospects and the problems the Bicol pili nut industry faces: significant steps towards realizing the promise of a potential dollar earner and better lives for pili farmers, traders, and processors.
BIOETHANOL PRODUCTION THROUGH ENZYMATIC SACCHARIFICATION AND FERMENTATION OF NAMO (DIOSCOREA HISPIDA)*

DARYL JOSE R. CIMANES, CYRILL KRIS A. DEDASE, CRESTIAN N. MORTA AND EVAN MAY B. OBIAS

This study was conducted to prove the potential of Dioscorea Hispida as a new source of biofuel. It was intended to compare the effects of different concentrations of alpha amylase on the saccharification of starch. This was also carried out to determine the significant amount of bioethanol produced through fermentation using Saccharomyces cervicasea.

The raw material for this study is the Dioscorea Hispida flour which was subjected to testing performed by SGS Philippines Inc. in Makati City, giving a result of 67.5% starch content.

During laboratory analysis, experimental data on saccharification of starch showed that the enzymatic activity of 0.3%, 0.5%, and 0.7% amylase concentrations decreased after 30 hours. In addition, this data were plotted on three different linearized equations of Michaelis-Menten kinetic model. These are Lineweaver-Burke, Eadi-Hofstee, Hanes-Woolf. Based on the analysis conducted, Eadi-Hofstee plot had the best fit on all levels of alpha amylase with \( R^2 \approx 1 \).

Based on the results of saccharification, the time of reaction and enzyme concentration that produce the highest glucose amount was determined. This was observed using 0.7% of alpha amylase with a reaction period of 30 hours. In this process glucose is converted into ethanol using baker’s yeast.

The product produced was analysed at the DOST  Region V Laboratory for the ethanol content. The findings in the AOAC 920.58 method on the analysis of percent alcohol showed the highest percentage ethanol yield of 3.52% for every 500 mL solution.

Based on the gathered experimental results, the researchers concluded that Dioscorea Hispida is an effective bioethanol source. Using an amount of 20 g of starch as a starting material a volume of 17.6 mL ethanol could be obtained. On large scale value, it is calculated to be 880 Liters/ metric ton of raw material on dry basis and estimated to be 350 Liters/ metric ton raw material on wet basis. This remarkable data is comparable with the other sources of bioethanol such as cassava with 280 Liters ethanol/ ton. In terms of cultivation, Dioscorea Hispida is an agricultural crop that is suitable for the unpredictable Philippine climate brought by global warming. This plant species can survive in typhoons and drought making it an ideal source of bioethanol nowadays.

In view of the findings and conclusions, the following recommendations maybe forwarded by this research: Glucose analysis must be done immediately after sampling to obtain a precise result; other method of glucose analysis that will attain more accurate results could be tried; immediate addition of Calcium Chloride is required to stabilize the calcium- dependent enzymes; for saccharification and fermentation constant agitation must be properly observed; further study regarding fermentation in terms of time and amount of yeast added to optimize the ethanol yield could be conducted and further study on the characteristics of wild yam could likewise be conducted.

*Presented during the Bicol University Student R&D Forum, March 11-12, 2010 at BU College of Science Auditorium, Legazpi City
The color of the pili pulp oil was analyzed by X-rite Spectrophotometer using the method of International Commission on Illumination (C.I.E.) Chromaticity by BASF Philippines, Inc.

Therefore for every liter of oil there would be an additional cost of Php9.20.

Thus, the decolorizing technology developed in this study is effective, power efficient and economical. This decolorizing technology will widen the range application and increase the marketability of pili pulp.

ENVIRONMENTAL HEALTH HAZARDS ASSESSMENT OF MOLLUSKS HARVESTED IN NATUNAWAN COVE, TABACO CITY: PLANKTON CHARACTERIZATION OF NATUNAWAN COVE*

Plankton Characterization of Natunawan Cove

The study aimed to characterize the biological composition and determine the physio-chemical parameters of water in Natunawan Cove for a period of three months from September 2009 – November 2009 with four stations namely: Station 1 (Tayhi), Station 2 (Pawa), Station 3 (San Carlos), and Station 4 (Bariw).

From the data obtained, there were 22 species of phytoplankton identified and 6 zooplankton species. The phytoplankton species belong to 4 major groups; 14 species belong to Division Chrysophyta being the most dominant comprising 64%; 4 species from Division Chlorophyta comprising 18%; while Pyrrophyta was 14% with 3 species and Cynophyta comprising 4% with 1 species. Station 3 (Brgy. San Carlos) had the highest density phytoplankton while Station 4 (Bariw), had the lowest density. *Cocconeis* sp. was the most abundant species belonging to Chrysophyta, while the least abundant species was *Cocconeis* sp. For zooplankton species, there were 3 major groups; 3 species belong to Division Copepoda being the most dominant comprising 50%. Two (2) species from Division Polychaeta comprising 33% and 1 species for Division Sarcodina with 17%. Station 3 (San Carlos) had the highest density of zooplankton and Station 1 (Tayhi), had the lowest density. Nauplius larvae were the most dominant while the least abundant species was *Nectochaeta* sp.

