

PHilMech

Official Newsletter of the Philippine Center for Postharvest Development and Mechanization
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April-June 2013

TREATS: All About Mango



Mango Peels Turn Earth and
Money Saver



(Cover Story) FIRCH: a
Breakthrough in Mango Drying





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A lady from Guimaras poses with the worlds' sweetest mango during the Manggahan Festival. Photo by APBermudez

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Development Plan

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PHilMech brings mango PH tech to Guimaras' Manggahan Festival

The Philippine Center for Postharvest Development and Mechanization (PHilMech) showcased the recent postharvest technologies and research-results in mango at the Manggahan Capitol Grounds, Jordan, Guimaras on April 15-19, 2013.

This years' Manggahan Festival offered not only entertainment and fun for visitors and tourists but also the latest information and trends through Agri Trade Fair participated by different government agencies and private sectors engaged in mango processing and research.

PHilMech showcased the commercially available postharvest technologies for mango such as Multi-commodity Solar Tunnel Dryer (MCSTD), Mango Cabinet Dryer, Controlled Atmosphere for Mango, Non-chemical Approach to Managing Postharvest Diseases in Tropical Fruits, Mango Peels as Source of Pectin and Far-infrared and Convection Heating Conveyor Dryer for Mango.

These technologies and approaches are geared towards helping farmers and other stakeholders maintain the quality of their produce for the international market.

Meanwhile, Mr. Ronnie Morante, Provincial Agriculturist of Guimaras,



TECHNOLOGY PROMOTION. PHilMech displays the commercially available technologies for mango processing during the Manggahan Festival in Guimaras.

said that the inclusion of activities like the Agri Trade Fair in the Manggahan Festival plays a vital role in informing the people of the efforts of the government in support to the growing mango industry in the country.

"Mango is our major crop here in Guimaras and mango industry is the main source of income of most of our people. We are glad PHilMech joined us in our efforts in bringing the latest technologies of mango to our people," Morante said.

Through the trade fair, PHilMech oriented and informed a wide array of audiences-- farmers, entrepreneurs, educators, students, researchers, among others.

First held in 1993, the Manggahan Festival is an annual celebration of the Guimarasnon to commemorate its independence as a province. The festival is also associated with the harvest season of the world's sweetest mangoes. APBermudez

Industry News



Features

TREATS

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Photo courtesy of DA-RAFID 8

UNIVERSITY-ON-THE-AIR. Director Rex L. Bingabing challenges the new graduates of the University-on-the-Air on Postharvest and Mechanization to support the government in achieving rice self-sufficiency this year.

375 finish UOA on Rice Postharvest and Mechanization

Three hundred seventy five farmers from Samar and Leyte completed the two-month long University-on-the-Air (UOA) program on Rice Postharvest and Mechanization in support to the National Year of Rice goals. These farmers attended the graduation ceremony last May 29 at the Leyte Park Hotel Gymnasium, Tacloban City.

This UOA on Rice Postharvest and Mechanization is a collaborative project of the Philippine Center for Postharvest Development and Mechanization, DA-Regional Field Unit 8 and the local government units of Samar and Leyte.

It started in April 1 and was aired through DYVL-Aksyon Radyo in Tacloban City and DYMS in Catbalogan City, Samar.

Farmer-enrollees were required to answer short quizzes and major examinations administered by the radio program hosts. The municipal/city agriculturists and agricultural technologists served as their supervisors.

The said enrollees also had an educational tour at the Eastern Visayas Integrated Agricultural Research Center (EVIARC) in Babatngon, Leyte. This activity further enhanced their knowledge on the existing rice postharvest and mechanization machinery and equipment in the country.

Mr. Felipe L. Ajero of Brgy. San Jose, Tacloban City was recognized as the top UOA farmer-graduate. In his message,

Mr. Ajero stressed that all the farmers in the region should take part in attaining the rice self-sufficiency status of the country.

“With the sufficient and proper knowledge we gained in this UOA, I believe if we apply it and use it properly, we can take part in attaining this goal”, he added.

Meanwhile, Director Rex L. Bingabing of PHilMech said that farmers should take advantage of the government’s offer to avail of postharvest machinery at a lesser (subsidized) cost and maximize their uses in order to help the country achieve rice self-sufficiency.

The said project was under the Rice Mechanization program of the government where accredited farmers’ groups, irrigators associations and cooperatives can get farm machinery and share only 15 percent of its total amount while the remaining 85 percent will be shouldered by the government.

On the other hand, Regional Executive Director Antonio G. Gerundio of DA-Region 8 reiterated the importance of having a UOA in the effective dissemination of information to the public especially the farmers.

“Training makes all other DA program components valuable. However, we only cover a minimal number of farmers with our training courses due to limited funds and manpower. It is only through radio that we are given the leeway to reach out even the most remote farming communities,” Gerundio said.

RED Antonio G. Gerundio and Dir. Rex L. Bingabing presented and confirmed the graduates, respectively **AP Bermudez**



PHilMech now leads PGPC

For the second time, the PHilMech will lead the Philippine Grains Postproduction Consortium (PGPC), the association of primary institutions engaged in grains postproduction RD&E, effective May 2013.

The leadership was officially turned-over to PHilMech Director Rex L. Bingabing by National Agriculture and Fishery Council (NAFC) Director Ariel Cayanan during the celebration of the PHilMech 35th anniversary and Postharvest Loss Prevention Week last May 22 at PHilMech headquarters.

PHilMech took its first leadership in the consortium in 1999 to 2001.

Member-agencies of PGPC include the International Rice Research Institute, Philippine Rice Research Institute, National Food Authority, University of the Philippines in Los Baños, NAFC and PHilMech.

The PGPC is mandated to identify, coordinate and pursue priority areas of collaboration among its member institutions, in the area of research, and development and extension to enhance the development of the rice and other grains postproduction industry in the Philippines.

The consortium conducts technology development, basic and applied researches, seminars, workshops and trainings, policy recommendations, and grains postproduction conferences.

The development of a six-ton batch recirculating dryer was one of the accomplishments of the consortium. At present, the dryer is undergoing a field testing operation in Isabela.

The PGPC was organized in June 1999 through a Memorandum of Agreement among the agencies. It was then institutionalized under the Department of Agriculture in April 2004 through Executive Order 309.

The PGPC was first known as PRPC or the Philippine Rice Postproduction

Consortium until the EO 309 was amended through EO 59 on September 30, 2011 mandating the inclusion of other grains in the coverage of the consortium’s RD&E activities. **VBCaliguiran**



NEW LEADERSHIP. NAFC Director Ariel Cayanan turns over the PGPC flag to PHilMech Director Rex L. Bingabing. DA Assistant Secretary Dante Delima witnesses the event.



BEST ENGINEERS. The PHilMech delegation to the PSAE Convention. Most of their entries to the paper and poster competition won.

