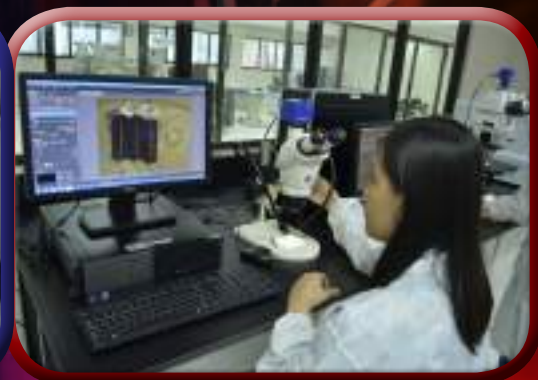
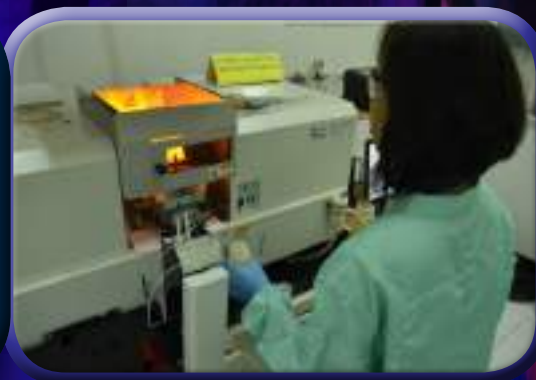




ITDI 2014 Annual Report





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About ITDI

The Industrial Technology Development Institute (ITDI) laid the groundwork for S&T in the country. Today, it is one of the DOST's R&D agencies and undertakes multidisciplinary industrial R&D, technical services, and knowledge translation or technology transfer/commercialization. ITDI harnesses know-how in new technology and product innovation, and through the years, has emerged as a credible and reliable industry and government partner in accelerating growth and development in the country.

Mandate

Conduct R&D to generate new knowledge and technologies

Undertake knowledge translation or technology transfer/commercialization

Provide technical services, tests and analyses

Establish, develop, and maintain national units of measure to provide international traceability

Vision

Excellence in propelling development as provider of technologies and services for industry

Mission

To make local industries globally competitive





Hon. Mario G. Montejo
Secretary, DOST

Message of the Secretary

I am pleased to congratulate the Industrial Technology Development Institute (ITDI) for a most successful 2014.

During this year, the Department of Science and Technology (DOST) along with its attached agencies especially the ITDI, have again proven itself as a significant partner to industries

The ITDI took the lead in collaboration with DOST Regional Offices, the One Stop Laboratory Services for Global Competitiveness (OneLab) project. This initiative is the DOST's platform that comprehensively provides an avenue for customers to meet their testing needs at a single touch point, through having broad access to testing services of all DOST laboratories with standardized technical services and fees as well as accurate test and calibration results.

It also showed a triumphant ITDI in garnering the Presidential Lingkod Bayan Award (Group Category) in recognition for developing the DOST Mosquito Ovicidal/Larvicidal (OL) Trap System that significantly reduced mosquito densities and dengue virus transmission in various communities nationwide. The OL Trap Kits, which are now readily available nationwide, has already attracted the interest of other countries with similar high dengue incidence.

Among these achievements, the ITDI has also installed DOST-designed food processing equipment such as water retort, vacuum fryer, and spray dryer in the Food Innovation Centers (FICs) in various regions around the country, empowering growth among local food establishments.

The ITDI has proven another banner year for the sterling quality of work and numerous other programs and projects it initiated in the last year that have transformed its role as catalyst for industrial growth of SMEs. I hope the Institute continues being a strong force in helping improve the lives of the Filipino.

Mabuhay!

A handwritten signature in blue ink, appearing to read 'Mario Go Montejo'.

Hon. Mario Go Montejo
Secretary

Message of the Director



Rowena Cristina L. Guevara, PhD
Officer-in-Charge, Office of the
Director, ITDI-DOST

Congratulations to ITDI for a sterling performance in 2014. Working with ITDI has been a privilege of a lifetime and I am optimistic about its bright future.

It is with pleasure therefore that I welcome everyone to read through the pages of this report. The accomplishments as listed indeed show a diligent and incredible team.

ITDI has already distinguished itself as a credible and reliable partner of DOST and industry over the years. Thriving in that culture has enabled the Institute to develop technologies and deliver technical services that answer the needs of our customers and make our employees and researchers incredibly proud of what they do.

A testament to this commitment is the Institute's Presidential PAGASA Award for OLTRAP, as well as being one of the leaders for DOST's One Lab project, that will enable industries to have broader access to the testing services of all DOST laboratories with standardized technical services and fees besides timely and accurate test and calibration results.

Likewise, ITDI's contributions to the development of DOST food process equipment and their subsequent roll-out leading to the establishment of Food Innovation Centers (FICs) for our local food industry in the regions are no mean feat. These FICs are vital for our MSMEs to move up the value chain and boost their productivity towards global competitiveness.

I am confident the best years lie ahead for ITDI, so let us continue exploring ways in which we can create more value for everyone especially, the industry – our major stakeholder.

With shared vision and goals for industry competitiveness and enterprise development, ITDI will continue working with partners in academe, government and the private sector for the improvement of the quality of life of every Filipino.

Rowena Cristina L. Guevara, PhD
Officer-in-Charge, Office of the Director, ITDI-DOST



Nuna E. Almanzor, PhD
Director, ITDI-DOST
(Retired, Sep. 2014)

The time to take my leave as Director of ITDI has finally come and it is with fondness that I bid farewell. As I look ahead to what the future holds for the Institute, I cannot help but be reminded of the challenges we faced and the accomplishments we achieved.

Throughout my nine-year stint as Director, we were guided by what we believed to be ITDI's reason for being – to live up to its vision-mission by consistently providing competitive and accessible innovations and services that lead to industry advancement, social development, and economic growth.

That is why it is with immeasurable pride that I now look back on each day I spent at ITDI. Many milestones were achieved to entrench ITDI as an indispensable agent and partner of DOST in its quest to make life better for every Juan and Juana.

My tenure has been fruitful indeed, and I want to thank all the ITDI staff for their dedicated and relentless quest to develop new ways to better serve our stakeholders by providing competitive technologies and services and thereby make DOST relevant in all sectors of society.

May I also thank ITDI's stakeholders and partners, for your trust and cooperation, and may you continue trusting and working with us in the years to come.

My professional life wouldn't have been as satisfying and rewarding without working at ITDI and with all of you.

To the ITDI staff, may your passion and commitment never ebb in creating and generating technologies and innovations that make a difference in the lives of Filipinos.

It is with much optimism that I pass on the leadership of ITDI, confident that the Institute will continue to attain greater heights in the service of Philippine industry and the Filipino people.

Nuna E. Almanzor, PhD
Director, ITDI-DOST
(Retired, Sep. 2014)

OUTCOME¹

Science-based know-how and tools that enable the agriculture sector to raise productivity to world-class standards



Blast-frozen durian "sealed for freshness"

Enhancing the competitiveness of fresh and semi-processed agricultural products through the application of appropriate and sustainable packaging technology (frozen durian)



Conducted jointly with Japan International Cooperation Agency (JICA), the project aims to develop appropriate packaging technology for fresh and semi-processed agricultural products. There are eight (8) commodities under the project and durian is one of them.

A packaging innovation for frozen durian was developed using multiple high-barrier packaging materials and packaging technique to keep the strong flavor and aroma of durian inside the package and at the same time keep the quality of frozen durian for at least one year. The developed packaging technology is now up for patent.

In its new packaging, frozen durian can be stored longer and has a high potential to expand its market both locally and for export. With this development, additional employment could be created resulting to additional income that can help improve the quality of life of rural farmers. Two durian processors in Davao already adopted the technology. Frozen durian in its new packaging technology has been introduced in Foodex, Japan last March 2014 and in May, and an initial shipment of frozen durian to Japan was realized.

This new technology is sure to benefit Durian farmers/growers/processors in Mindanao and other producing areas in Luzon as well as MSMEs involved in durian and fruit processing.



Development of transport packaging technology for fresh fruits and vegetables (fresh durian)

The project aims to develop sustainable packaging technology, innovative packaging design, and product branding for fresh fruits and vegetables.

Working directly with durian growers/farmers in Davao, an improved transport packaging and system that could withstand environmental and mechanical hazards during storage, transport, and distribution of fresh durian was developed.



Along with innovative packaging design and branding, this development helps reduce handling and distribution losses by at least 20%, and increases marketability and radius of distribution (both local and export), resulting to improved income of farmers/fruit growers.

An initial shipment to Singapore using the developed transport packaging system reported no product damage. SMEs, durian farmers/growers (Members of Durian Industry Council of Davao), and in other areas in Mindanao can benefit from this technology.



OUTCOME 2

Innovative, cost-effective, and appropriate technologies that enable MSMEs to develop and produce competitive products that meet world-class standards



Shelf life improvement of selected traditional sweets, bakery products and snack foods through the application of active packaging technology (phase 1 - honey glazed *pili* nuts, *bukayo* and squid rings)

The project helped improve the shelf life of traditional Philippine products such as honey glazed *pili* nuts, *bukayo*, and squid rings through the application of active packaging technology using in-packaged oxygen absorber.

With this technology, the shelf life of these products significantly improved; from 2 weeks to 15.4 months at 30°C for *bukayo*, and from 3 months to more than 12 months

at 30°C for squid rings and honey glazed *pili* nuts. The technology can also be applied to similar products.

With extended shelf life, producers of these traditional sweets and snack foods have better opportunities of selling their products on a wider market range that may lead to creating additional employment for the community.



Application of active packaging technology on honey glazed *pili* nuts

Development of intermediate products from *pili* nuts: paste and powder



Optimum processing parameters for the production of *pili* powder and paste were determined. The produced *pili* powder and paste were used as intermediate raw materials to develop various food products.

