



# MMSU Chronicle

GATEWAY TO INFORMATION AND TRANSPARENCY

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**Let's ACHIEVE!**

By SHIRLEY C. AGRUPIS

**“Enhance our values & strengthen our characters as we move forward.”**

**F**irst, I would like to thank and commend the committee tasked to come up with the Mental Health and Values Formation activities. Despite the limited time and the overlapping activities, you managed to come up with innovative ways for us to appreciate the value of mental health and more importantly, put up a program that will allow everyone – regardless of rank, position, or tenure – to reflect and enhance our values as we move forward as one University, as one family.

And indeed, together, we have achieved so much over the years that we focused on building a premier University. We so proudly wear our QS STARS Rating and ISO Certification because together, we have worked hard for these. In the last few months, despite the COVID-19 pandemic, we remained resilient and efficient in our operations; in fact, we were awarded by the Civil Service Commission for our concerted effort in providing assistance to the community.

All these achievements would not have been possible without the hard work and support of everyone. As I always emphasize: *higit sa labat, tao.* These achievements would mean nothing if they are not centered on the upliftment of people's lives. We want to create an MMSU for the people. It is for this reason that we serve our students to the best we can through

instruction. It is for the community that we conduct research and extension; and engage in resource-generation to augment livelihood for the people. These are all embedded in our core values: KIPS: Knowledge, Inclusiveness, Professionalism, Spirituality, and Social Responsibility.

Ours is not merely a job to do, but a service for others.

I am proud to say that the MMSU family is a family of quality service. I am touched by the dedication and sacrifice you have consistently shown. Yet, as we serve others, let us not forget ourselves. When we say, *'higit sa labat, tao,'* we must remember that our most important resources in the University are not our vast landholdings, not infrastructures, not computers or machines – but our people. YOU – your values and behaviors - are the most important assets of the University. And because you bring value to MMSU, it is important that we let you realize how much you are valued.

It is for this reason that we thought of the Mental Health and Values Formation Week as a way to help us enhance our values and strengthen our characters. And we can only do this if we are mentally and physically invigorated. Given the volume of work, we deal with stress from day to day; some are more stressed than others, but stressed just the same. This impacts our productivity and more importantly, our physical and mental health. We don't want to lose a colleague to burnout or depression; at the end of each day, we want everyone to return home to their families - happy and

fulfilled; and come back the following day with fresh energy and enthusiasm to start another work day.

***Hinto. Hinga. Hangad.***

Three words that will show us the way. ***Hinto. Hinga.*** We take a break every once in a while to recharge and refresh, But as we take a break, we also take this opportunity to dream and re-focus.