Phytochemical parameters showed that temperature ranges from 26.55-28.20°C with a mean of 27.02°C, while salinity recorded ranges from 21.67-32.5 ppt and a mean of 27.05 ppt. Hydrogen ion concentration (pH) ranges from 5.97-8.45 resulted to an average of 7.73. Water depth ranges from 21.67-32.5 cm. with a mean of 27.05 cm. Lastly, suspended solids was recorded with ranges from 1.25-2.42mg/l having an average of 1.63 mg/l. Temperature was found out to have a strong relationship to the plankton density while pH, salinity, suspended solids and depth showed a low relationship.

*Presented during the Bicol University Student R&D Forum, March 11-12, 2010 at BU College of Science Auditorium, Legazpi City
THE USE OF HDPE AND CLING WRAP ON READY-TO-COOK EMPANADA STORED AT CHILLING TEMPERATURE*

RAMIL R. PAJARILLAGA

Introduction

The Empanada is a semi-circular convenient food that usually contains ground pork or chicken meat, potato, chopped onions, and raisins. It has a doughy baked version and a flaky fried version. In this study, boiled diced cassava was used as alternative to potato and the mixture was cooked in asado style.

The Empanada is usually marketed within 24 hours because of the perishable nature of the filling. This study was conceived to determine the effect of chilling temperature (2°C) on the storage stability of the product. High density polyethylene bag and cling wrap were used for product preservation. Specifically, this study (1) determined the changes in sensory quality of pre-baked empanada; (2) identified physico-chemical changes in the samples; (3) monitored microbiological changes; and (4) compared the effect of packaging material on the quality of pre-baked empanada.

Materials and Methods

Ready-to-cook Empanada was prepared using a family recipe as reflected in Table 1. The garlic, onion and ground meat were sautéed in oil until meat was cooked. The diced boiled cassava, water and spices were added and allowed to simmer until the sauce evaporated. The prepared mixture was set aside to cool. Dough was prepared by mixing and kneading the ingredients. A spoonful of the filling mixture was filled into the flattened dough. The samples were pre-baked at 150°C for 20 minutes. The pre-baked samples (weighing approximately 48-50 grams) were air-cooled and packed separately in high-density polyethylene bags and cling wrap with styrophore trays as base. Each pack contained 5 pieces of Empanada.

Table 1. Ingredients for the preparation of ready-to-cook empanada.

<table>
<thead>
<tr>
<th>Specifications</th>
<th>Quantity</th>
<th>Specifications</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>ground meat</td>
<td>500 grams</td>
<td>all-purpose flour</td>
<td>500 grams</td>
</tr>
<tr>
<td>boiled cassava,</td>
<td>250 grams</td>
<td>egg yolk</td>
<td>100 mL</td>
</tr>
<tr>
<td>diced</td>
<td>1 teaspoon</td>
<td>egg white</td>
<td>20 mL</td>
</tr>
<tr>
<td>cooking oil</td>
<td>5 grams</td>
<td>salt</td>
<td>1 teaspoon</td>
</tr>
<tr>
<td>garlic, diced</td>
<td>5 grams</td>
<td>onion</td>
<td>¼ cup</td>
</tr>
<tr>
<td>onion, diced</td>
<td>1 teaspoon</td>
<td>diced</td>
<td>1 teaspoon</td>
</tr>
<tr>
<td>pepper, ground</td>
<td>10 grams</td>
<td>honey</td>
<td>½ cup</td>
</tr>
<tr>
<td>salt</td>
<td>10 mL</td>
<td>sugar</td>
<td>1 cup</td>
</tr>
<tr>
<td>sugar</td>
<td>20 mL</td>
<td>soy sauce</td>
<td></td>
</tr>
<tr>
<td>water</td>
<td></td>
<td>water</td>
<td></td>
</tr>
</tbody>
</table>

The packed samples were stored at chilling temperature (2°C) and quality changes were monitored for 30 days. The analysis conducted included sensory evaluation (color, aroma, texture, taste and general acceptability), physico-chemical tests (peroxide value, moisture activity, pH and microorganism examination). Significant differences among the samples were determined by ANOVA and DMRT.

Results and Conclusions

Changes in Color. Empanada packed in both HDPE bag and cling wrap were moderate creamy yellow all throughout storage. No significant change in color was observed for 30 days. However, the samples packed in cling wrap have higher mean values than those in HDPE bags.

