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ITDI, gracefully aging and getting better and better for the common good @ 113

"For a research and development Institute like ITDI, aging does not matter but counts, for like wine, the older it gets the valuable and expensive it becomes".

Turning 113 years on the 1st of July 2014, DOST's (Department of Science & Technology) ITDI (Industrial Technology Development Institute) never wearies and remains committed and persistent in pursuing its mandate and be able to contribute to the country's social and economic development through its endless discovery and development of applicable and timely innovations and services. Even today, ITDI programs and services are anchored on the recently launched DOST eight Outcomes for inclusive growth in the following key areas - agriculture, enterprises, industries, IT-BPM (business process management), connectivity, health, education, and disaster preparedness.

Through the years, the ITDI has been consistent in implementing programs that aim to improve the competitiveness of local industries and enterprises. The growth and welfare of all life forms and the environment are of topmost consideration as well. Thus, R&D (research and development) works are dedicated in developing new technologies/equipment; new standards for products/systems/practices and safety guidelines; improvements for existing ones; alternative sources of energy/fuel; water pollutant remedies/ treatment; and nanotechnology.

▫ **MSMEs/Industry**

- R&D/innovations

The ITDI is now leading the roll out of food processing equipment developed under the DOST-HITS (High Impact Technology Solutions) project - Design and Development of Process Equipment for Food Processing Firms in cooperation with the regional offices. This is an opportunity to make our own technology work for the needs of our food processing industry and help make them competitive.

Technological support program for the upgrading of local cacao and cocoa industry is also on-going. Spearheaded by the Industrial

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DTI Sec. Domingo visits ITDI

We always say in ITDI that "our business is industry". And so what better way to put that into proper perspective than by welcoming into the Institute the Secretary of the DTI (Department of Trade and Industry), Sec. Gregory L. Domingo (L).

The DTI Secretary arrived in the morning of April 30 at ADMATEL (Advanced Device and Materials Testing Laboratory). He and his party were welcomed by Dr. Amelia P. Guevara, Undersecretary for R&D (L, in pink), on behalf of DOST Secretary Mario G. Montejo who was away for another commitment. Also present was Engr. Reynaldo L. Esguerra (3rd R), OIC, ITDI Deputy Director for R&D and Chief of the Environment Biotechnology Division; with Dr. Blessie A. Basilia (2nd R), Chief of ITDI's Materials Science Division, and her ADMATEL staff.

Dr. Basilia oriented Sec. Domingo on how ADMATEL came about and how it can impact the Philippine electronics and semiconductor industry. On the prices of the services ADMATEL has been rendering however, Sec. Domingo has a rather critical suggestion: make the services more affordable especially for students for whom Sec. Domingo even suggested the

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From the Executive's Desk...

Soon I will be retiring from government service, from the ITDI in particular, which has served as my home base for many years. For the nine years that I have been at the helm of ITDI as Director, I had seen how the Institute had grown amidst challenges in its R&D and other endeavors. Truly I am glad to have been part of an Institution that has led in providing numerous innovations and technical knowledge for the continuous progress of Philippine industries.

As we are about to celebrate our 113th anniversary, I salute the men and women of ITDI who were behind in all its successes. There will not be enough space if I mention all our contributions. Let me just mention some of the most recent ones, example of which is the DOST-HITS (High Impact Technology Solutions) Project, in which we help provide cheaper and yet cost-effective locally-fabricated food processing equipment to food manufacturers and other stakeholders in the regions. Likewise, the roll-out of the candle-type ceramic water filter brings promise of clean and potable water for everyone.

The Institute has also become the prime standards and testing center of the country, thanks in part to ADMATEL, NML, and STD's newly-inaugurated Metrology in Chemistry facilities. And with the advancement of nanotechnology, we are also building our capability with our new Nanotechnology Laboratory at MSD that aims to provide world-class R&D services and innovations. Likewise, as our country gets ravaged by various calamities, our RTE arroz caldo and Sagip EFR nutri-foods are a welcome solution in disaster mitigation and livelihood gene-ration especially in disaster-stricken communities.