PHilMech engineers among PSAE's best

Two PHilMech engineers, Dr. Michael A. Gragasin and Engr. Andres M. Tuates Jr., were named as this year's Outstanding Agricultural Engineers of the Philippine Society of Agricultural Engineers (PSAE).

Meanwhile, four RD&E projects won in the paper and poster presentation during the 63rd PSAE Annual Convention held at Cagayan State University, Tuguegarao City, Cagayan in April 22-26.

Dr. Michael A. Gragasin of the Agricultural Mechanization Division of PHilMech is this year's Outstanding Agricultural Engineer in the field of Postharvest Technology and Food Engineering. He is currently a Supervising Science Research Specialist of PHilMech and his recent researches include ex-ante analysis of just in time brown rice hulling technology, design and development of village type cornmill, design and development of impeller type ricemill in the Philippines, among others.

Engr. Andres M. Tuates Jr. of the Bio-process Engineering Division of PHilMech received the Outstanding

Agricultural Engineer in the field of Agricultural Machinery. He is one of the project implementers on the development of a computer vision system for brown rice and on the design and development of pneumatic corn planter.

The project "Promotion of Biomass-fed Furnace Retrofitted to Mechanical Dryers" of Engr. Darius G. Ramos, Mr. Roderic O. Vereña, Engr. Aldrin E. Badua, Engr. Aileen R. Ligisan, and Dr. Eduardo T. Cayabyab won the 1st place in both paper and poster presentation for the Energy and Power Technologies Category.

The research paper of Dr. Gragasin on "Ex-ante Analysis of Just in Time Brown Rice Hulling Technology" also won 1st place under the Agricultural Processing and Structures Category.

For the Agricultural Waste Utilization Category, the paper 'Alternative Biomass Furnace Wall Material from Biomass Furnace Refuse' of Engr. Reynaldo P. Gregorio, Engr. Edgar D. Flores and Engr. Aldrin E. Badua and the poster on 'Development of Biomass Furnace By-products Based Fuel

Briquettes' of Engr. Andres M. Tuates Jr., Engr. Aileen R. Ligisan and Dr. Ofero A. Capariño placed third.

Engr. Aldrin E. Badua of the Agri-Infra Coordinating Unit of PHilMech was also elected as one of the new members of the PSAE Board of Trustees. He will share his expertise for two years.

During the convention, PHilMech Director Rex L. Bingabing discussed the mainstreaming of the agricultural engineers in the Philippine postharvest and agricultural mechanization road map.

The 63rd PSAE convention with the theme 'Agricultural Engineers: Catalyst towards Sustainable Food Sufficiency and Global Competitiveness' coincided with the 10th International Agricultural Engineering Conference and Exhibition and the celebration of the 24th Agricultural Engineering Week.

Agricultural engineers are among the front runners of PHilMech in achieving its vision and mission. Yearly, they receive recognitions from the PSAE.

VBCaliguiran

Luzon AgEn masters operation of new agricultural machinery

Fifty agricultural engineers from Luzon had undergone a four-day skills training on the operation and maintenance of selected agricultural machinery by engineers from the different Department of Agriculture-Regional Field Units, Provincial Local Government Units and Regional Training Centers of the Agricultural Training Institute.

The training course was conducted at PHilMech, Science City of Muñoz, Nueva Ecija on May 14-17, 2013 to enhance the technical capability of the engineers on the implementation of the farm mechanization program of the government.

The course has three modules namely: (1) land preparation; (2) planting, harvesting and threshing; and (3) drying and milling. The Technology Management and Training Division (TMTD) of PHilMech employed participatory learning strategies such as lecture discussion, hands-on/ actual operation and maintenance, and open forum.

The first two days of the training were devoted to the lecture discussion of the principles of operation, and construction, operating techniques, practices and maintenance, trouble shooting, precautions and safety and benefits of using the selected agricultural machinery.

The succeeding days of the training highlighted the activity where the participants gained skills and knowledge on the actual operation, maintenance and trouble shooting of different agricultural machinery. The machines used in the hands-on and actual operation include the: (1) Different type



NEW TECHNOLOGIES. The participants were trained to use the mechanical reaper. Agricultural engineers were trained on the operation of latest agricultural machinery

of tractors with different implements, (2) power tillers, (3) floating tillers, (4) rice transplanters, (5) rice reapers, (6) threshers and (7) combine harvesters. The agricultural machines used in the hands-on exercises and actual operation were provided by the Agricultural Machinery Manufacturers and Distributors Association (AMMDA).

On the other hand, the Philippine-Sino Center for Agricultural Technologies (PhilSCAT) provided the area of transplanting and equipment for drying and milling. Resource speakers from PHilMech, PhilSCAT and the technical staff and operators from AMMDA handled the different topics and facilitated the hands-on exercises and actual operation of these different agricultural machinery during the four day training course.

The participants provided positive feedbacks and response on the training

conducted. They appreciated the whole training course specifically the learning strategies employed because they not only gained theoretical knowledge but also enhanced their skills on the operation and maintenance of selected agricultural machinery. According to them, immediate application of their learnings in the actual hands-on and operation of the selected agricultural machinery is very effective in acquiring the needed knowledge and skills.

The trained participants are expected to provide technical assistance on the operation and maintenance to the beneficiaries of these agricultural machinery. There will be two more batches of this training course to be held in Visayas and Mindanao for this year.

The TMTD and Agri-Infra Coordinating Unit of PHilMech in collaboration with AMMDA spearheaded the training. **DRamos**



PHilMech reaches another milestone in service

It's another milestone for the Philippine Center for Postharvest Development and Mechanization (PHilMech) as it celebrated its 35th year in service as the premier agency in the development of the country's postharvest industry.

The industry day was held simultaneously with the observance of the 14th Postharvest Loss Prevention Week on May 23, 2013 at the PHilMech Headquarters, Science City of Muñoz, Nueva Ecija.

More than 700 farmers and leaders from all regions, together with the PHilMech employees, industry stakeholders and collaborators, and key people from the Department of Agriculture were present to grace this remarkable event of the agency.

In line with this year's theme, *'Makabagong Teknolohiya, Maunlad na Agrikultura'*, the event started with the inauguration and blessing of the newly



constructed Agricultural Mechanization Development and Demonstration Center that would showcase the new technologies designed and fabricated by the agency. This was followed by the opening and viewing of the Agricultural Machinery Exhibition in partnership with the AMMDA.

PHilMech Director Rex L. Bingabing, delivered the State of PHilMech Address (SOPA) featuring the accomplishments of the agency through the years and its future plans. A musical presentation followed depicting the brief story of PHilMech and how it helps farmers and fisher folk.

Challenge to PHilMech

Department of Agriculture Assistant Secretary Dante S. Delima represented Secretary Proceso J. Alcala during the program. He lauded the agency's efforts to meet its responsibilities and mandate of helping farmers to fully benefit from their produce, reducing losses and minimizing drudgery on farm operations.