Changes in Texture. Significant changes were observed in the flaky, soft, compact, and crispy attributes of Empanada packed in HDPE bags on the 18th, 21st, 27th, and 30th days, respectively. However, the moistness, toughness, and oiliness of the samples did not change significantly for 30 days. On the other hand, all texture attributes of the samples packed in cling wrap did not exhibit significant changes during storage. Crispiness, compactness, softness, and flakiness remained moderate; whereas, moistness and oiliness were weak.

Changes in Aroma. The meaty aroma of Empanada in HDPE bag exhibited significant change on Day 18, but the sample in cling wrap remained moderate. Rancid and moldy aroma developed on Day 24 and off-odor was detected on Day 27. No significant changes were noticed in empanada packed in cling wrap, except for the off-odor that developed on the 21st day. All samples were weak in peppery, greasy, and salty attributes.

Changes in Taste. No significant changes in sweetness, flour-like, cassava-like, peppery, salty, and greasy tastes were perceived in all samples. The meaty taste of empanada in HDPE bag weakened on Day 27. Rancidity and moldiness were changed significantly on Day 21 with cling wrap and on the 24th (rancidity) and 18th (moldiness) days with HDPE bags.

General Acceptability. Empanada packed in cling wrap was “liked very much” until Day 3 and “liked moderately” all throughout the storage period. Whereas, sample in HDPE bag was “liked moderately” from Day 3 until Day 30. This implies that the samples remained acceptable for one month.

Changes in Physico-chemical Attributes. The peroxide value changed significantly during storage, i.e., on the 18th day (in HDPE bags) and 21st day (in cling wrap). Samples increased from 3.5 mEq/g (Day 0) to 12.6 mEq/g (in HDPE bags) and 11.8 mEq/g (in cling wrap) on 30th day of storage. According to Pearson the rancid taste often begins to be noticeable when the peroxide value was between 20 - 40 mEq/kg.

The water activity increased until Day 6, and decrease thereafter until Day 30, in the samples packed in HDPE bags. In cling wrap, water activity was stable in Days 3 and 6, and decreased subsequently.

Analysis for pH and titrable acidity revealed that the ready-to-cook empanada is a low acid food. There were no significant changes in these properties all throughout storage.

Conclusions. A traditional Empanada only last for a short period of time because of the enzymatic and microbial activities. However, results of sensory evaluation, physico-chemical tests and microbiological examination revealed that ready-to-cook Empanada was still acceptable after 30 days storage at chilling temperature when packed in HDPE bags and cling wrap. This may be due to the moisture resistant characteristic of the packaging materials. Low temperature storage and the use of appropriate packaging materials maintained the quality of the samples and extended storage stability. The use of cling wrap exhibited less quality changes in the samples, due to the protection from air and prevent dry foods from absorbing moisture and wet foods from losing moisture. It can also seal-in odors to prevent them from spreading to other foods.

References

www.mybige.com/Empanada_History.html
http://en.wikipedia.org/wiki/plastic_wrap

*Presented during the Bicol University Student R&D Forum, March 11-12, 2010 at BU College of Science Auditorium, Legazpi City
A PROJECT FEASIBILITY ON “BIO-BROWN ORGANIC FERTILIZER PRODUCTION”*

JAYSON M. REMOLACIO AND ANTHONY GENE T. REBURIANO

Introduction
Considering what the world is experiencing in connection with global warming, it turned out that one possible cause is the use of inorganic fertilizer. The inorganic fertilizer uses chemicals that are harmful to our environment. This is the reason the proponents proposed Project Feasibility Study focused on caring and saving the environment, at the same time, earning through the production of organic fertilizer as a substitute for inorganic fertilizer. With the Bio-Brown Organic Fertilizer, environment-friendly, affordable yet high quality fertilizer will be produced, which will then contribute to the growth and development of Bicol Region.

Materials and Methods
The focus of this feasibility study was to produce Bio-Brown Organic Fertilizer to provide alternative fertilizer for the farmers of 3rd District of Albay, namely, Guinobatan, Oas, Polangui. The proponents envisioned to produce high quality but affordable fertilizer to sustain the needs for organic fertilizer and contribute to the growth and development of the locality and the country.

Bio-Organic fertilizer is a combination of end result of controlled aerobic decomposition of organic matter and biodegradable materials such as rice straws, corn stalks, vegetable trimmings and fruit peeling. Animal manures include chicken dung and swine manure. Mill waste includes burned rice hull. It is formulated by organic materials which are rich in carbon plus material composed of nitrogen, potassium, phosphorus, and micro-nutrients.

The production process adopted the improved method or microbial inoculation by applying micro-organisms that help hasten decomposition period from 3 months to 3-4 weeks. The harvest was milled on hammer mill, weighed and packed, stored, and delivered to the agricultural stores or outlets.