These are just some endeavors our experts at ITDI are working on, and without the support of everyone we will not succeed. And for this, I really appreciate your selfless service and dedicated efforts!

May the Institute continue to provide industries and the Filipino community better and competitive technologies as it had been doing for more than a century. **Mabuhay, ITDI!**

Dr. Nuna E. Almanzor, ASEAN Engineer
Director

ADMATEL now serving industry in full swing

The ADMATEL (Advanced Device and Materials Testing Laboratory) is now fully operational after a year of opening its doors in January 2013 as a service testing facility for the semiconductor and electronics manufacturing as well as other related industries. For the second phase of the project, activites consisted of (a) test and analyses of samples from the industry, (b) promotion and marketing of ADMATEL services, (c) development of manpower competency, and (d) alignment of operation of the faciltiy with International Standard ISO 17025.

To facilitate its full operation, seventeen (17) contractual employees were hired. Some of the staff attended local trainings including in-house training by local and foreign experts, industry immersion at STMicroelectronics and FASTECH Synergy Phils., and advanced training abroad to enhance the manpower capability of ADMATEL. Two consultants are helping oversee the operation of the facility namely, Mr. Virgilio S. Aguinaldo as the GM (general manager) who was a former top executive at NXP/Philips Semiconductors; and Jose Albert P. Guevarra as Senior Technical Engineer who worked as manufacturing engineer at SuperPower, Inc., both in its Schenectady, New York and Houston, Texas facilities in the U.S., and was also an Assistant Professor at UP Diliman.

Promotion and marketing activities were also conducted to diseminate the services and capabilities of the ADMATEL. These included presentations to several semiconductor and electronic industries, namely, ROHM LSI, Lattice Semiconductor, HGST, AMKOR, NXP, BITMICRO, PEZA, and AIR21; at the regular monthly meeting of CFAR, and in several conferences and conventions like the PIChE 74th Annual Convention, Philjafa 74th Founding Anniversary, MICROSPHIL Conference, and the Philippine Semiconductor and Electronics Convention and Exhibition (PSECE).

At present, the staff are working towards the alignment of ADMATEL operation to International Standard ISO 17025. Some of their activities involve trainings on awareness, documentation, internal quality audit and measurement of uncertainty, and preparation of required documents.

True to its mission, the ADMATEL as of December 31, 2013, has generated a total income of PhP3,616,600 with majority of the clients coming from the semiconductor and electronics industries.

S&T NEWSROUND

Nano R&D getting more focused at DOST

At the ITDI-DOST, nanotechnology R&D is getting topnotch priority with the setting up of its Nanotechnology laboratory/facility. The new facility is class 100K-certified and Electrostatic Discharge (ESD) – compliant.

The establishment of the facility is a step towards attaining the goal of having a world-class nanotechnology laboratory facility in the Philippines. It aims to provide nanotechnology-related technical services for the various local industries, and develop and implement R&D (research and development) initiatives on nanotechnology.

The Institute is now inviting partners from the academe, industry, and other sectors to join and use the facility to help advance nano R&D in the country.

Nanotechnology is the study and manipulation of matter at a scale of about 1 to 100 nanometers. It involves design, characterization, and production of structures, devices, and systems with unique properties by fine-tuning the physical, chemical, mechanical, and optical properties of materials at the nano-scale to achieve specific properties. Through nanotechnology, materials can be

made stronger, lighter, more durable, more reactive, more sieve-like, or better electrical conductors, among many other traits.

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Lowly *tiesa* gets boost as natural food coloring

Color adds life to the world, so does to the food we eat. People think that food stuffs with bright colors are healthy, fresh, and surely delicious. Add the fact that the color of the food and drink influences its appeal, taste, quality, nutritional value, and commands market preference. This led to the discovery of food coloring coming from different sources – artificial and natural.