The *pili* powder was used as an additive in baked goods like bread and cookies to improve their nutritional value; while the *pili* paste was used as a main ingredient in the manufacture of chocolate spread and other similar products.

This development can help boost the *pili* industry in the field of food application; and will likewise benefit the *pili* farmers and processors.

A comparative study on the effect of packaging materials (retortable pouch, glass and metal cans) on the quality of sautéed shrimp paste

The project intends to assist MSMEs in selecting suitable packaging material for thermally-processed and shelf-stable products (like bottled sautéed shrimp paste). The result of the project will provide baseline information on the production cost per type of packaging material and its effect on product quality. This can also help the producers appropriately position their products in the market according to consumers' preference e.g. in glass jar, metal can or in retort pouch.

Considering that the quality of thermally-processed foods is dependent on several factors such as temperature, packaging material and heating characteristics, the effect of different packaging materials



(retort pouch, glass and metal containers) on the process schedule, production cost, and quality of sautéed shrimp paste was determined.

Results indicated that the production cost was significantly affected by the type of packaging material used for sautéed shrimp paste. The use of retort pouch for a 250 grams sautéed shrimp paste has the lowest energy input due to fast heating time, taking only 46 minutes compared to 75 and 77 minutes for glass jar and metal cans, respectively; therefore, more cost-effective.

Development of ready-to-eat (RTE) dried Cavendish banana

Ready-to-eat (RTE) banana roll and banana slices were developed from Cavendish banana rejects that would have usually gone to waste.

In the process, the appropriate factors in producing the consumer-acceptable RTE banana roll and slices were investigated and determined. These included: maturity/

ripeness, drying parameters, moisture content, and microbiological quality.

The developed RTE banana roll and slices were comparable with the commercially available similar products. Benefit from this development can be three-fold; use of rejects can increase income of farmers and banana processors, value-adding, and reduced wastes.

E-nose and e-tongue evaluation of Philippine ethnic foods



Electronic nose and tongue offer an alternative and quicker method of analysis. These are used in quality control and shelf life studies.

These methods were used in characterization of Philippine sauces and discrimination study of coffee varieties.

E-Tongue was used in [a] quantification of caffeine in commercial 3-in-1 coffee mixes, [b] determination of the intensity of sweetness of selected commercial sweeteners, and, [c] evaluation of rice wine products from Region CAR; while e-Nose was used to determine the changes in coffee aroma of roasted coffee beans during storage.

Pilot scale production of natural food coloring from *tiesa* fruit crop

An alternative yellow food coloring has been previously developed from *tiesa* fruit.

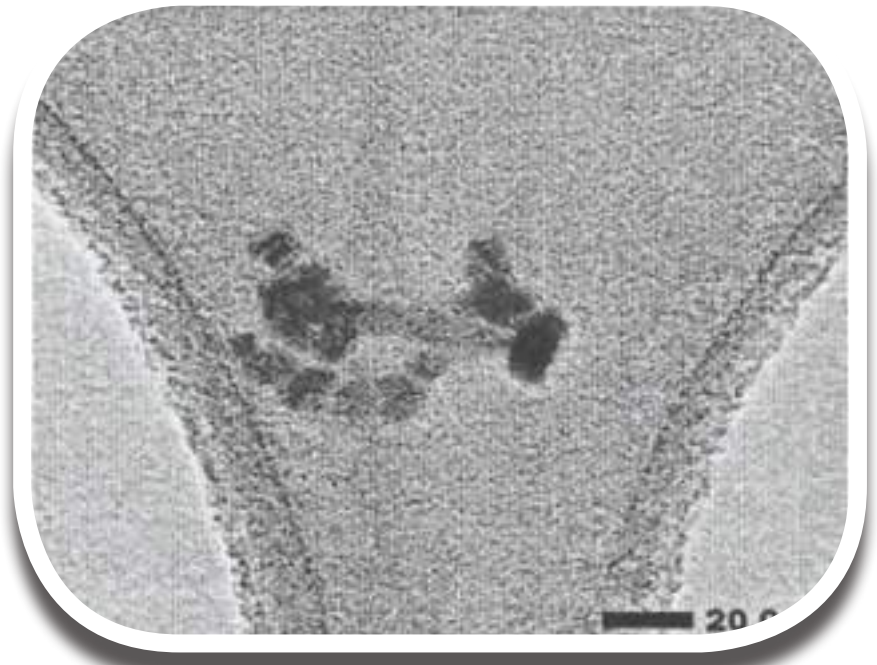
Scaled-up production of the developed food coloring was done with extraction and purification parameters standardized. Stability tests for the developed natural food coloring were also conducted.

The product compared favorably with a synthetic food coloring when applied on food products. This development is a good indication for producers of natural food colorings and *tiesa* which is considered an under utilized agricultural crop.



OUTCOMES

State-of-the-art facilities and capabilities that enable local industries to move up the value chain and attain global competitiveness



Transmission Electron Microscope (TEM) micrograph of synthesized nanocopper

Synthesis of nano copper as anti-microbial agent for ceramic water filter

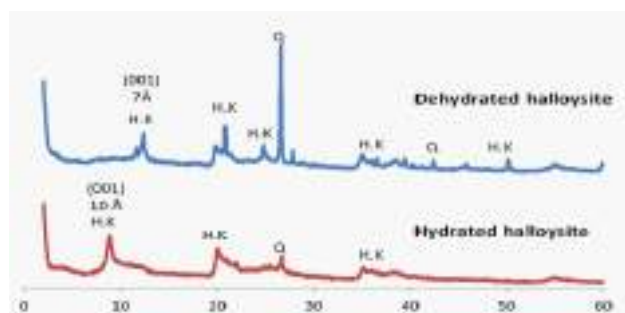
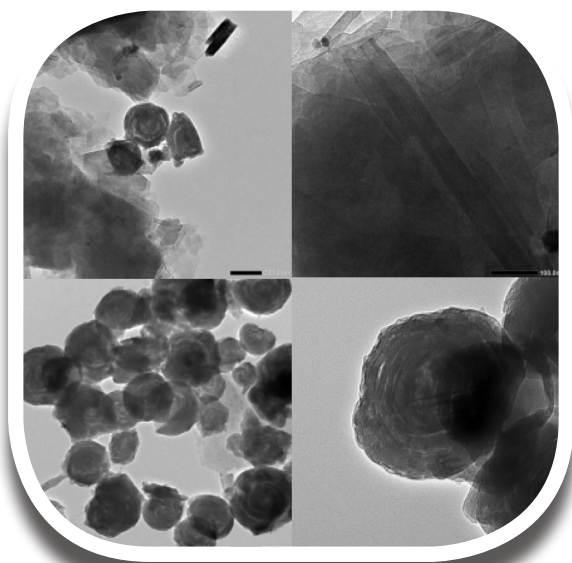
Colloidal silver as an anti-microbial agent for ceramic pot filter is well established. Its effectivity and non-toxic characteristic makes it suitable for water purification system. However, its use for mass-produced water purifier is limited due to its high cost being a precious metal.

Thus, a cheaper alternative is being explored like copper. Different forms of copper compounds were used for centuries to disinfect liquids, solids and human tissues. Copper nano particles have excellent physical and chemical properties and have

been known to have a strong anti-microbial activity. They are also cheaper to prepare.

The present study deals with the synthesis, characterization and application of nano copper as anti-microbial coating for ceramic water filter. Copper sulfate pentahydrate as precursor for nanocopper and ascorbic acid as stabilizer were used for the synthesis of nanocopper. UV-Vis analysis showed the stability of the synthesized nanocopper. Results of anti-microbial test by disc diffusion method also showed the potential of the synthesized nanocopper as anti-microbial coating for ceramic water filter.

Tubular and spheroidal halloysite pyroclastic deposits in the Philippines



Halloysite-bearing weathered pyroclastic deposits from two different deposits in the Philippines were characterised by X-ray diffraction (XRD), Scanning Electron Microscopy (SEM), Transmission Electron Microscopy (TEM), and X-Ray Fluorescence (XRF). It was observed that dehydrated form of halloysite is predominantly tubular in morphology while the hydrated form is that of the spheroidal form. There were no consistent differences in terms of the chemical and mineralogical composition of the deposits. The different morphological forms of halloysite may result from conditions of growth in the different micro environments related to variability in physical conditions.

Studies on the use of halloysite nanotube (HNT) as additive to polymer for numerous applications had been increasing. This is due to its desirable properties such as its natural tubular morphology, nano-scale diameter and contrasting chemistry on external and internal surfaces. Among its potential applications are as microfiber fillers, carriers for drug delivery, anti-corrosion coatings, and fillers for semiconductor devices.

Application of nanotechnology in providing potable water

Innovative potable water systems applying nanotechnology were developed to address the demand for simple, effective and inexpensive water filter for household use. These comprised of two types of ceramic water filters/systems, pot-type and candle-type; that were coated with positively charged nano-colloidal silver, used as the anti-microbial agent to eliminate water-borne microorganisms.

Two prototypes of pot-type filters of 1.5 li and 6.0 li capacity were designed while the candle-type filter was a pitcher-type portable system.



Candle-type ceramic water filter system

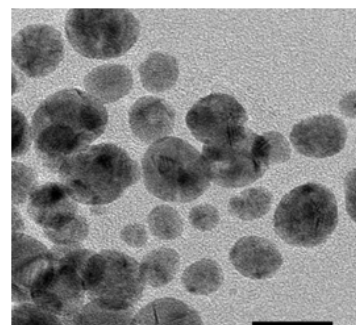


Pot-type ceramic water filter system

Field performance tests of the developed ceramic water filters were also conducted: for the pot-type filters at the National Housing Authority (NHA) Resettlement Site in Southville, Muntinlupa; and the candle-type filters at the Shelterville Resettlement Area in Vigan City.