The activity of production process in composting involved; first, shred the rice straw and corn stalk by means of mechanical process using shredder machine to cut the materials into small pieces, then put in a prepared compost heap, add compost fungus activator to hasten decomposition period. Water compost heap to maintain moisture content of 14% to help compost heap, add compost fungus activator to hasten decomposition. Inoculation by applying micro-organisms that help hasten decomposition period harvest the decompost rice straw or corn stalk. Cover it with plastic or banana leaves to preserve heat. Decomposing period will consume one week. After the decomposition period harvest the decompost rice straw or corn stalk. Mix materials such as, decomposed rice straw or corn stalk, carbonized rice hull, and chicken dung by manual process using shovel. Add Bio-N to increase nitrogen content, then spread Zeolite to eliminate bad odor of manures. Then cover it with plastic or banana leaves to preserve nitrogen content and heat. Decomposting period will last up to 15-20 days. Harvest the decomposed material and mill it in a hammer mill, weigh and bag it in 50 kilogram plasticinied sack. Store or deliver the finished product to distributor or retailers of Agricultural Supply.

Result and Conclusion
This Project Feasibility Study had a favorable result based on the surveys conducted by the proponent. After considering its demand and supply, it turned out that it is feasible to pursue the production of Bio-Brown Fertilizer and it will be generating more income if the marketing strategies will be implemented. Therefore the proponent had considered only those in the 3rd District of Albay like Guinobatan, Oas and Polangui. The total irrigated farmland within these three municipalities is six thousand two hundred sixteen hectares (6,216) (1,092 hectares from Guinobatan, 3,079 hectares from Oas, and 2,045 hectares from Polangui). This fluctuates according to the planting season and cropping intensity of the farmers. Ten percent (10%) of the total area in Guinobatan, 10% from Oas and 20% from Polangui were using organic fertilizers as of 2008. The municipal agriculturists encourage the use of organic fertilizers per hectare of at least five bags of 50 kilograms per sack during wet season and six bags during dry season. The supply was insufficient since it was estimated to have an increase demand of supply by 20% yearly. From 2008, projected supply volume of 2,818 may reach 8,416 in the year 2014.

Table 1. Projected Supply Volume of Organic Fertilizer (2008-2014)

<table>
<thead>
<tr>
<th>Year</th>
<th>Projected Supply Volume</th>
</tr>
</thead>
<tbody>
<tr>
<td>2008</td>
<td>2,818</td>
</tr>
<tr>
<td>2009</td>
<td>3,382</td>
</tr>
<tr>
<td>2010</td>
<td>4,058</td>
</tr>
<tr>
<td>2011</td>
<td>4,870</td>
</tr>
<tr>
<td>2012</td>
<td>5,844</td>
</tr>
<tr>
<td>2013</td>
<td>7,013</td>
</tr>
<tr>
<td>2014</td>
<td>8,416</td>
</tr>
</tbody>
</table>

Table 2. Demand and Supply Gap Analysis (2010-2014)

<table>
<thead>
<tr>
<th>Year</th>
<th>Projected demand (No. of bags)</th>
<th>Projected supply (No. of bags)</th>
<th>Demand and Supply gap analysis (No. of bags)</th>
<th>Production volume (No. of bags)</th>
<th>Market Share</th>
</tr>
</thead>
<tbody>
<tr>
<td>2010</td>
<td>11,000</td>
<td>4,058</td>
<td>6,942</td>
<td>3,600</td>
<td>52%</td>
</tr>
<tr>
<td>2011</td>
<td>12,100</td>
<td>4,870</td>
<td>7,230</td>
<td>3,960</td>
<td>55%</td>
</tr>
<tr>
<td>2012</td>
<td>13,321</td>
<td>5,844</td>
<td>7,477</td>
<td>4,356</td>
<td>58%</td>
</tr>
<tr>
<td>2013</td>
<td>14,652</td>
<td>7,013</td>
<td>7,639</td>
<td>4,792</td>
<td>63%</td>
</tr>
<tr>
<td>2014</td>
<td>16,126</td>
<td>8,416</td>
<td>7,710</td>
<td>5,271</td>
<td>68%</td>
</tr>
</tbody>
</table>

Table 3. Projected Sales Volume (2010-2014)

<table>
<thead>
<tr>
<th>Year</th>
<th>Production volume (50kg/sack)</th>
<th>Allowance spoilage (0.3%)</th>
<th>Sales volume (50kg/sack)</th>
<th>Cost per 50kg/sack</th>
<th>Total sales</th>
</tr>
</thead>
<tbody>
<tr>
<td>2010</td>
<td>3,600</td>
<td>11</td>
<td>3,589</td>
<td>Php310.00</td>
<td>1,112,590.00</td>
</tr>
<tr>
<td>2011</td>
<td>3,960</td>
<td>12</td>
<td>3,948</td>
<td>341.00</td>
<td>1,346,268.00</td>
</tr>
<tr>
<td>2012</td>
<td>4,356</td>
<td>13</td>
<td>4,343</td>
<td>375.00</td>
<td>1,628,625.00</td>
</tr>
<tr>
<td>2013</td>
<td>4,792</td>
<td>14</td>
<td>4,778</td>
<td>412.00</td>
<td>1,968,536.00</td>
</tr>
<tr>
<td>2014</td>
<td>5,271</td>
<td>15</td>
<td>5,255</td>
<td>453.00</td>
<td>2,380,515.00</td>
</tr>
</tbody>
</table>

The actual production was 300 bags per month or a total of 3,600 bags per year. With the foreseen demand and gap analysis the proponents decided to increase production by 10% yearly to meet the demand starting year 2010. The projected sales volume for five consecutive years is Php1,112,590.00 in 2010 and 2,380,515.00 in 2014.