These realities plus the increasing clamor of consumers for natural and organic-based food stuffs over artificial and synthetic ones inspired the young food researchers at the ITDI (Industrial Technology Development Institute), Department of Science and Technology (DOST) and started exploring the potential of *tiesa* (*Pouteria campechiana*), a locally grown fruit crop with a deep-yellow pulp and yellow-orange meat. *Tiesa* is an underutilized agricultural crop but its fruit was found to contain fair levels of ascorbic acid, is rich in niacin, and has a relatively high content of carotenoid, an organic pigment of yellow, orange or red color suitable for food application. Thus, a standardized procedure for the production of natural food coloring from *tiesa* was developed. The produced natural yellow coloring can be a good alternative for the synthetic food coloring FD and C Yellow 5.

Ms. Teresita Palomares, Supervising Science Research Specialist of the Food Processing Division said, "nowadays we cannot deny the importance of coloring materials being applied to food because of the many benefits it offers such as preserve the original food appearance even after processing and during storage; ensure color homogeneity of the product; intensify the normal color of food; protect the flavor and light susceptible vitamins; and make food look appetizing. And all these inspired us to develop one from an agricultural crop".

During the development process, research team lead and Science Research Specialist II, Mr. Christopher Andrew G. Bilbao explained, "using *tiesa* as the raw material, we standardized the methods of extracting and purifying its carotenoid pigments". Various parameters during extraction and purification were investigated and optimized (e.g., extraction solvent, temperature, time) to achieve the most efficient process.

"We employed solid-liquid extraction using various solvents typically accepted for food use", Bilbao said. "We then investigated appropriate carriers for the purified pigments to determine the forms of the food coloring that will be suitable for various food applications", he added.

Four materials were investigated as possible carriers for the pigments, namely: sunflower oil, an emulsifier mixture, maltodextrin and modified cornstarch. The natural food coloring developed in the emulsifier mixture was found most promising. It was then characterized and evaluated for its physico-chemical properties and acceptability in food application using calamansi juice. The results showed an enhanced yellow color on the product and no immediate degradation of the color was observed during processing.

In addition to the developed process, "other extraction techniques

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ITDI gracefully... *from p. 1*

Technology Development Institute (ITDI), the program is composed of four major projects and co-implemented with BIOTECH, UPLB, Metals Industry Research and Development Center (MIRDC), and the Philippine Center for Postharvest Development and Mechanization (PHILMECH). The program aims to upgrade and develop the capability of enterprises in the production of quality cacao and cocoa products that meets the minimum quality requirements of local and

international standards. Selected gaps in the industry will be addressed such as primary processing [fermentation and drying] and secondary/industrial processing of intermediate cocoa products

[cocoa liquor, cocoa powder and cocoa butter] that will surely benefit processors of fermented and dried cocoa beans and tablea.

Meanwhile, newly-developed packaging design, appropriate packaging technology, and country branding, particularly for upland rice, sweet potato, queen pineapple and Philippine citrus has enhanced the competitive identity and marketability of these unique Philippine products. These products were introduced in national (e.g. Agrilink) and international trade fairs (e.g. Foodex Japan and ANUGA in Germany).

Transport packaging technology for cutflowers - rose and and chrysanthemum using MAP (modified atmosphere packaging) was also developed which reduced handling and distribution damage from 10 to 96% and from 12 to ~100%, respectively. The cutflowers' freshness was preserved and shelf life extended by up to 600% by the use of appropriate passive MAP technology. A brand name with logo was also developed for the local cutflowers to gain market distinction and potential to compete in the export market.

An improved packaging design and technology for pork (roasted) lechon has been developed that has addressed problems on product shelf life, deformation, oil leakage, and safe handling and distribution. It has likewise prolonged the shelf-life of lechon, from the original 15 hours (with oil leak and blotting) to 21 hours minus the oil leak and blotting. The study was based on a medium-size whole lechon (9-12 kgs) and kilo-pack lechon (1-2 kgs), using the formulation and method of preparation of pork lechon in Leyte. With some modifications, the results can be replicated for lechon prepared in other localities.