"Congratulations dahil nagawa ninyo ang inyong tungkulin, ang mandato na tulungan ang ating magsasaka para mapakinabangan nila nang husto ang kanilang ani at hindi ito masira at pagaanin ang trabaho sa bukid," Delima said.

He also assured PHilMech that the Department of Agriculture is one with the agency in improving and extending its service for the welfare of the

farmers. Aside from his commendations, he also challenged PHilMech to make its approach people-centered (particularly for farmers) in creating new interventions and technologies for the industry.

"Sa lahat ng gustong gawin ng PHilMech, 'wag ninyong kalilimutan na tayo ay nagseserbisyo sa mga magsasaka. Kailangang patuloy ang konsultasyon, partisipasyon at pakikipag-ugnayan sa sektor ng mga magsasaka. Kung walang koordinasyon at ugnayan, sayang lang ang ating imbensyon, lahat lahat ng pagod, pera sa isang makinarya kung hindi mapakikinabangan ng magsasaka," he added.

He also emphasized that the key to better linkage is by going to the fields where farmers are, and personally talk with them. With this, the machines, tools and equipment that will be developed by the agency will be based on the needs of ordinary farmers.

Project launching and turn-over

For more than three decades now, PHilMech remains to be a dynamic pillar of the Department of Agriculture in the postharvest and mechanization. The agency continues to develop technologies that would highly benefit the farmers and stakeholders.

One of the highlights of this event was the launching of new projects and partnerships of PHilMech and turn-over of technologies to its end users.

PHilMech launched with the Agricultural Machinery Testing and Evaluation Center (AMTEC) of the University of the Philippines at Los Banos (UPLB) the Directory of Agricultural Machinery Distributors in the Philippines.

This directory provides the country's agri-machinery industry profile and the agricultural profile of regions where the agri-machinery manufacturers and distributors are based. It also includes list of accredited manufacturers of PhilRice and PHilMech; list of AMMDA members and protocol for accreditation.

The agency also launched a new project on the development of agricultural tractor implements for various farm operations (Phase I) such as hand tractor mounted rice transplanter and harvester, in collaboration with the DOST-MIRDC.

The availability of such implements will significantly increase the utilization of hand tractor in the farm areas. Moreover, it can potentially reduce the cost of farm level mechanization.

Software for the PHilMech Computer Vision System was also turned-over to the National Food Authority. This technology can analyze the standard quality parameters of brown rice, milled rice and corn in less than 10 minutes with high accuracy and repeatability.

This consists of a flatbed scanner which serves as the 'eye' and a laptop computer equipped with image processing and analysis software which serves as the 'brain'.



Lastly, a Memorandum of Agreement between PHilMech and AMMDA was inked during the event. The said MOA includes the display of new farm mechanization technologies developed and distributed by AMMDA at PHilMech headquarters. Also, it entails the joint campaign and technology demonstration of both parties to increase public visits to exhibit.

JMGSubaba



PHilMech pays tribute to outstanding partners

Six farmers group led the PHilMech outstanding partners and collaborators in receiving their plaques of recognition during the celebration of Postharvest Loss Prevention Week last May 22 at the PHilMech headquarters in the Science City of Muñoz, Nueva Ecija.

Yearly, PHilMech recognizes its outstanding partners like recipients of agricultural technologies, research and development institutions, government agencies, private companies and other cooperators who played significant role in curbing postharvest losses in the agriculture and fishery industry.

The Viga Costra Irrigators' Association (IA) of Nueva Ecija, SRT Narra of Palawan Multi-Purpose Cooperative (MPC) of Palawan, San D Mill IA, Inc of Bohol and Sto. Niño MPC of Butuan City, named as best recipients of the farm mechanization program while the Taloy Sur-Bawek Farmers Association of Benguet, and Sinabaddan Kag Tugallan and Barangay Sibulan LGU of Davao City were the two best tramline adopters.

The outstanding partners of PHilMech in research and development include Japan-Philippine Malunggay Eco-farm, Inc, SBE Farms Enterprises, Inc, Global Development Corporation, Tropical Fruit Asia Corporation and Mr. Reynaldo C. Hilario. They assisted PHilMech researchers in conducting laboratory and field works and pilot testing of newly generated technologies.

The extension support, education and training services group recognized also their partners such as the Regional Agriculture and Fishery Information Division 8, Ms. Rosario Villaviray, Keño Food Incorporated, Remzon Organic



BEST PARTNERS. Members of Sibulan Farmers Association received their plaque of recognition for being the outstanding user of the Agricultural Tramline System.

Products and Deli Shop and Marinduque State College. Meanwhile, Mr. Lorenzo C. Duqueza is the distinguished partner from the administrative cluster.

Sibulan barangay Chairwoman Roseta Abalayan said that they were surprised when they received the information about the recognition. According to her, the agricultural tramline is a great help to them. She said that there is an increase on the farm area and number of households living in the area where the tramline is located based on their latest survey.

The 800-meter Agricultural Tramline System in Sibulan was inaugurated on October 2011 with a service area of at least 80 hectares and with direct benefits to more than 50 farmers. The farmers grow low-land vegetables, banana, corn, peanut, abaca, coffee, camote, and gabi.

Before, farmers pay 'transporters' P2.00 per kilogram to haul their produce on the steep slopes for 30-35 minutes. These transporters were using horses

then to travel the agricultural products including livestock.

Today, with the tramline system, farmers are just now paying P1.00 per kilogram and their produce will arrive in the nearest access road in just 5-10 minutes. Even household supplies such as rice, sugar, and other grocery goods are also transported on the tramline facility.

On the other hand, rice growers of Butuan City were having a problem on drying was their produce especially during rainy season. But in 2008, their grain drying made easy through the flatbed dryer installed at Sto. Niño Multi-Purpose Cooperative. Another flatbed dryer was installed in 2012 because of their good reception and utilization of the technology.

PHilMech conducts regular monitoring on the utilization and maintenance of the farm machinery and postharvest facilities distributed to its cooperators to ensure the optimal operation of the machine. **VBCaliguiran**



700 farmers participate in technical sympo, techno-demo

For three consecutive days, PHilMech conducted a technical symposium and technology demonstration of selected agricultural machinery at its headquarters in the Science City of Muñoz, Nueva Ecija on May 20-22, 2013.

There were about 700 farmers and farmer leaders who participated in the said activities. The participants came from different Irrigators' Associations (IAs) and farmers' organizations (FOs) from Regions I, II and III. The ATI Region IV-A Lakbay Aral participants and technical staff from PLGUs and MLGUs also attended the activity.

The technical symposium showcased the machinery and technologies for land preparation, planting,

transplanting and harvesting through video presentation provided by members of AMMDA. PHilMech Rice Mechanization Program Focal Person Engr. Aldrin Badua discussed to the participants the DA Rice Mechanization Program to increase the participants' awareness on the program.

