

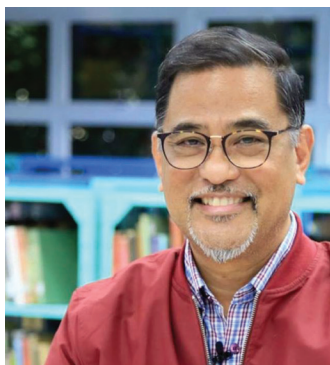
S&TPOST

APR-JUN 2020

Science Adaptation



Science Adaptation



Science is alive and kicking!

In this uncertain time, when the pandemic has virtually redefined how we live, how we work, how we relate to others, science has remained alive and kicking. More dynamic and vibrant,

science has transformed and adapted to the situation as an agent of change.

With COVID-19 literally changing our lives, science found ways to embrace it, undaunted, by innovating, by discovering new ways to fight the dreaded disease to make lives safer and protected. Again, science stepped up and took the big challenge to find creative solutions to a pandemic that we know nothing about.

The 2nd quarter issue of the S&T Post is solely dedicated to the many innovations of the different DOST agencies and regional offices and heralds the continuing initiative to produce science-based information, products and services.

Featured through the pages of this publication are the creative and ingenious innovations of our Filipino scientists, researchers, engineers, and innovators categorized under the

four thematic areas identified by the Inter-Agency Task for the Management of Emerging Infectious Diseases: *Kalusugan, Kaayusan, Kabuhayan, and Kinabukasan* or the 4Ks.

The selected stories in this issue will give us a feel of how science adapted to the pandemic and what the DOST has been contributing to the government's efforts to combat COVID-19. Some of these stories tells us how the *bayanihan* spirit of the Filipinos is working to make our lives livable today.

Read through this issue, and see how science adaptation plays a pivotal role to win the battle against COVID-19 with unique tales such as those of the bamboo-framed face shield, face mask with innovative filter, locally developed respirator and ventilator parts, FASSSTER app module for COVID-19 surveillance, food innovation as alternative source of income, STEM learning through radio and online facility, RxBox telehealth device for contactless diagnostics, VCO trials, and the frontline services rendered by our Balik Scientists, to name a few.

However, we know that there are still more heartwarming stories to be told and the limited pages we have can never do justice to the many sacrifices of our men and women of science. This is only the beginning of a long journey to document the many heroics of the Filipino scientists and surely we will find more space for the untold stories soon.


Richard P. Burgos
Director, STII

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#BEATCOVID19

TANONG NG BAYAN!

**MGA DAPAT MONG
MALAMAN TUNGKOL SA
50X REUSABLE FACE
MASKS NG DOST-PTRI**

INFO UPDATES

REUSABLE FACE MASKS

And DOST Philippine Textile Research Institute of DOST-PTRI sa pakikipagpugutan ng Taytay LGU at mga pribadong sektor ay gagawa ng 500,000 reusable face masks. Capami ito ng textile-coating technology para sa treatment at finishing. Makikipagpugutan din ito sa Power Fashion Inc. upang makapag-produce gamit ang local fiber textiles.

SMART PHONE THERMAL SCANNER

Mas pinahusay pa ng Advance Science and Technology Institute O DOST-ASTI ang kanilang research sa pagdevelop ng maliit na thermal camera na maaring ikabit sa smart phone na magagamit bilang temperature scanner.

SCHOLARSHIPS ONLINE APPLICATION

Ang Science Education Institute o DOST-SEI ay mayroong available na online application systems para sa DOST Scholarships. Patuloy din ang pagproseso nito sa pagbibigay ng allowances in advance sa mga iskolar nito.

DOSTV 22

**GAMOT NGA BA ANG
Saging
SA COVID-19?**

DID YOU KNOW?

**Pareho lang ba ang
SARS at COVID-19?**

Hindi. Ang virus na nagdulot ng COVID-19 ay may kaugnayan sa SARS, genetically, ngunit bahagyang magkaiba ang sakit na dulot nila.

Ang SARS ay mas nakamamatay ngunit bahagyang nakakahawa kumpara sa COVID-19. Wala ring naitalang outbreak ng SARS.

Source: World Health Organization (WHO)

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- HAND SANITIZER
- ANTIBACTERIAL SOAP
- PROCESSED FOOD

STRESS KA BA?

Malungkot o balisa? Hindi mapakal? Sabi ng mga psychologists, ang estado ng iyong utak ay nakakaapekto sa iyong kalusugan.

Source: DOST-PTRI

#ResponsiblePakikiamayangPagsasagotSaCOVID19

**Covid-19
MYTH OR
FACT**

#StopTheSpread

DOSTV

**Healthy Food Options
ngayong ECQ**

Rated ng DOST-PTRI

GOOD NEWS!

**DOST-PRODUCED
3D-PRINTED FACE
SHIELDS,
NAIPAMAHAGI NA!**

PRODUCED BY DOST-NIRDC

DOSTV

**TIPS PARA SA MGA
Bored
AT HOME**

**ANO NGA BA ANG
PACK OF HOPE?**

Ang RTE (ready-to-eat) ay proyekto ng DOST-ITDI na layuning makatulong sa mga taong biktima ng sakuna. Tinatawag itong disaster food ready-to-eat at no preservatives added.

DID YOU KNOW?

**106 RxBox for vital signs
monitoring delivered to PGH**

Isaalalita sa mga pasyente for vital signs monitoring. Data will be collected and there is the advantage of less physical contact for our health workers.

DID YOU KNOW?

1 test kit = 20 tests

Ang isang locally-made COVID-19 test kit ay maaaring makapagpagawa ng 20 test.

One (1) test by the local COVID-19 test kit costs P1,320.

**DOSTV COVID-19
UPDATE**

**PRESIDENT DUTERTE HAS
ORDERED AN
ENHANCED COMMUNITY
QUARANTINE
OF ENTIRE LUZON.**

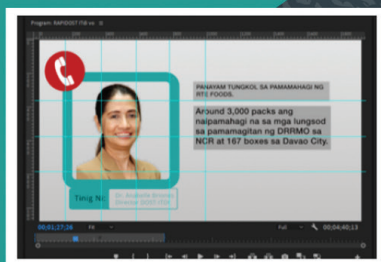
Strict home quarantine, transportation will be suspended and provision for food and essential health services will be required.

Source: GMA News Online

VIDEOS

PAGE 1/2

CLICK HERE



DOSTV
Science For The People

CONTENTS

WHAT'S NEW

- 4 DOST-ITDI now offers sulfite testing for dried mangoes

DOST NEWS

- 5 Multi-awarded bamboo company lauds DOST-FPRDI for support
- 6 Promoting Innovation among STEM students: DOST-MIMAROPA provides robotic and mechatronics kit to schools in Palawan

SCIENCE NEWS

- 8 Bamboo leaves show great promise for its health benefits - DOST-FPRDI
- 9 Forest woody vines get needed R&D attention
- 10 DOST-ITDI develops plant-based protein concentrate for sports nutrition
- 11 DOST-NRCP researchers say Eureka! Antibiotic compounds found in marine sediments
- 12 DOST-FPRDI studies the use of heat to treat wood and bamboo

KALUSUGAN-COVID STORIES

- 13 DOST-CAR donates ethnic cloth face masks to frontliners against COVID-19
- 14 DOST-SETUP woman-entrepreneurs produce face masks to help fight COVID-19
- 15 Unmasking the truth behind your COVID-19 face mask: DOST-PTRI uses special coating to make ordinary masks more functional
- 17 DOST-MIRDC leads mass production of face shields for COVID-19 frontliners
- 18 DOST-funded CSU lab develops innovative filter for face mask
- 20 DOST MisOcc Donates PPEs to MHARS Medical Center in Ozamiz City
- 21 DOST-IX distributes 6,000 new face shields
- 23 DOST-FPRDI produces bamboo-framed face shields



ABOUT THE COVER

Featured in this issue's cover photo are the various programs, technologies, and initiatives of the Department of Science and Technology (DOST) to help the country in combatting COVID-19. This issue also highlights how science and technology adapted to the pandemic and how the innovations and technologies developed by DOST together with Filipino scientists and inventors helped in addressing the needs of the country under these four thematic areas Kalusugan, Kaayusan, Kabuhayan, Kinabukasan or 4Ks.

- 24 DOST-FPRDI develops antimicrobial soaps, hand mists
- 25 DOST LDN responds to COVID-19
- 26 DOST-PCHRD Balik Scientists join fight against COVID-19
- 28 DOST-PCHRD rolls out more RxBox telehealth devices to fight COVID-19
- 29 DOST-ITDI develops respirator, ventilator parts for COVID-19 patients
- 30 VCO: The "miracle" oil?

KAAYUSAN-COVID STORIES

- 32 DOST in awe of Scholars' volunteerism amid COVID-19
- 34 DOST launches program for repatriated OFWs during COVID-19
- 35 FASSSTER adds a module for surveillance of COVID-19

KABUHAYAN-COVID STORIES

- 36 DOST-NAST calls for change in local food system amid COVID-19 enhanced community quarantine
- 38 DOST conducts nationwide survey of SETUP-assisted MSMEs to develop ECQ-adaptive measures
- 39 DOST MSMEs shift into overdrive to supply Calamansi products amid ECQ
- 40 DOST-PCAARRD fights COVID-19 with food innovation

KINABUKASAN-COVID STORIES

- 42 The Feeding Force Project
- 44 STEM learning through radio and online in the post ECQ period 54
- 46 DOST's science high joins fight against COVID-19 with PisaYuda outreach program

- 47 Beat COVID 19 with the new DOST app: DOST mobile app puts science at your fingertips

WHO'S WHO?

- 48 DOST-NRCP Vice President Dr. Raul V. Destura, the Scientist behind the First Local COVID-19 Testing Kit
- 50 DOST-NRCP Humanities Chair and renowned Cebuano Writer bags 2020 Gawad Balagtas Award
- 51 DOST-PCHRD Scholar is country's finalist to the ASEAN-U.S. Science Prize for Women 2020

DOST-ITDI now offers sulfite testing for dried mangoes

Natural. Organic. Healthy. These are the products that are getting the most attention nowadays worldwide.

Text and photos by DOST-ITDI

TRENDS IN consumer preference show that demand for these products has been increasing in recent years. The popularity and market demand for dried fruit products, dried mangoes, in particular, continue to increase especially in the export market. Considering this scenario, it is a must that local dried mangoes pass the quality and standard of the stringent international market.

To do this, a method to test and determine the level of sulfite in locally produced dried mangoes and other food products for export should be made available.

Thus, the Department of Science and Technology-Industrial Technology Development Institute's (DOST-ITDI) Standards and Testing Division (STD) and the National Metrology Laboratory, through its Metrology in Chemistry services, worked together and validated the Optimized Monier-Williams method, a standard testing method for sulfite presence in foods that is generally accepted worldwide. From that validation, a reference material for sulfite testing in dried mangoes was developed for accuracy and traceability of measurements. The efficiency of the method was satisfactory compared with other local and international testing laboratories.

With these developments, DOST-ITDI's STD is now able to offer the sulfite (SO_2) test for dried mangoes.

The availability of this new testing service resulting from research and development will greatly help local dried mango processors comply with product quality and standards set by the international market. This is one big step to help avoid very costly product detention.

Like the Philippines, other countries also strictly monitor the presence of sulfite in export food products, as the sulfite level can be a technical barrier to trade when not compliant to standards. Product detention applies when sulfites are not declared in the label and analysis shows the presence of sulfites at levels greater than the regulated limit.

The Philippines' Food and Drug Administration sets the regulations on the allowable limit of sulfite content in food products at 3,000 mg/kg of dried fruits/mangoes as indicated in the Philippine National Standard, PNS/BFAD 15:2007.

Sulfite is a food additive that is used for the preservation of processed food products



PR-Sulfite Testing_MG_0452researcher at work on sulfite testing.jpg

to increase its shelf life. It is widely used in processed foods such as dried fruits, canned vegetables, jams, and condiments. Sulfites also occur naturally in some foods, such as beer, wine, and fruit and vegetable juices.

However, it is known also to have adverse effects on human health at elevated levels. Hence, the government regulates its use. Sulfite-sensitive individuals have been reported to show adverse reactions ranging from dermatitis, flushing, abdominal pain, and diarrhea to life-threatening anaphylactic and asthmatic reactions.

DOST-ITDI started offering its sulfite testing service in June 2019. The testing fee is at PhP 2,200.00 per sample. A minimum of 500 grams of sample is required.

For those needing this testing service, and/or, for inquiries, contact the Standards and Testing Division at (02) 8837-2071 local 2197 or send an email at std@itdi.dost.gov.ph or visit their Facebook page, Standards and Testing Division-ITDI, or ITDI's DOST ITDI Updates.





Multi-awarded bamboo company lauds DOST-FPRDI for support

Bambuhay is currently the country's largest producer of bamboo straws. (Photo source: Bambuhay).

By Rizalina K. Araral, DOST-FPRDI

"BAMBUHAY", A bamboo-based social enterprise that has won several international awards in the last two years, recently thanked the Department of Science and Technology's Forest Products Research and Development Institute (DOST-FPRDI) for its technical support to the company.

As the major producer of bamboo straws in the Philippines, Bambuhay uses bamboo farming and entrepreneurship to help farmers fight poverty and protect the environment at the same time.

While onlookers may say that the firm's success is largely fuelled by its leadership's aggressive drive to help poor farmers, its founder and CEO, Mark Sultan Gersava, acknowledges that Bambuhay owes part of its growth to the help they received from DOST-FPRDI in 2017 and 2019.

"The technical assistance from the Institute was key to improving the quality of our products and consequently enabled us to compete in the world market," Gersava said.

Bambuhay establishes bamboo plantations in deforested areas (with the help of the government's Bamboo Agro-Forestry

Program) and makes various bamboo products – straws, tumblers, and bamboo charcoal – both for local and global markets.

According to Gersava, the company not only wants to give jobs to farmers in the poorest provinces, but it also aims to turn them into "agri-preneurs." The company dreams of becoming the first social enterprise in Asia owned by everyone directly involved in its operations – from the growers who supply the raw materials to all the production workers and all their other personnel. Bamboo became their plant of choice because it grows very well locally and is an efficient eco-warrior. It can absorb huge amounts of climate-changing carbon dioxide from the atmosphere.

"We did not know much about bamboo processing, so we were glad we have found in DOST-FPRDI a partner for our technical needs. Their specialists trained us on bamboo finishing and treatment and did microbial analysis on our bamboo straws and phytochemical analysis on bamboo leaves. As a result, our product quality improved and sales ballooned by 250%," Gersava said.

"In the years to come, I'm sure we would go back to DOST-FPRDI to get more help," he added. "We have big plans for our farmers, so we are always on the lookout for better ways to assist them. Because of that, we would always be needing the support of anyone and everyone who knows how to make the most out of bamboo."

According to Gersava, as of 2019, Bambuhay has already helped 181 farming families (and pulled 52 of them from poverty), sold 916,727 bamboo straws, and eliminated 5.6 million pounds of CO₂ from the atmosphere.

As testament to their noble undertaking, the company has received various awards as follows:

- Grand Winner of the 2019 ASEAN Impact Challenge (Kuala Lumpur, Malaysia)
- Global 100 Winner of the 2019 Entrepreneurship World Cup (out of more than 100,000 applicants worldwide) (Riyadh, Saudi Arabia)
- Grand Winner Start-upper of the Year (Paris, France)
- Winner of the Action Accelerator-ENACTUS World Cup (Silicon Valley)

Promoting Innovation among STEM students: DOST-MIMAROPA provides robotic and mechatronics kit to schools in Palawan

By Pacifico T. Sario II, PSTD, PSTC-Palawan & Phyllicia Anne M. Baguyo, SRS II, PSTC-Palawan

Photos from DOST-MIMAROPA



Awarding of Robotics Kits during the DOST-MIMAROPA 2019 Regional Science and Technology Week on November 29, 2019 at Puerto Princesa City Coliseum, Puerto Princesa City, Palawan.

TO KEEP up with the rapidly changing and technology-driven world, providing students with advanced technological capabilities and information has become integral to their education. This initiative prepares and equips them in facing and addressing many challenges in society, economy, and globalization that require technological and scientific innovations.

Philippines currently ranks 54th in the Global Innovation Index (GII)— a metric that gauges countries' capacity for and success in innovation in connection with economic output. The index also measures capacity through identified eight pillars, two of which focuses on Human Capital and Research and Knowledge and Technology Outputs. Jumping from its 73rd place in the last two years according to the GII 2019 12th Report, it is evident that efforts in developing a more innovative Philippines are already taking effect. To further this development, capitalizing on the country's vast pool of talents produced in universities and colleges is prioritized.

The new but growing Science, Technology, Engineering, and Mathematics or STEM education in the Philippines is essential in preparing Filipino youngsters for today's world of non-stop innovation.

In Palawan, higher education institutes produce around 4,000 graduates a year, with only a fraction of this number belonging in various STEM disciplines. Creating environments that promote hands-on learning and real-world applications and foster creativity, critical thinking, and tinkering skill in the students may encourage the youth to continue education in a STEM field.

To aid in this mission, the Department of Science and Technology-MIMAROPA (DOST-MIMAROPA) through its Provincial Science and Technology Center in Palawan (PSTC-Palawan) initiated a project that would facilitate increased opportunities in STEM education in a creative, exciting, and competitive environment. Entitled "Enabling the Learning Environment of STEM Teachers and Students

on Robotics and Mechatronics," senior high school students and faculty in various schools in Palawan will gain foundational knowledge and skills and abilities in the high-demand, multidisciplinary area of mechatronics and robotics, particularly in design, programming, and building in a technical environment. The project will also introduce students to a number of opportunities from different sectors or industries.