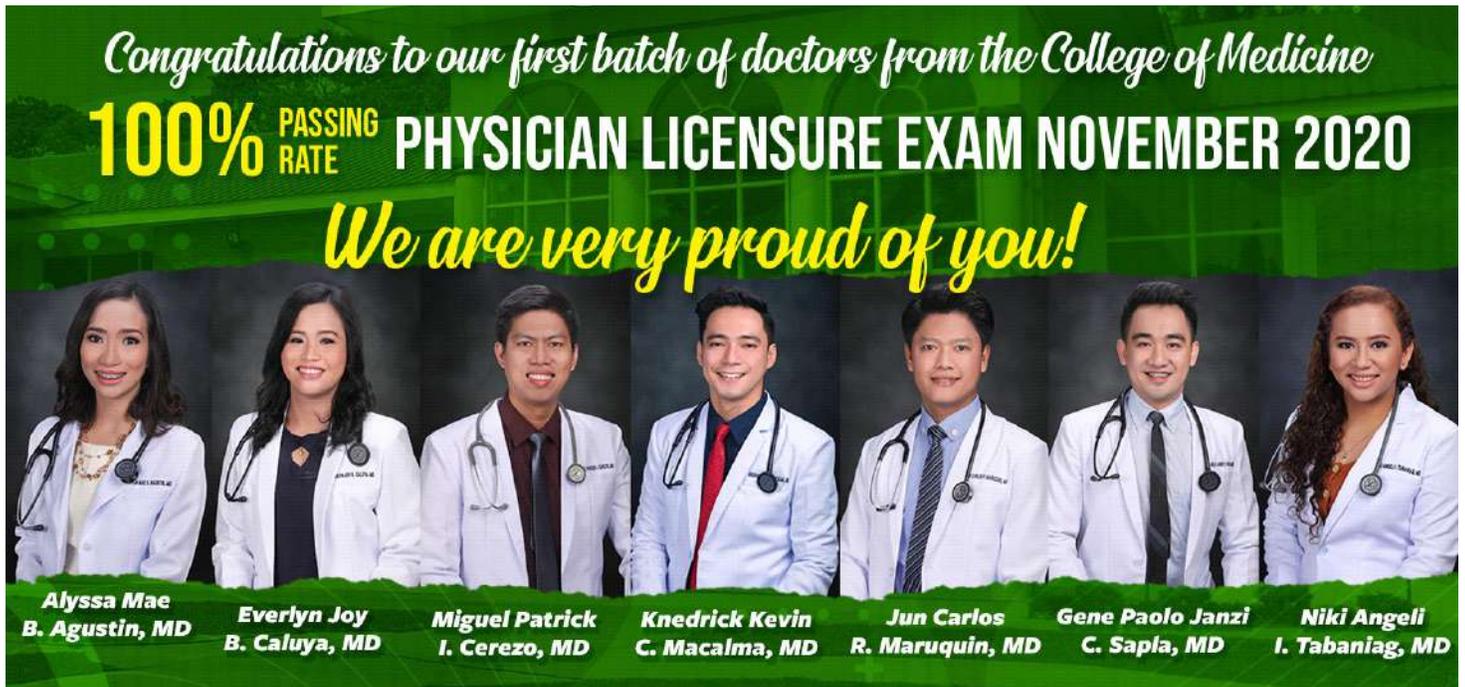
The eminent Austrian neurologist Viktor Frankl, said, *“Ever more people today have the means to live, but no meaning to live for.”* Our jobs are our means to live, and these should also give us our meaning to live. But more than our work, let us find meaning in building positive relationships with our colleagues, in the love that we share with friends and family, in deepening our spirituality and sense of self rooted in our faith in God. May we find the meaning to live in life itself.

As we champion mental health and values formation in the university, I would like us to reflect on this quote from Paulo Coelho: *“When we strive to become better than we are, everything around us becomes better too.”* This goal to become better and make better represents the third ***H – Hangad.***

Let this day be the start of a better you as an instrument in building a better MMSU. 



# MMSU posts 100% rating in physician exam



By DANIEL P. TAPAOAN, JR.

**W**hile the country continues to fight the COVID-19 pandemic, the Mariano Marcos State University (MMSU) produced its first breed of doctors who are willing to join the roster of dignified medical practitioners.

Seven pioneer graduates of the MMSU College of Medicine (COM) posted a whopping 100 percent passing rate in the 2020 Physician Licensure Examination (PLE) administered by the Professional Regulation Commission on November 10-11 and 15-16.

Tagged as the MMSU's 'Magic 7' who will soon take their oath of service are Alyssa Mae B. Agustin, Everlyn Joy B. Caluya, Miguel Patrick I. Cerezo, Knedrick Kevin C. Macalma, Jun Carlos R. Maruquin, Gene Paolo Janzi C. Sapla, and Niki Angeli I. Tabaniag.

The successful examinees were among the 3,538 who passed the examination taken by 4,704 examinees throughout the country. The national passing rate stood at 75.21%.

The PRC conducted the board exam in the cities of Manila, Baguio, Cagayan de Oro, Cebu, Davao, Iloilo, Legazpi, Lucena, Tacloban, Tuguegarao and Zamboanga.

"This feat is a feather in the cap of the university," expressed Dr. Ricardo S. Guanzon, COM dean, thanking the MMSU leadership and university community for the overwhelming support to the college and its graduates.

"Since they are the pioneering class, we really wanted to show our wholehearted support so that they can hurdle the board exam, and they did it," Guanzon added.