An open forum for the participants allowed them to clarify some of the issues and concerns on the technologies and machines presented.

One of the highlights of the event was the techno demonstration of selected agricultural machinery wherein farmers witnessed the actual operation of the different machinery such as power tiller, rice transplanter,

combine harvester and four wheel tractors equipped with backhoe, loader and leveller.

Most of the farmers were inspired by the efficient performance of the machines in the demo. Although there were a few who were apprehensive of labor displacement caused by the adoption of the different agricultural machinery, this issue was clarified during the technical symposium.

Another highlight of the event was the raffle draw and giving of tokens for the farmers. The members of the Agricultural Machinery Manufacturers and Distributors Association (AMMDA) sponsored the activity. The major prizes given were 5 gasoline engines, 4 knapsack sprayers, 2 generator sets, 1 drum seeder and lots of tokens such as t-shirts, caps, bags, umbrella, raincoat and jacket. Twelve lucky farmers went home with these major prizes.

The PHilMech Technology Management and Training Division (TMTD) and the Agri-Infra Coordinating Unit (AICU) headed by Dr. Eduardo T. Cayabyab and Director Raul R. Paz, spearheaded the event, in collaboration with AMMDA headed by its President George Kanapi and Vice-President Joel Panagsagan.

The technical symposium and techno-demonstration are support activities of PHilMech in partnership with the private sector to develop and promote appropriate agricultural machinery and other agricultural mechanization technologies to enhance agricultural development in the countryside.

HRCalica



TECHNOLOGY DEMONSTRATION. Farmers were treated with the demonstration of various farm machinery such as transplanter, rice combine harvester, and latest models of tractors.



FIRCH: a breakthrough in MANGO DRYING



by Vladimir B. Calguiran

The Philippines can now meet the world demand for dried mangoes. Through the newly engineered drying technology that uses combined far-infrared and convection heating (FIRCH) system, dried mango processors can now double-up their production.

After two years of laboratory and pilot-scale research, PHilMech engineers found out that the two-stage drying technique using FIRCH significantly reduced the drying time of mango slices from 12 hours to just eight hours.

Far-infrared is now increasingly used worldwide in various food processing systems because of its efficiency in heat transfer. And in mango drying industry, this would be the first in the Philippines.

Mango Drying

According to the Food and Agriculture Organization (FAO), the country is one of the top 10 producers of mango in the world. The Philippines claims to have the world's sweetest mango—and that is the Philippine Carabao Mango. Thus, Philippine mango, either fresh or processed, has been in demand in the export market.

During the peak harvest season, local processors are constrained to meet the growing demand of dried mango export market due to the limited drying capacity. In Cebu, wherein the most number of dried mango processors could be found, mango drying through convection dryer such as cabinet dryer heated by LPG or steam boilers is common practice.

Convection dryer is suitable for mango drying because in the drying process the circulating heated air cannot easily damage the sensitive mango slices; it consumes a longer drying time though. Mango slices can not stand high temperature for a long period because of risks of case hardening (undesirable phenomenon wherein the outer surface is already hard while the inside remains soft) and made it more complicated by the added syrup before drying.

Rapid Dryer

The team of Dr. Romualdo Martinez and Engr. Robelyn Daquila, both experts in drying, initiated the research to find solution to the lengthy mango drying. This led to their discovery on the use of far-infrared.

The pilot-scale unit dryer is tunnel shaped and made of food grade stainless steel with a dimension of 9.6 meters in length, 0.38 meter in width, and 0.38 meter in height. It uses ceramic heaters to produce infrared energy with temperature of 250°C.

Because of the sensitivity of the mango slices on high temperature, Dr. Martinez and Engr. Daquila found out that far-infrared could be still used through intermittent exposure. Using a conveyor, mango slices are moved slowly at the rate of 4-6m/h and in the process it will be heated through far-infrared for three minutes. The mango slices will undergo seven intermittent drying and cooling cycles and requires two hours for 40 trays of mango slices to partially dry. The moisture content is reduced from 60 percent down to 40 percent. According to the researchers, this is the optimum length of exposure that the mango slices can handle, otherwise, the surface of the product will be burned.



The pilot-scale unit dryer is tunnel shaped and made of food grade stainless steel.

convection dryer. This means a 100 percent increase on the usage of the dryer; the production output of the cabinet dryers will be then doubled," Engr. Daquila explained referring to the two-stage drying system with the FIRCH technology as the first stage dryer and cabinet dryer for the second stage.

Another significant result of their research is that the FIRCH can have 30 percent savings in overall energy consumption and the 17 percent reduction in energy cost compared to convection method alone.

In a sensory evaluation conducted by the College of Home Science and Industry at the Central Luzon State University, the FIRCH-dried mango has no significant difference with the commercially available dried mango. There is no difference on the sweetness and sourness, aroma, texture, firmness and moist appearance of the products.

Two-stage Drying

Still, there's a need to dry the semi-dried mango slices to convection dryer to completely reduce the moisture content down to 14 percent. And the good news is, this will only consume six hours in the cabinet dryers.

"The mango slices will just spend six hours at the cabinet dryer, 50 percent is saved on the drying time in the

RESEARCHER.

Engr. Robelyn E. Daquila of the Agricultural Mechanization Division of PHilMech.