In addition, a biomass-fired steam kettle was fabricated for the production of concentrated coconut water as intermediate material for coconut beverage. The developed steam kettle and processing method can now be used to process surplus coco water to minimize wastage, efficiently process coconut water, and extend and preserve the product shelf-life. Using biomass as fuel also proved to be most economical thus this innovation is suitable for small coconut farmers and in areas with no electricity.

Potential sources of raw materials for fuel/biofuels had been explored. Some of those studied that have shown great potential include: *calumpang* seed oil which was found to be rich in linoleic acid (48.09%) and palmitic acid (35.64%); refuse-derived fuel (RDF) was produced from the mixture of biomass materials from tobacco wastes and pine needles and high density polyethylene (HDPE) plastic laminates wastes as alternative fuel to coal; and acid oil by-product from glycerin refining that is used in the production of methyl ester using the continuous biofuel reactor developed by ITDI. Production time was shortened as compared to the conventional batch-stirred tank.

The ITDI has also designed an energy-efficient reactor and boiler system and adsorption/desorption setup for surface-modified biomass activated carbon as adsorbent material and application for post-combustion carbon dioxide (CO_2) capture. The activated carbon produced through steam injection in a fluidized bed reactor can be utilized as filter medium for the removal of undesirable gas components from carbonization and activation and wastewater treatment.

For the environment, ways to treat and manage environmental hazards polluting the water, land, and air that endanger life forms were studied. These included the development of fatty acid grafted coir dust as oil spill absorbent which can absorb crude oil to its modified surface and therefore, can be a good sorbent material for oil spillage. Another study was on the removal and decomposition of water soluble diesel fuel (WSDFF) fraction by TiO_2 (titanium dioxide) photocatalysis.

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DTI Sec. ... *from p. 1*

services be free! Considering that a significant percentage of the samples being analyzed by ADMATEL come from the academe, plus the meager funding students can budget for their researches, this is a logical argument, the Secretary stressed. Following the orientation, Sec. Domingo (R) was ushered into the heart of ADMATEL, its laboratories, for a short tour and more informal conversations about ADMATEL and its "young and very promising workforce".

In the afternoon, TSD Chief Ms. Nelia C. Florendo (L) with some technical staff, along with FPD Food Engineering Section Head Charito Villaluz (2nd L), accompanied Sec. Domingo to the pilot plant of FPD, to view the food processing equipment prototypes developed under the DOST's High Impact Technology Solutions (HITS) project. He was also shown some of the imported equipment for comparison with the locally-fabricated HITS equipment, as both parties shared insights on how these interventions could help the Philippine food industry.

Hopefully, with this visit ITDI and DTI could work closer together and continue helping each other in improving our country's various industries through more linkages. Until your next visit, Sec. Domingo! Thank you! (*RRUdelaCruz*)

ITDI gracefully... *from p. 4*

Results showed that TiO_2 catalysis using TiO_2-coated silica gel beads is a promising treatment for the degradation of diesel fuel oil-contaminated wastewater. Meanwhile, a bench-scale treatment of tannery wastewater using ITDI-isolated microbes is being done. The salts and chemicals in the wastewater were found to be non-biodegradable so that salt-tolerant strains are recommended for this particular type of wastewater.

Capability in emerging technologies like nanotechnology is being developed and the Institute continues in harnessing its potential and various industrial applications. To beef up local capability in this field, the ITDI has established a Nanotechnology Laboratory that can provide nano-related technical services and R&D.

Likewise, ITDI did not stop at R&D, "we tried to translate our R&D results into tangible products and processes", Director Almanzor said. "And our active pursuit of knowledge translation or technology transfer saw the growth and improvement of existing business firms and creation of new ones", she added.

- Technical services of international standard

Aside from technologies and innovations ITDI ensures that the various technical services it provides to make industries and other stakeholders competitive are at par if not better with its counterparts around the world.