Activities like distribution of education resources such as robotics and micro-electronic kits and capacity building of STEM teachers on the said field were conducted. Forty (40) public high schools all over Palawan and Puerto Princesa received the kits which were awarded during the 2019 DOST-MIMAROPA Regional S&T Week Celebration held at the Puerto Princesa City Coliseum, Puerto Princesa City, Palawan on 29 November 2019.

The awarding was headed by DOST-MIMAROPA Regional Director Dr. Ma. Josefina



Training on the use of robotics and micro-electronics kits on 16-17 January 2020, at Pulot National High School in Sofronio Española, Palawan

P. Abilay and DOST Secretary Fortunato T. de la Peña, together with PSTC-Palawan PSTC Director Engr. Pacifico T. Sariago III, Palaweño ICT Association (PICTA) Representative Fheter John B. Calanday, and Department of Education-Puerto Princesa City (DepEd-PPC) Representative Dr. Rolando A. Taha.

Following the awarding, a training on how to use the kits was conducted on 16-17 January 2020 at Pulot National High School in Sofronio Española, Palawan. A total of 98 participants from various school-recipients in Southern Palawan took part in the activity. Experts from Fullbright College served as resource persons during the training.

For school-beneficiaries located in Northern Palawan, another training was held on 23-24 January 2020 at Central Taytay National High School in Taytay. Fifty (50) STEM teachers from various schools participated in the activity.

The series of trainings were culminated in Puerto Princesa City where school recipients from Puerto Princesa were trained on Basic Arduino-based Microelectronics and Robotics. The training was attended by 27 participants composed of teachers who will facilitate the use of the kits, as well as some students who are interested in learning how to use the kits.

The project was developed and implemented in partnership with DepEd-Palawan, DepEd-PPC, and PICTA.

With these efforts, DOST-MIMAROPA hopes for the rise of creative and innovative minds who will contribute in developing various industries and to a more progressive and globally-competitive Palawan.



Training on the use of robotics and micro-electronics kits on 23-24 January 2020 at Central Taytay National High School, Taytay, Palawan



Training-workshop on Basic Arduino-Based Microelectronics and Robotics on 12-13 March 2020 at the DepEd PPC Office, Puerto Princesa City, Palawan

Bamboo leaves show great promise for its health benefits - DOST-FPRDI

By Rizalina K. Araral, DOST-FPRDI

The bamboo plant is useful beyond its poles.

BAMBOO—which is a type of grass—is one amazing plant.

It is one of the fastest-growing plants in the world and is said to be the most versatile. It is so versatile, in fact, that an international research group says that bamboo has as many as two thousand documented uses.

Most Filipinos, however, know bamboo only as a source of culms for making houses, furniture, fences, baskets, barbeque and bananaque sticks, and of course, *tinikling* poles. Very few know the value of bamboo leaves.

A recent study of the Forest Products Research and Development Institute of the Department of Science and Technology (DOST-FPRDI) on the health benefits of bamboo leaves will soon make this plant more popular in the Philippines.

The research project, completed by the team of Mariluz SP. Dionglay, shows that the leaves of the bamboo species *kauayan-tinik* (*Bambusa blumeana* J.A. & J.H. Schultes) have a big potential as source of antioxidants and antimicrobials, and thus, are possible raw materials for medicines and nutritional supplements.

Their antioxidant potential is very high — similar to that of ascorbic acid which is the standard for vitamin C.

The DOST-FPRDI project studied leaf extracts from five types of bamboo found in the Philippines. The leaves were harvested during the dry season and extracted using water and ethanol.

“Among the five species, *kauayan-tinik* was the most promising,” said researcher Rebecca B. Lapuz. “*Kauayan-tinik* leaves extracted with water had the highest antioxidant level compared with *bolo*, giant bamboo, *kauayan-kiling* and *buho*, aside from showing antimicrobial action against the two bacteria species studied.”

“Given these promising results, and considering the abundance of bamboo in the Philippines as well as the giant market for health and wellness products here, we look forward to doing further research on *kauayan-tinik* leaves, as well as leaves of other Philippine bamboos,” added Lapuz.

In recent years, bamboo leaf extracts have received a lot of research attention especially in China due to their reported health benefits.

A DOST-FPRDI researcher measures the phytochemical content of bamboo leaves.



Forest woody vines get needed R&D attention

By Rizalina K. Araral, DOST-FPRDI

Photos from DOST-FPRDI

ACCORDING TO studies by the Department of Science and Technology-Forest Products Research and Development Institute (DOST-FPRDI), woody vines found in the Philippine forests are an important natural resource that needs to be taken seriously.

Most of us, however, are not well acquainted with forest woody vines. To some, they may be nothing but those amazing “ropes” Tarzan uses to swing across the jungle while to others, they are the rustic raw materials for the handicrafts sold in tourist souvenir shops or “gugo” for their Lola’s do-it-yourself shampoo.

According to DOST-FPRDI Director Dr. Romulo T. Aggangan, “Because of their many uses, woody vines are part of the daily life of tropical forest communities worldwide. They are used for medicine, food, handicrafts, furniture, house construction, oral hygiene, and hunting. They are especially useful in remote areas where synthetic medicines are not readily available. Among scientists, however, not much is known about these non-timber forest products.”

Dr. Aggangan says that forest vines are mostly underappreciated as there have been few researches so far conducted. This is why, in recent years, the Institute has put in place a research and development program dedicated to studying local forest woody vines.

“Through the program and with support from fund-donors, the Institute aims to collect information on the biology; inventory; basic properties such as anatomy, physical and mechanical, chemical and natural durability; treatability; and phytochemical properties of Philippine commercial forest vines,” he explains. The program also hopes to identify promising commercial species and improve the resource supply chain in selected areas.

In one recent study, researchers looked into the chemical content of five vine species and got encouraging results. The curare vine (*Strychnos sp.*) was identified as a promising material for pulp production and a source of cellulose for biofuels and nanocellulose products. *Mulawing-baging* (*Symphorema luzonicum*), *lalapau* (*Hypserpa nitida*), *bulakan* (*Merremia peltata*), *abuhab-baging* (*Strophantuss p.*) and curare, on the other hand, have high phytochemical content, and need to be further studied for their possible medicinal value.

“These results underline the importance of the woody vines that abound in our forests,” says Dr. Aggangan. “By giving ample research attention to them, we not only get to understand them better and help ensure a sustainable supply of materials for the handicraft industry. We also get to discover treasures hidden inside this underutilized forest resource.”



DOST-FPRDI aims to discover treasures hidden inside local forest vines.

DOST-ITDI develops plant-based protein concentrate for sports nutrition

By DOST-ITDI



UNDER GROWING huge piles of agricultural wastes from coconut, rice, and vegetables is an untapped wealth – functional protein. Called by some as “green gold”, the global functional protein market is projected by Markets and Markets Research Private Ltd. based in Pune, India to reach USD 5.73 billion by 2022.

At the Industrial Technology Development Institute of the Department of Science and Technology (DOST-ITDI), food technologist Lourdes S. Montevirgen and her team are working to tap into this potential market. Their focus is primarily to increase usage of protein concentrates from local plant and vegetable sources, which otherwise are underutilized or just end up as wastes.

Funded under the DOST Grants-In-Aid program, the team will recover and extract the protein content by processing agricultural by-products such as pressed coconut meal and rice bran and local vegetables like cowpea (*paayap*), and pigeon pea (*kadyos*).

Current functional protein concentrates and their other forms are seeing increased global demand because of consumer awareness

and the growing need for food products with improved functionalities such as infant formula, sports nutrition, functional beverages, dietary supplement, and animal nutrition.

More than these, Montevirgen is also looking at alternative source materials that would not compete with products that are more commonly important in use, for example, protein from coconut meat instead of pressed meal or protein from animal sources instead of rice bran. These are rich sources offering added functionality for other higher-value products like copra and their derivatives, milk, and milk products.

The project started rolling and the team aims to develop protein concentrates that can be applied in sports nutrition like high-protein drinks, animal meat alternatives like textured vegetable protein products, and in liquid food as stabilizers or emulsifiers.

To recover protein from these sources, the project will develop and modify existing methods of pretreatment, extraction, and recovery. These will maximize factors such as productivity, reliability, and efficiency of methods to recover the protein especially for commercial production of food-grade protein concentrates.

Hence, while the growth of functional protein market is driven by consumer awareness and need for functional foods, the team is riding on the growing preference for healthy diet, increasing instances of chronic diseases, and technological upgrades in food to shift demand from plain functional to healthy and enhanced functional food, and achieve the envisioned positive change through research and development.

DOST-NRCP researchers say Eureka!

Antibiotic compounds found in marine sediments

By Maria Elena A. Talingdan, DOST-NRCP
Photos from DOST-NRCP

"FINDINGS FROM basic research lay the groundwork to establish validated data and information needed to prepare the country should there be an epidemic or a pandemic." Thus emphasized by Dr. Doralyn S. Dalisay, NRCP Member of Division IV (Pharmaceutical Sciences) and Chair of DOST - NRCP Visayas Chapter.

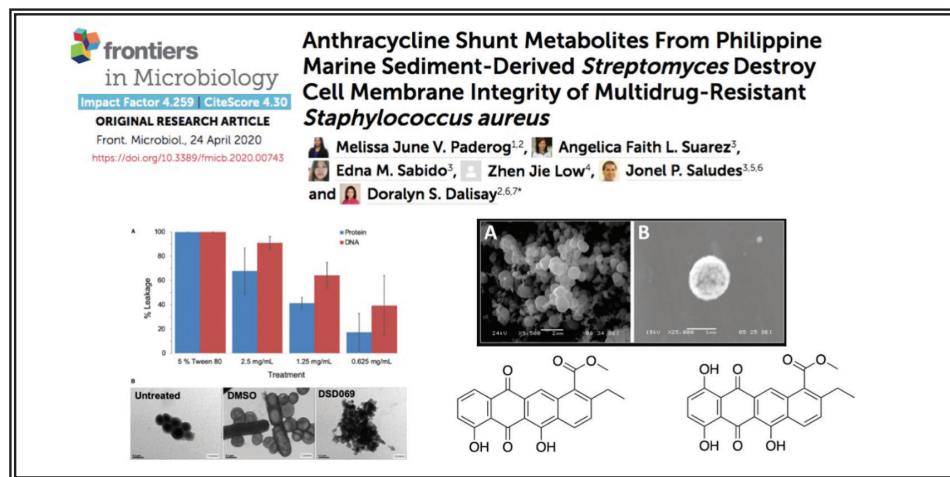
While we are in the midst of discovering the cure and eventually producing the vaccine to combat COVID-19, the National Research Council of the Philippines of the Department of Science and Technology (DOST-NRCP) researchers has discovered medicines (antibiotics) from unexpected sources like marine sediments.

At the University of San Agustin (USA) in Iloilo City, two DOST-NRCP researchers — Dr. Doralyn S. Dalisay and Dr. Jonel P. Saludes — have discovered antibiotics from a bacteria thriving in marine sediments in the Philippines. The antibiotics are effective in killing the multidrug-resistant *Staphylococcus aureus*, a pathogen or germ that causes a range of illnesses from minor skin infections to life-threatening diseases, by breaking the protective membrane of the cell. The findings of this research provide evidence that these antibiotics potentially serve as leads to combat antibiotic-resistant pathogens.

The research work was reviewed by antibiotic experts from Italy and Russia and was published on 24 April 2020 in a high impact international journal, *Frontiers in Microbiology*, under the research topic "Marine Microbial-Derived Molecules and Their Potential Medical and Cosmetic Applications." *Frontiers in Microbiology*, one of the most cited



Dr. Jonel P. Saludes (center) describing to DOST Undersecretary for R&D, Dr. Rowena Cristina L. Guevara (right) the invaluable role of forward-looking and organized planning on infrastructure, equipment acquisition, and human resources development by the Center for Chemical Biology and Biotechnology (C2B2) and Center for Natural Drug Discovery and Development (CND3) of USA that elevated the quality of health research in Region VI.



Read more about the discoveries in *Frontiers in Microbiology* at: <https://doi.org/10.3389/fmicb.2020.00743>.



Dr. Doralyn S. Dalisay: Eureka! Antibiotics from marine sediments!

microbiology Q1 journals, has an Impact Factor of 4.259 and publishes rigorously peer-reviewed manuscripts across the entire spectrum of microbiology.

This research was made possible through a grant awarded to USA by the Grant-in-Aid Program of the DOST-NRCP. This funding enabled the USA to develop groundbreaking drug discovery research competencies in Region VI in particular, and the Philippines in general.

Dr. Dalisay is a member of Division IV (Pharmaceutical Sciences) and currently the Chair of DOST-NRCP Visayas Chapter and the Director of the USA Center for Chemical Biology and Biotechnology. On the other hand, Dr. Saludes is also a DOST-NRCP member of Division X (Chemical Sciences) and the Associate Vice President for Research and Global Relations also at the USA. They are both DOST Balik Scientists.

DOST-FPRDI studies the use of heat to treat wood and bamboo

By Rizalina K. Araral, DOST-FPRDI
Photos from DOST-FPRDI

AROUND THE world, people in these modern times have always relied on synthetic chemicals to treat wood. Many of these chemicals, however, are known to be toxic and can cause serious health problems and can harm the environment, if not used properly.

Researchers at the Los Baños-based Forest Products Research and Development Institute of the Department of Science and Technology (DOST-FPRDI) are currently looking into a process called thermal modification or TM as a more eco-friendly way of protecting wood and bamboo from insect pests and fungi.

According to DOST-FPRDI Assistant Scientist Juanito P. Jimenez, “Thermal modification uses high heat to change the kind of chemicals present in a piece of wood. With the right amount of heat and time of exposure, the right chemical changes take place. These usually make the wood more durable as it becomes more stable [more weather-proof, less prone to swelling and shrinking] and less appetizing to termites.”

The downside of TM is that extremely high heat can affect the strength of the material and give it a darker color. The trick, according to Jimenez, is to find the right mix of temperature and treatment time that will not cause much change in wood or bamboo strength.

“TM is already being used in Europe, the US, and Canada, as well as some Southeast Asian countries like Malaysia and Indonesia, and it’s about time we check how we can apply it in the Philippines,” says Jimenez who is currently verifying the gluing and finishing

traits of TM bamboo in a project funded by the DOST-Philippine Council for Agriculture, Aquatic and Natural Resources Research and Development.

He and his team have also recently finished determining the physical and mechanical properties of three thermally modified bamboo species using spent engine oil as medium and they got promising results.

According to Jimenez, he is excited about the possible applications of TM in the country’s wood-based sector.

“Although this is already a mature technology in some countries, the process needs to be studied locally since our small and medium enterprises can’t afford to buy imported TM equipment from, say, Finland. And even if we can buy equipment from them, we would still need to check how

various wood/ bamboo species respond to the procedure. Just like in kiln-drying, since each species is unique, we need to develop the right heat treatment protocol for each one,” he explains.

Researchers have studied the effect of TM on the strength of giant bamboo using spent engine oil as medium. Initial findings showed that TM made the bamboo more stable – less prone to swelling and shrinking. However, higher heat also made the material darker.

Right now, Jimenez says, the technology seems ideal for wood and bamboo meant for furniture and architectural moldings. The use of toxic chemical preservatives is usually not preferred for these products and they need the dimensional stability, which the TM process can give.



Researchers have studied the effect of TM on the strength of giant bamboo using spent engine oil as medium. Initial findings showed that TM made the bamboo more stable – less prone to swelling and shrinking. However, higher heat also made the material darker.



Ethnic-designed face masks. DOST-CAR through its Provincial Science and Technology Center (PSTC)-Kalinga produced 300 face masks using ethnic fabrics with colorful designs for frontliners battling COVID-19. (Text by Rodolfo P. de Guzman, DOST-STII and photo from DOST-CAR/PSTC-Kalinga)

DOST-CAR donates ethnic cloth face masks to frontliners against COVID-19

By Rodolfo P. de Guzman, DOST-STII

The Department of Science and Technology (DOST)-Kalinga, the provincial office of the Department in the region, donated 300 pieces of reusable face masks (with tissue slot inside) that are made of Kalinga's ethnic cloth from Kinwa Etnika's shop.

Joining the DOST system in its efforts to help find solutions to the COVID-19 pandemic, DOST-Kalinga added a touch of culture to the otherwise drab design of the ordinary

face mask. This protective gear also carried an innovation by incorporating a slot where the individual can put added protection like tissue or any other supplemental cloth.

To ensure that the face masks are safe to use, they were washed prior to repacking together with 300 packs of assorted cookies produced by Small Enterprise Technology Upgrading Program (SETUP) cooperators and 50 pieces of do-it-yourself face shields for the gallant frontliners. These were turned-over to the Kalinga

Provincial Disaster Risk Reduction and Management Office.

Incidentally, SETUP is one of the of the flagship programs of the DOST implemented in the regions that provides technical and financial assistance to micro, small, and medium enterprises. The SETUP cooperators or adoptors share with the DOST the passion for service so that in this time of health emergency, they came out to extend a helping hand to our fellow Filipinos.



Supplies for COVID-19 Frontliners. DOST-CAR and PSTC-Kalinga donated ethnic-designed face masks and food produced by proponents of the SETUP, a flagship program of the DOST implemented in the regions. (Text by Rodolfo P. de Guzman, DOST-STII and photo by DOST-CAR/PSTC-Kalinga)

DOST-SETUP woman-entrepreneurs produce face masks to help fight COVID-19

By Mary Claire Estoque & Junelyn-Louvena Ruiz, DOST-X
Photos from DOST-X

CAGAYAN DE ORO CITY, Misamis Oriental - A total of 180 face masks were produced and distributed by Puyo Handicrafts to different hospitals in the city for frontliners fighting COVID-19. The 70 pieces of face masks were given to Northern Mindanao Medical Center, 50 pieces to JR Borja General Hospital, 30 pieces to Capital University Medical Center, and 30 pieces to Cagayan de Oro Medical Center.