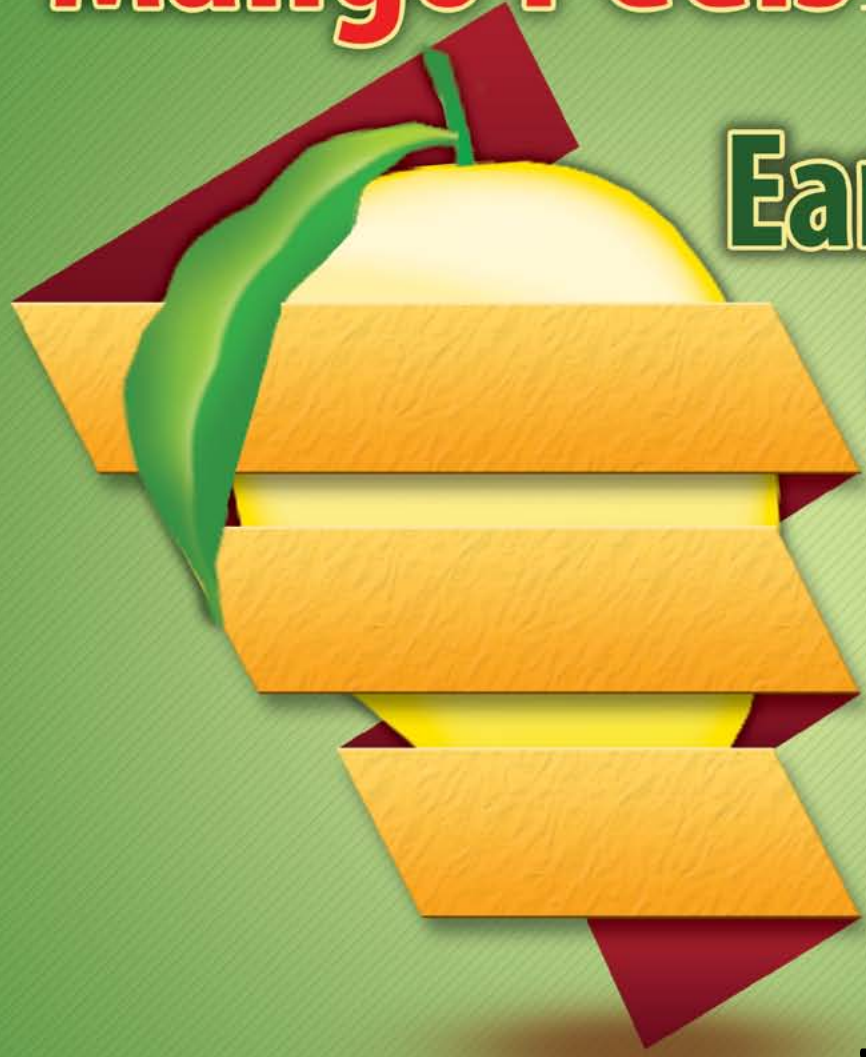


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Mango Peels

Turn
Earth
and
Money
Saver



by Mila B. Gonzalez

There is a little known fact about the Philippine Carabao mango. Its mango peels can be turned to pectin, an earth and money saver.

This is the result of the joint research conducted by the Philippine Center for Postharvest Development and Mechanization (PHilMech) of the Department of Agriculture (DA) and the Industrial Technology Development Institute (ITDI) of the Department of Science and Technology (DOST).

Pectin and Its Many Uses

Found in the cell wall of plants like apples and citrus fruits is pectin, a complex polysaccharide, a carbohydrate.

Pectin has many uses. It is a food additive, pharmaceutical ingredient, cosmetic stabilizer, a dietary fiber. All these because of its gelling, thickening and stabilizing properties.

As food additive, pectin is found in jams, jellies, marmalades, yoghurts and baked products. One thing good about pectin is its safety. The World Health Organization (WHO) and the Food and Agriculture Organization (FAO) of the United Nations consider pectin as a safe food additive.

As a pharmaceutical ingredient, it is used in drug suspension and emulsion, wound healing preparations, medical and denture adhesives and even in throat lozenges. It is also a generally recognized as safe (GRAS) substance by the Food and Drug Administration (FDA).

As a cosmetic stabilizer, pectin is used as a natural texture powder for paste, ointment, oils and creams. It is used in hair tonic, shampoo and body lotion.

Pectin is also a dietary fiber. It binds to cholesterol in the gastrointestinal tract and slows glucose absorption

by trapping carbohydrates (<http://en.wikipedia.org/wiki/pectin>).

Pectin has indeed many uses that private companies abroad are commercially producing it with apple pomace and peels of citrus fruits as source.

Mango Peels as Source of Pectin

Among plants, apples and citrus fruits contain large amounts of pectin. But here is the good news! The Philippine Carabao mango is also a good source of pectin. A team of researchers from DA-PHilMech and ITDI-DOST found this out.

Dr. Ma. Cristina B. Gragasin, Supervising Science Research Specialist of PHilMech and the lead researcher

“Production of pectin from mango peels is both technically and economically feasible,” said Dr. Gragasin. “Therefore, local production of pectin from mango peels is a promising venture,” she added.

According to Dr. Gragasin, “For every five kilograms of dried mango peels, one kilogram of pectin is produced. This is done through an extraction process whereby mango peels are dissolved in acidified water and alcohol precipitation.”

For this research result, Dr. Gragasin and her team composed of Engr. Aileen Ligisan, Dr. Rosalinda Torres and Romulo Estrella garnered top awards in several R & D award giving bodies like the Bureau of Agricultural Research (BAR), Central Luzon Agricultural Resources Research and Development Consortium (CLARRDEC), and PHilMech.

Contribution to Economy and the Environment

About 25,000 to 33,000 kilograms of mango peels are thrown away by mango processors in the country every year. This poses a disposal problem, an environmental concern.

With the utilization of mango peels for pectin, mango wastes will no longer be a garbage problem. Instead, these mango wastes can be turned to wealth.

Continued on page 23



Photos by PHilMech-BPED



ALL ABOUT MANGO

The Philippines is the seventh biggest mango producing country in the world next to India, China, Mexico, Thailand, Indonesia and Pakistan. The Philippine “Carabao” mango, also known as the Manila Super Mango, is the country’s dollar earner with its fresh fruits and processed products exported to other countries. No wonder, mango is the country’s third most important fruit, next to banana and pineapple.



TIPS

BEST WAY TO HARVEST MANGOES

- Mangoes normally reaches maturity in four to five months from flowering.
- Harvest mangoes from 9:00 am to 3:00 pm for minimal latex flow.
- Use yard clippers or a picking pole to harvest mangoes if they cannot be reached from the ground or a ladder. Otherwise, gently hand pick mangoes to avoid bruising.
- Harvested mangoes should not be left under the sun, wind or rain either on the field or during transport.

Sources: http://www.hot.purdue.edu/newcrop/Morton/mango_ars.html; http://www.pakissan.com/english/allabout/orchards/mango_postharvest.handling.of.mangoes.html



RECIPE

MANGO CASHEW SALAD

Ingredients

- 1 mango (peeled, seeded and cubed)
- 1 apple (peeled, cored and diced)
- ¾ cup toasted cashew nuts
- 1 tbsp balsamic vinegar
- ½ tsp ground cinnamon
- ¼ tsp ground ginger
- 1 pinch salt

Procedure

In a medium bowl, toss together mango, apple, cashew nuts, balsamic vinegar, cinnamon, ginger and salt. Makes six servings.

Source: <http://allrecipes.com/recipe/mango-cashew-salad/>



EQUIPMENT

ULTRASONIC CLEANER FOR MANGOES

Mangoes can be cleaned by an ultrasonic washer. A PHilMech research led by Senior Science Research Specialist Elijah Davalos of the Food Protection Division utilized its principle to remove latex stains which show as black spots on ripe mango peels.

Sound waves travelling through the water create very small bubbles which burst with tremendous energy and pressure that breaks the mechanical and ionic bonds that hold the very small particles on the surface of mangoes being cleaned.

(For details of this research, please refer to p. 19)



ADVISORY

PHILIPPINE NATIONAL STANDARD (PNS) FOR MANGOES

The PNS for mangoes established a system of grading and classifying commercial mango fruits grown in the Philippines especially those supplied fresh to the consumers. In all classes of mangoes, PNS requires that mango fruits should meet these minimum standards:

- Mango must be mature and its shape characteristics of the variety.
- Mango must be reasonably clean and free from any visible foreign matter.
- Mango must be free from diseases and insects.
- Mango must be free from any injury.