With the establishment of ADMATEL or the Advanced Device and Materials Testing Laboratory, ITDI can already address the failure analysis and testing gaps plaguing the country's electronics and semiconductor industry. It was inaugurated by President Aquino on May 31, 2013 and is now servicing the major players in this sector.

Our National Metrology Laboratory or NML, also the Philippines' National Metrology Institute or NMI, capped 2013 with the acceptance of the country's Calibration and Measurement Capabilities (CMC) in the field of mass. CMCs are awarded by the Joint Committee of the Regional Metrology Organizations (JCRB) and the International Bureau of Weights and Measures (BIPM). The approved CMC is now included in the BIPM global database and website (http://kcdb.bipm.org/AppendixC). With this recognition of the Philippines' competence in metrology, Almanzor said, "the country now proudly joins the ranks of the world's premier NMIs (National Metrology Institutes), such as those of Germany, USA, Japan, UK, Korea, China, and Singapore".

While establishing the national measurement standards for physical measurements, ITDI is now expanding its metrological activities to chemical analysis. Our goal is to

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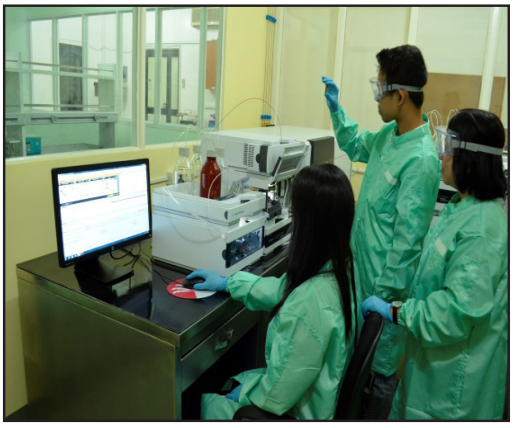
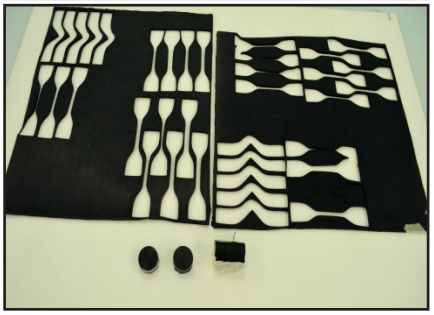
ITDI gracefully... *from p. 5*

obtain Calibration and Measurement Capability (CMC), which is being issued by the Consultative Committee on Quantity of Matter (CCQM) – International Bureau of Weights and Measurements (BIPM). ITDI is now the country's Designated Institute (DI) for Metrology in Chemistry and is listed in the BIPM website. Having established CMCs means the country has marked recognition to analyze specific analytes per matrix. With MiC, "our tests and analyses gain traceability, acceptability, and comparability to international standards; and safety and reliability for both the manufacturer and the consumer is ensured", emphasized Almanzor. The effective regulation and trading of food



and agriculture products (e.g. pesticides and food additives) is also facilitated that can help prevent product detentions.

Another recent development hopes to benefit the rubber industry. While the rubber industry has greatly contributed to the Philippine economy as early as the 1900s, it has always been challenged by the lack of testing facilities and standards for rubber products. Working closely with the other key players in the industry, "we at ITDI are working on the integration of analytical testing services for manufactured rubber in our STD (Standard & Testing Division) in accordance with established standards especially mandatory standards, and the test requirements for the DTI issuance of PS/ICC quality marks, and initiate accreditation



of additional rubber testing services to ISO17025", said Almanzor.

▫ Food safety and health care

Popular or favorite local foods are also being investigated to ensure that foods sold in the market are safe to eat. Since the incidence of illnesses due to high consumption of salt and sodium is high, the salt and sodium content of cornick was assessed. Good enough, this popular corn-based snack food sold in public markets in Metro Manila contains acceptable salt and sodium content based on standards set by the World Health Organization (WHO). Many more samples out in the market however must be studied to make the information conclusive.