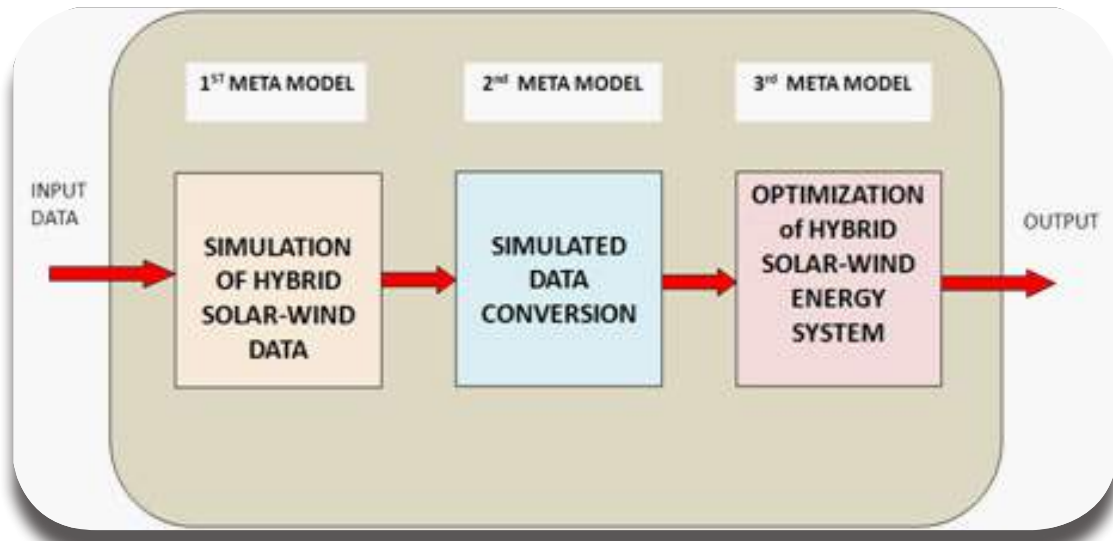
Results of microbial analysis of the filtered water using the developed systems in both areas conformed to the microbiological criteria set by the PNS (Philippine National Standard) for drinking water.

Several red clays from various regions showed potential for the production of ceramic filters, and two (2) clay deposits were identified for further studies: Aurora (Aurora Province) red clay for the development of pot-type filters and Vigan (Ilocos Sur) red clay for the candle-type filters.



Transmission Electron Microscope (TEM) micrograph of nano silver crystals

Development of energy model to simulate hybrid combination of solar and wind energy systems for reliability of power generation in selected key cities



Energy Model Framework

This study looked into the underlying concepts of combining two energy sources (solar and wind) that exist in a probabilistic system where the occurrence of events cannot be perfectly predicted over time. The behavior of a complex system like hybrid solar and wind energy system was described in terms of probability function through input data simulation technique.

Solar radiation and wind speed data gathered from meteorological stations of PAGASA were treated as entities of the physical system which have the ability to change the system. Through simulation process, the entities were analyzed to come up with the most applicable distribution functions resulting in the best fit of data. Multiple meta models were generated as best fit for the hourly data based on the mean square error (MSE). Goodness of fit tests were also performed in the different meta models using Chi-square and Kolmogorov-Smirnov tests to check goodness of fit and establish the initial hourly meta models for the 12-month

period in two cities, Laoag City and Legapsi City, as initial component of the proposed framework of energy model.

While studies to understand the characteristics of wind and solar energy as complementary sources are limited considering their unpredictable nature, past research works showed that knowing and understanding the complementary characteristics of the two energy resources can make it technically and economically viable. (Ekren and Ekren, 2009).

Simulation studies can be adopted and localized which could serve as the tools for identification of sites, optimization of design and size, and installation of hybrid solar and wind energy systems in many parts of the country, especially in remote and isolated areas where there are no grid connection for electrification. When isolated areas are electrified then there would be more opportunities for income generating activities. This can also improve educational opportunities for people in these areas.

Effect of corrugated fiberboard inserts on the compression strength of corrugated containers

Corrugated fiberboard inserts are usually used to separate or cushion fragile packaged products. Fiberboard inserts also provide additional structural strength to corrugated fiberboard containers. The designs of corrugated inserts from the FEFCO Code were used to test each design's capability to reinforce the structural compression strength of corrugated containers or boxes.

Compressive tests to 27 corrugated inserts designs were conducted and results showed that using corrugated fiberboard inserts provide additional compression strength to corrugated boxes by more than 200% depending on the style. The inserts not only provide adequate protection against compressive top loads but also protect multiple products from hitting each other during transport.



This can help prevent or minimize product damage during distribution translating to savings. Packaging suppliers and engineers and exporters/distributors of food and non-food products can benefit from this innovation.

The designs used in the study can be re-used in future projects and/or modified (into combinations) to address cushioning needs of products with intricate designs and irregular shapes. Likewise, the data gathered can also be used and incorporated (or as reference) in developing transport packaging for specific type of products in the future.



Compression testing using PTD's Shimadzu AG-X Testing Machine

A buckled panel as a result of compression failure



PCR-based detection and monitoring method of papaya (*Carica papaya* L.) adulteration in black pepper (*Piper nigrum* L.)

In the food industry, maintaining high quality standards determine product acceptance and viability in the market. Adulterations in products must be eliminated at the different process points where they can be incorporated.

A PCR (Polymerase chain reaction)-based method using gene-specific primers for papaya was developed to detect its presence in bulk samples of black peppercorns. Results can be used to authenticate the purity of a sample.

Using this method, three of the four random samples tested were found to have papaya seed adulteration. It is efficient and can detect adulteration even at very low levels. It is unbiased and can be used by the regulatory agencies for quality assurance of black pepper powder.

Implementing this method can benefit local black pepper farmers and small suppliers. Likewise, knowledge of the purity and quality of the product being bought or sold in any quantity will assure fair value for both buyer and seller.

Several points were considered in developing this method, as follows:

1. The black peppercorns being monitored are samples which had undergone continuous drying for an average three days. This drying process had effect on the quality and quantity of DNA extracted from the samples. Thus, DNA preparation becomes a crucial step for the success of detection.

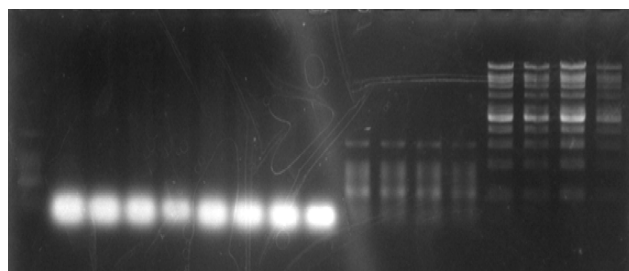


Figure 1
The amplified fragment of the papain gene

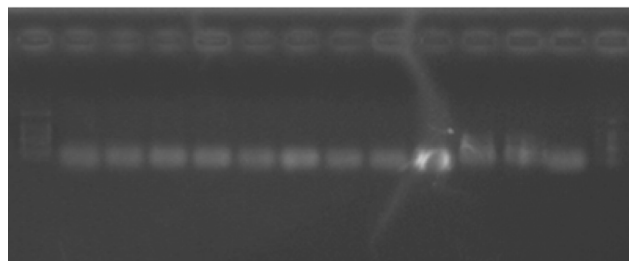
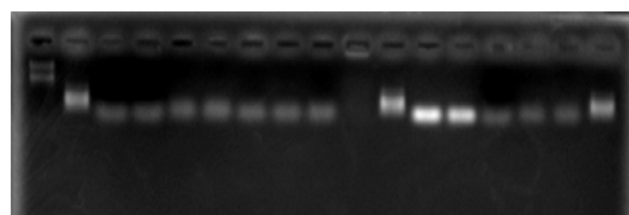


Figure 2. Detecting limit of detection (LOD) with decreasing Papaya DNA template concentrations (Lane 1: Marker; Lanes 2-13: 100%, 100%, .1%, 0.2%, 0.3%, 0.4%, 0.5%, 0.6%, 0.7%, 0.8%, 0.9%, 0.01%; Lane 14: Marker).



M M PL PL PS PS S1 S2 S3 S4 M PL PL PS PS PS M
Figure 3
Test run using black pepper samples from the market (S1, S2, S3, S4).

2. Second, the primers used are highly specific for one particular species, that of papaya. Thus, this method has the limitation of detecting one particular species at a time, and other primers would have to be selected and validated for different adulterant species

3. Third, the load of detection (LOD) for papaya was determined at 0.6% template concentration. Intact bands representing the stable detection at a minimum DNA concentration was noted at 0.6%.

Laccase production using locally cultivated mushroom



The use of laccase enzymes is considered a green technology that could replace chemicals. It has diverse application in production processes in various industries as in food, paper and pulp, and textile; as well as for environmental bioremediation.

Five mushroom isolates were screened: *Ganoderma lucidum* (RTU), *Ganoderma* sp. (wild), *Pleurotus florida* (Angel mushroom-Oyster), *Pleurotus cystidiosus* (Abalone), and *Lentinus edodes*.

Two mushroom cultures, Oyster and *Ganoderma* were grown in four agricultural substrates (corn, sorghum, sweet potato, and wheat) for optimal growth selection using simple media consisting the substrate and dextrose.

Results indicated that substantial laccase enzyme activity could be produced with Oyster cultures using simple media.

Compared to other enzymes, laccase exhibits the following advantages: relatively high yields, uncomplicated isolation from bulk fungal cultures, easy screening for specific producers with a broad substrate spectrum, a high degree of stability and activity especially after immobilization, broad specificity (which allows them to transform a wide range of substrates), and wide diversity. Also, most fungal laccases are very stable, especially at pH near neutrality (glycosylation seems to be implicated in the stability of fungal laccases), and their organic substrate oxidation site exhibits a high redox potential.