The proponents therefore concluded that the product of the proposed project will be patronized by the local farmers in the 3rd District of Albay because people in the province prefer to buy farm products like vegetables and fruits that are fertilized by an organic fertilizer.

*Presented during the Bicol University Student R&D Forum, March 11-12, 2010 at BU College of Science Auditorium, Legazpi City


**STRENGTHENING CAPACITIES FOR CLIMATE RISK MANAGEMENT AND DISASTER PREPAREDNESS: A GOP-FAO INITIATIVE IN BICOL REGION**

Arnulfo M. Mascarillas

Director, Bicol University Research and Development Center and CHED-Bicol University Zonal Research Center, Legazpi City, Philippines

The Bicol Region, due to its geographic location and physical environment, is highly vulnerable to typhoons, floods, and droughts. It experiences an average of 20 typhoons and tropical storms annually. They usually result to landslides, flash floods, widespread flooding and together with strong winds, cause the destruction of homes, public infrastructures, and agriculture. The region also experiences seasonal variations in weather, especially of rainfall, resulting to variations in production and seasonal price fluctuations that significantly affect the income of the farmers.

Climate change is expected to further exacerbate the poverty condition in Bicol given its vulnerability to climate-related hazards. The Government of the Philippines (GOP) and the Food and Agriculture Organization (FAO) saw the need to strengthen the capacity of local communities to respond to climate change. This concern is being addressed by (a) improving capacity of local government units to use early warning system; (b) strengthening capacity of PAGASA to provide site-specific short- and long-term forecasts; (c) strengthening capacity of the DAR-FRU and concerned LGUs to undertake timely and accurate post-disaster damage assessment; (d) developing and implementing community-based natural disaster risk management plans; and (e) identifying, pilot testing and disseminating good practice options for climate change adaptation and disaster risk reduction for vulnerable livelihood groups.

**Keywords:** climate change, climate risk management, disaster preparedness, vulnerability, climate related hazards, early warning system, and good practice options

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**GEOGRAPHICAL DISTRIBUTION OF EGGPLANT (Solanum melongena Linn.) VARIETIES IN THE LANDSCAPE OF ALBAY PROVINCE: PHENOLOGY AND STOCHASTICITY OF GERMPLASM**

Joey A. Soniega1 and Ludivina C. Savilla2

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2Central Bicol State University of Agriculture, Pili, Camarines Sur, Philippines

Eggplant is a widely cultivated crop in the province of Albay, Philippines. This paper assesses the varietal preference of farmers for the crop and the dynamics of genetic resources distribution in the agricultural landscape of the area. For reference during the field surveys done in 2008-2009 cropping, the province was divided into Eastern and Western grids. A total of 60 sampling sites with varied topography across gradient of soil texture were identified based on predetermined selection criteria. Thirty of these were located in nine municipalities in the Eastern grid. Another thirty were located in seven municipalities in the Western grid. The total land area of all sampling sites was approximated at 83.21 hectares, 35.90% of which was planted with S. melongena. The Eastern grid shared 9.63% while Western grid had 26.27%. This assures both grids as continuum of productive agricultural lands.

In terms of seed types planted, landrace variety occupied only 5.66% of the approximated total land area. Hybrids which are classified as genetic resources under improved germplasm occupied the bulk of 94.64%. The large proportion of land planted to hybrids compared to the landrace indicates (1) shift in preference of farmers in Albay Province from traditional to modern, and (2) prelude to consequential gradual displacement of landraces by hybrids in the agricultural landscape of the province.

Overall, the geographical distribution of S. melongena in Albay has both ecological and socio-economic roots. Farmers’ preference and availability of planting materials (e.g. seeds) appears as primary determinants of continuity of variety bin time and space. Further, the extensive occurrence of eggplant fruit and shoot borer (Leucinodes orbonalis) offers a deterministic threat and limiting factor to S. melongena production since farmers have become reliant on chemicals for pest control. Stochastic threats experienced in the province included “force majeure” such as disasters and natural calamities brought by eruptions of Mayon Volcano and frequent typhoons. The decimated lands after super typhoon Reming which struck the province on November 30, 2006, used to be the dominion of human populace but now have their own new timetable of blooms which decorate the landscape with remnants of catastrophes.