Words of gratitude from the beneficiaries were what the enterprise got in return: "Thank you so much Tita Vivian! Just when we needed it the most! *Happy kaayo mi, Way maka tupong! Daghang Salamat Puyo Handicrafts!* (We are so happy! Nothing else would compare. Thank you, Puyo Handicrafts!)"

Puyo Handicrafts, owned by Vivian Libao, is a SETUP-assisted enterprise of the Department of Science and Technology (DOST) Region X that produces woven bags, purses, and other handicrafts. The enterprise was assisted by DOST-X way back in 2016 with the acquisition of upgraded equipment to improve its production process and product quality. SETUP is short for Small Enterprise Technology Upgrading Program, one of the flagship programs of the DOST that provides micro, small, and medium enterprises (MSMEs) financial and technical assistance to improve their competitiveness.

With the COVID-19 pandemic threatening the city, the company has joined other institutions in fighting the deadly disease by producing non-woven three-ply face masks. Apart from the face masks provided to the health workers, Libao also shared 25 packs of rice to 25 needy families in Barangay Bulua and Barangay Patag.

These humble undertaking shows that even micro enterprises like Puyo Handicrafts can have a significant part in giving assistance to both frontliners and responders helping in flattening the curve brought by the COVID-19 pandemic, while extending help to

the affected families who could not work to earn for their daily living. This act of kindness will surely ignite the "bayanihan" spirit of other MSMEs and encourage them to take part in these challenging times, even in their own little ways.



Health workers receive the non-woven three-ply face masks made by Puyo Handicraft







Recipients of the packs of rice donated by Puyo Handicrafts in Barangay Bulua and Barangay Patag.

Unmasking the truth behind your COVID-19 face mask

DOST-PTRI uses special coating to make ordinary masks more functional

By Rodolfo P. de Guzman, DOST-STII

Table 1. Understanding the differences of face masks.

	 N95	 Surgical Mask	 Cloth Mask	 REwear Mask
Intended Use and purpose	Reduces wearer's exposure to particulates including small particles aerosols and large droplets (only non-oil aerosols)	Fluid resistant and provides the wearer protection against large droplets, splashes of bodily or other hazardous fluids. Protects the patient from the wearer's respiratory emissions.	Not fluid resistant	Fluid resistant and provides the wearer protection against large droplets, splashes of bodily or other hazardous fluids. Protects the patient from the wearer's respiratory emissions.
Breathability	Difficult	Breathable	Breathable (cotton-based)/ Non-breathable (synthetic-based); may get warm	Breathable; may get warm
Fit	Tight-fitting	Loose-fitting	Maybe loose-maybe close-fitting	Close-fitting
Reusability	Yes	No	Yes	Yes

REwear face mask, a cloth mask, will be tested for water-repellency, toxicity, fluid resistance, bacterial filtration efficiency, particle filtration efficiency, breathability, and flammability following the protocols shown in the figure above.

With the ordinary face mask taking the limelight during this time of pandemic, it is very important to know what kind of face mask you would use to get the needed protection from the severe acute respiratory syndrome coronavirus 2 or SARS-CoV-2 that causes the deadly coronavirus disease or COVID-19.

Taking up the challenge to find a better alternative, the Philippine Textile Research Institute of the Department of Science and Technology (DOST-PTRI) embarked immediately on developing a special face mask with added functionality and value. So, in truth, not all face masks are created equal.

N95 mask

As a general description, a face mask is a loose-fitting device that creates a physical barrier between the mouth and nose of the wearer and potential contaminants in the immediate environment.

If the face mask is worn properly, it can help block large-particle droplets, splashes, sprays, or splatter that may contain viruses and microbes from reaching one's mouth and nose. On the other hand, the face masks also help reduce exposure of one's saliva and respiratory secretions, especially if one has cough, to others.

In general, face masks are effective in blocking splashes and large-particle droplets, but by design, they do not filter or block very

small particles in the air that may be transmitted through coughs, sneezes, or certain medical procedures. Face masks also do not provide complete protection from germs and other contaminants because of the loose fit between the surface of the face mask and one's face. Also, the face masks are not intended to be used more than once and should be disposed of properly.

The N95 respirator, on the other hand, is a respiratory protective equipment designed to achieve a very close facial fit and very efficient filtration of airborne particles. The edges are deliberately designed to seal portion around the nose and mouth. However, the Surgical N95 Respirators are more commonly used

Breathability	Difficult	Breathable	Breathable (cotton-based)/ Non-breathable (synthetic-based); may get warm	Breathable; may get warm
Fit	Tight-fitting	Loose-fitting	Maybe loose- maybe close-fitting	Close-fitting
Reusability	Yes	No	Yes	Yes

For the first three columns, here is the reference: Center for Disease Control and Prevention (CDC), National Institute for Occupational Safety and Health (NIOSH). (n.d.). Understanding the Difference. (Photo from www.cdc.gov)

in healthcare settings like hospitals by healthcare workers as a personal protective equipment.

To ensure its protective characteristic, the N95 respirators are subjected to fluid resistance, bacterial filtration efficiency, particle filtration efficiency, breathability, and flammability tests.

It is called "N95" because the respirator blocks at least 95% of very small (0.3 micron) test particles. When fitted properly, the filtration capabilities of N95 respirators exceed those of ordinary face masks. However, it must be noted that even a properly fitted N95 respirator does not completely eliminate the risks.

Surgical mask

Leveling up, the surgical mask is a kind of face mask made with non-woven fabric that has better bacteria filtration and air permeability while remaining less slippery than woven cloth. The surgical mask material is commonly made of polypropylene with 20 or 25 grams per square meter in density. Other masks can also be made of other materials: synthetic fibers like polystyrene, polycarbonate, polyethylene, or polyester.

This kind of mask is composed of multi-layered structure. The outer layer is made of nonwoven, water-repellent protective layer. The middle part is made of high-efficiency filter spray nonwoven. Lastly, the inner layer is made of finer fiber and skin-friendly material.

Just like the N95 mask, the surgical masks are also tested for

fluid resistance, bacterial filtration efficiency, particle filtration efficiency, breathability, and flammability. Similarly, the surgical mask should only be used once and discarded properly after every use.

Cloth mask

A cloth mask, from its name, is made of cloth or fabric and is mostly worn by people to protect themselves from air pollution. Its effectivity varies mainly with the kind of material used, the design and construction, or how it was put together.

Specialized cloth masks can provide protection against particulate matter or microscopic particles that are present in the air.

REwear Face Mask, the smarter alternative

DOST-PTRI, using the water-repellent textile finishing technology under its Smart Textiles R&D Program, has developed the REwear Face Mask that was made smarter than the ordinary cloth face mask. In fact, the REwear Face Mask is washable up to 50 times, thus making it more economical in the long run.

The finishing procedure involves application of silane compounds, which are prepared into a nanosol or solution that is applied onto a natural-fiber blended textile such as cotton fabrics.

Many textile materials used for clothing, home textiles, and others may have water repellency or the ability to prevent water from

penetrating. An example of this is the water-repellent fabric that can be used for a face mask.

Respiratory diseases, such as COVID-19 are transmitted through respiratory droplets over a short distance by coughing and through direct contact with a patient's secretions.

As protection, cloth masks, especially those made of cotton, typically absorb liquid droplets unless a finishing process is applied to it. By using water-repellent finishing, the liquid droplets will just slide down the REwear Face Mask.

Like a surgical mask made of multiple layers, the REwear face mask is constructed with a two-piece, three to four-layer mask. Fully detachable, the first piece (outer layer) is made of water repellent fabric and the second piece (inner layer) is made of absorbent fabric.

REwear Face Mask also underwent rigid testing for water repellency, toxicity, fluid resistance, bacterial filtration efficiency, particle filtration efficiency, breathability, and flammability following the standard protocols.

REwear Face mask is an ideal protection for the following: people who care for patients with respiratory infection symptoms, people visiting clinics or hospitals, workers handling food, public transport operations staff/drivers, and people in crowded or poorly ventilated places.



The plastic injection machine is housed inside the DMSC in the DOST-MIRDC Compound in Bicutan, Taguig (left); Team MIRDC engineers and technicians carry out mass production of the face shield frames (right). (Photos from DOST-MIRDC)

DOST-MIRDC leads mass production of face shields for COVID-19 frontliners

By DOST-MIRDC

Answering the country's need for more supplies of personal protective equipment (PPEs) for the frontline workers, the Department of Science and Technology-Metals Industry Research and Development Center (DOST-MIRDC) now mass produces medical face shields.

Initially, DOST-MIRDC produced 3D-printed face shields that were distributed to our modern-day heroes who are bravely fighting COVID-19. To produce more, DOST-MIRDC transitioned to plastic injection technology, allowing them to increase production volume by up to 2,500 pieces of face shield frames per day.

The plastic injection mold was fabricated at the Die and Mold Solution Center (DMSC), a facility within the DOST-MIRDC compound in Bicutan, Taguig City. Mass production of the face shield frames is also being done in the said facility.

"With the mass production of the medical face shields being done simultaneously in Laguna and in Taguig, we can assure the enhanced protection of our frontliners," says Engr. Fred P. Liza, chief of the Materials and Process Research Division and project leader of the DOST-MIRDC's Advanced Manufacturing Center.

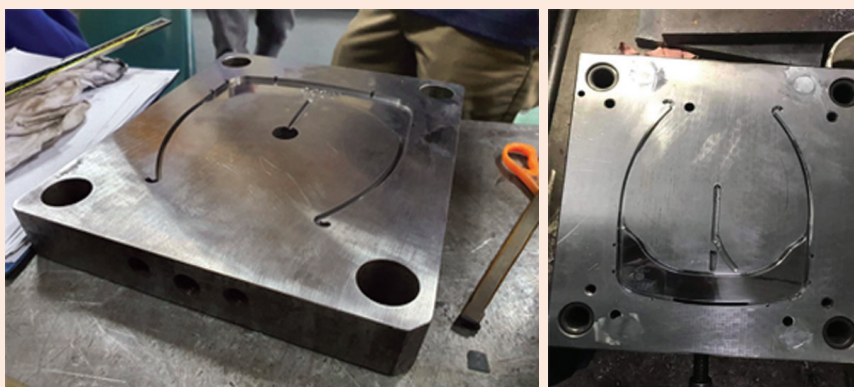
To further augment the supply of face shields, partner organizations such as Team Twilight Men Only (a private group composed of managers from the semiconductor industry) and the Tzu Chi Foundation Philippines donated 6,000 pieces and 23 rolls of acetates, respectively. Other donors were Manly Plastics, Inc., Prima Plastics, and the University of the Philippines Visayas (in cooperation with Frabelle Fishing Corporation, Inc., and Philippine Fishing Gear Industries, Inc.) that donated 300kg, 1200kg, and 1000kg of polypropylene (PP), respectively.

Other technology partners also joined DOST-MIRDC in this cause. Omnifab fabricated another injection mold, while the Megasamsotite Plant in San Pedro, Laguna became another site

for mass production of the face shield frames. They can also produce up to 2,500 face shield frames daily.

DOST-MIRDC, realizing the need for more PPEs, is calling on organizations, both from the public and the private sectors, for donations of more raw materials. With one ton of PP, they can produce 25,000 face shield frames. DOST-MIRDC believes that this collective effort will help save the lives of our gallant and selfless frontliners.

The DOST-MIRDC has started packaging and distributing the face shields to various hospitals since 06 April 2020. For inquiries about the medical face shields, send messages on facebook (facebook.com/dostmirdc), or e-mail (mirdc@mirdc.dost.gov.ph).



The plastic injection mold for the face shield frame fabricated at the DMSC inside the DOST-MIRDC Compound in Bicutan, Taguig City. (Photos from DOST-MIRDC)



DOST-funded CSU lab develops innovative filter for face mask

By Aliana Gene E. Sarmiento, *DOST-Caraga*

Photos from DOST-Caraga

The problem of the lack of effective face masks motivated the team of Dr. Rey Capangpangan from Caraga State University (CSU) to develop the nanocellulose filter material which is sourced from waste materials to produce face masks that are now very important for frontliners battling COVID-19.

Cloth face masks are especially in demand now. But are the ordinary face masks really effective against coronavirus? Sadly, no. These cannot filter larger droplets containing the virus because of the large pores in the material. However, with the shortage of commercial masks like surgical and N95 masks, people opted to use washable cloth face masks.



Research team testing the material with CSU President Dr. Anthony Penaso

This problem motivated the team of Dr. Rey Capangpangan from CSU to develop a filter material that can be inserted in the cloth face mask to efficiently filter out contaminants — the nanocellulose film, which is sourced from waste materials.

The team embarked on the research project last 27 March 2020 and developed the prototype at the Material Science and Polymer Chemistry Laboratory in CSU, a project funded by the DOST-Philippine Council for Industry, Energy and Emerging Technologies Research and Development. The lab serves as a facility, not just for researchers who are into materials development but also for local industries. The team's current work is on cellulose biopolymer where they saw the potential in developing a filter material from it while integrating nanotechnology.

The team used paper wastes, acid, base, and bleaching reagents to produce nanocrystals then integrated with nanocellulose film to increase the filtering capability of the product. According to Dr. Capangpangan, the nanocellulose crystals can also be extracted from agricultural wastes such as pineapple leaves and water hyacinth.

The research is in collaboration with the College of Engineering and Geosciences and Caraga Fabrication Laboratory in CSU in developing the 3D printed face masks. The lab also collaborated with Dr. Arnold Alguno from the Mindanao State University-Iligan Institute of Technology for the nanocellulose extraction.

The nanocellulose filter will cost around PhP 15.00 per piece, while the 3D printed face mask will cost PhP 300.00 per piece. Costs can still be lowered if mass-produced. The face mask can be reused while the filter material can be sun dried before reusing. The team continues to modify and test the product for its longevity.



Shredded paper wastes and trial tests of the film material



3D printed face mask produced by Caraga Fablab with the nanocellulose filter.

Results from the flame and wettability tests show that the nanocellulose filter performs well as much as the commercial face masks. The team emphasized that the research project does not aim to replace the masks used by health and medical practitioners but to provide innovation to effectively reduce contamination using washable low cost nanocellulose films.

For now, the laboratory is in need of raw materials and reagents to

continue its production. The team of researchers are appealing for further assistance to manufacture more face masks. Interested parties who want to help can contact Department of Science and Technology-Caraga or the project leader, Dr. Rey Capangpangan at CSU, Butuan City.

Incidentally, Dr. Capangpangan is an active member of the National Research Council of the Philippines (NRCP) of the Department of Science and Technology.

DOST MisOcc Donates PPEs to MHARS Medical Center in Ozamiz City

By Rogelyn C. Calago, DOST-X
Photos from DOST-X

O ZAMIS CITY, Misamis Occidental- Answering the call for help during the COVID-19 pandemic, the Department of Science and Technology Regional Office X (DOST-X) donated Personal Protective Equipment (PPE) for medical frontliners of the Mayor Hilarion A. Ramiro Sr. Medical Center (MHARSMC) in Ozamiz City.

On 06 April 2020, DOST-X, through its Provincial Science and Technology Center Misamis Occidental, turned over 150 pieces of N95 masks and 500 pieces of surgical masks to the hospital with the aim of augmenting the dwindling PPE supply.

Also, DOST-X gave 10 Acrylic Aerosol Boxes to MHARSMC to help medical frontliners reduce exposure to droplets when intubating patients while containing the spread of the virus.

The donated aerosol boxes were fabricated by Emrys Industries of Iligan City in accordance with the accepted specifications. Emrys Industries is a DOST-Small Enterprise Technology Upgrading Program (SETUP) cooperator that also supplies aerosol boxes to other hospitals in the region.

In a Facebook post, MHARSMC expressed their gratitude to DOST-PSTC Misamis Occidental for partnering with them in their effort to beat the COVID-19 pandemic. Initiatives such as this may not completely capture the entire requirement of the hospital as the COVID-19 battle goes on, but this is also a call to stir Filipino ingenuity to come up with more creative solutions.

As medical frontliners continue to fight COVID-19, the provided PPEs are a big help in protecting them from the virus and the concerted efforts of all sectors reminds us to raise the banner of “bayanihan spirit” among public and private institutions to win this fight.



MHARSMC officials receive the PPE from DOST-X.



MHARSMC received the acrylic aerosol boxes from DOST-X for added protection.

DOST-IX distributes 6,000 new face shields

By Bon Padayhag, DOST-IX

Photos from DOST-IX

The Department of Science and Technology Region IX (DOST-IX) is ready to distribute for free 6,000 newly-designed face shields to different hospitals and frontline facilities throughout Region IX. This initiative is in partnership with Zinex Zign Express, a beneficiary of the Small Enterprise Technology Upgrading Program (SETUP) of DOST-IX.

The BLAZED face shields (Beneficial Life Apparatus by Zinex Express and DOST) allow users to quickly replace used shields through a practical locking mechanism that can easily be adjusted based on the user's preference. The new design is also cheaper and faster to produce, and yields more face shields (150 pieces) per acrylic sheet.

A total of 1,140 face shields have since been produced, with 435 already given to the following: 300 for Zamboanga City Medical Center (ZCMC), 50 for Hospital de Zamboanga, 35 for PhilHealth Regional Office IX, and 50 for the recently accredited COVID-19 testing center of the Department of Agriculture.

In Zamboanga City, the following have been slated to receive the new face shields:

- AdZU-Lantaka Campus Isolation Facility
- Camp Navarro General Hospital
- Mindanao Central Sanitarium and General Hospital
- Zamboanga Puericulture Maternity and Lying-in
- PhilHealth Zamboanga City Field Office
- Universidad de Zamboanga Medical Center
- Zamboanga Peninsula Medical Center
- Ciudad Medical Zamboanga
- Zamboanga Doctors Hospital



DOST-IX, through the Tzu Chi Foundation, delivers 50 face shields for the DA-ZCMC COVID Center



ZCMC Staff and DOST-IX with the new face shields (left), while Doc. Saude Imlan goes on social media with the new design.