Biological treatment of industrial wastewater from semiconductor industry



Treatment for 80 L contaminated waste water with Cu (Aerobic Conditions)



Treatment for 18 L contaminated waste water with Cu (Anaerobic Conditions)

The environmental risks and impacts of wastewater generated by the semiconductor industries had been getting significant attention recently. The wastewater from this industry contains heavy metals, large amounts of refractory volatile organic compounds, and high chemical oxygen demand (COD).

An alternative method for semiconductor wastewater treatment has been developed using a locally-isolated yeast strain (*Cryptococcus humicolus*) that was made to perform under aerobic and anaerobic conditions in order to remove heavy metals, organic and inorganic compounds in the wastewater.

A detailed technical evaluation of continuous, biological treatment processes for wastewater contaminated with copper (Cu) has been carried out.

Based on the experiments, a continuous aerobic set-up with a hydraulic retention time of 3 days could be a good option for the treatment of copper-contaminated wastewater. Cu removal in one-liter (L) volume of wastewater was 42.66%, 84.50% in 10-L, 66.41% (Batch Type Method) in 80-L and 81.70% (Continuous Type Method) in 45-L.

On the other hand, the removal of Cu under anaerobic conditions also showed promising results at 49.40%

This new bioremediation process can be an option for the semiconductor industry to comply with the stringent wastewater effluent standard for heavy metals required by the DENR. The treated wastewater may be reused as well for agricultural purposes.

Round robin antibacterial test of photocatalytic materials based on ISO 17094 among Asian Countries



MOA signing Dr. Yoshio Okamoto President, PIAJ, Mr. Tatsuya Imura Vice-Pres. PIAJ; Dr. Nuna E. Almanzor, ITDI Director.

A joint activity between Asian countries and Photocatalysis Industry Association of Japan on the antibacterial activity of photocatalytic materials was conducted to verify the performance of photocatalyst-treated samples at Asian environment. Two bacterial strains were used, namely *Staphylococcus aureus* DSM 346 and *Escherichia coli* ATCC 8739.

Protocol for the antibacterial test was based on ISO 17094 'Fine ceramics-test method for antibacterial activity of semiconducting photocatalytic materials under indoor lighting environment'. Test pieces consisted of photocatalyst-treated and non-treated samples in glass base. Inoculated samples were incubated under illuminated and dark conditions for four hours.

Results showed that using the photocatalyst treated samples, bacterial reductions under illumination were 99.4% and 99.9% for *S. aureus* and *E. coli*, respectively. Bacterial reductions were also observed in treated

samples incubated in the dark with 61% in *S. aureus* and 99.9% in *E. coli*. The photocatalytic antibacterial activity after illumination was 2.2 ± 0.06 log for *S. aureus* and 3.1 ± 0.1 log for *E. coli*.

Parameters such as incubation temperature, type of bacteria, initial cell density, illumination time, and effect of cover films are some factors to be considered to further improve ISO 17094 technique for application to photocatalytic materials.

The output from this project will be useful in preparing laboratory test standard for evaluating influencing factors on the performance of photocatalytic materials at Asian environment. This undertaking will also be helpful to support countries that would like to build photocatalytic antibacterial testing laboratories.



Setting-up of illumination apparatus



Actual antibacterial activity test based on ISO 17094

The Institute has over the years, sustained its efficient delivery of technical services and has served client's needs for test and analysis, calibration, formula of conversion, and other specialized services (i.e. package development, label design, use of facilities, test and evaluation, brand development, training, environmental technology verification, technology transfer and technical assistance).

For 2014, total income for technical services amounted to PhP 17 million from a total of 15,546 services rendered. The calibration and measurement services posted the highest income of PhP 9.6 million, followed by test and analysis with PhP 5.7 million, and formula of conversion with PhP 1.7 million, respectively.

Revenues from other specialized services amounted to a total of PhP 5.7 million from a total of 753 services rendered or 647 customers.

TECHNICAL SERVICES



2014 INCOME FROM TECHNICAL AND OTHER SPECIALIZED SERVICES

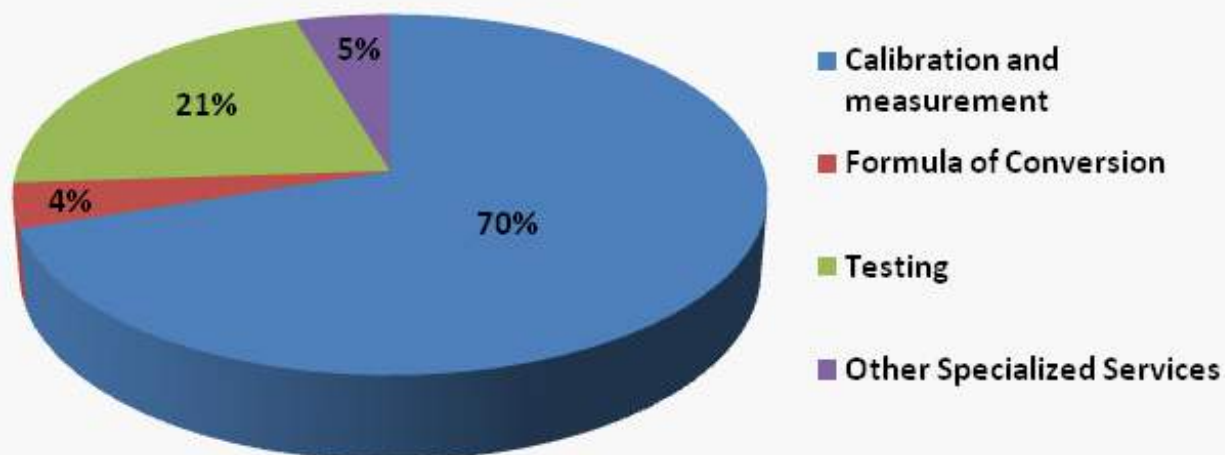


Figure 1:
2014 Income From Technical And Other Specialized Services

TYPE OF SERVICE	CLIENTS SERVED	SERVICES RENDERED	AMOUNT (PhP)
Package Development	7	9	246,960.00
Label Design	28	36	164,375.00
Use of Facilities	306	361	870,049.00
Tests and Evaluation	289	325	3,877,841.00
Brand Development	1	1	5,256.00
Training	3	3	29,448.00
Technical Services	2	3	8,698.00
Technology Transfer	4	4	169,578.00
ETV	6	10	134,031.00
Energy Audit	1	1	59,943.00
TOTAL	647	753	5,566,179.00

Table 1:
2014 Other Specialized Services Rendered

METROLOGY



ITDI's National Metrology Laboratory (NML), being the country's National Metrology Institute (NMI) is responsible for the establishment, development, maintenance, and dissemination of national measurement standards in physical quantities that are consistent with the SI or other internationally-recognized standards.



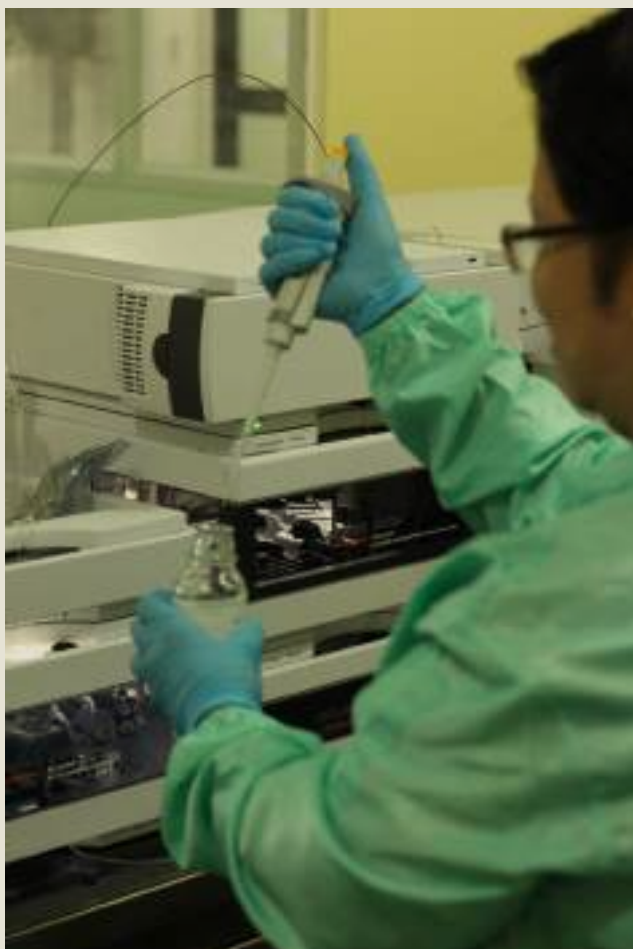
Regular calibration and measurement services generated an income of PhP 9.6 million from 11,398 services rendered or 407 clients served.

In-house trainings were conducted to improve efficiency and productivity of its clients, from ITDI and industry. Among the trainings conducted were: proficiency testing; introduction to metrology; calibration of electronic balances, volumetric wares, mass standards, pressure gauge, and digital multimeter.

NML further enhances its expertise thru attendance in meetings, exhibits, training/ forum, seminars/workshops, here and abroad. These included participation in the ASEAN-PTB workshop on best practice in metrology law development, and attendance in KRISS Korea-APMP General Assembly and related technical committee meetings; APMP DEL TCEM training workshop on angel and surface metrology.



TESTS AND STANDARDS



ITDI's test and standards laboratories are constantly performing tests and analyses of products and materials to industry clients and other stakeholders to help them become globally competitive.




PAO Accredited
Testing Laboratory
PNS ISO/IEC 17025:2005
LA-2005-081C
LA-2011-190A
LA-2011-191A

For 2014, income from testing services amounted to PhP 5.7 million from 3,175 testing services rendered and 1,543 customers served in the National Capital Region (NCR) and from nearby provinces. Income from services for Formula of Conversion (FOC) amounted to PhP 1.9 million from 703 customers for tax drawbacks and as PNP requirement.