**Keywords:** geographical distribution, phenology, stochasticity, landscape

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**DIFFERENTIAL CARBOHYDRATE METABOLISM OCCURS DURING SUBMERGED GERMINATION AND EARLY GROWTH IN BARNYARDGRASS (Echinochloa spp.) AND CONTRASTING RICE (Oryza sativa L.) GENOTYPES**

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1Bicol University, Legazpi City, Albay, Philippines
2University of the Philippines Los Baños, College, Laguna, Philippines
3International Rice Research Institute, Los Baños, Laguna, Philippines

With the looming water crisis due to climate change, more rice farmers are likely to shift from transplanted to direct-seeded rice (DSR). An important aspect of DSR which is flooding to suppress weed growth; however, could also adversely affect growth of rice.

This study was conducted to determine the morphological and biochemical responses of two rice genotypes, IR42 and KhaolHlan On (KHO), and two grasses, E. crus-galli (Ecrus) and E. colonia (Ecol) to various times and depths of flooding.

KHOand IR42 had less reductions in germination, shoot and root growth and tolerated early and deep flooding better than did Ecrusand Ecol. However both weeds recovered fast, which allowed them to catch up with both rice genotypes after initial flooding injury. In all four species, flooding enhanced anaerobic fermentation through increased activities of alcohol dehydrogenase (ADH) and pyruvate decarboxylase (PDC). The ability of Ecrusand Ecol to shut off ADH and PDC after aerobic germination, which was not observed in both rice genotypes, could contribute to the faster growth and competitiveness of the two grasses. Activity of aldehyde dehydrogenase (ALHD), which detoxifies acetaldehyde, was higher in KHO and Ecrus than in Ecol and IR42 under flooded conditions. Regulation of ALDH activity appeared to be implicated in the mechanisms of tolerance to flooding of Ecrus and KHO and may serve as basis in developing flood-tolerant rice cultivars and other crops.

**Keywords:** flood tolerance, Anaerobic fermentation, weed competition, glycolysis, hypoxia, Echinochloa colona, Echinochloa crus-galli

*Presented during the 2010 ISSAAS International Conference on November 14-18, 2010 in Bali, Indonesia*
**Mascariñías, 2 BU faculty present papers in 2010 ISSAAS International Congress**

Left to Right: Dr. Arnulfo M. Mascariñas, Dr. Lucy P. Estioko and Professor Joey A. Soniega

**BU R&D... (from page 1)**

management are the following: 1) individual research undertakings should have individual folders where all documents pertaining to the research are compiled according to the approved work instruction; 2) evaluation of research proposal should include score per criterion to identify the area where the proposal can be improved; 3) quarterly R&D monitoring reports should reflect the objectives of the study as stated in the appointment of researchers and the extent of accomplishment for each objective/expected output in the quarter; and 4) the status of externally-funded researches should be reported to the Center since the BU faculty conduct said researches.

The Key Results Areas (KRAs) for research include: research output publication, research output dissemination and commercialization, faculty-researcher development, and research grants and awards.

The BURDC Quality Management Representatives during the Stage 1 Audit were Mr. Erwin E. Torres, Prof. Yolanda Julieta B. Brugada, Prof. Ronnel S. Dioneda and Prof. Marcial R. Jane. The examination of documents and interview which lasted for two hours was done in the presence of Dr. Joseph Bartolata, the University Planning Officer. (ROB & EET)

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**Candelaria presents papers in Taiwan**

**PROF. ANGELO P. CANDELARIA, BURDC staff, presented his papers during the 5th International Conference on Ecological Discourse at Tamkang University, Taipei Country, Taiwan held on December 16-18, 2010.**

The papers are entitled “Household Potable Water Consumption and Demand by User Sectors: An Assessment” and “Mechanisms Utilized in the Development of Marine Fishery Reserves and Sanctuaries in the Bicol Region, Philippines for Coastal Resource Management.” The first paper dealt on the description of water usage, demand management, and other strategies to improve potable water resources in ten urban barangays in Sto. Domingo, Albay. The second paper was a process documentation of activities in the Marine, Fishery, Reserves and Sanctuaries, and the problems and issues emerging in their establishment.

The conference was hosted by English Department, Tamkang University in cooperation with Chemistry Department, Tamkang University. Prof. Candelaria was given travel grant by BU Research and Development Center. (RROB)

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the keynote addresses on September 28 and 29, 2010, respectively.

The plenary papers included “Application of Geographic Information System on the Vulnerability Assessment of Watersheds as a Tool in Reducing Climate Change Impacts on Agricultural Production, Biodiversity Conservation and Environmental Hazard Avoidance: The Case of Yabo Naga Watershed, Camarines Sur” by Mr. Alejo Balaguer; “Strengthening Capacities for Climate Risk Management and Disaster Preparedness: A GOP-FAO Initiative in the Bicol Region” by Dr. Arnulfo M. Mascariñas; and “Impacts and Influences of Smallholder Upland Development Project in Alleviating in the Philippine Uplands” by Dr. Nena Espiritu.