Studies on *sorbetes* or traditional ice cream revealed that the overall microbial quality of traditional ice cream samples sold by small-

scale producers is unsatisfactory. Thus, a food safety system for traditional Philippine *sorbetes* have been established to address concerns on contamination during production commonly attributed to improper handling of raw ma-

terials and equipment, and inappropriate heating and cooling treatments. Also developed were the standards for ethnic foods like *salabat* or instant ginger drink.

Studies on our local plants like *duhat*, *guyabano*, mango, mangosteen, pomelo, rambutan, turmeric, and *sinta* are being conducted to develop dietary antioxidants.

Phytochemical screening gave positive results and natural health supplements were developed. Among those already completed were anti-diabetic supplements from *guyabano* in capsule and

teabags; and from the mixture of three plants – *malunggay*, *duhat*, and unripe *saba* in capsule. Both products can be of great help to millions of Filipinos suffering from diabetes.

The use of natural alternatives such as plant extracts is likewise explored to develop vector control measures for mosquito-borne diseases. Of the plant samples investigated, *Anacardium occidentale* or *kasuy* exhibited the most highly toxic effect against the larvae of *A. aegypti*.

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ITDI gracefully... *from p. 6*

In addition, the developed ceramic water filter with anti-microbial agent is now being rolled out in the regions. With this, ITDI hopes to address problems on the increasing number of households having no access to potable water, especially those in the far-flung areas of the country. Over time, this project could significantly contribute in attaining the Philippine Millennium Development Goal (MDG) of increasing the country's accessibility rate to potable water of 82.9% in 2007 to 86.6% in 2016.

▫Disaster preparedness

ITDI's efforts are also geared at contributing to disaster preparedness to help make life bearable during calamities. A Ready-to-Eat (RTE) chicken arroz caldo has been developed that is shelf-stable for a year. It is an ideal disaster mitigation/relief food that can immediately address hunger pains of disaster victims. It is ready-to-eat, needing no further preparation like adding water and heating which are often almost impossible to do because of utilities being cut off or destroyed during calamities. It is also lightweight and very handy, designed to withstand aerial distribution from about 800 to 1000 feet. With RTE chicken arroz caldo, immediate relief from hunger is possible.

Field testing and validation studies are now being undertaken in collaboration with the Department of Social Welfare and Development (DSWD). Meanwhile, other RTE disaster preparation foods are also being developed. Process validation is on-going for chicken tocino rice meal, product development for beef tapa rice meal, and shelf life study for corn soup.

Indeed, ITDI's 113 years were fruitful. The years were fruitful for the Institute never wavered in doing its best and has always been guided by a simple principle which is the heart of ITDI – live up to its vision-mission through consistently providing competitive and accessible innovations and services that lead to social development and economic growth. ITDI Director, Dr. Nuna E. Almanzor therefore urges the researchers and staff to "never tire in being passionate and committed in creating and generating technologies and innovations that never fail to improve the lives of those we serve". (*DDGotis & VBConoza*)

Nano R&D... *from p. 3*

The project is being implemented by ITDI's Materials Science Division (MSD) and funded by PCIEERD (Philippine Council for Industry Energy and Emerging Research & Development)-DOST. New equipment capable of characterizing materials at the nano-level are now available in the facility. Among these are the high resolution Field Emission Transmission Electron Microscope (FE-TEM) with high resolution STEM (Scanning Transmission Electron Microscope) imaging and Energy Dispersive Spectroscopy (EDS), and Atomic Force Microscope (AFM) with

twin-screw extruder

reduced drift rate and step-and-scan automation that provides ultimate performance in non-contact nanoscale metrology, e.g., Scanning Electron Microscope (SEM), X-ray Diffractometer (XRD), X-ray Fluorescence (XRF), Dynamic Light Scattering Particle size analyser (DLS), and Particle surface area measurement (BET) to offer a wide range of characterization and analytical tools for various nanotechnology-related researches.

Additional equipment for the production and processing of nanomaterials and nanocomposites were also installed such as programmable vacuum mixer and dispenser, nano-spray dryer, twin-screw extruder with pelletizer, and electrospinning apparatus.