The institute continues to uplift its laboratories' competency by participating in national and international undertakings. In doing so, its Standards and Testing Division (STD) participated in various national and international Proficiency Testing (PT) programs which resulted in satisfactory and even excellent performance

In 2014, STD participated in Proficiency Testing (PT) programs organized by the USA Environmental Research Associate (Turbidity in water), Envitest 6 from Jabatan, Kimia, Malaysia (Mercury, Arsenic and Trace Metals in water), Milk Powder from Jabatan, Kimia, Malaysia (Moisture, Ash, Protein, Fat, Carbohydrate, and Calcium), and Soy Sauce from Jabatan, Kimia, Malaysia (pH, Protein, Total Kjeldahl Nitrogen, and Sodium Chloride).

STD laboratories which are accredited by the Department of Trade and Industry (DTI) Philippine Accreditation Bureau (formerly Philippine Accreditation Office) under Philippine National Standard ISO/IEC 17025:2005, or the general requirements for the competence of testing and calibration laboratories, have sustained their laboratory accreditations.

The Microbiological Section of the Biological Laboratory had their First Surveillance Audit in 30th of July 2014 after the laboratory's accreditation was renewed in 2013. From this audit, the laboratory successfully demonstrated their competence, and sustained the accreditation.

Currently, STD has existing accreditations for its Organic Chemistry Section of the Chemistry Laboratory, Microbiological Section of the Biological Laboratory, and the Physical and Performance Testing Laboratory. The Pharmacological and Toxicological Section of the Biological Laboratory, specifically its



Laboratory Animal House, is accredited by the Philippine Association of Laboratory Animal Science (PALAS), and Bureau of Animal Industry under RA 8485 "Animal Welfare Act".

Mandated to establish national measurement standards for physical measurements, ITDI thru STD expanded its metrological activities to chemical analysis. It started activities for Metrology in Chemistry (MiC) under the program "Development of National Standards for Chemical Measurements" focusing on food additives and contaminants and metals in water.

STD-ITDI has established the MiC facility and is now a Designated Institute (DI) for Metrology in Chemistry since January 21, 2014 and is listed in the International Bureau of Weights and Measurements (BIPM) website. The MiC Lab was inaugurated on July 1, 2014.

It envisions to obtain its Calibration and Measurement Capability (CMC) from the Consultative Committee on Quantity of Matter (CCQM) International Bureau of Weights and Measurements (BIPM). Its technical competence is shown in its satisfactory performance in APMP and CCQM key companion and pilot studies.

Having established CMCs means the country has marked recognition to analyze specific analytes per matrix. This global recognition assures the end-user that STD's MiC results can demonstrate traceability and comparability to international standards which can be disseminated to local laboratories.

Also, the STD's MiC has organized three PT Schemes:

- (1) MiCPT-14-01 Benzoic Acid in Mango Juice
- (2) MiCPT-14-02 Trace Metals in Water, and
- (3) MiCPT-14-03 Calcium in Water.

The PT scheme on trace metals in water was composed of the analytes Cadmium, Cobalt, Lead, Magnesium, Manganese, Nickel, and Zinc. The aim of these PT schemes was to help local laboratories assess their capabilities in the analysis of these analytes and to provide laboratories with quality control materials.

The first PT scheme was participated by 11 laboratories coming from the academe, government agencies, and private companies. Of these participants, 82% got satisfactory results. The PT scheme on trace metals in water was participated by 33 laboratories nationwide. Of these participant laboratories, seven were from the DOST laboratories (both from regional offices and R&D institutes), three from other government laboratories, five from the academe, and 18 from private companies. Laboratories with satisfactory results for Cadmium was 93%, 95% for Cobalt, 93% for Lead, 80% for Magnesium, 85% for Manganese, 93% for Nickel, and 90% for Zinc. The last PT scheme got more participants, a total of 39 laboratories, with 10 from DOST laboratories, two from other government agencies, six from the academe, and 21 from private companies. 88% from these laboratories got satisfactory results.

These PT schemes assisted the participant laboratories evaluate the accuracy of their test results with an estimate of measurement uncertainty based on their own test methods and establish traceability of measurement.

ADMATEL



The Advanced Device and Materials Testing Laboratory (ADMATEL) started commercial operation on January 8, 2013. Established to provide failure analysis (FA) and materials testing for the local industries, the laboratory is now fully equipped with advanced analytical equipment like Focused Ion Beam-Field Emission Scanning Electron Microscope (FIB-FESEM), Auger Electron Spectroscopy (AES), and Time-of-Flight Secondary Ion Mass Spectrometer (TOF-SIMS), and currently servicing the needs of the semiconductor, electronics and other related industries in the country.

In 2014, ADMATEL has served 88 companies since its commercial operation, 48% came from the Semiconductor and Electronics Industry, 37% were from the Allied Industries (Plastics, Automotive, Energy, etc.), and 15% from the Academe.

During the year, initial assessment on ISO/IEC 17025 was conducted in August and the completed Proficiency Tests for Chemical and Metallurgical Labs were submitted in the same year.

Other efforts were focused on improving the lab services and, in response to requests from industry, testing fees for services on its three

major equipment, were reduced: Focused Ion Beam - Field Emission Scanning Electron Microscope (FIB-FESEM), Auger Electron Spectroscopy (AES), and Time-of-Flight Secondary Ion Mass Spectrometer (TOF-SIMS). The testing laboratory also offers 20% discount for students who are conducting their thesis and research, and for micro, small, and medium enterprises (MSMEs).

In terms of capability building, continuous competency development and training is provided to laboratory analysts, who have also participated in Interlab and Intralab proficiency testing as part of the PNS ISO 17025:2005 compliance.

Targets for 2015 are directed towards improvement of facilities and capabilities to include new/additional technical services, offer bundled pricing, Research and Development services, and offer seminars / trainings on FA tools and materials characterization.

ADMATEL is now winning the interest and trust of the companies they have served. Customers find the testing facility sufficient and helpful in resolving their technical-related problems and in the characterization of their materials. Some satisfied industry clients shared their testimonials, stated as follows:

"We already discussed ADMATEL's results with our team and we got the signal to proceed to localize this test."

"It's nicely done, thank you. I think we got what we wanted for this request."

"We would like to express our appreciation for the assistance and we are looking forward to doing business with ADMATEL in the future."

"Results we got are at par with the foreign laboratory."

"I was astounded with the clarity of the result. We will be submitting more samples in the future."



Chemical and Metallurgical Analysis Laboratory



Thermal Analysis Laboratory



Surface Analysis Laboratory

NANOLAB

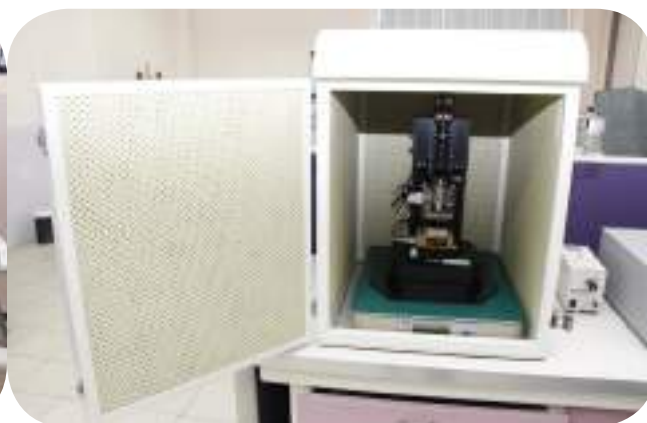


Inaugurated in July, the DOST-ITDI Nanolab is a new nanotechnology research facility in the Philippines that was established to provide nanotechnology-related technical services for the various local industries and to develop and implement R&D initiatives on nanotechnology.

This new laboratory houses sophisticated equipment that offer a wide range of characterization and analytical tools for various nanotechnology-related researches like high-resolution Field Emission Transmission Microscope (FE-TEM), and various detectors such as high-resolution Scanning Transmission Electron Microscope (STEM), that are maintained in a Class 100K and Electrostatic Discharge (ESD)-compliant room.

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.

NanoLab also networks with industries especially for the utilization and development of local raw materials; and offers testing services, contract researches, training opportunities, and technology transfer as well.



KNOWLEDGE TRANSLATION



Knowledge Translation or KT has become an integral part of creating awareness of science and technology, especially in the various areas of research and development (R&D). Through KT, the ITDI can promote its innovations by bringing the information or knowledge from the lab setting to consumers and the public.

In this light, ITDI uses KT to create awareness of the technologies the Institute has developed through

exhibits/forums, AVPs, online/print press releases, and other IEC (Information, Education, Communication) materials, such as newsletters, posters, and brochures/flyers.

KT initiatives also involve training and technical consultancy and assistance, as well as the development of various forms of business portfolios. Intellectual property management is also pursued.



IEC Materials/Activities

For 2014, ITDI, through the Technological Services Division, has produced and released a total of 10 issues of ITDI's monthly newsletter MiscellaNews, two issues of its biannual newsletter Techno Bulletin, 12 flyers, 14 press releases (plus 48 mentions of the Institute in print and online press), and 5 Flash News.

ITDI experts also went on TV/radio airwaves either live or via phone patch 26 times. Dr. Almanzor was also featured on DOST's S&T Post in time for her retirement as ITDI Director.

Around 210 walk-in clients and phone inquiries were accommodated, as well as 19 parties for study tours, plant visits, and field trips to its various R&D facilities, with guests coming from the academe, LGUs, NGOs, and even from abroad, specifically guests from the Kingdom of Bhutan.

Five AVPs were produced, namely on Metrology in Chemistry, restructured steak making, Nano Lab, EFR, and for Director Almanzor's retirement.