The parallel sessions focused on the following thematic areas: 1) Agri-entrepreneurship for productivity and efficiency; 2) Climate change adaptation for sustainable agriculture; 3) Community empowerment; 4) Ensuring food safety for a healthy community; and 5) Sustainable management of bio-resources for self-sufficiency.

The congress also included the oath-taking ceremony of the new members of ISSAAS Bicol Chapter led by Dr. Rañola, the executive meeting on September 27, 2010, and the tour in Albay on September 30, 2010. Dr. Agnes J. Nepomuceno, Research Coordinator of BU College of Arts and Letters, was the lady of the ceremonies. Dr. Fay Lea Patria M. Lauraya, BU President, is the Regional Coordinator and Adviser of ISSAAS Bicol Chapter while Dr. Arnulfo M. Mascariñas, BU RDC Director, is the president of the ISSAAS Bicol Chapter. (RROB)
THE 1ST PROGRAM/PROJECT LEADER’S Conference was held on November 25, 2010 at the BU College of Science Auditorium in order to give the BU researchers the opportunity to present their status reports and problems encountered in the implementation of their research activities.

The conference included presentations on the Key Results Area for Research and Development, and Highlights of the ISO 2008 Stage 1 Audit by Prof. Erwin E. Torres, and Process of Monitoring of On-going Research Programs/Projects by Prof. Yolanda Julieta Brugada. Dr. Arnulfo M. Mascarinas presented rationale and mechanics of the conference.

To facilitate the presentation of status reports, parallel sessions for the new and on-going researches were held. During the open forum, comments and questions pertaining to the administrative aspect of implementing a research program/project, and problems encountered by the researchers were discussed. The panelists for the session on new researches were Dr. Mascarinas, Prof. Brugada and Mr. Torres, while Dr. Luis O. Amano, Prof. Ida Francia Revale, Prof. Angelo P. Candelaria and Prof. Corazon V. Caputan were in-charge of the session for on-going researches.

The conference was attended by BU program/project leaders, college research coordinators and RDC staff. (RROB)
BU Welcomes 17 Kochi University Studies, 4 Faculty

KOCHI UNIVERSITY delegation composed of 17 students and 4 faculty arrived on August 20, 2010 at Bicol University Tabaco Campus as part of the foreign exchange student program between Kochi University and Bicol University.

The purpose of the Student Exchange Program is to enrich the academic study of the students through exposure in foreign language, arts, cultural, political condition and other relevant aspects in foreign relation. The community immersion provides the students with field experience and actual understanding of the theoretical concepts that they have studied.

Moreover, the new discoveries that they will acquire will be beneficial to their different researches and will open possible linkages to develop partnership activities in the future. Finally, the variations of social condition of the country such like labor laws, facilities, technology and other factors that indicate its development enable students to gain additional knowledge about their field specialization.

In exchange, the Bicol University will send seven students and two faculty from BU Tabaco Campus, Fisheries Department to Kochi University, Japan in October 2010. (MRJ)

BU Leads Trainings on Supply Chain Improvement for Abaca Project

Mr. Rebancos facilitating the reorganization of MACABULUHAN Farmers’ Producers Cooperative

Prof. Candelaria facilitating the training on team building and values reorientation

Members of BUFAPROCO during their training on team building and values reorientation

Mr. Erwin Torres labeling the grades of the abaca fibers produced by the FIDA-improved handstripping device in Manambrag, San Andres, Catanduanes

Ms. Grace Torres facilitating the reorientation of MACABULUHAN FPC members

TO SUSTAIN THE EFFORTS to make the identified clusters of abaca farmers in Catanduanes viable economic units, activities on the networking, organizational strengthening, and technical assistance and equipment support components of the Supply Chain Improvement project of Bicol University are ongoing.

Trainings to be conducted were already identified as follows: team building and values formation; vision, mission, goals and objectives formulation; strategic planning and management; training on the use of stripping device and abaca fiber grading and classification; bookkeeping and financial management; and business planning (Abaca fiber trading) and enterprise management.

To facilitate the conduct of the trainings in MACABULUHAN Farmers Producers Cooperative, reorganization was pursued on August 5, 2010 and was attended by representatives from Department of Agrarian Reform (DAR), FIDA, Supply Chain project staff and members of the cooperative. Team building and values reorientation training was conducted in BUFAPROCO and MPC on September 16 and 17, 2010, respectively. Evocative discussion, sharing, storytelling, group dynamics, group activity and lectures were the actual workshop methods utilized during the training.