For details of the PNS for mangoes, please refer to PNS/BAFPS13:2004ICS65.020.20 of the Bureau of Agriculture and Fisheries Product Standards (BAFPS).



TRIVIA

DID YOU KNOW THAT...?

- Mango is known as the “King of Fruits” throughout the world.
- Mango has a biennial fruiting habit. This means that it is an alternate bearing tree. When the mango tree heavily fruits this year, it will bear only half or even no fruit at all the next year if no complete fertilizer with trace elements will be applied.

Source: <http://www.dixonexoticfruittrees.com/ref/fruiting.htm>.



SELECTION

FRESH OR PROCESSED MANGOES

- Mango is rich in Vitamins A, B6 and C. It is high in dietary fiber and very low in saturated fat. Mango has no cholesterol.
- Mangoes maybe eaten fresh or as processed products. Dried mangoes, mango juice, mango puree, mango jam and a lot more are some examples of mango processed products. Which mango to eat? Mangoes are best served as ripe, chilled and fresh.

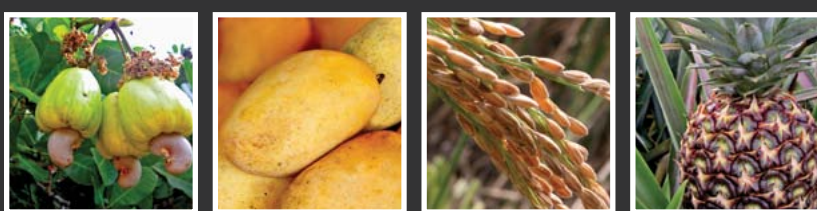


Background

Guimaras is an island province located in the Western Visayas (Region 6). It has five municipalities namely Jordan, Buenavista, Nueva Valencia, Sibunag and San Lorenzo. Jordan is the capital of the province.

Guimaras is known for its sweet Philippine Carabao mango. In 1993, former President Fidel V. Ramos issued Proclamation No. 314 declaring the island of Guimaras as a "Special Quarantine Zone." Because Guimaras is free from mango seed and pulp weevil, measures should be undertaken to maintain such status.

Main Commodities



GUIMARAS

Agricultural Profile

With agriculture as the main livelihood of the people, major crops of Guimaras include rice, coconut, fruits, nuts, vegetables, poultry, livestock and fishery products.

Guimaras is the supplier of rice in Western Visayas. The province also produces five major high value crops like mango, banana, cashew, pineapple and coffee for the local and foreign markets.

Proposed Postharvest Projects

Based on the proposed interventions by the stakeholders and participants in the Guimaras consultative workshop like the provision/improvement/rehabilitation of postharvest facilities and Infrastructure, training and extension, support policies and programs, the following projects were proposed:

- Retrofitting of underutilized mechanical dryers with rice-hull fed furnace
- Establishment of community-based drying center
- Promotion of the rice-hull carbonizer for mass production of CRH
- Establishment of facilities, service center for corn mechanization and processing
- Establishment of facilities, service center for cashew products
- Establishment of village-level processing center
- Rehabilitation/enhancement of trading post

Postharvest Situationer

- Postharvest losses in the different operations is among the major problems of the agriculture sector in Guimaras.
- The low profitability in rice and corn production is because of the high cost of farm inputs and low price of corn and palay. This is discouraging farmers to produce since they rely on loans with high interest rates for their farming support.
- The inadequacy of appropriate and efficient postharvest facilities particularly drying and storage facilities in Guimaras and the lack of technical know-how among farmers on the application of proper postproduction techniques is another problem besetting the grains industry sector.
- Meanwhile, the inadequacy of postharvest facilities like packing house, bagsakan centers with complimentary equipment and other packing and packaging materials and the difficulty in transporting of produce due to poor/inaccessible farm-to-market road conditions is another problem besetting the HVCC industry of the province.

Source: *Guimaras Postharvest Development Plan (2009-2018)* by the Provincial Government of Guimaras through the Provincial Office for Agricultural Services and the Department of Agriculture-PHilMech (formerly BPRE)



Effect of Age of Latex and Time of Delatexing Using Ultrasonic Washing of Alum on the Quality of Carabao Mango (*Mangifera indica* L.)

Elijah Z. Davalos and Danilo T. Eligio

Washing is the first line of defense for postharvest quality maintenance. The study aims to determine the potential of ultrasonic washing as de-latexing option utilizing sound waves passing through a liquid medium to remove contaminants. Conventionally used in computer industry, its performance is hereby tested on an agricultural commodity.

Latex was allowed to age for 0, 10 and 20 minutes on the peel of medium size Carabao mangoes after which these were washed for 0, 10, 20 and 30 minutes with a 40kHz frequency ultrasonic washer using two percent alum and 10 grams of detergent as washing solution. Latex removal, color change, weight loss, total soluble solids, shriveling, texture, ambient temperature, and relative humidity were monitored daily.

Results showed that regardless of latex age, 20-minute ultrasonic washing

removed latex stain and reduced latex burn. Control samples manifested serious latex injury while 30-minute washing resulted to mechanical damage due to over exposure. No statistical difference was found on the rest of the parameters. Correlations were found, however, between latex age and texture ($r = 0.37$), latex age and color ($r = 0.56$), between weight loss and TSS ($r = 0.85$), weight loss and shriveling ($r = 0.75$) and between TSS and shriveling ($r = 0.83$).

The experiment suggests the potential of ultrasonic cleaning as an alternative de-latexing method. With optimized operational parameters, it can clean mango without adverse effects on important quality standards. The advantage of this nonconventional method is its flexibility on design features in constructing a mechanized mango packing house. Results would be helpful in designing unified custom-made ultrasonic de-sapper, cleaner and decontamination prototype equipment.

*Elijah Z. Davalos is a PHilMech researcher while Dr. Danilo T. Eligio is a former professor at the Central State University (CLSU)



PHilMech merits 3 postharvest photos

PhilMech presented meritorious awards to three photographers for the Photo Contest on Postharvest Loss Prevention during its 35th Anniversary and Postharvest Loss Prevention Week celebration last May 22.

The agency acknowledged Jacqueline O. Estrella, Henry S. Cornelio and Victor V. Gutierrez for capturing postharvest in their photographs with efforts to be creative and technically accurate. Each received a certificate and a check worth P3,000.

PHilMech also awarded four consolation prizes worth P1,000 plus certificate to Donnabelle A. Cornelio, James L. Espiritu, Romeo dP. Trinidad and Kevin David S. Estigoy. Their photographs were included in the Photo Exhibit that highlighted the event.