Also, 31 ITDI publications had been granted ISBNs, while the ITDI Library accommodated 50 users, mostly students. Ten techno/services AVPs/videos, featuring ITDI's past and presently offered technologies and services, had also been uploaded in ITDI-DOST's YouTube account, while the TSD-ITDI Facebook page was launched in time for ITDI's 113th Founding Anniversary.

Exhibits

ITDI also participated in eight exhibits, such as DOST's annual National Science and Technology Week (NSTW), held at the SMX Convention Center last July 24-28, 2014, as well as its four regional legs (Legaspi City, Albay for Southern Luzon Cluster; Tuguegarao, Cagayan for Northern Luzon; Mandaue City, Cebu for Visayas; and Davao for Mindanao).

ITDI was also featured at the Cordillera Month celebration in Bangued, Abra last July 8-11. Along with EBD and FPD, TSD was also present at this year's National Biotechnology Week (NBW) held at CHED, UP Diliman, featuring ITDI's technology for *bubod* or rice wine. ITDI was also featured in an exhibit at New Era University in Quezon City.

ITDI-developed technologies – namely the use of *Garcinia mangostana* (mangosteen) waste as larvicidal agent against *Aedes aegypti* mosquito, as well as development of *Andrographis paniculata* (sinta) as dietary supplement – were also among the posters presented during the 63rd Annual Convention of the Philippine Association for the Advancement of Science and Technology (PhilAAST) held at the De La Salle University in September.



Trainings and Fora

For the year 2014, a total of 115 trainings were facilitated/implemented, covering various topics/technologies with 2,240 participants coming from MSMEs, LGUs, cooperatives/associations, academe/SUCs, government offices, and private individuals nationwide. These trainings were delivered thru regular (conducted at ITDI) and special trainings (conducted at ITDI and on-site), and thru the DOST-Regional Offices, that generated an income of PhP 823,834.34.

Training courses included among others, food processing (e.g., fruits, vegetables, fish, meat); solid waste management and operation of equipment (e.g., using bioreactor and styro plastic densifier); and nonfood technologies (e.g., health and wellness products); and metrology.

One of the highlights of the training program conducted during the year was the production of emergency food reserve (EFR) for the Community Health Education Emergency Response Services (CHEERS) Corporation, a non-government organization that is involved in disaster preparedness and post-disaster relief services. They were trained to produce choco bar, polvoron, and cookies using EFR or emergency food reserve that was made from a powdered mix of malunggay, monggo and cassava. These products will be included in CHEERS' Go Bags in line with its disaster preparedness advocacy.

Another major activity of the Institute is the roll-out of ceramic water filter in the regions, one of DOST's priorities. Training on the production of candle-type ceramic water filter was provided to the adopter, University of Northern Philippines (UNP), Vigan, Ilocos Sur.

As part of the development of new training designs/modules, training dry-runs were facilitated/implemented to validate the readiness of the technology or service to become part of the training courses to be offered by the Institute, as follows: restructured meat processing (ham and steak), and trainer's training on the operation of five (5) DOST-developed equipment for food processing firms – participated in by 13 representatives from DOST-Regional Offices.

In addition, five techno-demonstrations were conducted simultaneously in various ITDI training rooms/labs such as bath soap making; liquid dishwashing detergent and fabric conditioner; calamansi juice concentrate; ham making; and accelerated vinegar production using ITDI acetator, as part of the ITDI's 113th Founding Anniversary Celebration held on July 4, 2014.

These were attended by women's groups (group of kababaihan) from Central Bicutan, school faculty members in Bicutan, and selected ITDI "retirable" employees.



Technology Roll- Out

ITDI, in cooperation with the Department's regional offices, has started rolling-out the DOST-developed food process equipment in Food Innovation Centers (FICs) in the regions.

These FICs serve as launching pads for the DOST equipment where local food processors can innovate. They also serve as one-stop food R&D centers for clients to develop new products and thus add value to local agriculture and fisheries industries and improve their productivity. This roll-out project is spearheaded by ITDI, along with MIRDC, DOST-PMEDSO, and PCIEERD, in cooperation with DOST ROs, academe, and the private sector.

Among the regions, the following already have their FIC operational: DOST-XI (Davao City), DOST-II (Tuguegarao City), and DOST-VIII (Tacloban City). Upcoming FICs include: DOST V (Legaspi City), DOST-VI (Iloilo City), DOST-VII (Cebu), DOST-IX (Zamboanga City), DOST-X (Cagayan de Oro City), and DOST-NCR (Manila).

Technical Assistance/Consultancies

As a continuing support to clients of ITDI, a total of 29 technical assistance services in various fields were rendered and served the needs in terms of improved production process, increased productivity, solid waste management, among others of 68 clients (MSMEs – food and non-food sectors, LGUs, cooperatives, association/foundation) in regions NCR, II, III, IV-A, IV-B, VI, X, XI, and XII. Among the technical assistance services rendered were the following:

- Assessment of plant facilities (boiler system and DOST essential oil extractor, vacuum fryer, essential oil extraction plant);
- Technical consultancy services on food safety for food processors;
- Technical assistance on processing of virgin coconut oil, packaging and labeling, and product and process development of MSMEs;
- Assessment of existing production facility of clients for possibility of installing ITDI gasifier to reduce cost on fuel in Asia Ceramics Corporation Pampanga and ZCE Organic Farm, San Idelfonso, Bulacan.
- Technical consultancy among food processors of peanut butter, ice cream and *taho* in Iba and Olongapo, Zambales
- Technical assistance /consultancy on the establishment of calamansi processing in Concepcion, Tarlac
- Technical assistance in the installation of rice hull combustor in Kalibo, Aklan



- Technical assistance/consultancy on Cleaner Production Technology in Concepcion and Sta. Ignacia, Tarlac
- Technical assistance on energy audit in Koronadal City, South Cotabato

In support to the Institute's project with GAIN (Global Alliance for Improved Nutrition), TSD and CED performed continuous monitoring of the salt iodization facility of Salinas Salt Inc., Bauan, Batangas and the provision of training/technical assistance on salt iodization to local salt producers in Pulpungan, Negros Occidental.

Business Opportunity Plans (BOPs)

- Materials Science (1.5L/6L/candle-type ceramic water filter, nanoclay, bricks, thermoplastic starch pellets)
- Food Processing (EFR nutri-choco bar/ nutri-polvoron, restructured ham, mango/*makapuno*/banana flakes, chicken adobo flakes, concentrated coco water, *tablea*, nipa sap sugar, goat milk powder, culled chicken in brine)
- Chemicals and Energy (analgesic balm, iodized salt, virgin coconut oil, carrageenan capsules)

Conforme Letters covering various technical assistance/interventions and services totaled PHP 251,168.00 as follows:

Crude coconut oil and cake from coconut dried meat

SOROSORO IBABA DEV. COOP.
SOROSORO IBABA, BATANGAS CITY,

Production and performance testing of jatropha-diesel fuels

DE LA SALLE UNIVERSITY, MANILA

Supervision in the fabrication and setting-up of a Biomass Burner Gasifier Combustor

JEAN'S CAKES AND PASTRIES
KALIBO, AKLAN

Supervision in the fabrication and setting-up of a 2 cu. m. LPG Fired Kiln intended for LGU Sta. Maria, Isabela

AGRICOMP MACHINERIES AND
CONSTRUCTION CORP., CAUAYAN,
ISABELA

Supervision in the fabrication and setting-up of a 2 cu. m. LPG Fired Kiln intended for LGU Bauko, Mt. Province

DOUGLAS ENG'G AND MACHINE SHOP
SERVICES
ABATAN, BUGUIAS, BENGUET

Technical assistance on the fabrication and test-run of ITDI modified carbonizer

LGU TAYTAY, TAYTAY, RIZAL



While **Memoranda of Agreement (MOA)** with the following stakeholders generated a total of PhP 539, 139.00:

OL Trap

HERITAGE VETERINARY CORP.
STA. MARIA, BULACAN,

Commercial-scale AFBBR

WASTE & RESOURCES MANAGEMENT,
INC.
TRECE MARTIRES, CAVITE,

Pilot scale anaerobic digestion of dairy waste sludge using the ITDI portable biogas digester

CLEANWAY ENVIRONMENTAL
MANAGEMENT SOLUTIONS, INC.
SILANG, CAVITE,

Essential oil extraction plant

ORANI SUHAI FOUNDATION, INC.
ORANI, BATAAN

Integrated fruit puree and juice processing plant

JMV FISHER CORP.
MANDALUYONG CITY

Bioreactor

BRGY. MOLINO 3
BACOR CITY, CAVITE

Two draft package costs were also prepared for ADMATEL, as well as six draft revisions of its testing fees for FIB-FESEM analyses, offering two options of each type of analysis, as well as for its other technical service packages. Also prepared were financial analyses for ITDI's technologies on mango flakes and ceramic water filter, and reports on ITDI's intellectual property matters.

Intellectual Property (IP)

ITDI was awarded two patents in 2014

- Dream Weave Logo: The Traditional T'nalak of the T'boli, and
- Oil Expeller.

Meanwhile, patent application were filed as well for the following technologies/ trademark:

- Process of preparation of natural health supplement from *Anona muricataa* (*guyabano*) leaves
- Process of preparation of tea from *Anona muricata* (*guyabano*) leaves
- Screw-type salt iodizing machine
- Rapyra trademark

OUTCOME 6

Improved quality healthcare and quality of life through science, technology, and innovation.



Improvement and standardization of iodized salt production facility

To help small scale salt processors produce high quality table salt, a continuous-type salt washer was designed and fabricated and the salt production process standardized.

These developments benefit the small producers that can help them comply with the ASIN law, which requires 95% purity for salt to be iodized, since problems as regards salt purity, moisture content, and consistency of iodine content are adequately addressed.