With this sterling performance, Guanzon said the COM plans to increase its number of medical students for next academic year, explaining that it is also in response to the urgent need of medical doctors in the country, especially in this time of health crisis.

He said that next academic year, the college will admit 40 to 50 first year students, depending on their qualifications which will be determined

by the result of their National Medical Admission Test (NMAT), college general weighted average, and interview performance.

For him, maintaining the same performance in future Physician Licensure Examinations (PLE) is a great task, considering the challenges of the new normal mode of learning and training, along with the changing line of technology.

Meanwhile, MMSU President Shirley C. Agrupis extended her commendation to the Magic 7, exclaiming, "the whole University is very proud of this achievement, and we wish you the best blessings as you enter the field of health service.

"I hope that you will continue to uphold the values of excellence, compassion and devoted service for our fellow Ilokanos," she said.

Established in 2015, the COM is the youngest college in the University and medical school in northern Luzon. It produced its first batch of graduates in 2019. 

# MMSU extends hearty help to typhoon victims in Region 2



The 'Natarnaw nga Agtutubo' student organization receives the relief packs and boxes of clothes from MMSU. (Photo by Renzie A. Aguada)

By JOHN VINCENT B. TORIBIO  
and DANIEL P. TAPAOAN, JR.

**M**MSU cares.  
MSU shares.

The Mariano Marcos State University (MMSU) extends its help to the people of Cagayan and Isabela who suffered intense flood caused by typhoon Ulysses and other tropical cyclones in the previous weeks.

Last November 21, the MMSU team, led by University President Shirley C. Agrupis, handed over 1,200 relief packs and boxes of clothes to the representatives of the Provincial Government of Cagayan, the Local Government Unit of Aparri, and the 'Natarnaw nga Agtutubo' student organization at the Ilocos Norte – Cagayan Border for distribution to the typhoon victims in Cagayan and Isabela.

“While we were spared by the wrath of the typhoons, we continue to carry the same burden and suffering for our brothers and sisters, showing that MMSU is truly one University that cares and shares – always ready to lend a hand and to extend the heart,” Dr. Agrupis said.

In response, the recipients expressed their gratitude to the University for its generosity, saying that the relief packages will benefit the communities affected by the typhoon and will bring hope and joy to the families.

The donation will benefit 630 MMSU students and other communities which will be identified by the Resiliency Focal Persons in the said provinces.

Since November 16, MMSU employees and students have pooled their concerted efforts to conduct donation drives and collected cash and in-kind donations.

For instance, the Faculty Association, Inc. (FAI) initiated the *Bangon Cagayan – We Heal as One Drive*, which collected Php 112,000 from instructors and professors for the affected families in Cagayan. The amount was used to buy food relief packages.

The faculty clubs, too, have facilitated the donation drives in all

colleges such as the College of Agriculture, Food and Sustainable Development (CAFSD), College of Arts and Sciences (CAS), College of Aquatic Sciences and Applied Technology (CASAT), College of Business, Economics and Accountancy (CBEA), College of Engineering (COE), College of Health Sciences (CHS), College of Industrial Technology (CIT) and College of Teacher Education (CTE).

Dr. Agrupis, who is a native of Aparri, Cagayan, encouraged the faculty group to join in the donation drives by sharing a start-up fund of Php10,000.

Dr. Marlina L. Lino, FAI president, expressed gratitude to the overwhelming support from her colleagues saying that such a kind gesture is a form of humanitarian endeavor, and that “we did it cheerfully and from our hearts.”

Along with the University’s donation of 15 cavans of rice, each of the relief packs contains three kilos of rice, two liters of bottled water, one bottle of salted fish, seven canned

goods, seven pieces of instant noodles, two packs of assorted biscuits, and six sachets of instant coffee.

Also, the Association of Non-Teaching Administrative Personnel (ANTAP) has simultaneously initiated a drive among the staff of the University.

ANTAP President Gerard S. Ragudo said that “we are one with the University for this cause in continued service for the people.”

According to him, the group raised Php100,000 from the generous contributions of the members of various offices. A total of 500 food packs from the FAI and ANTAP were prepared for the relief operation.