- Brent Hospital and Colleges, Inc.
- West Metro Medical Center
- Labuan (Satellite Hospital)
- Quiniput (Satellite Hospital)

Another 1,300 new face shields are set to be delivered to the province of Zamboanga Sibugay (300), Zamboanga del Sur (300), Pagadian City (200), Zamboanga del Norte (300), Dipolog City (100), and Dapitan City (100).

This undertaking is part of the DOST Region IX's DOST SAVES Program (Devising Operational Strategies and Tools to Safeguard Against the Virulent Epidemic Situation), which focuses on developing pragmatic solutions to be used in the COVID-19 efforts.

Throughout their involvement, Zinex has shouldered the repair and maintenance of their equipment, utilities, operational, and miscellaneous expenses, as well as the salaries of their workforce.

The firm has also produced 1,100 washable face masks that have been



Nurse Rasheed Dantes gives the new design a thumbs-up (left), while Philhealth CARES Team Leader Happy Mojica receives a batch of face shields from DOST-IX (right).

distributed to frontliners and, with the Tzu Chi Foundation, produced 35 protective enclosures called "aerosol boxes" that are used by doctors in treating patients with COVID-19.

For more information on the DOST SAVES Program, please call

(062) 991-1024 or text 0917 8011 887 and look for John Apolinario III, or email us at dost9info@gmail.com or visit our Facebook page at www.facebook.com/DOSTRegion9



Zinex Zign Express putting together the BLAZED face shields

DOST-FPRDI produces bamboo-framed face shields

By Apple Jean C. Martin-de Leon, *DOST-FPRDI*
Photos from DOST-FPRDI

Responding to the need for more personal protective equipment amid the COVID-19 outbreak, the Department of Science and Technology- Forest Products Research and Development Institute (DOST-FPRDI) produced bamboo-framed face shields for distribution to frontline services in Laguna.

“Our team had to improvise with the materials at hand because the enhanced community quarantine made it challenging to procure supplies,” explained DOST-FPRDI Director Romulo T. Aggangan.

The frames of the face shields were made from bamboo (*kauayan-tinik*) — a perennial, woody-stemmed

grass known for its versatile uses. Bamboo grows very well locally and is a favored raw material for handicraft and furniture production.

According to Aggangan, at least 300 face shields were produced and turned over to the University of the Philippines Los Baños, some barangays in Los Baños (LB), Laguna and rural health units of LB and Bay, Laguna, among others. Another batch will be produced in the coming weeks.

“The DOST-FPRDI is one with the science community in finding ways to protect our frontliners and the public from COVID-19. Currently, we are exploring other possible uses of forest products to help combat this global pandemic. The use of R&D and scientific facts is all the more needed to cope in these challenging times,” he ended.



UPLB representatives receive the face shields on 27 April 2020. The shields will be distributed to the UPLB University Police Force, University Health Service and other university frontliners (Photo by Muriel B. Dizon)



Turn-over of face shields to some barangays in Los Baños, Laguna (Photo by Muriel B. Dizon)



The bamboo-framed face shields produced by a team led by DOST-FPRDI's Froilan B. Samiano, Audel V. Mosteiro, Noel M. Medrano, Val DV Valderama, and Engr. Cesar O. Austria (Photo by Audel V. Mosteiro)

the FPRDI-formulated hand and liquid soaps, and hand mists will undergo further bioassay testing to determine their germ removal efficiency. (Photo from DOST-FPRDI)



Prior to mass production, the FPRDI-formulated hand and liquid soaps, and hand mists will undergo further bioassay testing to determine their germ removal efficiency. (Photo from DOST-FPRDI)

DOST-FPRDI develops antimicrobial soaps, hand mists

By Apple Jean C. Martin-de Leon, DOST-FPRDI

Exploring the vast potential of our local forest resources, the Department of Science and Technology-Forest Products Research and Development Institute (DOST-FPRDI) has developed personal care products useful in maintaining personal hygiene amid the COVID-19 outbreak.

The antimicrobial liquid hand soaps were formulated using cinnamon (*Cinnamomum mercadoi* Vidal) and bamboo-activated carbon, with lavender and Manila elemi oil scents. The hand bar soaps, meanwhile, used bamboo charcoal (*Bambusa sp.*) bamboo-activated carbon, “sapang”, (*Caesalpinia sappan* L.) and “tawa tawa” (*Euphorbia hirta* L.), with eucalyptus oil scent.

“The results of DOST-FPRDI’s previous and on-going studies on bamboo charcoal and

bamboo-activated carbon were useful in making these personal care products,” shared research team leader Dr. Jennifer P. Tamayo.

“The bamboo-activated carbon helps remove microorganisms, such as germs, by absorbing them. While the Institute has yet to study “sapang” and “tawa tawa” thoroughly, available literature point to their antimicrobial properties,” she added.

The Institute also prepared antimicrobial hand mists for disinfecting hands in the absence of soap and water. The hand mists were made from cinnamon, a proven natural disinfectant, and infused with either lavender or Manila elemi oil scent.

According to Tamayo, bioassay testing and sensory test are now being done to further study the products. DOST-FPRDI aims

to partner with local bamboo-based companies to speed up the manufacture of these antimicrobial soaps.

“Maintaining personal hygiene, such as through washing and sanitizing of hands, is deemed an important step in preventing the spread of diseases. As COVID-19 cases continue to rise in some areas of the country, DOST-FPRDI will look for more ways to help protect the public against this global pandemic,” said DOST-FPRDI Director Romulo T. Aggangan.

Aside from Tamayo, the research team includes Rebecca B. Lapuz, Rowena E. Ramos, Benjo S. Salvatierra, Rogelio O. Rantael Jr., Kim Wilmer B. Balagot, Kimberly B. Delica, Audel V. Mosteiro, Kristopher R. Breis, and Alexis B. Dorado.



Iligan City Mayor Celso G. Regencia (left) receives the aerosol boxes handed by Ms. Gerrylou Sweet M. Pia (middle), Officer-In-Charge of DOST-Lanao del Norte last 6 April 2020 at the City Mayor's Office.



Iligan City Disaster Risk Reduction and Management Council receives the 450 bread loaves last 7 April 2020 for frontliners.

DOST LDN responds to COVID-19

By Dorina Marie E. Ytang, DOST-X

Photos from DOST-X

As the Local Government Unit of Iligan City is making headway in fighting the battle against COVID-19, the Department of Science and Technology (DOST) Region X, through its Provincial Science and Technology Center of Lanao del Norte, took part in the locality's response to the pandemic.

A total of five aerosol boxes were handed over to City Mayor Celso G. Regencia last 6 April 2020, three of which were given to Gregorio T. Lluch Memorial Hospital. The other two boxes were turned over to the Iligan Medical Society to be used at Iligan COVID-19 Quarantine and Treatment Facility located at E&R Hospital, Iligan City. The aerosol boxes will help frontliners reduce exposure from aerosolized particles during the intubation of COVID-19 patients.

"These will not only be used for intubation but also can be utilized for suctioning, AMBU-bagging, and any other minor procedure due to its dimensions and hole sizes that are enough for manipulation by hand," says Dr. Michele Remarata of Iligan Adventist Medical Center. Dr. Remarata provided the design and specifications of the fabricated aerosol boxes.

On 7 April 2020, DOST-X donated 450 bread loaves that were distributed to the frontliners of Iligan City. Frontliners include medical personnel, police officers, and even the Barangay Peacekeeping Action Team of local barangay units who are on duty round the clock to help secure the safety of Iliganons. These bread loaves were distributed to the frontliners as food supply during operation.

The donated aerosol boxes and bread loaves were locally supplied by Emrys Industries and Racquel's Bakeshop of Iligan City, respectively. Both are DOST - Small Enterprise Technology Upgrading Program beneficiaries. The items were given to DOST-X only at cost to show their support to the government in the fight against COVID-19.

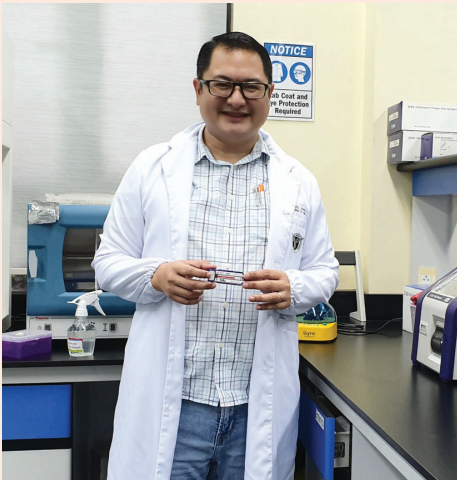
"This action may not suffice the requirement to combat COVID-19 in our locality, but we hope that this will stimulate the drive of "Bayanihan Spirit" among different sectors and that we ultimately prevail in this battle against COVID-19," said Gerrylou Sweet M. Pia, Officer-In-Charge of DOST Lanao del Norte as she expressed her support to LGU Iligan in the fight against COVID-19.

DOST-PCHRD Balik Scientists join fight against COVID-19

By Rodolfo P. de Guzman, *DOST-STII*

Heeding the call to help the country fight COVID-19, Filipino scientists formerly based abroad have joined other frontliners in the fight against COVID-19 and are now working in different hospitals in the country.

Carrying the “bayanihan” spirit in their hearts, these gallant medical practitioners are now offering their expertise under the Balik Scientist Program of the Department of Science and Technology (DOST) in close collaboration with the Philippine Council for Health Research and Development (PCHRD).



Dr. Edsel Maurice T. Salvaña is a member of the Technical Advisory Group that advises the DOH and the Inter-Agency Task Force. Dr. Salvaña is a multi-awarded and internationally recognized scientist, physician, and HIV/AIDS advocate. He is a director at the University of the Philippines Manila, an Associate Professor at the University of the Philippines-Philippine General Hospital (UP-PGH), and Adjunct Faculty for Global Health at the University of Pittsburgh



Dr. Joseph Adrian L. Buensalido, an expert in infectious diseases, is a graduate of the De La Salle University-Health Sciences Campus. After his fellowship from the Wayne State University-Detroit Medical Center in Michigan, USA, Dr. Buensalido conducted clinical research on the mechanisms of action of antibacterials, antibiotic resistance, hepatitis, HIV, and infections of the spine, among others. He is currently an Infectious Diseases and Internal Medicine Consultant at the Asian Hospital and Medical Center, Makati America Center, Manila Doctors Hospital, and had conducted his research studies at the UP-PGH



Dr. Jonel P. Saludes, a professor of Chemistry and Associate Vice President for Research at the USA, is now assisting in assessing the capacities of the Western Visayas Medical Center (WVMC)’s facilities and technicians for compliance and accreditation by the Department of Health. Dr. Saludes is trained on various fields like magnetic resonance spectroscopy and mass spectrometry, chromatography, and chemical biology, to name a few, from the University of California Davis and University of Colorado Boulder.



Dr. Doralyn S. Dalisay, a 2019 Outstanding Professional of the Year awardee in the field of Pharmacy given by the Philippine Regulatory Commission, is also assisting in assessing the capacities of the WVMC's facilities and technicians for compliance and accreditation by the DOH. Dr. Dalisay returned to the Philippines as the DOST Balik Scientist in June 2015 to establish a research program on natural products drug discovery at the Center for Chemical Biology and Biotechnology in USA. Incidentally, she holds two US patents on the use of a marine natural product for fungal infections and cancer.



Dr. Raymond Francis R. Sarmiento leads the Data Warehouse Team of FASSSTER, a project of the DOST-PCHRD to fight COVID-19. FASSSTER stands for Feasibility Analysis of

Syndromic Surveillance using Spatio-Temporal Epidemiological Modeler, which has been used for creating predictive models and visualizing possible scenarios of outbreaks of dengue, typhoid fever, and measles, at specified time periods.

Currently, Dr. Sarmiento works as the Director of the National Telehealth Center of the UP National Institutes of Health (NIH). He is a Balik Scientist of the DOST who specializes in clinical and public health informatics and health data science, among others.



Dr. Reynaldo L. Garcia, an expert in biomedical research, consulting and biotechnology enterprise, now leads the national databasing of laboratories with polymerase chain reaction to assist DOH in testing. Dr. Garcia returned to the Philippines in 2010 as a Balik Scientist and was appointed as a Full Professor at the National Institute of Molecular Biology and Biotechnology, University of the Philippines Diliman, and concurrently as UP System Director of the Technology Transfer and Business Development Office. He currently heads the multi-awarded Disease Molecular Biology and Epigenetics Laboratory.



Dr. Harvy Joy C. Liwanag performs projections for DOH on the health workforce requirements for the Philippines to address COVID adequately. Dr. Liwanag is the Coordinator of the Training Center for Health Research Ethics and Good Clinical Practice at UP-NIH. Dr. Liwanag returned as a medium-term Balik Scientist after completing his PhD in Epidemiology at the Swiss Tropical and Public Health Institute and is currently being hosted by the DOH- Health Human Resource Development Bureau.

As the fight to put a stop to the spread of this deadly virus continues, it is expected that more and more medical practitioners, scientists, and researchers will render service in different capacities and share their expertise to protect the lives of the Filipinos. (Source: PCHRD, V1. Updated JCM Talking Points-PCHRD Program for COVID-19/S&T Media Service)

DOST-PCHRD rolls out more RxBox telehealth devices to fight COVID-19

Text and photo by Rodolfo P. de Guzman, *DOST-STII*

While waiting for the so-called “flattening the curve” in terms of the spread of the Severe Acute Respiratory Syndrome Coronavirus 2 that causes the deadly COVID-19, the Department of Science and Technology-Philippine Council for Health Research and Development (DOST-PCHRD) continues to deploy more RxBoxes in different hospitals across the country.

The DOST in collaboration with the University of the Philippines Manila – National Telehealth Center, University of the Philippines Diliman–College of Engineering, DOST-Advanced Science and Technology Institute, and the Department of Health developed this telemedicine device that aims to supplement the country’s community healthcare system, particularly to help rural health centers (RHCs) in the country.

Classified as a telehealth device, the RxBox is capable of measuring a patient’s temperature, blood pressure, heart rate, oxygen saturation, uterine

contractions, and electrocardiogram readings remotely. In other words, the patient need not be physically present in the hospital because the device allows diagnosis to be done in another hospital by a specialist doctor.

Thus, the use of the RxBox device can reduce contact between patients diagnosed with COVID-19 and healthcare workers, as it provides an efficient way for healthcare workers to monitor multiple patients at once.

The RxBox devices are now deployed in selected healthcare facilities for bedside monitoring of vital signs, oxygen saturation, and electrocardiogram readings of patients diagnosed with COVID-19, especially those in severe or critical conditions who need continuous monitoring.

Some 106 RxBox devices were initially sent to designated COVID-19 wards in the Philippine General Hospital.

As the implementing agency, DOST Region IV-A assesses and

coordinates the needs of the healthcare facilities in each region for the rollout of the RxBoxes to augment the health facilities, particularly in the provinces.

On the other hand, according to DOST Region X, there are 65 RxBox Telehealth devices earmarked for distribution in selected RHU sites across Northern Mindanao (Region X). The sites will be appropriately evaluated through the project’s Pre-deployment Assessment procedure, during which the Regional Management Team validates the qualifications of the proposed health facilities. Once approved, four staff from the RHUs will be invited for a Super User Training and the facility will receive one RxBox Telehealth device, one CPU, one monitor, and one router for the deployment.

The RxBox units are being manufactured in partnership with IONICS EMS Inc., a local manufacturing company based in Laguna.

RxBox telehealth device provides medical diagnosis particularly for patients in remote rural areas in the country with limited access to health facilities.



DOST-ITDI develops respirator, ventilator parts for COVID-19 patients

Text and photos by DOST-ITDI

The fight against the COVID-19 pandemic has been a struggle for most Philippine hospitals as the need for respirators and ventilators continues to increase.

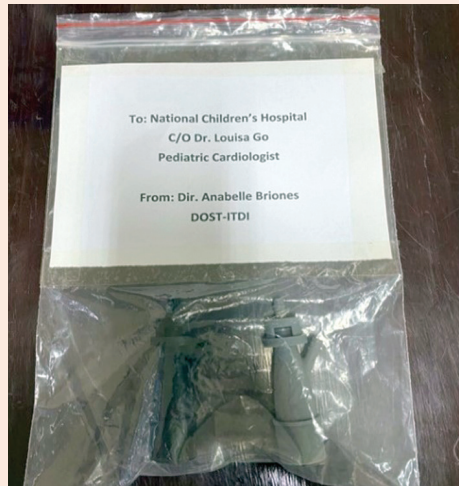
With confirmed cases reaching 5,453 as of Wednesday, 15 April 2020, Department of Science and Technology-Industrial Technology Development Institute Director Dr. Annabelle V. Briones, through its MATDEV Team Leader and Materials

MATDEV is also working on 3D printing prototypes of parts of the Multiple Patient Ventilator Splitter and Mechanic Ventilator- Mini-War Zone. Also listed by the Department of Health as one of badly needed equipment for COVID-19 treatment, ventilators are machines that help to get more oxygen into the lungs and take carbon dioxide out. It is designed to breathe for somebody who is unable to breathe effectively on their own.



Science Division Chief Dr. Blessie A. Basilia, delivered two prototypes of 3D printed respirator venturi valves to the National Children's Hospital in Quezon City on 14 April 2020, to test fit in their existing respirator.