To determine the applicability and acceptability of the FIDA-improved handstripping device to abaca farmers, technical evaluation of the device was conducted on August 4-6, 2010. It was found out that the device can produce lesser amount of abaca fiber compared with the traditional hagotan per unit of abaca leaf sheath. However, it can produce finer and whiter fiber compared with the traditional hagotan. For the abaca farmers to use the device, few modifications have to be incorporated to the technology that include the increase in the length of the knife by three inches to accommodate more leaf sheath and to increase the height of the tensioner assembly for the wooden base to have longer useful life.

The Memorandum of Agreement (MOA) of the project is ready to be signed by its stakeholders which include the Provincial Government of Catanduanes (PGC), Municipal Governments of Bato and San Andres (MGB and MGSA), Bicol University (BU), Catanduanes State College, Department of Trade and Industry (DTI), and Department of Science and Technology (DOST) except for the Fiber Industry Development Authority Regional Office V (FIDA RV) for the reason that the MOA is being reviewed at the FIDA Central Office. The Development Bank of the Philippines (DBP) also shows interest in providing financial assistance to the project. Ways where they can intervene are being explored.

The MOA as well as the procedures for the modification of the stripping device is being worked out with the FIDA Central office. Trainings on mission, goals and objectives formulation, and fiber classification are on the schedule in October 2010. (EET)
Nieves Presents Papers in Thailand, Japan

DR. PLUTOMEO M. NIEVES, Dean of Bicol University Tabaco Campus, presented his papers entitled “Assessment of the Fishery for Macro-Invertebrates Cleaning in Lagonyo Gulf, Philippines” during the 2010 Coastal Zone Asia-Pacific Conference (CZAP) and World Small-Scale Fisheries Congress (WSFC) held at Montien Riverside Hotel, Bangkok, Thailand on October 17-22, 2010; and “Effect of Nature and Socio-Economic Changes on Coastal and Upland Ecosystem in San Miguel Island” during the 4th International Symposium on Kuroshio Science held at Kochi University, Japan on November 6-8, 2010.

The 2010 Coastal Zone Asia-Pacific Conference and World Small-Scale Fisheries Congress featured 30 plenary speakers from all over the world who are social scientists, biologists, ecologists, conservationists, oceanographers, sociologists and academicians. Nieves’ paper was presented during the Concurrent Session 3 with the theme “Sustaining Fishing livelihood.”

The 4th International Symposium on Kuroshio Science with the theme “Effects of Recent Societal Changes and Modifications to the Natural Environment on the Marine and Land-based Ecosystem in the Kuroshio Region” featured five thematic sessions. Nieves was the chair during the first thematic session where he also presented his paper. The symposium also included the Toba Bay cruise which gave the participants the chance to observe the actual oceanographic and ichthyofauna survey, and to visit Kochi University Marine Laboratory with its state-of-the-art marine science laboratory.

BU Fisheries R&D Papers Win in Regional Symposium

BICOL UNIVERSITY won first prize in the Fisheries-Research and Fisheries-Development categories during the 22nd Regional Symposium on Research and Development Highlights held on August 19, 2010 at Bicol University, Legazpi City.

The papers entitled “Early Life History of the Spiny Siganid spinus (Linnaeus 1758) Inferred from Otolith Microstructure” by Victor S. Soliman, H. Yamada and K. Yamaoka, and “Experimental Culture of the Scallop Decatpecten striatus: Stacking Density Effects to Growth Recovery and Production” by Victor S. Soliman, Jonel R. Corral, Renan U. Bobiles and Shiela B Belen bested the other entries in the Fisheries research and development categories, respectively.

Likewise, BU dominated the research poster category. Four posters were adjudged as winners; namely, 1) “Sea Urchin (Tripneustes gratilla) Resource Enhancement Project Along Logonyo Gulf” by Plutomeo M. Nieves, Skorzeny C. de Jesus, Anotnio B. Mendoza, Jr. and Aldrin Mel Macale (1st Best Poster); 2) “Perils and Profits in the Scallop Fishery: An Economic Analysis of the Trade-offs between Monetary Returns and Fatality Risk and the Race for Fish in a Common Pool Resource Regimen in Naro Island, Masbate” by Victor S. Soliman (BU) together with Raul G. Bradecina (PSU) (2nd Best Poster); and “Early Life History of the Folk-tailed Siganid argentus Inferred for Otolith” by Victor S. Soliman, H. Yamada and K. Yamaoka, and “Population Dynamics of the Scallop Decatpecten striatus in Asid Gulf, Masbate” by Victor S. Soliman, Jonel R. Corral, Shiela B Belen and J.C. de Chavez (3rd Best Poster).

The regional symposium was sponsored by the Bicol Consortium for Agriculture Resources Research and Development (BCARRD) under the directorship of Dr. Ninfa R. Pelea.
Casting out Personal Demons
Ronan N. Sarmiento

A MATH–TINIK TEACHER
by Shella Marie