The photo contest is PHiMech's way of promoting advocacy using photography or visual media. It is also a means in getting feedbacks on how people see the meaning and importance of preventing postharvest losses. **BGSMagararu**



PHOTOCONTEST WINNER. Henry S. Cornelio receives his prize for capturing one of the best postharvest loss prevention photo.

FIRCH...from page 13

Interestingly, the Food and Nutrition Research Institute of the Department of Science and Technology conducted nutrient analysis on the product of FIRCH system. It was found out that the product's beta carotene is higher by 15 percent compared to conventionally dried.

Technology Demonstration

Recently, a technology demonstration was conducted among the mango industry players in Cebu. "Many showed interest on FIRCH during our techno-demo. We also gathered some ideas that could greatly improve our technology," Engr. Daquila added.

According to him, the capacity of the far-infrared conveyor dryer can be

customized to fit with the capacity of the existing convection dryers of the processors. The FIRCH technology is set for commercialization this year.

Mango Drying R&D

Through the years, mango drying technologies developed by PHilMech is evolving near optimum efficiency. Engr. Robelyn Daquila started it all with the adaptation of the Multi-Commodity Solar Tunnel Dryer. This was followed by the development of mango cabinet dryer with biomass-fed-furnace which was pilot-tested in 2006. These two dryers are now commercially available.

Still, with the discovery of FIRCH, PHilMech engineers continue to improve the mango drying industry through the development of more efficient dryers.

"If drying process will be quicker and the products are of high quality, this will be a big help to the processors and to the mango farmers too," added Engr. Daquila.



The participants of the technology demonstration in Cebu observe the operation of the FIRCH dryer.



PROJECT REVIEW. Engr. Andres Tuates clarifies some issues raised by the panel reviewer.



Agriculture in the Philippines" (first place), "The Role of the Social Laboratory in Accelerating the Establishment of MCSTD-Based Enterprises" (second place) and "Performance Verification of PHilMech Computer Vision System for Quality Analysis of Rice and Corn" (third place).

Dr. Flordeliza A. Lantican, Professor of the College of Economics and Management, University of the Philippines at Los Baños (UPLB) chaired the Board of Judges for Best Paper. Dr. Teotimo M. Aganon of the Central Luzon State University (CLSU) and Dr. Orlino A. Mercado of the Department of Agriculture – Central Luzon Integrated Agricultural Research Center (DA-CLIARC) in Magalang, Pampanga served as members. Dr. Pepito M. Bato, Associate Professor and Chairman of Agricultural Machinery Division Institute of Agricultural Engineering, University of the Philippines at Los Baños (UPLB) chaired the Board of Judges for Best Poster. Ms. Geraldine V. Sombero, of the National Economic Development Authority (NEDA) Region 3 and Engr. Romeo Santiago of the Philippine Council for Agriculture, Aquatic, and Natural Resources Research and Development- Department of Science and Technology (PCAARRD-DOST) served as members.

The panel of evaluators in this in-house review included Dr. Christian Joseph M. Cumagun, Dr. Marilyn M. Elauria, Dr. Cesar B. Quicoy, Dr. Jessie C. Elauria, and Dr. Pepito M. Bato from UPLB; and Dr. Renato G. Reyes and Dr. Eduardo G. Marzan, Jr. from CLSU. **VMBarlis**

34th In-house R&D Review held

The Philippine Center for Postharvest Development and Mechanization (PHilMech) conducted its 34th Agency In-House Research and Development Review on May 7 and 8, 2013 at the PHilMech Auditorium, Science City of Muñoz, Nueva Ecija. The Evaluation and Management Services Section (EMSS) of the Planning, Management and Information Technology Division (PMITD) organized the activity.

Plaques and cash awards were given to winning researchers. Of the 14 projects presented, 12 are under Research Category and 2 are under the Development Category. For the research category, the winning papers include: "Ex-ante Analysis for the Development of Brown Rice Just-in-Time Hulling Technology" (first place) by Dr. Michael A. Gragasin of the Agricultural Machinery Division, "Determining the Available Power for Utilization in Agricultural Mechanization" (second place) by Dr. Renita SM. Dela Cruz of the Socio-Economic and Policy Research

Division and "Performance Verification of PHilMech Computer Vision System for Quality Analysis of Rice and Corn" (third place) by Engr. Andres M. Tuates, Jr. of the Bio-Process Engineering Division. For development category, winning papers include "Establishment of Agricultural Tramlines for Upland Agriculture in the Philippines" (first place) by Engr. Bartolome S. Tesorero, Jr. of the Agri-Infra Coordinating Unit and "The Role of the Social Laboratory in Accelerating the Establishment of MCSTD-Based Enterprises" (second place) by Dr. Helen F. Martinez of the Enterprise Development Division. Early Bird Award was given to the paper "Non-Chemical Approach of Managing Postharvest Diseases of Tropical Fruits (Mango & Pineapple)" by Dr. Dionisio G. Alvindia of the Food Protection Division for being the first to submit the report.

Three best posters were judged as winners from the seven poster entries. These were the "Establishment of Agricultural Tramlines for Upland



DANGAL NG PHILMECH. Engr. Rodel Idago was hailed for the second time as Dangal ng PHilMech or the most outstanding PHilMech employee (left). Top executives pose with the 2012 PHilMech *Natatanging Kawani* (right)

PHilMech lauds outstanding, loyal employees

PhilMech's Annual 'Natatanging Kawani' and Loyalty Awards under the agency's Program on Awards and Incentives for Service Excellence (PRAISE) were given to exemplary employees in recognition of their outstanding performance and unwavering commitment to public service during the conduct of PHilMech 35th Anniversary Celebration.

Employees with exceptional outputs for the past year were hailed "*Natatanging Kawani*" for Research and Development, Training and Extension, and Support Services. PHilMech Director, Engr. Rex L. Bingabing, along with Dir. Arnel Ramir M. Apaga and Dr. Reynaldo F. Concepcion of Administrative Division rewarded the awardees with plaque of recognition and cash incentive on the

awarding ceremony during the Industry Day Program on May 22, 2013.

The 2012 PHilMech *Natatanging Kawani* for Research and Development were Dr. Ma. Cristina B. Gragasin (Senior Category) and Engr. Rodelio G. Idago (Junior Category). Awardees for Training and Extension were Engr. Aldrin E. Badua (Senior Category) and Ms. Priscilla C. Castillo (Junior Category). For Support Services, Mr. Johnson N. Dela Cruz and Ms. Jane A. Foronda were the awardees for the Junior and Senior Category. Mr. Samuel S. Joson received the award for *Natatanging Kawani* of First Level Category,

Meanwhile, employees with unparalleled loyalty and dedication to PHilMech's endeavors were honored

with Service Awards during the conduct of Employees' Technical Symposium and Team Building Activities on May 25, 2013 at Punta Riviera Resort, Bolinao Pangasinan. Plaques and cash incentives were likewise awarded to employees who celebrated their milestone in the agency for the year 2013.