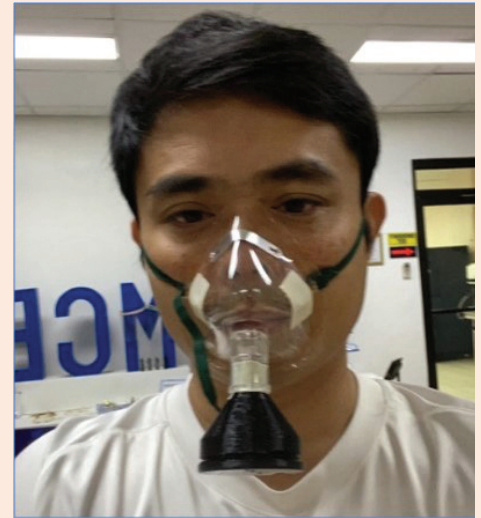
The MATDEV (Multiple Materials Platform for Additive Manufacturing Project) Team, using Fused Deposition Modeling and Markforged Mark Two 3D printers developed the prototype to assist hospitals as they easily run out of respirator valves. These valves connect patients in intensive care to breathing machines. Respirator venturi valves are commonly used by hospitals worldwide because these can be used for a maximum of eight hours at a time.



Currently, five hospitals in Metro Manila are waiting for their 3D printed prototypes of ventilator parts.

Further, the Team is improving nebulizer mask design. They developed a 3D printed filter attachment for use in commercially available masks such as the Modified Oxygen Concentrator Mask. The attachment allows for a more efficient way for patients to breathe in medications.

They also 3D printed a prototype of an N95 mask and are now considering some improvements for optimum functionality by using nano-enabled filament material, an anti-viral filter cloth, and adding a flexible lining on the edges of the mask.



Meanwhile, DOST-ITDI donated 100 3D printed frame and face shield assemblies to the Perpetual Help Medical Center in Las Piñas City on 14 April 2020. This augmented an initial donation of 100 of the shield assemblies each to the Philippine Heart Center on 30 March 2020, and the Lung Center of the Philippines on 6 April 2020.

Through innovative thinking and application of research and development advances, the science community can serve the people, help save lives, and impact change.



VCO: The “miracle” oil?

Text and photos from DOST-ITDI

Amid the frenzied search for a cure for COVID-19 that has claimed many lives and continues to infect human beings around the world, one of the country’s natural products has been taking the limelight for its medicinal properties, the VCO or virgin coconut oil against the dreaded contagion.

Of all the hundreds of products that one can produce from coconut, one has been getting a lot of attention lately — virgin coconut oil or VCO.

Yes, people have suddenly taken quite a bit of interest in VCO; described by beauty experts as a superfood, with some advertising it as the “miracle” supplement for the treatment of COVID-19.

Certainly, a lot of Filipinos are pinning their hope on it.

But what exactly is VCO? Why is the oil called virgin? How is it produced? How is it different from regular coconut oil?

More importantly, what is in it that makes it suitable as a supplement as treatment for COVID-19? Can it work its “magic” on the dreaded virus SARs-CoV-2, the deadly virus causing this disease?

First, let us get to know more about VCO, the water white oil. So, why is VCO called virgin?

VCO is called virgin because it is extracted from a single press using fresh, mature coconut meat instead

of copra that is dried coconut meat. In VCO production, oil is obtained by mechanical or natural means, either with or without application of heat resulting in no alteration of the oil.

One might say, thus, that VCO is raw oil — fresh and unaltered with that peculiar nutty, coconut aroma and taste, and water white color.

While VCO is coconut oil in an unaltered state, refined coconut oil, on the other hand, is characterized by the amount of refining that it undergoes. Characteristically slightly yellow in color, it is also odorless and tasteless.

It is often referred to by its acronym label, RBD coconut oil, for having been refined, bleached, and deodorized. Further, refined coconut oil has undergone a drying process that is typically done outside in the sun.

Going on with VCO, Tropical Traditions, the first company to export VCO from the Philippines to the US, claims that there is no industry standard definition for “virgin” coconut oil unlike in the olive oil industry where the product is categorized either as “virgin” or “extra virgin” olive oil.

The company was the first to publish, in 2006, the standards for the use of “virgin coconut oil” under the edible oil category. While, there may be as many processes as there are VCO processors (there are 30

listed under the Virgin Coconut Oil Producers and Traders Association of the Philippines, Inc.), the industry has lately been able to develop the Philippine National Standard for VCO. However, some may still be following the standard set by the Asia Pacific Coconut Community.

With the numerous benefits that one can get from VCO, the demand from local and international market has been growing.

Finally, VCO is now classified as a nutraceutical product, one that has both nutritional and medicinal properties.

DOST-ITDI VCO processing technology

In 2000, DOST-ITDI developed a VCO production process that targets mass production.

Albeit enjoying slight changes in design in 20 years, the DOST-ITDI modified wet process may benefit processors from the expected increased demand for VCO as current research tests also show potential therapeutic promise.

A centrifuged process (also known as cream separator process), the wet processing method for VCO is a modification of the “traditional boiling method.” Here, coconut milk is passed through a centrifuge to separate the cream from the water. Centrifugation coagulates the proteins present in the milk, resulting in faster natural process of separating cream from the water.

To recover the oil, the cream is mildly heated. Heating partly removes unpleasant/acidic odor or rancidity while at the same time destroying microbes in the oil.

Further, a pressure filter to make the oil clear and free of sediments is used. This removes both free and bound moisture from the oil, resulting in the final moisture content of less than 0.1% that results in a longer shelf-life. Partnered with vacuum drying, the process produces high-quality oil. Further, the technology is more efficient as it can process 500 nuts in eight hours.



Filtration

Aside from this wet process, DOST-ITDI has also developed another method of producing VCO, this time through the dry process. This involves drying the coconut meat at low temperature, followed by extracting the coconut oil from the dry meat under high pressure and controlled temperature.

VCO: A miracle of nature

VCO does not contain cholesterol. It is composed of different types of naturally saturated fatty acids, mostly medium-chain triglycerides that makes it easily digestible and convertible to energy in the human body. It remains solid inside the body and it is not bad for the heart and will not cause hardening of the arteries. While other vegetable oils are hydrogenated to produce its solid form (e.g. margarine) and in the process creating trans-fatty acids, coconut oil contains zero trans-fat.

About 50% of the saturated medium-chain fatty acids in VCO is lauric acid and has been widely studied for its health benefits as a nutraceutical substance.

In fact, VCO is fit for human consumption in its natural state. It can be ingested directly straight from a teaspoon, used as frying oil, or as ingredient in food preparations. It can also be used to produce non-food items such as scented oils for

aromatherapy, creams and lotions, and herbal soaps.

More than this, however, people are now more interested in lauric acid's monoglyceride form called monolaurin or ML for its medicinal attributes.

Discovered in the 70s by Prof. Dr. Jon J. Kabara, a chemist and pharmacologist, ML was established to have antibacterial, anti-fungal, and anti-viral properties. ML is formed in the human body when coconut oil is taken in and provides protection against infectious diseases.

So, will ML in coconut oil work against the virus SARS COV2?

In a series of research studies, Dr. Kabara found that the nontoxic ML adversely affects bacteria, yeast, fungi, and enveloped viruses or viruses with lipid covering.

He found out that the properties that determine the anti-infective action of lipids are related to their structure, e.g. free fatty acids and monoglycerides. The monoglycerides like ML are active; diglycerides and triglycerides are inactive.

Further, of the saturated fatty acids, lauric acid has greater antiviral activity than other fatty acids such as caprylic acid (C-8), capric acid (C-10), or myristic acid (C-14).

Fatty acids and their monoglycerides like ML produce their killing/inactivating effects by several mechanisms.

The first mechanism for antiviral action attributed to lauric acid and ML is that of fluidizing the lipid and phospholipids in the envelope of the virus, causing the disintegration of the microbial membrane.

The second mechanism according to Hornung et al. in 1994 is the ability of lauric acid to interfere with virus assembly and maturation.

Witcher et al. followed this up with a study in 1993 showing that the third mechanism for antiviral action of lauric acid and ML is dependent on the immune system itself of the patient.

Similarly, in 1982 Dr. J. C. Hierholzer and Dr. Kabara jointly reported the antiviral activity of ML on viruses that affect humans, such as enveloped RNA and DNA viruses.

Conducted at the Center for Disease Control of the U.S. Public Health Service, the study showed that the presence of a lipid membrane on viruses makes them especially vulnerable to lauric acid and its derivative ML.

These findings have been confirmed by many other studies including those conducted by Isaacs et al. in 1986, 1990, 1991, and 1992, and by Thormar et al. in 1987. There are a host of other viruses that can be inactivated by lauric acid and ML.

DOST researchers are thus working to determine if lauric acid and ML in VCO will also work its magic on SARS-CoV-2.

DOST Secretary Fortunato T. de la Peña is leading the department's clinical trials to test VCO as a possible supplement in treating patients with COVID-19.

While not directly involved in these clinical studies, DOST- ITDI's processing technology for VCO that has been established through research and development may just help ensure the continuous supply of this miracle oil for medicinal studies.



DOST scholars pitched in to provide food packs to vulnerable communities around the country affected by COVID-19.

DOST in awe of Scholars' volunteerism amid COVID-19

By Marco D. Melgar, *DOST-SEI*
Photos from DOST-SEI

When the country imposed the nationwide community quarantine amid the spread of the Coronavirus Disease 2019 (COVID-19), worry and uncertainty clouded the minds of many, especially the poor, who are unprepared of the sudden restrictions in movement and economic activity. Despite this, scholars of the Department of Science and Technology - Science Education Institute (DOST-SEI) were among the first to respond and to organize themselves to do volunteer work in their localities.

DOST officials are amazed with the various initiatives done by its scholars — both ongoing and scholar-graduates.

"It is very inspiring to know that our DOST scholars are doing their own part to help the nation recover from the current crisis," said DOST Secretary Fortunato de la Peña who regularly reports of the agency's efforts in his official social media page.

As of 05 June, there are 1,081 ongoing and former science scholars

who volunteered in relief operations; data encoding and validation; 3D printing of frames for face shields and production of other personal protective equipment (PPE) for frontliners; and production of alcohol as disinfectant. Some even helped in their community safety assistance program by monitoring persons entering and leaving their barangay.

DOST-SEI Director Dr. Josette T. Biyo said that while they are in awe of these initiatives, she credits the Institute's scholars' formation program called "The Filipino Patriot Scholars Project" in further awakening patriotism and servant leadership traits among scholars.

"Since 2017, we wanted to inculcate the core values such as professional excellence, social responsibility, servant leadership, and volunteerism among our scholars aside from them pursuing academic excellence. We know that those values don't fully blossom in a matter of days or weeks, but the Patriot Project allowed them to find deeper meaning to the brand of being DOST scholars," Dir. Biyo said.

The number of scholar-volunteers kept rising from an initial 500 in April to more than a thousand as of date. Dir. Biyo further said that there are still scholar-volunteers whose contributions were undocumented.

"The documented efforts may represent only some of the initiatives from DOST Scholars but the impact cannot be overstated," she said.

Among the documented efforts, Dir. Biyo said are some notable modes of assistance that include data validation for the distribution of Social Amelioration Program, development of online tracking mechanism for persons under investigation and monitoring, and strategic campaign to provide baby-friendly relief via a movement called #FeedPHBabies. A number of scholars and alumni also pooled resources to buy food packs, groceries, and other essentials for the vulnerable individuals in their localities.

Scholars further assisted in information dissemination by creating infographics and publication of relevant information materials while

others enlisted as volunteers for the Molecular Biolab to be established to augment in COVID-19 testing.

Another example of volunteerism among the DOST scholars is their involvement in research. The Feasibility Analysis of Syndromic Surveillance using Spatio-Temporal Epidemiological Modeler (FASSTER) was developed by a team led by researchers from the Ateneo de Manila University that allows forecasting of possible cases in a given area at a specified period of time. The project is used for creating predictive models and visualizing possible scenarios of outbreaks of dengue, typhoid fever, and measles at specified time periods.

Under the FASSTER project, 45 DOST scholar-volunteers are deployed at the Department of Health (DOH) regional offices nationwide and work as data encoders and analysts. Data gathered from this model support the decision-making of DOH, local government units and healthcare facilities in terms of resource planning and other measures to mitigate the spread of the virus

The project was funded by the Philippine Council for Health Research and Development of the DOST.

On the other hand, Dir. Biyo mentioned that Shana Genavia, a DOST scholar, was also part of the DNA Sequencing Core Facility that helped validate the COVID-19 Detection Kit developed by the University of the Philippines-National Institutes of Health. A number of MD-PhD scholar-graduates of UP Philippine General Hospital also underwent training at the UP National Institute of Molecular Biology and Biotechnology for deployment to the different DOH Testing Centers.

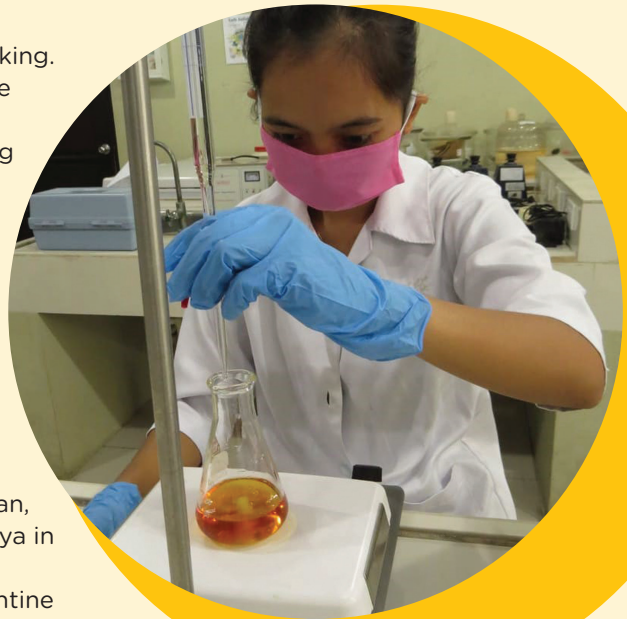
She also cited that some DOST Balik Scientists and graduate scholars from University of San Agustin in Iloilo are doing epidemiological modeling of COVID-19 for the provinces of Iloilo, Guimaras, and Panay. The results of which are given to the City Mayor and

Governors in aid of policy making.

Dir. Biyo also said that the volunteerism efforts of DOST scholars were also seen during the Marawi Siege in May 2017. "Even in Marawi, we saw great volunteer efforts from those who benefitted from our Bangon Marawi Scholarship Program. These scholar-graduates who named themselves Team Batis distributed food packs in Marawi City and Balo-i in Lanao del Norte, and Saguwaran, Marantao, Maguing, and Tugaya in Lanao del Sur," she said.

As the community quarantine continues to be implemented in various parts of the country, DOST-SEI is very positive that the initiatives from its scholars will remain.

"Indeed, there's no amount of volunteer work that is too small nor big enough. The fact that reaching out to others while being under the same threat of exposure to the deadly virus is noble for our young scholars. We're so proud of them," Dr. Biyo disclosed.



A DOST scholar helps out in formulating alcohol and hand sanitizers for distribution to communities in Cagayan de Oro City.



A DOST scholar-volunteer made use of university facilities in producing PPE for distribution to public hospitals in Bohol.

DOST launches program for repatriated OFWs during COVID-19

By Monique Arcinue and Febe Estamo, DOST-NCR

Manila, Philippines – With the repatriation of 28,589 OFWs as of 21 May 2020, the Department of Science and Technology (DOST) launched a project entitled iFWD PH: Innovations for Filipinos Working Distantly from the Philippines on 28 May 2020 to provide assistance in establishing alternative livelihood projects in their own provinces.

According to the Undersecretary for Regional Operations of the DOST, Brenda L. Nazareth-Manzano, this project “will provide them with opportunities to continue what they have started in their journey to building a good and progressive future for themselves and their families.” The undersecretary also referred to the OFWs as the “modern-day heroes” because of their contribution to the Philippine economy. She also stated that “we at the DOST will be our OFWs’ big sisters and brothers, ready to lend helping hands so that they will be able to realize their dreams here in our country.”

DOST-NCR Regional Director Jose B. Patalinjug III said that the general objective of the DOST’s iFWD PH project is to provide support and opportunities for OFWs and their families to establish technology-based enterprises in the country.

Dir. Patalinjug laid the program framework such that phase 1 will be comprised of capability building and phase 2 will consist of funding support for the establishment of technology-based enterprises.

He also emphasized that part of the program is the provision of and access to technology-based entrepreneurship advisors, technical assistance, use of DOST

facilities, and network and linkages with established SETUP (Small Enterprise Technology Upgrading Program) beneficiaries.

Under the project, returning OFWs may also form groups of five members to form a partnership or corporation, or 15 members to form a cooperative. He also pointed out that the DOST’s goal is to provide opportunities for OFWs to establish technology-based enterprises so they can literally move forward from being quarantined to returning home and building their own livelihood.

Holistic support for the Filipino family

The iFWD PH project will initially start in NCR and will eventually be implemented nationwide. “Considering that the Filipino ‘family’ is part of the iFWD PH program, the OFWs’ family members can be vital in putting up a technology-based enterprise for them. Subsequently, entrepreneurial activities will materialize for the OFWs and their families,” DOST Secretary Fortunato “Boy” de la Peña said on in his remarks during the virtual presser.

Sec. de la Peña enumerated some important components of the said project such as the provision of technology training and technology assistance. He also emphasized that OFWS may already have the capacity and would only need a boost. “*Other OFWs kailangan lang ng briefing. ‘Yong iba may naipon ‘di na kailangan ng financial but technical. ‘Di sapat ang financial. Walang ipon,*” said Sec. de la Peña.

On the other hand, Usec. Edwin Bael representing Secretary Abdullah D. Mama-o of the Office of the Presidential Adviser on Overseas

Filipino Workers (OPA-OFW) welcomed the collaboration of their office and the DOST and said, “*Kapag sinabi mong ikaw ay matatag at matapat, ikaw ay susulong at uunlad,*” just like how our kababayans were described by their employers and co-workmates abroad—determined and dedicated—they will do anything with all their might to live their dreams.