Joining the activity are the officers of the University Student Council (USC), in collaboration with the College Student Councils (CSCs), which initiated the “EASEtallions” donation drive to help their affected fellow students and other communities in the said provinces and in the town of Pagudpud, Ilocos Norte.

USC Chairperson Philip Joshua S. Aliga, a BS Pharmacy student, said the initiative has accumulated some P50,000 from MMSU officials, faculty, and students, added to an amount of P45,000 from the USC which was used to buy 26 sacks of rice.

“Various in-kind donations such as food (rice, canned goods, instant



The University turns over its donation to the government authorities of Cagayan for distribution to typhoon victims in the said province and in Isabela. (Photos by Ryan Roi B. Domingo)

noodles), water, hygiene kits, and clothes from various individuals and organizations across the province were also collected,” Aliga added.

The USC officers and student volunteers have sorted hundreds of relief packages at the MMSU Student Center.

Meanwhile, to facilitate the operation, the USC assigned various drop-off points for in-kind donations,

while Land Bank Account No.: 2131-1085-51 was used for cash donations.

Dr. Jan Rich A. Guira, chief for student development, also said that he is overwhelmed by the help of the whole MMSU community, saying that “while we have a lot of things to do in the university, these activities show that we truly embody compassion above all other things.”



*'Higit sa lahat, tao':*

**MMSU reignites self-care of employees**

By JOHN VINCENT B. TORIBIO  
and DANIEL P. TAPAOAN, JR.

University President Shirley C. Agrupis re-echoed her administration's mantra for its human capital, *'Higit sa lahat, tao,'* on November 5 as the Mariano Marcos State University (MMSU) launched series of mental health activities to promote self-care among its employees and students.

Reiterating that the University's most essential capital is its workforce, Dr. Agrupis highlighted the value of 'pausing from work and taking a breath of fresh air,' among the teaching and non-teaching personnel of the University.

In a virtual celebration of the University's Mental Health and Values Formation Week (November 3-6) dubbed as "*Hinto. Hinga. Hangad.: Pagbibigay-espasyo para sa Kalusugang Pangkaisipan,*" MMSU employees were taught on how to sustain their mental health and to form values needed amid the COVID-19 challenge.

Specifically, they undertook the following activities: *Hinto* (to stop and be aware of their mental state; *Hinga* (to breathe in wisdom and breathe out bitterness); and, *Hangad* (to aim by defining their hope of their mental wellness).



University employees from the Human Resources Management Office pose with a heart sign as they join the Mental Health and Values Formation activities of MMSU. (Photo from HRMO)

Ms. Nerisa T. Gonzalo, guidance counselor of St. Louis University, Baguio City, who served as the resource person emphasized that mental health is one's "mental well-being in which people are able to cope with the normal stresses they face daily."

She added that maintaining mental health allows people to work productively and to make meaningful contributions to their communities.

With this, she advised the University faculty and staff to be

reminded of the following: have adequate sleep, do regular physical exercise, possess effective stress management skills, have a growth mindset, connect with and help others, remain empathic, keep a positive outlook in life, seek help, and cultivate spirituality.

Another virtual activity that is devoted to students titled '*Project Pag-asa: Ang Pagsalimbay sa Himpapawid ng Linanag*,' took place on November 16. (See story on next page)

A series of online and physical activities for faculty and staff were also launched. These include *Hinto: Pabinga at Pagbabalik-Tanaw* (Self-Care Day), *Hinga: Kuwentuhan at Kumustaban* (a monthly debriefing session for employees), and *Watwat Salun-at* (physical activities).

First, *Hinto: Pabinga at Pagbabalik-Tanaw* is a one-day rest for university faculty and staff. Held on November 6, this activity also gave them time to reflect on life and revisit their core values.

Second, *Hinga: Kuwentuhan at Kumustaban* is a monthly debriefing session that is open to MMSU employees, giving them the opportunity



Faculty and staff play badminton every Tuesday and Thursday at the Student Center. This game is one of the activities of the MMSU's *Watwat Salun-at* under its Mental Health and Values Formation program. (Photo by Procopio B. Dafun, Jr.)