Service Awardees for 10 and 15 years of public service were Engrs. Hernaiz G. Malanon and Danilo A. Briones. Awardees for 20 years of dedicated service were Mr. Ronaldo B. Cuenca, Mr. Nelson C. Santiago, Mr. Roderic O. Vereña, Mr. Elito V. Circa, Ms. Emelie C. Ablaza and Ms. Isis DC. Davalos. Ms. Miriam A. Acda and Mr. Alez Q. Aquino were also given awards for 30 years of loyalty and dedication. **LDRamos**



Photo courtesy of UPLB-CEAT

Dr. Dante B. de Padua

Father of postharvest passes away

Dr. Dante B. de Padua, the first executive director of the National Postharvest Institute for Research and Extension (NAPHIRE), now PHilMech, passed away on June 3, 2013. Dr. de Padua succumbed to lung cancer at the age of 82.

Known as the father of Philippine postharvest, Dr. de Padua led NAPHIRE from May 1978 to December 1984.

As the Institute's strategic manager, he together with his staff carefully defined the driving force of NAPHIRE- the operation and application of appropriate postharvest technology geared towards significantly improving food and feed quality and reducing losses.

He also accessed international funding to start research activities at NAPHIRE. Under his tenure, NAPHIRE was placed in the local and international map.

Aside from being a scientist, Dr. de Padua was also an educator. He became a professor of agricultural engineering and dean of the University of the Philippines in Los Baños- Institute of Agricultural Engineering from 1956 to 1977.

After his leadership at NAPHIRE, his expertise was sought by international R&D institutions like the United Nations- Food and Agricultural Organization and International Development Research Centre, among others. **VBCaliguiran**

Mango Peels...from page 15

The Philippines imports pectin from other countries for its domestic use in the industry. The Department of Trade and Industry importation data showed that in 2011, the average cost of one kilogram imported apple pectin was Php 27,122.56.

On the other hand, Dr. Gragasin revealed that the cost to produce one kilogram of pectin from mango peels at the laboratory was only Php 5,667.51. Imagine how much the country will save if this venture works at the commercial level.

Dr. Gragasin added, "The Philippines can be a major pectin exporter if all the projected mango peels at the mango processing plants can be utilized for

pectin production... Job creation will also result... Moreover, it will create a high impact on the environment through solid waste reduction."

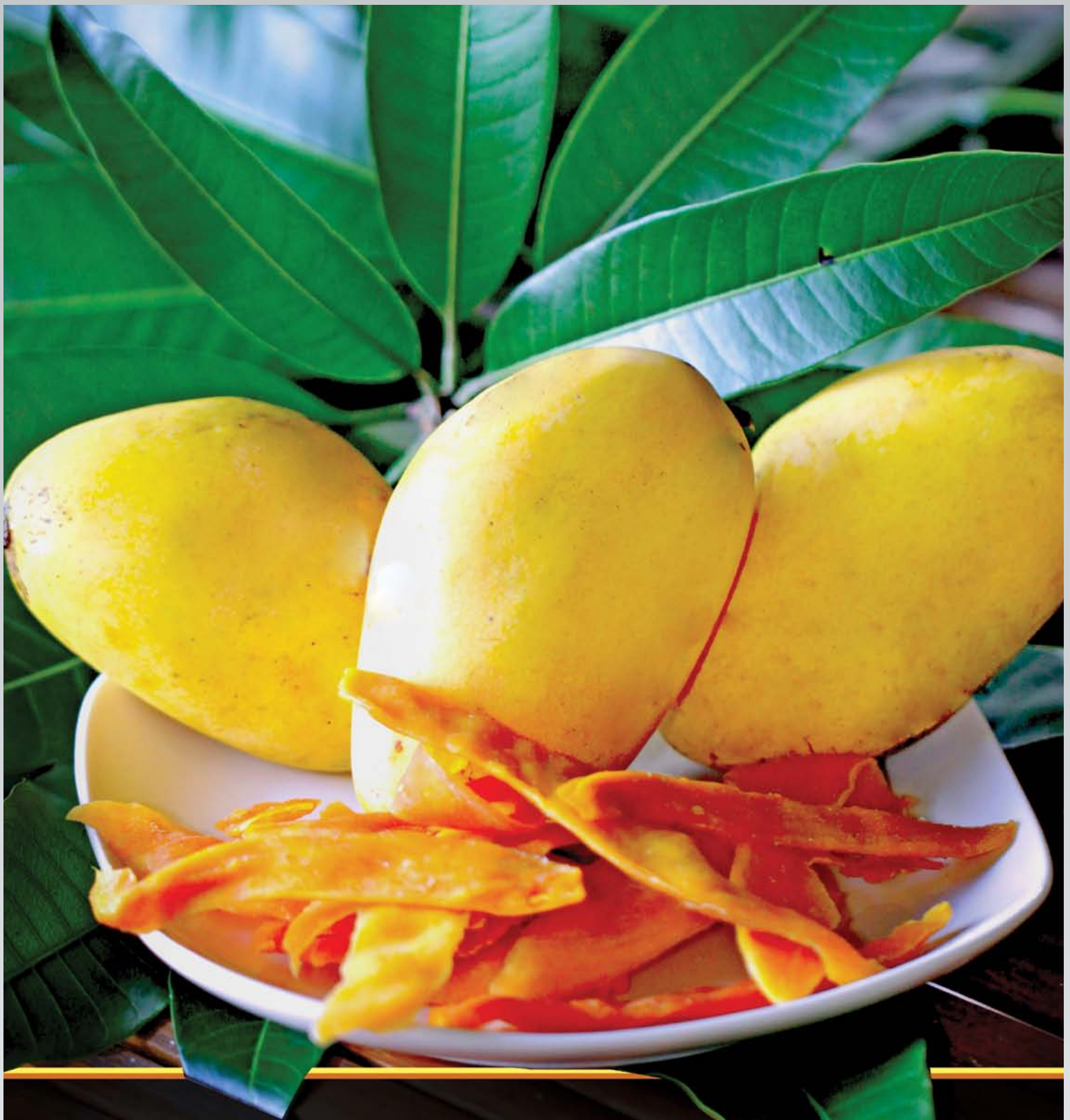
With this laboratory result, Dr. Gragasin's team is optimistic that the utilization of mango peels for pectin at the commercial level will also do good in the near future.

Yes, everything has its purpose. Even the unwanted mango wastes can be transformed to a thing of high commercial value -- pectin, an environment and money saver.



Dr. Ma. Cristina B. Gragasin, the lead researcher of the project.





The **PHILIPPINE CARABAO MANGO**, fresh or processed, is one of the top exports of the country. It is one of the best in the world because of its sweet flavor and aroma.

Photo by Danilo T. Esteves