Signing of the Memorandum of Understanding

To seal the partnership of the DOST and OPA-OFW, a memorandum of understanding was signed, with the agreement to commit and collaborate in the provision of support and opportunities to OFWs and their family to own or manage technology-based enterprises, as well as assist and protect their interest and welfare.

During the virtual presser, Sec. de la Peña stressed one of the requirements for the OFW to be eligible to avail of the project, “*Ang pwede lang dito ay technology-based na negosyo—technology ng DOST or other government-funded research output.*”

As to the role and contribution of the OPA-OFW, Usec. Bael said, “Our role is to help DOST network with other agencies and with OFW groups all over the Philippines and even abroad. As to the counterpart funds, *pu-pwede naming umpisahan na makipag-negotiate sa ibang mga bansa, especially sa Middle East na bigyan nila ng parang development assistance to provide for the counterparty sa ating mga approved programs, approved projects dun sa iFWD para matulungan ang mga returned OFWs.*”

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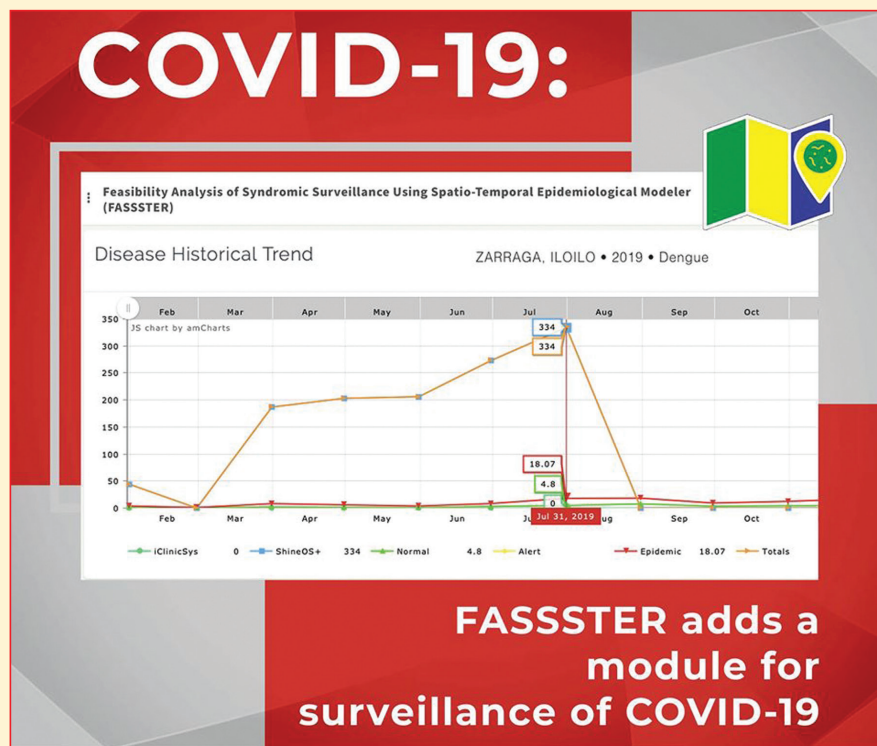
FASSSTER adds a module for surveillance of COVID-19

By Catherine Joy C. Dimailig, DOST-PCHRD

THE FEASIBILITY ANALYSIS of Syndromic Surveillance using Spatio-Temporal Epidemiological Modeler (FASSSTER) will undergo enhancements to create a predictive model for COVID-19 that allows forecasting of possible cases in a given area at a specified period of time. Data generated from this model will support the decision-making of the Department of Health (DOH), local government units, and healthcare facilities in terms of resource planning and other measures to mitigate the spread of the virus.

Developed by Dr. Ma. Regina Justina E. Estuar of Ateneo de Manila University and her team, with support from the Department of Science and Technology's Philippine Council for Health Research and Development (DOST-PCHRD), FASSSTER serves as a hub for different data sources, providing a rich layout of integrated information that facilitates understanding of the spread of diseases.

At the moment, FASSSTER is used for creating predictive models and visualizing possible scenarios of outbreaks of dengue, typhoid fever, and measles, at specified time periods. It uses data from the DOH's Philippine Integrated Disease Surveillance and Response system, electronic medical records, and SMS-based reports of primary care facilities.



FASSSTER adds a module for surveillance of COVID-19

The latest addition to the technology is its TUGON feature, an SMS-based reporting feature that allows staff from rural health units and *barangay* health stations to report cases of dengue, measles, and typhoid fever through text commands.

To date, FASSSTER had been deployed and tested in the DOH-Region VI where 17 rural health units have been trained in the use of the SMS-based reporting system for surveillance of dengue, typhoid fever, and measles.

DOST launches...from previous page 34

Responding to questions from the media, Dir. Patalinjug disclosed that the project is aligned with the DOST's existing programs, "*Isa sa mga ipapakita natin sa programang ito, ipapakilala natin at magse-setup tayo ng mga advisor, mga technology-based entrepreneurship advisors and entrepreneurial advisors kung saan ito'y kinabibilangan ng mga SETUP clients natin. Kukuha tayo sa kanila na tututok, tutulong, maga-advise sa mga newbie OFW entrepreneurs.*"

Dir. Patalinjug added that the Entrepinoy Volunteers Foundation, Inc. will also help the OFWs by

conducting seminars and trainings for them and said, "*pwede silang i-pasok sa supply chain ng SETUP projects (natin).*"

Help on the way

On a final note, Dir. Patalinjug excitedly exclaimed, "*Parating na ang iFWD para sa ating mga OFW... Abangan!*" which Usec. Nazareth-Manzano seconded by saying, "We're ready to FORWARD our assistance."

Usec. Bael reiterated that the DOST and the OPA-OFW are looking forward to the full participation of the returning OFWs because this

technology-based projects are going to serve as multipliers. He said, "*Para ito sa ating pagsulong at pag-unlad, upang makatulong nang husto ang ating bumabalik na manggagawa ay maka-reintegrate sa ating bayan.*"

For his concluding remark, Sec. de la Peña echoed Usec. Bael's statement, "*Ang umunlad ang lahat ng ating rehiyon ang susi sa pag-unlad ng ating bayan.*"

For more information and for all interested returning OFWs, they may send their inquiries via e-mail at ifwdph@ncr.dost.gov.ph addressed to DOST-NCR Regional Director Jose B. Patalinjug III.

DOST-NAST calls for change in local food system amid COVID-19 enhanced community quarantine

By David Matthew C. Gopilan, DOST-STII

NAST AGRICULTURAL SCIENCES DIVISION and **SEARCA** support the **COALITION FOR AGRICULTURE MODERNIZATION OF THE PHILIPPINES** in promoting local food systems during the COVID-19 pandemic



THE LOOMING FOOD CRISIS

Today, the nation is in a state of widespread confusion, fear, and feeling of helplessness in the face of deepening threat from COVID-19. Adding to our worries is the justified sense of food insecurity, caused by disruption in the food system. Farmers are afraid to leave their homes, traders are constrained from delivering farm inputs and buying farm products, retailers have to pass through many checkpoints before they are finally turned away, markets have limited hours and some food items are now scarce. We need an alternative and complementary food system, one that is decentralized, de-industrialized, local. We need to prepare for an extended quarantine; food must be secured.

Establishing this new system requires local action by barangay officials, civic-minded citizens, and individual households. We need to do two things:

- 1) establish a community-based food system: production, distribution, processing, waste recycling; and
- 2) enjoin every household to grow food.

Let us secure inputs at the local level: seeds, fingerlings, mushroom spawns, chicks, feeds, biofertilizers, biopesticides, water, land. This requires community effort led by the barangay government. Among the things they can do:

- 1) requisition/rent vacant lots and farms;
- 2) put up deep wells or other facilities for irrigation;
- 3) establish nurseries for plants, animals, fish; and
- 4) put up biofertilizer and biopesticide production facilities.

With inputs secured, the community can put up food production and processing facilities. Local manpower idled and quarantined in the community can volunteer and/or be paid to help. The able-bodied young adults can do the community farms and fishponds. Seniors can do food processing at home, or provide administrative support such as accounting, auditing, and communications. Young people who are less susceptible to COVID-19 can be utilized to distribute food by foot or on bicycles and motorcycles.



ACCORDINGLY, THERE is “the justified sense of food insecurity, caused by disruption in the food systems” given the “deepening threat from COVID-19”. For one, farmers are afraid to leave their homes. Next, traders could hardly transact with farmers to buy and deliver farm goods. Then, retailers have to go pass through numerous checkpoints, only to be turned away. Lastly, public markets could only open on limited hours only and some food items are now scarce.

Considering this farm-to-fork journey, DOST-NAST sees community-based food system as alternative and complementary source for typical marketgoers.

This community-based food system can be likened to a community farm. In this case, the source of food for communities is no longer centralized to a market, and de-industrialized. A de-industrialized food production means the food products are no longer prepared large-scale, while use of harmful chemicals is reduced or none at all.

DOST-NAST recommended the *barangay* officials, advocates and all households to join community-based food system. The barangay officials can give out seeds, fingerlings, mushroom spawns, chicks, feeds, biofertilizers, and biopesticides. The whole community can also rent vacant lots or farms and put up deep wells for irrigation and nurseries for crops, fish and livestock. The community can also consider establishing a production facility for biofertilizers and biopesticides.

Everyone can participate in maintaining the community farm. Young adults can put up and maintain the farm and fishponds. The seniors can take charge in accounting and auditing, and communications, and do some food processing while at home. The jobless can either volunteer or be paid to help. Others who

are less susceptible to contacting COVID-19 can distribute the food either by foot, bicycle, or motorcycle.

Mentioned in the released statement is that citizens can simply look in the internet for guides and manuals in putting up a community farm or fishery.

Prioritizing the less fortunate households was also mentioned given that they are vulnerable to food insecurity.

The advisory council also recommended that the citizens involved should still comply to guidelines connected to the enhanced community quarantine implemented by LGUs. Examples are social distancing and observing curfew hours.

Lastly, the advisory council said that committed leadership, volunteerism, and civic spirit are key in changing the local food system.

On July 2019, Senators Francis N. Pangilinan and Grace Poe separately filed bills promoting vertical gardening and urban agriculture to address food security and livelihood opportunities. Sen. Pangilinan's bill proposes that the government may use idle or abandoned government lots and buildings to grow crops and raise livestock.

The full released statement of DOST-NAST pertaining to the change in the local food system can be accessed on their Facebook page.

Communities can plant
malunggay and sweet potato
in backyard patches as food
complement.

Let us set up a local food system that is quarantine compliant and waste reducing. Provide passes for vehicles and people delivering farm inputs (fertilizer, pesticides and seeds) and products. Provide guidelines as to when and where retailers can sell food, and provide local cold storage and processing facilities to minimize food waste. Let us share/sell excess food to needy households in neighboring barangays. Recycle food waste into fertilizer.

Support household food production efforts by providing free inputs to those who cannot afford. Production guides are everywhere, in the internet. Pots and discarded containers can be used if they do not have land. The weather is very favorable. There is enough manpower; utilize hours spent simply watching Netflix.

We call on the barangay officials to act NOW. Make a plan, execute the plan. Keep the virus away but keep the people mentally and physically healthy. The plan should not cost much money. But it requires committed leadership, volunteerism, and civic spirit.

We call on the mayors and governors to provide the needed coordination, financial, and moral support for their barangays.

We call on the national government to provide the policy and technical support and immediately release whatever financial support is already programmed for this purpose. Allocate additional funds if possible.

We call on individuals, organizations, and companies to donate funds and volunteer to help their own community establish this new food system, particularly during the initial phase when government funds are slow in coming.

We call on local people to share whatever food production assets they may have to the needy. These may include backyard patches of camote, malunggay, banana, papaya, cassava, tomatoes, onions, pechay, young edible leaves of various trees, seeds, fingerlings, cuttings.

**It is a time that calls for the Bayanihan spirit.
Please listen, survive.**



@nastphi



3rd Level, Philippine Science Heritage Building, DOST Compound, Bicutan, Taguig City

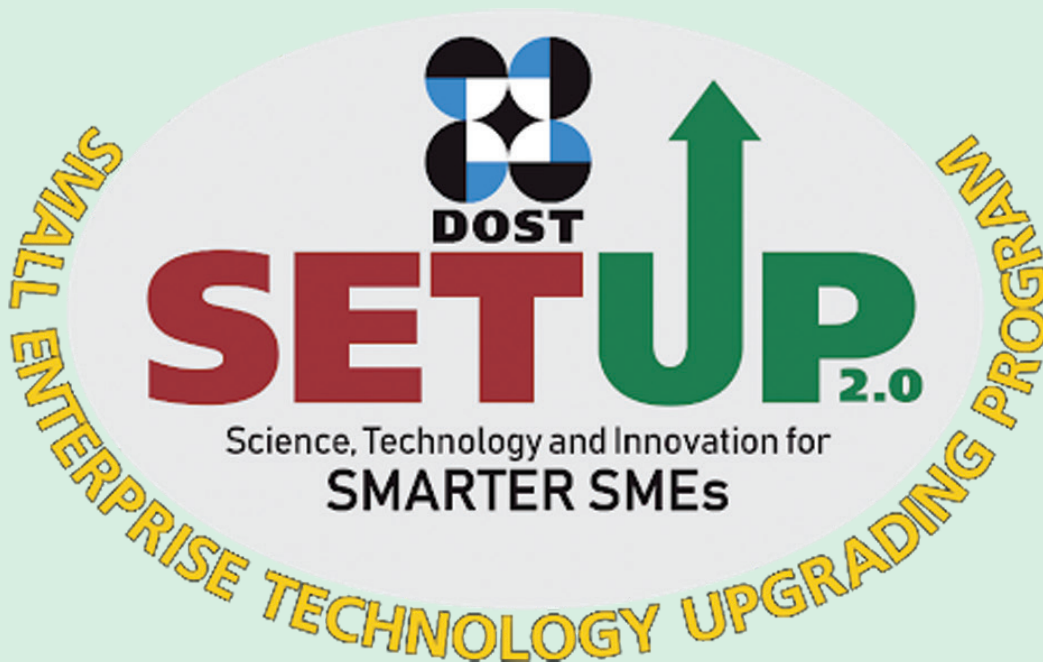


www.nast.ph
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(Photo from worldcrops.org)

DOST conducts nationwide survey of SETUP-assisted MSMEs to develop ECQ-adaptive measures

By DOST-Regional Office



A quick online nationwide survey to determine the situation of DOST-assisted Micro, Small, and Medium Enterprises (MSMEs) amidst the COVID-19 pandemic was conducted by the Department of Science and Technology (DOST) in collaboration with the Office of the Undersecretary for Regional Operations Brenda L. Nazareth-Manzano and the 16 DOST Regional Offices.

The survey was able to collect data that guided the DOST in formulating ECQ-adaptive policies/measures to mitigate the effects of the pandemic, especially the imposition of enhanced community quarantine (ECQ) that affected their businesses.

A total of 2,318 firms assisted under the Department's Small

Enterprise Technology Upgrading Program (SETUP) participated in the survey, providing data that may be used to create industry-specific solutions that are tailor-fit to address the needs of every affected business.

Out of the total firms that responded to the survey, 1,594 or 68.8% said that they have temporarily ceased operations due to the nationwide ECQ. Of the remaining 724 firms that sustained their operations during the ECQ, 413 or 57% earned less than P50,000 during the ECQ, way below during normal operation. Only businesses that provided "basic commodities and services" were the ones allowed to operate during the ECQ.

Initially, the DOST allowed a two-month (March to April 2020) rental deferment to all SETUP proponents

due to the implementation of the ECQ. However, since the survey yielded results showing how distressed most of the MSMEs are during this crisis, the Department issued an additional three-month moratorium on SETUP refund payments, thus extending the moratorium up to July 2020.

"This moratorium is our way of helping our MSMEs to survive this crisis. Most of them have already incurred losses and it is just right that we do not add to the burden they are already carrying," said DOST Secretary Fortunato T. de la Peña.

If you are a SETUP proponent and would like to communicate your business concerns to the DOST, please send your inquiries through email at dostros2016@gmail.com, or contact the nearest DOST office in your region.

DOST MSMEs shift into overdrive to supply calamansi products amid ECQ

By Bon Padayhag, DOST-IX
Photos from DOST-IX

Despite the rising dangers brought about by COVID-19, firms under the Small Enterprise Technology Upgrading Program (SETUP) of the Department of Science and Technology in Region IX continue to produce their calamansi-based products in to guarantee supply of affordable and natural alternatives to Vitamin C.

Zambo Tropical, a SETUP proponent operating in Zamboanga City, maintains 50% of its total production to cater to the provinces of Zamboanga, Basilan, Sulu, Tawi-Tawi (ZamBaSulTa) and Davao weekly.

Zam's Delight, also based in Zamboanga City, is still fully operational amidst the enhanced community quarantine and continues to distribute to different locations as far as Cebu City.

On the other hand, Charles and Charlie Food Products in Zamboanga Sibugay also continues to produce and distribute its ready-to-drink juice in the market.

In Zamboanga del Sur, Del-C reported a 50% production operation but still continues to produce until the raw materials are available considering the municipality's strict implementation of ECQ.

Polyfruits, Inc. in Zamboanga del Norte reported a 70% production level despite constraints on production resources and raw materials.

For more information, please call (062) 991-1024 or text 0927 831 8824 and look for John Apolinario, or email us at dost9info@gmail.com or visit our Facebook page at www.facebook.com/DOSTRegion9





DOST-PCAARRD fights COVID-19 with food innovation

By Noel A. Catibog, DOST-PCAARRD
Photos from Cavite State University Facebook Page

The regular supply of food in the time of enhanced community quarantine (ECQ) because of COVID-19 is very important to ensure that communities will not go hungry as they observe quarantine rules implemented by the local government units.

Realizing that food is a vital lifeline, the Philippine Council for Agriculture, Aquatic and Natural Resources Research and Development of the Department of Science and Technology (DOST-PCAARRD) heeded the call to help in providing food and non-food products in COVID-19 affected communities, hospitals, and health facilities in the country.