The standardized continuous process of refining coarse salt basically involves washing, drying, sieving, iodization and packaging. Compared to the old method there is no need of cooking which is energy-intensive and a slow process.

On the other hand, the continuous-type salt washing machine has a rated capacity of 5 kg/minute, 25 rpm, powered by a 0.375 kW electric motor, and can be operated by one to two persons. It has a base area of 2 meters by $\frac{3}{4}$ meter and height of 1.2 meters. All parts in contact with the salt are made of stainless steel materials in compliance with food safety standards.

The machine removes some of the impurities and dirt in the solar salt increasing its purity. With the integration of the existing machines like the basket centrifuge and salt iodization machine, the problem in moisture and consistency of iodine content are addressed as well.

Extraction, characterization and bio-assay for larvicidal activity of some Philippine medicinal plants



Detrimental drawbacks to the environment of chemical insecticides for dengue control led to search for better alternative means of control such as the use of natural plant-based larvicides.

Larvicidal activity of some Philippine medicinal plants collected from different localities in the country against 3rd and 4th instars larvae of *Aedes aegypti* mosquito was evaluated.

Several plant materials have proven to have significant toxicity against the larvae such as *Citrus grandis* (L.) Osbeck (*suha*) peels, *Anacardium occidentale* (cashew) shell wastes, *Annona muricata* Linn. (*guyabano*) leaves, *Persea americana* (avocado) seeds and peels and *Garcinia mangostana* (mangosteen) pericarp, crown and seeds.

Results of the study may help improve public health in the country.

Process validation, stability studies and application tests of bixin from *Bixa orellana* and *ube* powder in pharmaceutical and personal care products



A water-soluble pigment, bixin, also considered as a natural colorant, was extracted from the seeds of Annatto (*Bixa orellana* L.), a tropical tree.

Its seeds' pigments, bixin and norbixin, are amongst those mostly used in food, pharmaceutical and cosmetics industries due to the intensity of their colors, greater stability and wide variety of tones from yellow to red. This range of colors is an additional advantage of the annatto carotenoids over other carotenoids.

Highest percentage yield of bixin was obtained through alkali extraction with spray-drying.

The process parameters for the extraction

and purification of bixin were optimized for yield. The stability of the produced bixin was also determined through application tests on pharmaceutical and personal care products like chewable tablet, soap, lipstick, blush-on tack, shampoo, and liquid hand wash.

Also undergoing the same stability studies and application tests is *ube* (purple yam) powder or purple yam pigments or colorants.

Using bixin and *ube* powder as natural colorants could help address current issues of toxicity and allergic reactions often associated with the use of synthetic dyes that may yet increase value of both bixin and *ube* powder.

Development of antioxidant health supplements from plants

A natural-based antioxidant health supplement in the form of chewable tablet, capsule and syrup has been developed from a combination of three plant materials. The product has promising antioxidant activity.

Eating plant foods with high antioxidant activity or taking-in antioxidant health supplements can help maintain a healthy lifestyle and wellness.

The plant materials used for the supplement were fruits and vegetables known to possess antioxidant activity. The different plant materials were processed according to WHO standard protocol.

The safety, purity and efficacy of the plant materials were established. Heavy metals and microbial profile/contamination were also determined. Plants were subjected to aqueous extraction followed by spray-drying and alcoholic extraction.

A combination of at least three plant materials (*mangosteen, rambutan, bignay, strawberry, guyabano, turmeric*) which exhibited very promising antioxidant activity was formulated into health supplement products.

The developed health supplements are now being evaluated as to their purity, efficacy, and safety. This is a promising development especially for the health care and herbal processing industries.



FINANCIAL Management

For 2014, the Institute had an allotment amounting to PhP 280,015,831.00 broken down into (1) Personal Services (PS) of PhP 211,444,831.00; (2) Maintenance and Other Operating Expenses (MOOE) of PhP 53,751,000.00; and (3) Capital Outlay of PhP 14,820,000.00. As shown in figure 1, the largest allocation was for PS (76%) followed by MOOE (19%) and Capital Outlay (5%). Included in the PS allotment were payment of terminal leave benefits of retirees and full implementation of the 2014 Magna Carta benefits. The Capital Outlay is broken down into Equipment Outlay (PhP 2,050,000.00) and Repair of Buildings (PhP 12,770,000.00).

In terms of programs/projects/activities, 61% or PhP 91,629,000.00 was allocated for MFO 1 or Research and Development; and for MFO 2 or Technical Advisory Services, 26% or PhP 37,738,000.00 and 13% or PhP 18,604,000.00 were apportioned for Testing and Analysis and Promotion and Marketing of Technologies respectively. Figure 2 shows the distribution of Allotment by Major Final Outputs (MFOs).

In addition to the GAA Budget, ITDI received Grants-in Aid from DOST, other DOST agencies and various clients amounting to PhP 21,579,173.60, PhP 31,658,456.48, and PhP 544,158.50 respectively. These resources in the amount of PhP 53,781,788.58 are shown in Figure 3.

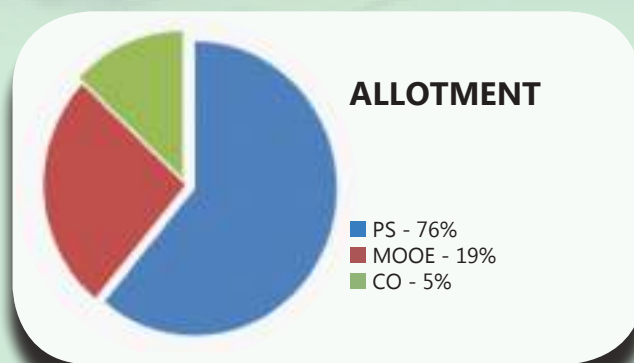


Figure 1

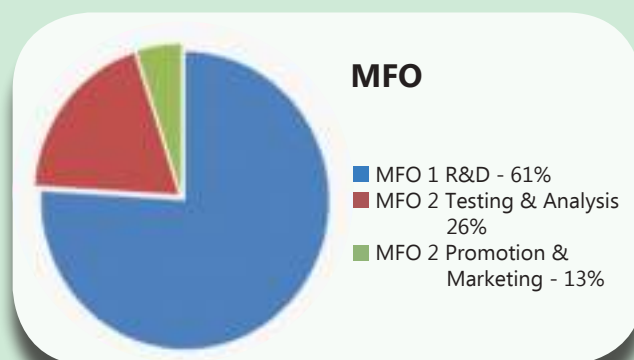


Figure 2 Distribution by MFO

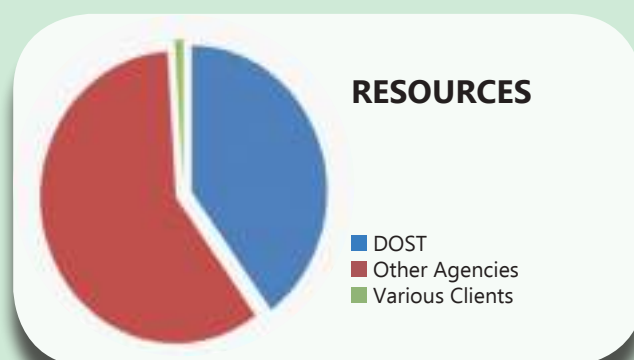


Figure 3 Resources Generated from Various Sources

HUMAN RESOURCE Management

ITDI has a total of 369 authorized positions in 2014, of which 312 are filled and 57 are vacant. Of the current manpower, 176 are female and 136 are male.

Its manpower profile by educational attainment is as follows:

15 - PhD 60 - MS
171 - BS 66 - Below BS

The Institute continuously upgrades its human resource's capabilities to improve performance. In 2014, there were 78 participants in foreign trainings, workshops, conferences, and symposia and 384 in local ones.

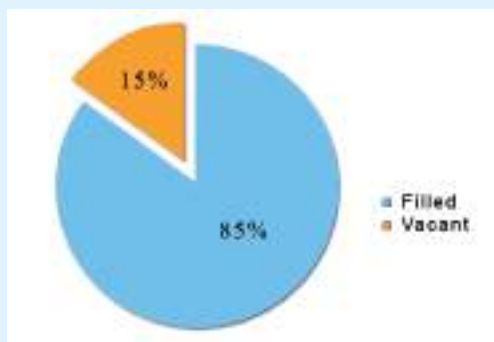
Specific areas and events included: metrology, materials science, nanotechnology, food Expo, benchmarking activities (food, standards, rubber manufacture), APMP Workshop/meeting, leadership for sustainability, QL analytical measurement, equipment training, capacity building of S&T activity, biosecurity workshop, and ASEAN meeting.

Five staff availed of local scholarships in food science (UP Diliman), agricultural engineering (UPLB), and information technology (DLSU). Another staff enrolled in a Master's program in Science of Measurement at the University of Science and Technology Korea through a foreign scholarship.

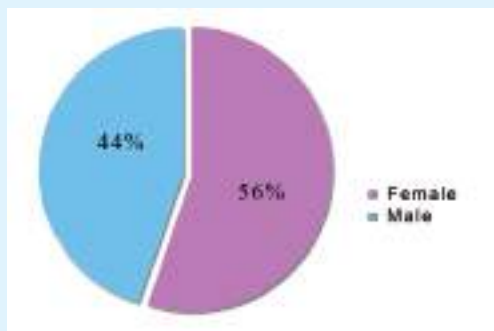
In 2014, the following ITDI personnel completed their degree programs: PhD Public Management, Editha T. Lagasca; MS Technology Management, Josefina L. Diaz, Joannalene T. Tuazon, Francis E. Villamor; MS Food Science, Rommel M. Belandres, Oliver C. Evangelista.

The Institute also hired 12 new staff who were deployed in different divisions: food technology-FPD, chemistry-STD, PTD, electrical engineering-STD, management-ADM, computer engineering-TSD, and microbiology-EBD.