**MMSU REIGNITES.../P7**

# MMSU intensifies mental health wellness among students

**Kumusta ka sa dalawang salita?**

**Ms. Shareid Shundy Aguilar**  
AGOS: Bagong Umaga, Bagong Pag-asa



The virtual event tackled the following topics: *SINAG: Bukang-linayway ng Kalusugang Pangkaisipan* (a lecture presentation on mental health awareness); *AGOS: Bagong Umaga, Bagong Pag-asa* (a discussion on suicide prevention); and *BUHOS: Kalasag sa Panahon ng Lunos* (a panel discussion on anxiety and depression).

Dr. Elizabeth Marfel F. Gagni, OSAS director, discussed the importance of mental health, the factors that affect it, and the tips on how to stay mentally healthy.

By DANIEL P. TAPAOAN, JR.

**To cultivate hope among students amid these challenging times, Mariano Marcos State University (MMSU) held a virtual session on mental health awareness and suicide prevention last November 17.**

Dubbed “Project *Pag-asa: Ang Pagsalimbay sa Himapang ng Linanag*,” the online session taught the students on how to maintain mental health wellness, to cope with suicidal tendencies, and overcome anxiety and depression.

Spearheaded by the University’s Health and Wellness Services, in partnership with the Office of Student

Affairs and Services (OSAS), the activity was streamed online via the MMSU Students’ Facebook Closed Group.

Ms. Shareid Shundy B. Aguilar, chief of MMSU’s psychological testing center, said the *Project Pag-asa* shows that “the university is one with the world in upholding mental health wellness.”

She explained that the initiative was also conducted in the light of “the steady increase of mental health-related cases and the apparent climate of fear, struggle, and tragedy that caused adverse impacts on the lives of young people.”

Meanwhile, Aguilar discussed the characteristics of suicide, the ways on how to help a person with suicidal tendencies and how to raise above suicidal behaviors.

Moreover, a panel composed by Dr. Ricardo S. Guanzon, dean of the College of Medicine, Dr. GERALDEEN B. Pascual, chief of student welfare, and Aguilar addressed certain concerns raised by the students during the virtual session.

Aside from this, Pascual led the launching of e-Counseling, an online platform for student welfare and guidance service, which is accessible at <http://sas.mmsu.edu.ph/student-welfare/counselors>. 

## MMSU REIGNITES.../from P6

to express themselves through the assistance of guidance counselors.

The activity started on November 26 and will be conducted every last Thursday of each month.

Third, *Watwat Salun-at* is composed of physical fitness activities that can help promote holistic well-being among university employees. This is spearheaded by the College of Arts and Sciences – Department of Physical Education (CAS - DPE), and

the Center of Human Movement Studies (CHuMS).

These activities are composed of aero dance (Thursdays at 3:30 to 4:30 pm), badminton (Tuesdays and Thursdays at 2:00 to 6:00 pm), weight training (daily at 3:00 to 6:00 pm), and dart (Fridays at 2:00 to 5:00 pm). These are being conducted at the University Covered Court, Student Center, Fitness Center, and Teatro Basement, respectively. To join, employees must reserve their slot by sending message to 09108090564. The organizers assure

that COVID-19 health protocols are being observed in the activities.

These mental health and values formation activities are facilitated by a university committee headed by Ms. Marcela V. Aison, director of human resources management office, and co-chaired by Dr. Elizabeth Marfel F. Gagni, director for student affairs and services.

Aison said the activities were initiated in the light of the “emotional exhaustion and distress that leads to reduced performance of employees.” 

# MMSU personnel qualify for ASEAN fellowship program

By DANIEL P. TAPAOAN, JR.

**T**hree personnel from the Mariano Marcos State University (MMSU) were qualified as fellows of the Pioneering Intellectual Property Program (PIP) for Association of Southeast Asian Nations (ASEAN) Young Researchers 2020.

Dr. Mark R. Limon, Engr. Artbellson Mamuri, and Ms. Alecsis G. Villarín were accepted to the program because of their “excellent research track and enthusiasm to know more about Intellectual Property.”