Assorted food products, valued at roughly Php 1.1 M, will be produced under the National Agri-Aqua Technology Business Incubation (ATBI) and the Science for the Convergence of Agriculture and Tourism (SciCAT) Programs of DOST-PCAARRD.

With a value of Php840,000, the ATBI program's startup incubatees were able to produce upland and lowland vegetables, mushroom products, herbal teas, turmeric tea, different natural juices and concentrates, peanut butter, poultry and goat [canned chevon] products, herbal plants seedlings, laundry detergents, liquid disinfectants, and handwashes, among others.

Papaya for life. DOST-PCAARRD collaborates with the Cavite State University (CvSU) under the SciCAT Program to help frontliners access nutritious food like fruits and vegetables as they continue to fight COVID-19. DOST-PCAARRD staff recently turned over papaya fruits to the General Emilio Aguinaldo Memorial Hospital. CvSU, on the other hand, also provided vegetables harvested from their Techno-Demo Farm that were planted by students living in the dormitories. (Text by Rodolfo P. de Guzman, DOST-STII)

The products were outputs of technical trainings and trial runs by the incubatees that were originally intended for product testing and market validation but had been on hold due to the ECQ.

The ATBI program's partner-agencies include the following: Benguet State University, Central Luzon State University, Isabela State University, and Laguna State Polytechnic University in Luzon;



COVID-19 frontliners get food assistance from the DOST-PCAARRD in collaboration with the CvSU, local government units, state universities and colleges, and other stakeholders from the agency's consortia. (Text by Rodolfo P. de Guzman, DOST-STII)

Capiz State University in the Visayas; and Central Mindanao University and Sultan Kudarat State University in Mindanao. These educational institutions will provide the assistance to communities and frontline hospitals near their areas in close coordination with the respective local government units.

For the SciCAT program, the partner-agencies and cooperating farm tourism sites include the following: Cavite State University (for Silan Agri Farm); DOST-X (for Bukidnon and Mt. Kitanglad Agri-Tourism Farm); and the University of Southeastern Philippines (for Dimpas Greentegrated Farm).

Said cooperators of tourism sites have offered various farm products

like organic rice, papaya, squash, sweet bell pepper, sweet potato, pinakbet vegetables, and duck eggs. The products, valued at Php260,000, were produced using DOST-PCAARRD practical technologies in their respective demonstration farms within the tourism sites suitable for growing said agricultural produce.

PCAARRD is one of the sectoral councils of the DOST mandated to formulate policies, plans, and programs for science and technology-based research and development in the different sectors under its concern. It also coordinates, evaluates, and monitors the national R&D efforts in the agriculture, aquatic, and natural resources sector. It also allocates government and external funds for

R&D and generates resources to support its program.

The other two sectoral councils are the Philippine Council for Industry, Energy and Emerging Technology Research and Development and the Philippine Council for Health Research and Development. Both councils are also actively pursuing different R&D initiatives to combat COVID-19 like the production of COVID-19 test kits (in collaboration with the UP National Institutes of Health and Manila HealthTek Inc.), face shields, contact tracing apps, and studies on virgin coconut oil to treat the disease, to name a few.

It is not just about the food inside the bags. It is about the spirit and the love that goes in them as well. NVC volunteers stuffing 7,800 servings of Mingo Meals into the bags of more than three tons of farmers' crop before going to 520 households in Negros Occidental.



The Feeding Force Project

By DOST-VI
Photos from NVC

As the Enhanced Community Quarantine has been extended in most parts of the region, the social and economic structures of the country cannot absorb months-long quarantine; otherwise, there will be serious problems on poverty, famine, law and order, among others. True to its mission to fight hunger and poverty by providing proper nutrition for the poor, the Negrense Volunteers for Change (NVC) Foundation spearheaded the donation of food packs for hundreds of households and Mingo meals for the poor children in some areas in Negros Occidental.

The NVC donated food packs (meal bags) for hundreds of households with Mingo meals for the poor children in Negros Occidental through its “The Feeding Force Project.” NVC has 240 kitchens preparing food.

NVC has produced a total of 361,783 packs of Mingo meals (complementary food) for children in response to the COVID-19 crisis. Mingo uses the complementary food technology developed by DOST-FNRI.

As emergency relief assistance, NVC believes that Mingo meals would provide optimum nutritional support for children whose access to proper

food and nutrition is compromised. The project also includes the distribution of Mingo meals and meal bags to the other constituents through the Provincial Government of Negros Occidental. The generous donations even reached the different barangays of Iloilo City and Metro Manila.

Originally intended for kids, adults now discovered that Mingo meals in their food bags can also be a delicious and nutritious beverage. It’s “4-in-1” they call it, because they get a good share of rice, mungo, malunggay and a choice of chocolate, squash, or ube. It can be a healthy alternative to coffee.



A recipient of food bag from NVC Foundation enjoying Mingo as a healthy alternative to coffee.

In addition to Mingo meals, NVC Foundation has also started producing PPEs for health workers. As of 29 April 2020 or 40 days after they started producing PPEs, NVC was able to produce and deliver 7,184 face shields and 11,323 hospital gowns to various hospitals and healthcare facilities in Negros Occidental with the help of donors and volunteers.

The NVC Foundation was established in 2010 and was able to put up their FDA licensed complementary food production plant in 2011 with the technology and technical assistance from DOST VI and DOST-FNRI. Their plant is capable of producing 19,500 Mingo sachets (20 g each) per batch of operation. To date, NVC has provided over 10 million Mingo meals, a nutritious instant complementary food for infants and toddlers among children of the poor needing nutritional support. Because of its convenience



and nutritional value, Mingo has also gained popularity as emergency food in disaster relief operations.

With the Double Screw Extruder and Vacuum Fryer Machine availed through DOST-Small Enterprise Technology Upgrading Program – Innovation Enabling Fund, NVC will be able to produce more than double

of their current capacity and they can also develop more nutritious products for the public.

The NVC Foundation is accepting donations to fund their activities in response to the COVID-19 crisis through <https://www.nvcfoundation-ph.org/covid-19/>.



Health workers at the Bacolod City Health's Lying-in Clinic wearing PPEs donated by NVC Foundation.

STEM learning through radio and online in the post-ECQ period

By Geraldine Bulaon-Ducusin, *DOST-STII*

Prior to the SARS-CoV-2 virus and Extended Community Quarantine (ECQ) period, some students in the provinces get to appreciate science because of the Science Explorer and nuLab buses of the Science Education Institute of the Department of Science and Technology (DOST-SEI). These facilities bring science and laboratory experiences to the students in different parts of the country. However, with the current situation where mobility is limited and social distance needs to be observed, these buses will have to park temporarily. But this does not mean that students' learning will also have to stop.

Natural disasters and recently even public health crises have brought all educational activities to almost a complete halt, with most schools compressing the academic curricula to take home assignments, readings, and home-based activities. Children are left to the guidance of their parents, doing written activities using workbooks/worksheets, or for urban schools, to the technology of online teaching and learning. These frequent disruptions in the formal schooling of K-12 students greatly impede the learning of basic concepts necessary in building a strong foundation for higher education.

"Learning the basics in science, technology, engineering, and mathematics or STEM at the pre-secondary level is considered foundational in that it serves as the pillars for processing more complex concepts in later years of education," says Dr. Josette Biyo, Director of DOST-SEI.

To ensure that the students' learning will not be hampered by the current national health situation, DOST-SEI is developing supplemental education resources that will enable the students and teachers to enrich

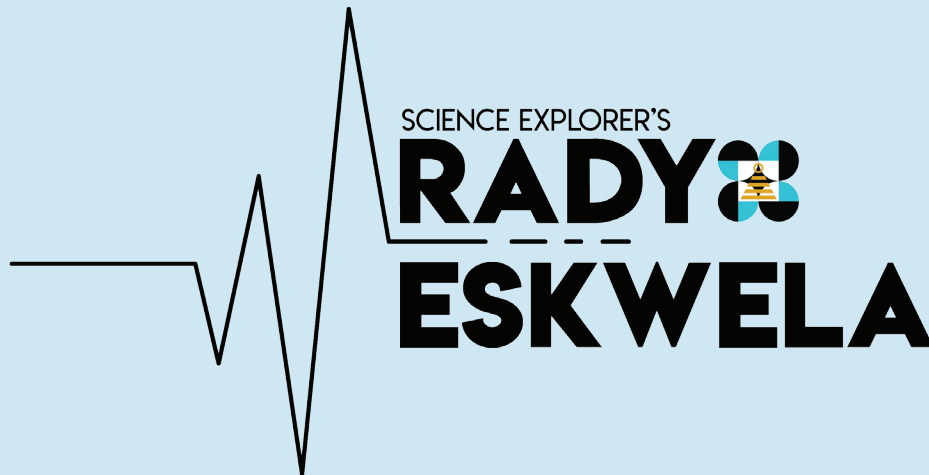
their STEM learning even when they're outside the confines of their classrooms and in effect promote STEM careers.

This school year, elementary students, especially in the remote areas of the country that do not have a reliable internet connection, and high school students who have access to the internet, will be able to learn the sciences even when they're at home.

DOST-SEI will be collaborating with the Department of Education (DepEd) to enhance STEM learning for elementary students through their RadyoEskwela sa Siyensya and for high school students through *TuklaSiyensya sa Eskwela* programs. These programs will be on the roll in

materials. Online learning may be feasible to students in the urban areas, but this is not the case for the students in many disadvantaged areas in the country who do not have access to reliable internet connection at home, and whose family may not own tablets, laptops, or computers. For these school population, information comes from the radio, which is considered to be the second most-used media, reaching 85% of Philippine households, according to the Philippine Statistics Authority data.

Communities with no access to internet, television, and mobile communication have been relying on radio for information. The basic yet pervasive mass-based channels and



time for the opening of classes this school year.

RadyoEskwela for elementary students

Why "balik radyo?"

Radio remains as the most accessible medium in the rural areas. It has proven to be an effective educational channel in the past when used in combination with classroom learning and/or printed learning

approaches again become useful in the delivery of science education for school age children in the countryside.

This school year, grade school students can listen to RadyoEskwela sa Siyensya, a radio program which will feature story-based science lessons to be aired by a network of community radio, which will be the media partner of DOST-SEI in implementing this project for the students. RadyoEskwela consists of twenty (20) 30-minute episodes that are story-based and

produced for early, primary, and intermediate clustered grade levels. The episodes may be replayed by regional stations and offered to the DepEd as learning resources for students who will be in distance learning mode anytime during the school year.

The teachers will also be provided with Teacher's Guide to help them in integrating the episodes in their daily lessons. These may be downloaded from the SEI website and will also be accessible through the DOST regional offices and Provincial S&T Centers.

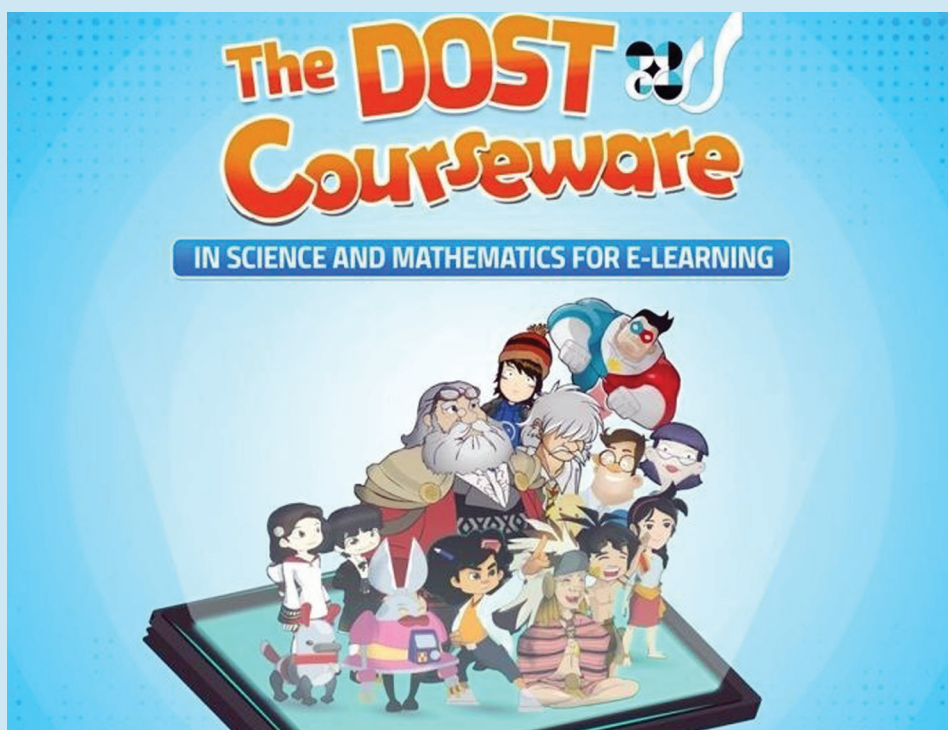
Some of the topics for the RadyoEskwela include Mikrobyo, Lutang, Insekto, Pagsukat, Tala, Street Food, and Tubig.

TuklasSiyensya sa Eskwela for junior and senior high school students

TuklasSiyensya is designed as both a supplement to the traditional learning method for junior and senior high school students and STEM career promotions package. The modules are designed to help students adapt to the "new normal" and ensure their continuous learning amidst the post-ECQ. Online modules will be produced using the facilities available at the nuLab and based on the existing modules developed by young scientists and scholars who will also serve as facilitators. It will feature engaging presentations by the scientist-facilitators, process demonstrations, animations, and post viewing activities to enrich student's learning experience and inspire them to explore natural phenomenon or know more about a particular STEM discipline.

Results of project evaluation reveal how the scientists who facilitate nuLab and Science Explorer modules are able to influence the participants in their choice of future careers in the STEM fields.

TuklasSyensya will produce 15 science lessons, each running for 30-45 minutes. These lessons will be uploaded to an online platform, making it available for access to formal and informal learners anytime.



Topics include aerospace engineering, geological hazards, oceanography, nanotechnology, among others.

The other good thing about this project is that, not only are the students' learning enriched, but that the teachers also get to learn enhance their teaching skills because they will be provided with 15 Teachers Guide to be published online by DOST-SEI or reproduced as low-cost printed materials by DOST Regional Offices. Both teachers and students learn from adapting to this online platform.

The country may have been caught unaware by the COVID virus, and it is not certain until when some areas will remain in quarantine, but what is certain is that the earlier initiatives in the area of S&T education is built on a solid ground, strong enough that other initiatives can be developed on top of it. RadyoEskwela and TuklasSyensya are paving the way for students and teachers to not just cope, but creatively adapt to the "new normal."

DOST's science high joins fight against COVID-19 with PisaYuda outreach program

By Jasmin Joyce P. Sevilla, DOST-STII

“Ayuda” is the Filipino word that means “help” and with the continued threats of COVID-19 in the country, the Department of Science and Technology’s Philippine Science High School (PSHS) system responded to the government’s call for bayanihan as it launched “PisaYuda: Siyensya para sa Bayan.”

PisaYuda is an outreach program of PSHS system that aims to help frontliners, health workers, and communities who are in need of personal protective equipment (PPE) and relief goods to continue the battle against this deadly virus.

True to its core value of “commitment to service”, all of its 16 campuses composed of faculty members, administrators, alumni, students and their parents joined forces at a time “when kindness and unity are needed the most.”

To date, the PisaYuda outreach program was able to provide 16,316 face masks; 23,673 face shields; 1,291 ear savers; 86 aerosol boxes; 927 liters of alcohol; and 1,914 liters of disinfectant to health workers, police officers, and other frontliners in their immediate communities.

Moreover, five employees from the PSHS system volunteered to assist in the Mega Swabbing Center at the Philippine Arena. Aside from this, PSHS system donated 9,945 food packs; 30 sacks of rice; and PhP 539,490 worth of groceries to different beneficiaries across the country.

‘PisaYuda: Syensya para sa Bayan’

The PisaYuda outreach program did more than just relief goods donations. As a science institution, the PSHS campuses used science and technology to their advantage in order to give and to serve the country better.



Benito A. Baje (left) and Gencianus Alphonsus Retardo (right), research assistants from PSHS-CVC show the sample face shield they produced using their 3D printer. The PSHS-CVC is just one of the 16 PSHS campuses that extended a helping hand in producing face shields for frontliners as part of the PisaYuda outreach program. (Photo from PSHS-CVC)

The PSHS system was also able to install sanitation tents and wash basins, that they fabricated as well. In addition, PSHS faculty members and staff collaborated to provide face shields to medical frontliners and security officers using the 3D printers and laser cutters in its 16 campuses.

“Considering that none of the doctors in Argao Hospital in Cebu has PPE, we started designing and mass printing upon the approval of Campus Director Rachel Luz Rica,” said Benito A. Baje, Physics Unit coordinator at the PSHS-Central Visayas Campus (CVC) as he shared their efforts to provide PPEs in their region.

PSHS also ramped up their information campaign by giving out flyers and posters and providing tele-counseling services (psychological service provided through telephone) led by PSHS’ guidance counselors, and online sessions on different topics, which were provided to medical frontliners and other beneficiaries.

The PSHS campuses across the country worked together in lending their facilities and equipment to hasten the country’s efforts of combating COVID-19.

The PSHS-Main Campus in Quezon City and PSHS-Ilocos Campus lent their gym and housing facility, respectively, to house suspected and probable cases of COVID-19 and also provided free shelter for health workers.

“We are in the midst of a health crisis that is possibly the worst in our history, and allowing a part of the campus to be used by Philippine Children’s Medical Center is our way of contributing to the fight against COVID-19,” PSHS-Main Campus Director Lawrence Madriaga said in his statement from the Philippine News Agency.