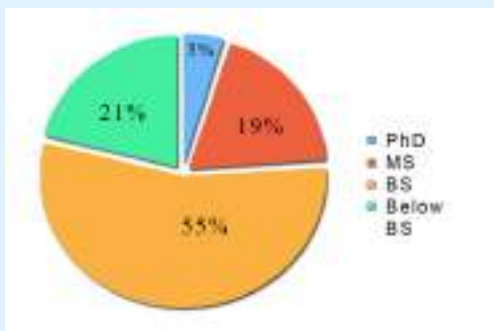
Other seminars were also organized in 2014 focusing on financial management, leadership sustainability, scientific writing, technology management, and hands-on training on excel/ms word.



Total Position



Female Vs. Male



Educational Attainment

AWARDS & CITATIONS



Presidential PAGASA Award
DOST-ITDI OL Trap
R&D Team (CED)

DOST-ITDI OL Trap R&D Team (CED)
'Search for Outstanding Public Officials
and Employees CSC '
Annabelle Briones, J. Pondevida, H. Bion, N.
Almanzor, A. Garbo, M. Carandang



Certificate of Excellence First Prize Winner
Dr. R.C. Torres, Z. Walde, A. Garbo)
"Extraction, Characterization and Bio-Assay
for Larvicidal Activity Against Dengue
Vector *Aedes aegypti* of *Anacardium
occidentale* (Cashew) Shell Wastes"
NRCP 81st General Assembly
Poster Competition Cluster IV
Manila Hotel, March 26-27, 2014



2014 First Prize Winner, 63rd PHILAAS Annual
Convention Poster Contest
Dr. R.C. Torres and Zinca Walde
"Potential of *Garcinia mangostana* as Larvicidal Agent
against Dengue Vector *Aedes aegypti*"
De La Salle University, Manila, September 2014



"Process for the Production of Fire Retardant from Nanosized Sodium-Modified Montmorillonite for Wood-Based Materials"
Blessie A. Basilia, et al, 2-2012-000504



2014 DOST Incentive Awards for Utility Models

■ "An Improved Portable Biogas Digester" - C. Silverio, S. Oredina, B. Villanueva, O. Trinidad et al, EBD.
 ■ "Pharmaceutical Grade Pectin from Mango Peels" - Dr. R.C. Torres and R.R. Estrella, CED
 ■ "Process Producing Floor Tiles from Rubber Crumbs" - M. Paglicawan, B. Basilia, B. Visaya, R. Loberiano et al, MSD.
 ■ "An Improved Coffee Roasting Machine" - L. Pacatang, H. Marasigan, E. Barnuevo, E. Sungaben, C. Magpantay et al, FED.
 ■ "Oil Expeller" - L. Pacatang, D. Pugal, A. Bawagan, L. Mabuti, E. Barnuevo et al, FED. NAST Philippines.

■ PICHE Outstanding Chemical Engineer
 Dr. Blessie A. Basilia, Chief, MSD
 Endeavor and Leadership in the Field of
 R&D

■ Outstanding PICHE Chapter
 PICHE-DOST Chapter led by
 Dr. A. Monsada, MSD
 Expertise and Dedication to their
 Profession

LINKAGES

International/Local



R&D PROJECTS Completed

Extraction Characterization and Bioassay for Larvicidal Activity of some Philippine Medicinal Plants, (Year 2)
R. TORRES

Development of Antioxidant Health Supplements from Plants
R. TORRES

Stability Studies and Application Tests of *Ube* Powder in Pharmaceutical and Personal Care Products
R. TORRES

Process Validation, Stability Studies and Application Tests of Bixin from *Bixa orellana* in Pharmaceutical and Personal Products
R. TORRES

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M. E. EVARISTO

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L. MONTEVIRGEN

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A. FLORES

Development of Ready-to-Eat (RTE) Dried Cavendish Banana

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Evaluation of *Makapuno* as Stabilizer for Ice Cream

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Modification of Natural Zeolite as Adsorbent for Animal Livestock Litter

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Production of Dome-Type Ceramic Water Filter

B. BASILIA

Production of Biodegradable Products from Plasticized Starch/Clay and Biocomposites

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Study on the Incorporation of Cigarette Filter in Concrete Blocks

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ADMATEL Phase 3 - Operation of ADMATEL (Non-R&D)

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B. BASILIA

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J. CELORICO

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J. CELORICO

Development of Rubber-Silicate Nanocomposites Using Natural Rubber and Locally Synthesized Nanoclay for Rubber-Based Sports Products

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Enhancing the Competitive Identity of Unique Philippine Products through the Development of Packaging Design and Appropriate Packaging Technology (Phase II)

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F. VICTORIA

A Comparative Study in the Effect of Packaging Materials (Retortable Pouch Glass and Metal Cans) on the Quality and Marketability of Processed Foods (Phase 1- Sauteed Shrimp Paste)

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Shelf-life Improvement of Selected Traditional Sweets, Bakery Products and Snack Foods through the Application of Active Packaging Technology Phase 1 (Glazed *Pili* Nuts, *Bukayo* & Squid Ring)

C. BIHIS

Effect of Inserts in the Compression Strength of Corrugated Containers

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Determination of *Malungay* Leaves Powder as Tumor Suppressor for Colorectal Polyp: A

DR. C. OCHONA

Rapid Detection and Monitoring Method of Adulterant Papaya Seeds (*Carica papaya* L.) in Black Pepper (*Piper nigrum* L.)

E. PANERIO

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BLESSIE BASILIA, ANNA ZARINA LAGADA, IAN HARVEY ARELLANO, JOANN SY

KEY OFFICIALS



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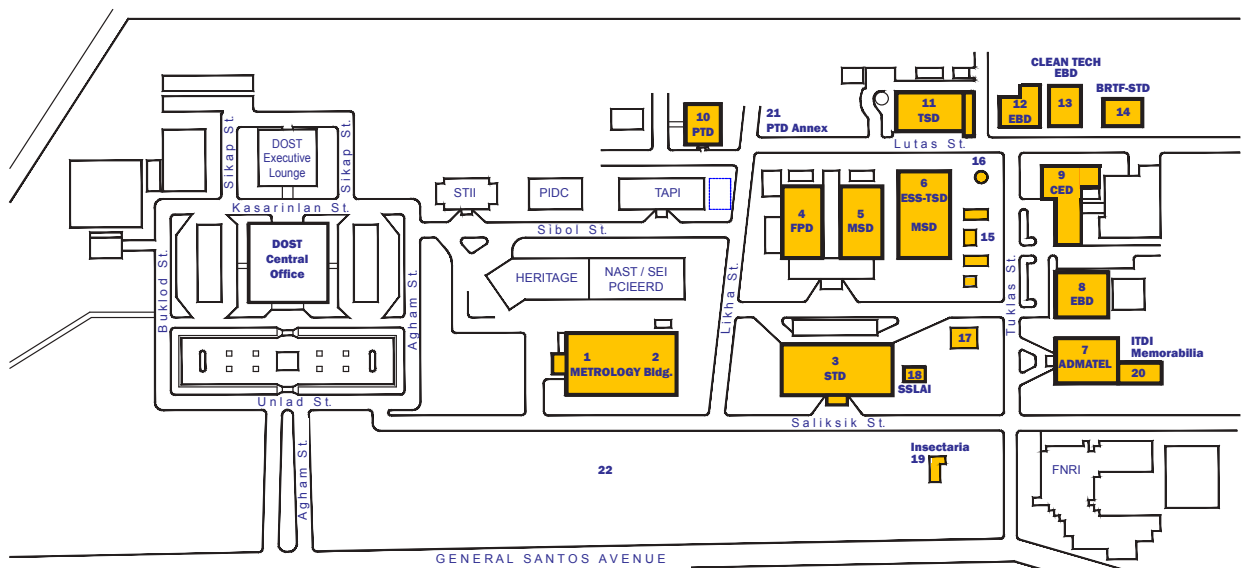
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Dr. Benjamin S. Magbanua, Jr., Deputy Director

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Back (L-R) : Daisy E. Tañafranca, Chief, Packaging Technology Division (PTD); Dr. Diana L. Ignacio, Chief, Administrative Division (Admin); Lydia M. Ablaña, Chief, Planning and Management Information Systems Division (PMISD); Hermelina H. Bion, Chief, Standards and Testing Division (STD); Nelia Elisa C. Florendo, Chief, Technological Services Division (TSD); Dr. Annabelle V. Briones, Chief, Chemicals and Energy Division (CED); Aurora V. Kimura, Chief, National Metrology Division (NMD); Dr. Blessie A. Basilia, Chief, Materials Science Division (MSD).

ITDI LOCATION MAP



LEGEND:

- | | |
|---|--|
| 1. Industrial Technology Development Institute (ITDI) | 11. Technological Services Division (TSD) |
| 2. National Metrology Laboratory (NML) | ITDI Library |
| 3. Standards & Testing Division (STD) | 12. EBD Annex |
| 4. Food Processing Division (FPD) | 13. Cleaner Technology, EBD |
| 5. Materials Science Division (MSD) | 14. Biological Research & Testing Facilities, STD |
| 6. Engineering Shop, TSD | 15. Biodiesel Processing Plant, CED |
| Nanotechnology, MSD | 16. ITDI Elevated Water Tank |
| Water Filter, MSD | 17. GSU |
| 7. Advanced Device & Materials Testing Laboratory (ADMATEL) | 18. Science Savings & Loan Association, Inc. (SSLAI) |
| 8. Environment & Biotechnology Division (EBD) | 19. Insectaria, STD |
| 9. Chemicals & Energy Division (CED) | 20. ITDI Memorabilia |
| 10. Packaging Technology Division (PTD) | 21. PTD Annex |
| | 22. DOST Auditorium & Recreation Facilities (proposed) |



"OUR BUSINESS IS INDUSTRY..."

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ITDI-DOST

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