Limon is the chief of MMSU’s food safety and product quality assurance, while Mamuri and Villarín are research assistants of the University’s Intellectual Property and Technology Business Management (IP-TBM) Office.

The fellowship program is a three-month online workshop series that aims to harness the talent and drive of young ASEAN researchers to better

understand intellectual property in the context of their research.

Established by the ASEAN Young Scientists Network, in partnership with Licensing Executives Society International (LESI), the program envisions “to create a pool of IP-competent ASEAN researchers who will champion the realization of the science, technology, and innovation (STI) potential in the region.”

In the workshops, the fellows are taught about the fundamentals of IP knowledge, to engage with IP experts, to convene and network with other professionals, and to be nurtured by an academic culture that promotes interactions between scientists, investors, and industry.

The activities which started last November 17 and will end by February 2, 2021 are run by professional members from LESI societies. 



## CTE mentor to take int’l fellowship program

By NIÑA CHRISTELLE M. SUMINTAC  
Correspondent



**A** faculty member of the MMSU College of Teacher Education (CTE) will take an online international certificate program offered by a prestigious university in England.

Prof. John Paul C. Vallente was selected by a team of mentors from the University of Liverpool (UoL) in England

to take the Postgraduate Certificate Academic Practice (PGCAP) program for 10 months which starts on January 2021.

Vallente said PGCAP is the first online program of the foreign school. Upon graduation, he will automatically receive a postgraduate certificate and professional recognition as a Fellow of Higher Education.

In the program, Vallente will learn the contemporary approaches to learning and teaching, alternative approaches which support learning, enhance teaching and learning, and extend higher education career in a global context.

After completing the course, Vallente is expected to craft action plans and project proposals that will train public teachers and college students in implementing classroom action research, integrate global citizenship education in the curriculum, cultivate indigenous traditions, and incorporate gender equality in sustainable living.

Likewise, the CTE mentor will represent MMSU in the Transformative Academic Practice in Higher Education on the Philippines (TAPHEP) nationwide capacity-building project that is headed by the University of the Philippines – Los Baños (UPLB), in partnership with UoL.

Vallente said TAPHEP aims to aid in the capacity building of UPLB and other selected higher education institutions (HEIs) in the country via two approaches: training and certification of Philippine higher education teachers, and complementary pathway that will involve training module development.

The TAPHEP will run for two years, from November 2020 to October 2022. The Project Team of UPLB, spearheaded by UPLB Chancellor Jose V. Camacho, Jr., and Prof. Anna Floresca F. Firmalino of UPLB International Programs and Partnerships, will provide overall coordination and handle the fiscal management for the implementation of the various project activities. 

# NBERIC trains PSU researchers on alcohol production

By DANIEL P. TAPAOAN, JR.

**M**aking science work for the people. Sharing technologies that help others.

The Mariano Marcos State University – National Bioenergy Research and Innovation Center (MMSU-NBERIC) trained personnel from the Pangasinan State University (PSU) in Lingayen, Pangasinan to produce alcohol from nipa in order to help the school cope with the adverse effects of COVID-19 crisis.

In a two-day training held last November 10-11, the PSU personnel learned the technical skills and methods of MMSU's propriety fermentation and distillation technology to produce 70% ethyl alcohol.

Engr. Thomas Ubiña, chief of MMSU-NBERIC, said the training particularly taught PSU's seven researchers on safety issues, operation, and maintenance of the MMSU's 850-liter Village Scale Reflux Distiller. The research team from PSU is headed by Dr. Larry A. Santos, the school's director for research.

"Aside from the lecture session, demonstrations on feedstock preparation and actual distillation process demonstration, and alcohol formulation were also done," he added.

Engr. Nathaniel Ericson Mateo and Dr. Roque Ulep, project leaders of NBERIC, served as lecturers in the training. Mateo discussed fabrication and distillation of multi-feedstock bioethanol production, while Ulep talked about MMSU's fermentation and distillation technology.

A demonstration on how the product is developed was done by Mr. Jayson Cariaga, science research assistant of the Center.