With these new acquisitions, nano R&D at ITDI-DOST surely gets a boost. MSD researchers led by their Chief, Dr. Blessie A. Basilia are now deeply immersed in their 'creations' among which are: halloysite nanotubes – SFE die-attach material production and application in IC devices; development of rubber-silicate nanocomposites using natural rubber and locally-synthesized nano-clay for rubber-based sports products; development of cellulose acetate-based membrane using electrospinning for ultra and/or nano filtration; and production of dome-type ceramic water filter (with nano anti-microbial agent).

For those interested to avail of the services/facility, you may contact Dr. Blessie A. Basilia, Chief, Materials

Science Division, Industrial Technology Development Institute, DOST Compound, Gen. Santos Ave., Bicutan, Taguig City, Philippines 1631. Tel. No. (632) 837-2071 to 82 loc. 2201; 2233; Fax No. (632) 837-3167 & 837-6150. Email: msd@itdi.dost.gov.ph (*JCelorico & CEmolaga, MSD*)

Lowly tiesa ... *from p. 3*

such as supercritical fluid extraction (SFE) and ultrasonic-assisted extraction (USE) should be studied to develop more efficient and greener standardized procedures in the production of natural food coloring from tiesa", concluded Bilbao. Likewise, other sources of natural pigments should be investigated to have more sources for natural colorants.(*DDGotis with reports from CBilbao, FPD*)

profile

EDITHA F. TORRES-LAGASCA
Doctor in Public Management

Dr. Editha F. Torres-Lagasca is one of the Institute's popular faces, known for her candid and striking personality, distinctive as a lawyer rather than a researcher because of her language accent. She can be likened to one of the country's lady senators, tagged as the defender of the people.

Dr. Lagasca is a graduate of Bachelor of Science in Business Administration major in Accounting and is a Certified Public Accountant. Her quest for excellence and higher education never die down, advancing two notches higher when she completed Master in Public Management in 1988 and Doctor in Public Management from the Pamantasanng Lungsod ng Maynila in April 2014.

Dr. Lagasca is presently with the PMISD as Science Research Specialist II and heads the Audit Team for ITDI-ISO. As head auditor for ISO, she oversees the Institute's compliance to total quality management, and with her co-auditors ensure and monitor that ITDI work frames adhere and operate within the bounds of ISO guidelines. Her outstanding performance to this task has merited approval of her scholarship for a doctorate degree in public management, which she recently completed. Her dissertation entitled "Sustainability of ISO 9001:2008 Quality Management System at DOST Towards Customer Satisfaction" obtained a high satisfactory rating. She also received the Director's Award for ISO 9001:2000 Internal Audit in July 2009.

Her long and varied work experiences earned for her valuable knowledge in accounting, auditing, writing and research-related works. Prior to joining ITDI, she was a Senior Management and Audit Analyst at MSRI in 1984. Aside from her work at ITDI, she also teaches managerial accounting and auditing theories and practices in some undergraduate and graduate schools in the Metropolis. Over the years, she has produced knowledge products that are worth mentioning. She was the lead writer for the report on the Impact of PRDC's Packaging Interventions to Lety's Buco Pie and the whole buco pie industry, and Impact Assessment for ITDI Interventions 1997-1999 and 2001-2002 (done by the former Economics and Planning Division now PMISD). She was also a contributing writer for the then ITDI writers pool, now known as ICOW or ITDI Committee of Writers. She also served as lecturer in a seminar on "Review of ITDI Internal Audit and Enhancement of the QMS" in March 2014.

Fondly called "Edith" by colleagues at work, she loves challenges in work for she believes that these are opportunities to practice and even improve her intellectual abilities, and thereby drive her to higher productivity. At home, she is undeniably a loving and caring wife and mother to her family. She really is a born auditor, because she is always into details – be it work or family. As a friend, she is genuine and trustworthy. (*DDGotis*)

Our Business Is Industry

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