On the other hand, the PSHS-Eastern Visayas Campus lent their PCR (polymerase chain reaction) equipment to assist in the COVID-19 testing in the region. They also assigned one of their faculty members to operate the machine at the regional office of the Department of Health in Region VIII. On the other hand, two certified bio-safety officers from the PSHS-Western Visayas Campus joined in the training and setting up of COVID-19 testing centers in Iloilo City, Negros, and other areas in Region VI.

To aid in the COVID-19 testing in Mindanao, the PSHS-Southern Mindanao Campus lent their drying oven machine to the Philippine Genome Center housed at the University of the Philippines Mindanao. The drying oven can be used to sterilize and disinfect medical equipment or PPEs to ensure the safety of health workers in the testing centers.

As the country continues its battle with COVID-19, the PSHS system, through the PisaYuda outreach program, will also continue its efforts in helping frontliners and affected communities by using technology and innovation to bring science to the people. (Information from PSHS-Office of the Executive Director)

Beat COVID 19 with the new DOST app DOST mobile app puts science at your fingertips

By Allan Mauro V. Marfal, DOST-STII

Starting 08 April 2020, the Department of Science and Technology (DOST) mobile app will be available for download in Google Play with Android and soon in iOS.

“At DOST, our goal is to provide a friendly, responsive and mobile-friendly access to science, technology, and innovation services, programs, projects, events, and information available to the public,” said DOST Secretary Fortunato T. dela Peña. “As our fellow Filipinos battle the effects of the coronavirus disease 2019 or COVID- 19, our mobile app would help in informing the public about the efforts of DOST and the entire scientific community against this pandemic.”

Appropriately named the DOST: Science for the People app, users will get a 24/7 access to all information about the different services, research and development (R&D) projects, programs, and knowledge products. The app will also give access to COVID 19 related efforts of DOST such as the development and production of the COVID-19 test kits and the quick response efforts by DOST agencies through production and distribution of face shields, improvised personal protective equipment (PPE), disinfecting solutions, and food packs. Users will also be informed about the RxBox developed by Filipino researchers from the University of the Philippines (UP) Manila and UP Diliman, with support from DOST-Philippine Council on Health Research and Development (DOST-PCHRD). The RxBox is a biomedical device capable of measuring a patient’s temperature, blood pressure, heart rate, oxygen saturation, uterine contractions, and electrocardiogram readings. There is also available information about DOST-PCHRD’s clinical trials on virgin coconut oil’s potential to possess antiviral properties against COVID-19.



“Our DOST Agencies and Regional offices have been very active in distributing PPEs such as face shields, reusable face masks, and disinfecting solutions to the country’s front liners,” says Secretary de la Peña. “Some of the PPEs were improved by DOST technology such as face masks that can repel liquid and ready-to-eat food packs formulated by certified nutritionists.”

The app was generated through the partnership of the DOST with Bizooku Philippines Inc., which will give DOST an additional platform for media engagement. The Bizooku Philippines Inc. generates applications and works with clients to organize and manage available information for a meaningful user experience. The generated application provides real-time design and content updates, making it ideal for community engagement.

The DOST app features the “Our Fight Against COVID-19” as the landing image, with buttons available for news, infomercials, and the call for donations activities. As the user swipes up the app, frontline services such as scholarships and application for funding opportunities may be viewed. For easier user experience, the main menu contains categories that will be helpful to the user. The

“Be Cool” button contains the latest technologies produced by R&D. The “Be Healthy” button contains health and nutrition technologies produced by Filipino health researchers and nutritionists. The “Be Innovative” button are R&D technologies that can be adopted by industry members. The “Be Upscale” button contains funding opportunities available to academe and industry members. The “Be Safe” includes latest announcements and updates from DOST-Philippine Institute of Volcanology and Seismology (PHIVOLCS) and DOST-Philippine Atmospheric, Geophysical and Astronomical Services Administration (PAGASA). Lastly, the “Be Smart” Button contains more information about scholarships and technologies related to youth and education.

At the bottom of the app, a news button is available that contains the latest programs, projects, events, and activities of DOST.

“Optimizing the use of technology and communication is a key component in bringing science to the people,” said Secretary de la Peña. “Through the DOST app, we can develop highly personalized features in the app to ensure better user engagement and an enhanced user experience.”

DOST-NRCP Vice President Dr. Raul V. Destura, the Scientist behind the First Local COVID-19 Testing Kit

By Maria Elena A. Talingdan, DOST-NRCP

"AS A clinician-scientist, I continuously try to narrow down the gap between Basic Science, Medical Science, Biotechnology, and Community Service by forging strong collaboration among disciplines to reach focused goal. My research bench to community approach is ultimately geared towards developing low-cost technologies for the control of infectious diseases in the Philippines and the generation of new knowledge to find sustainable and equitable solutions to disease of poverty" – Dr. Raul V. Destura.

On 1 April 2020, the banner story of the day that reverberated across social media, print, radio, and television broadcast was the Food and Drug Administration (FDA) Advisory No. 2020-513 titled, "Approving the First Locally Manufactured Test Kit for COVID-19 for Commercial Use." It was a "just-in-time" scenario for the Philippines when it badly needed test kits for COVID-19 cases." It is a much-awaited result of research and development (R&D) that was conducted immediately when the COVID-19 startled the whole world in January 2020. This completely upholds the mantra of the Department of Science and Technology, "R&D making change happen".

The test kit was previously approved by the FDA for field trial with gene sequencing on 10 March 2020. Upon the submission of necessary requirements, the FDA issued a certification for the COVID-19 test kit to be allowed for commercial use.

The FDA Advisory confirmed that this is the first locally made polymerase chain reaction (PCR)-based COVID-19 test kit approved by the FDA, which was developed in collaboration with the University of the Philippines-National Institutes of Health (UP-NIH), funded by the Department of Science and Technology (DOST).

In another milestone, DOST also supported the Manila HealthTek Inc., the spinoff company established by Dr. Raul V. Destura, that will produce the COVID-19 test kits. Manila HealthTek, Inc. reported that the first batch of reagents has arrived, which will enable them to start the manufacturing process to create testing kits that can



Dr. Raul V. Destura stressing a point during the mid-year review of the DOST-NRCP National Integrated Basic Research Agenda (NIBRA). (Photo from DOST-NRCP). (Source: <http://nih.upm.edu.ph/content/destura-raul-v>)

accommodate up to 120,000 tests. A certain number of testing kits that can do up to 26,000 tests will be prioritized by the DOST for field implementation and distribution to the Philippine General Hospital, Makati Medical Center, The Medical City, Vicente Sotto Memorial Medical Center, Southern Philippines Medical Center, and Baguio General Hospital.

From 4-25 April, there had been a field implementation for the 26,000 tests funded under the DOST and UP-NIH project.

The remaining testing kits good for around 94,000 tests will be sold commercially by Manila HealthTek, Inc. at around PhP 1,300 per kit, which is cheaper than the units currently being used in hospitals, which cost about PhP 8,000. The Manila HealthTek, Inc. said they have enough orders from the private

sector individuals who intend to donate them in turn to the Department of Health (DOH) and hospitals.

Dr. Destura in the mainstream of infectious diseases

A Presidential Lingkod Bayan 2019 Awardee, Dr. Raul V. Destura is a known scientist and molecular microbiologist who is also responsible for developing local and less-costly diagnostic kits for rapid detection of the most dreaded infectious diseases such as dengue, hepatitis, and tuberculosis. Notable of these is the Biotek-M, a rapid test kit for dengue that is projected to be more affordable especially among average Filipino families that may not be able to afford the existing and

WHO'S WHO?

sensitive yet more expensive PCR technology. This new technology is hoped to advance the diagnostic capability of the hospitals for better management of the dengue disease. Biotek-M is currently being rolled out to three government hospitals, namely Rizal Medical Center, the National Children's Hospital, and the Philippine Children's Medical Center for field testing.

Dr. Destura's versatility is exhibited by the establishment of two world-class molecular biology laboratories, the Molecular Biology

the University of the Philippines' Research Productivity Award in 2011; The Outstanding Young Men (TOYM) of the Philippines award in 2011; Gawad Agham 2015; Outstanding Alumni in Microbiology of the University of Santo Tomas; the 2015 Outstanding Alumni in Medicine of the De La Salle University and the prestigious 2015 Dr. Jose Rizal Memorial Award in Research given by the Philippine Medical Association.

At the DOST-National Research Council

The NRCP stands by the government efforts to sustain its immunization programs as we strongly urge the public to pay attention to the knowledge claim of scientists on the beneficial effects of immunization".

On 7 March 2020, while in the midst of isolation for his research work on the COVID-19 test kits, he was consulted by DOST-NRCP President Dr. Ramon A. Razal when the Department of Health raised Red Code Alert on COVID-19 on 7 March 2020. Because



and Biotechnology Research Laboratory at the UP NIH and the Clinical Molecular Diagnostic Laboratory of the Medical City.

He is also a recipient of several prestigious national and international awards for his innovative research and leadership in the field of research and clinical molecular biology. First is the Gold Medal given during the International Exhibition of Inventions of Geneva (Salon International Des Inventions Geneve), Geneva, Switzerland in April 2018. Then, Dr. Destura got the International Training and Research in Emerging Infectious Diseases Research Fellowship Award from the Center for Global Health Division of Infectious Disease and International Health from the University of Virginia. Further, he was a recipient of the Bill and Melinda Gates Travel Scholarship for 2005 Keystone Symposia.

At the home front, Dr. Destura also garnered several awards: the Outstanding Young Scientist of the Philippines in 2008;

of the Philippines (NRCP), Dr. Destura was named the 2015 Dr. Eusebio Y. Garcia awardee. The recognition is given annually to Filipino scientists in recognition of their outstanding research contributions in the fields of Molecular Biology and Molecular Pathology. The award was founded by Dr. Eusebio Y. Garcia in 1985 to encourage more researchers to venture into this field and also to recognize the groundbreaking researches made by the Filipinos in the said field.

In June 2018, immunization became a hot topic in the Philippines primarily because of the Dengvaxia scare. In the midst of the controversy, the DOST-NRCP made a categorical pronouncement on the importance of vaccines. The DOST-NRCP statement crafted by Dr. Destura stated that "Scientific evidence has clearly demonstrated that vaccines have dramatically eradicated small pox and polio and have greatly reduced child mortality in the Philippines and in many parts of the world.

of this, DOST-NRCP's biggest annual event that was to be held on 9 March 2020 – The Annual Scientific Conference and 87th General Assembly at the PICC, Manila – was cancelled, with the anticipated 1,200 participants from all over the country.

Dr. Destura recommended for the postponement of the activity in view of the already escalating curve of COVID-19 transmission globally. It was a bold and unpopular decision at that time but Dr. Razal, upon consultation with the DOST-NRCP Governing Board and the expert advice of Dr. Raul V. Destura, finally announced the postponement of the DOST-NRCP annual event. Eventually, the decision became the Council's contribution to the national efforts to prevent the risk of further local or community transmission of COVID-19.

DOST-NRCP Humanities Chair and renowned Cebuano Writer bags 2020 Gawad Balagtas Award

By Jenny Leigh Daquioag, DOST-NRCP

Photos from DOST-NRCP

DR. HOPE Sabanpan-Yu, Governing Board and Department of Science and Technology-National Research Council of the Philippines (DOST-NRCP) Chair of Division of Humanities, was named as one of the 11 recipients of the “2020 Gawad Pambansang Alagad ni Balagtas” (Gawad Balagtas).

The Gawad Balagtas is a lifetime Achievement Award for a Filipino writer given by the *Unyon ng mga Manunulat sa Pilipinas* (UMPIL) or Writers Union of the Philippines.

Launched in 1988, Gawad Balagtas awardees will receive a citation and a sculpted hardwood trophy by world renowned Filipino artist, Manuel Baldemor.

Dr. Yu is being honored for her works in Fiction, Essay, and Translation in Cebuano.

The awarding ceremony that was originally scheduled on 25 April 2020 was postponed indefinitely because of the declaration of the enhanced community quarantine due to the COVID-19 pandemic. The schedule and venue of the awarding will be announced on a later date.

Dr. Yu is an advocate for the promotion and preservation of the Cebuano culture and heritage. She led the DOST-NRCP-funded research project on the compilation of extant Cebuano songs with music transcription and analysis. The results of her project have been

translated into a policy brief on the preservation of the country's most intangible heritage—music—for possible use by policymakers, students and those in the culture and arts sector.

“If at present we know only bits and pieces of what are expressive of our collective community as Visayans, then it matters very much that we begin the collection, documentation, music transcription/notation, and possibly provision of the historical background and analysis of what makes Visayan song distinctive and expressive of the Visayan spirit,” Dr. Yu said when she presented the results of her project during the NRCP Policy Forum on Valuing Music Heritage as Learning, Entertaining, and Sustainable Resources on 20 November 2019 at the University of San Carlos (USC), Cebu City.

Dr. Hope Sabanpan-Yu shares the results of her research on valuing musical heritage during the DOST-NRCP Visayas Policy Forum on Valuing Music Heritage as Learning, Entertaining, and Sustainable Resources on 20 November 2019 at the USC, Cebu City.

Dr. Yu has authored various books. Among of these are: *Beads* (2002), *Things to Take on a Journey* (2004), *Women's Common Destiny: Maternal Representations in the Serialized Cebuano Fiction of Hilda Montaire* and



Austregelina Espina-Moore (2009), *Paglaum*, (2000), *Small Wonder* (2010), *Institutionalizing Motherhood in Cebuano Literature* (2011), *Bridging Cultures: The Migrant Philippine Woman in the Works of Jessica Hagedorn, Fatima Lim-Wilson and Sophia Romero* (2011), and *Kulokabilido: Dialogues with Cebuano Writers*.

Currently, she is the Director of the USC Cebuano Studies Center. She earned her doctorate degree in Comparative Literature from the University of the Philippines Diliman and her Master of Arts in English from the University of Calgary.

The other recipients of the 2020 Balagtas Award are Fray Paolo Diosdao Casurao (*Play in Waray*), Crisanta Nelmidia Flores (*Literacy Criticism in Filipino*), Eric Gamalinda (*Poetry and Fiction in English*), Marra PL. Lanot (*Poetry and Essay in English*), Priscelina Legasto (*Literacy Criticism in English*), Glenn Sevilla Mas (*Play in English*), Jose Javier Reyes (*Screenplay*), Augie Rivera (*Children's Literature in English*), and Aida Santos (*Poetry in Filipino*).

The Executive Board of UMPIL is composed of Michael Corozza as chairperson, Susan Lara as vice chairperson, John Iremito as secretary-general, Louie Jon Sanchez as treasurer; Aldrin Pentero as auditor; Romulo Baquiran, Jr., Karina Bolasco, Celina Cristobal, Marne Kilates, Joey Tabula, and John Enrico Torralbo as members; and John Bengan, Dulce Maria Deriada, Grace Chong, Joaquin Sy, and Ariel Tabag as sectoral representatives.



DOST-PCHRD Scholar is country's finalist to the ASEAN-US Science Prize for Women 2020

By Jwynne Gwyneth Macan, DOST-PCHRD

THE ASSOCIATION of Southeast Asian Nations (ASEAN), in collaboration with the United States Government and the Underwriters Laboratories, announced Dr. Maria Ruth Pineda-Cortel of the University of Santo Tomas (UST) as the country's finalist for the annual Science Prize for Women last April 27.

Dr. Pineda-Cortel, a Department of Science and Technology - Philippine Council for Health Research and Development (DOST-PCHRD) scholar, was chosen as finalist for her project on gestational diabetes.

Conducted with support from DOST-PCHRD together with nine graduate students from UST, Dr. Pineda-Cortel's project entitled, "Blood and placental gene expression in gestational diabetes mellitus: potential identification of early biomarkers" aims to identify biomarkers that can be predictive of gestational diabetes mellitus (GDM) or glucose intolerance during pregnancy.

"I am hopeful for a healthcare system that prioritizes preventive healthcare for pregnant women," Dr. Pineda-Cortel says. "Although GDM is a transient condition, it has long term effects on both the mother and the baby, such as the future development of type 2 diabetes mellitus and risk of obesity," she added.

The disease can cause complications during pregnancy that may lead to premature birth, high blood pressure, low blood sugar, diabetes, or in worst-case scenarios, stillbirth. Studying potential biomarkers of GDM will help identify those who are at risk earlier, and in turn contribute to the development of strategies that may improve health and maternal pregnancy. The project was participated by pregnant women in different tertiary hospitals and private clinics in Metro Manila.

"Dr. Pineda-Cortel's project is an example of how we utilize OMIC technologies for health to advance health research for the development of targeted diagnostics, which may contribute to better healthcare solutions in the country, particularly in improving Filipino maternal health," DOST-PCHRD Executive Director Jaime Montoya says.

Along with other national finalists from Brunei Darussalam, Cambodia, Indonesia,

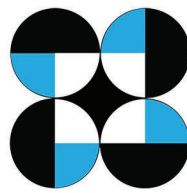


*Dr. Maria Ruth Pineda-Cortel.
(Photo from www.aseanfoundation.org)*

Lao PDR, Malaysia, Myanmar, Singapore, Thailand, and Vietnam, Dr. Pineda-Cortel's project on GDM will be evaluated for the selection of two regional finalists for the pitch competition in Lao PDR in June 2020.

The annual ASEAN-US Science Prize for Women seeks to recognize exceptional women who are engaged in research or are promoting activities related to preventive healthcare in the region and who are role models for other women working in and pursuing careers in science, technology, engineering, and math fields.





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PJS impact factor jumps 562%

The **Philippine Journal of Science** grew by a whopping 562.6% or 0.530 in its Journal Impact Factor (JIF) which refers to the number of citations its articles received at a given time. the 114-year Journal's dramatic JIF increase levelled up its importance in the academic circle.

The journal is published quarterly through the guidance of its editorial board led by Acd Caesar Saloma of UP. The publication is managed by **DOST-STII**.



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