The training-workshop for the partner-SUC was conducted after PSU President Dexter Buted expressed interest on exploring the huge potential of nipa palm for the school's research development.

PSU is one of the partner universities of MMSU-NBERIC in its renewable energy program, along with the Aklan State University, Cagayan State University, Central Luzon State University, Marinduque State University, and Western Philippines State University. It is also one of the 19 member-agencies of the Ilocos Agriculture, Aquatic, and Natural Resources Research and Development Consortium (ILAARRDEC) where MMSU is the lead agency.



Research assistants of the NBERIC produce Nipahol. (File Photo)

The NBERIC envisions to become the renewable energy hub in the country. It sets the strategic building blocks that utilize agricultural crops that are excellent sources of bioethanol such as nipa, and that explore on the optimal use of the country's renewable energy resources.

NBERIC is one of the flagship research initiatives of MMSU President Shirley C. Agrupis who also serves as the program leader.

Dr. Agrupis said the training is "the fruition of NBERIC's dream to capacitate its partner-SUCs to help us make science work for the people, particularly in the field of bioethanol and renewable energy." 🌱

## New teachers oriented on standards for instruction

By NIÑA CHRISTELLE M. SUMINTAC  
Correspondent

**F**orty-five newly-hired faculty members of the Mariano Marcos State University (MMSU) convened in a seminar-workshop at the Center of Teaching Excellence (CTEX) Hall on November 11-12 in order to be oriented with the university's brand of excellence in instruction.

The activity, dubbed "Onboarding of New Teachers on the University's

Standards for Curriculum and Instruction," was organized by the CTEX, a special university center based at the College of Teacher Education (CTE), in collaboration with the University's Human Resource Management Office.

CTEX Chief Aleli R. Martin said the workshop has equipped the new teachers with the knowledge and skills on the outcomes-based education (OBE) principles; the standards for curriculum, instruction and assessment; and the 21st century skills for face-to-face and online teaching modes.

Of the 44 participants, 15 are from CTE; eight from the College of Arts and Sciences (CAS); five from the College of Agriculture, Food and Sustainable Development (CAFSD); four each from the College of Aquatic Sciences and Applied Technology (CASAT) and the College of Industrial Technology (CIT); three each from the College of Business, Economics and Accountancy (CBEA) and College of Health Sciences (CHS); two from the College of Engineering (COE); and

**NEW TEACHERS.../P15**

# Univ inaugurates SIP Hub, new Teatro Ilocandia

By DANIEL P. TAPAOAN, JR.

Officials of the Mariano Marcos State University (MMSU) inaugurated the Social Innovations and Partnership (SIP) Hub located at the Science and Technology (S&T) Park, and the newly-refurbished Teatro Ilocandia last November 25.

University President Shirley C. Agrupis led the blessing and dedication of the facilities as part of the celebration of her third presidential investiture anniversary, dubbed “Triumphant Together at 3.”

Dr. Agrupis said the creation of SIP Hub and renovation of Teatro Ilocandia are part of the MMSU’s



commitment to achieve a vibrant and engaging, culturally-focused university campus.

She hopes that the SIP Hub will serve its purpose of creating a culture of innovation and entrepreneurship in Ilocos Norte and in the region.

The facility intends to showcase the MMSU's culture of hospitality synergized in its four-fold functions – instruction, research, extension and production. In line with this, it will also feature the University's patented food technologies such as black garlic, sandcooked-peanut, kamangeg flour and cheesecake, and dragon fruit pink noodles, among others.

Dr. Agrupis is also happy “that we have transformed the Teatro Ilocandia amidst all the struggles that we encountered during its renovation.”

With an allocated budget of Php 30 million, the refurbishment of the building started in 2019 and is one of the priority infrastructure projects of the present MMSU leadership. 🇵🇭



# Dragon fruit industry revival set

By SHERLYN B. NICOLAS  
and REYNALDO E. ANDRES

**T**he Provincial Government of Ilocos Norte (PGIN), in collaboration with the Mariano Marcos State University (MMSU), Department of Agriculture – Ilocos Norte Research and Experiment Center (INREC), the Saniata Growers Association (SGA) and concerned local government units (LGUs) are stepping up moves to revive the ailing dragon fruit industry in Ilocos Norte.

These agencies plan to rehabilitate the dragon cactus in the province, increase the fruit quality, sustain the quality of dragon cactus planting materials, expand the area planted with dragon cactus, strengthen the marketing aspect of the industry, and strengthen linkages among farmers, LGUs, NGAs, NGOs and traders.

As part of the rehabilitation program, interested dragon fruit growers will be provided with farm inputs such as dragon cactus cuttings, organic, inorganic and foliar fertilizers. The PGIN will provide the expenses of farm inputs, while the farmers will take care on the labor and maintenance of the plants.

Meanwhile, MMSU and DA-INREC will do the research component to provide solutions to the problems encountered by the growers especially on the pests and diseases. The PGIN and the SGA will establish an entrepot center to solve marketing issues. Moreover, to strengthen the industry, livelihood programs will be given to the farmers who are into value-adding of the said high value cash crop.

As a kick-off activity, dragon fruit growers in Burgos, Ilocos Norte already received their farm inputs. This was graced by Ms. Edita Dacuycuy, REFMAD owner; Mr. Edwin Cariño, sustainable development center (SDC) Officer of PGIN; Ms. Lolita Raposas of OPAg; Burgos Municipal Agriculturist Cheryll Rugian; and



Dragon fruit growers in Burgos, Ilocos Norte receive their farm inputs from the Provincial Government of Ilocos Norte, DA-INREC, and MMSU as part of their move to revive the ailing dragon fruit industry in the province. (Photo courtesy of Extension Directorate)

MMSU Extension Director Dr. Aris Reynold V. Cajigal.

The rehabilitation of the industry is in time with the Plant-Plant-Plant program of the Department of Agriculture and one way of mitigating climate change in the province to ensure food security and sufficiency.

## In retrospect

The dragon fruit industry in the province boomed in early 2000. It was on July 9-11, 2013 when the province celebrated the first Saniata Dragon Fruit Festival, an activity that was spearheaded by the Ilocos Agriculture and Aquatic Resources Research and Development Consortium (ILAARRDEC) and was held at the MMSU Teatro Ilocandia.

During the celebration, then ILAARRDEC Director Stanley C. Malab said the festivity is very unique because of its theme, *Patibkeren ti Industria ti Saniata Para iti Nadur-as nga Agrikultura*, which summed up the description of the province as becoming the dragon fruit capital of the Philippines because of its perfect climate suited for the crop, and with the hectareage being expanded every year.

Program of activities for the three-day festivity were the launching of the

book on dragon fruit recipes and the six Saniata Dragon cactus varieties dubbed as Saniata 1, 2, 3, 4, 5, and 6. These varieties have local names as Imee, Imelda, Miriam, Edit, Mimi and Elena, respectively.

Some of the highlights of the celebration were demonstration activities on how to cook dragon fruit recipes such as yema saniata, pastillas, empanaditas, saniata flan, toasted saniata cake, and saniata balls. There was also a dragon fruit eating contest, and essay and photo essay writing contests.

Dragon fruit was now considered one of the favorite fruits of many Ilocanos because of its known therapeutic properties and many were involved in the production of this medicinal fruit in the province where the climatic condition is very much adaptable.

With the support of former Ilocos Norte Gov. Imee Romualdez-Marcos, more than 100 hectares in composite areas of the province have been planted with dragon cactus. These areas are considered barren, marginal or idle. Marginal areas are those which are non-productive and would require a lot of inputs, like fertilizers, to make them give a yield equal to that of productive areas not given inputs.



In support of the project, a package of technology (POT) has been produced in printed and video formats to guide growers in the production of dragon fruits. Demonstration plots in farmers' field, elementary schools, and barangay organization have also been established. Training programs, cross visits, monitoring, and field consultations, school-on-the-air programs, product development, marketing, and exhibits have been conducted.

### **The MMSU dragon fruit production project**

In 2014, the MMSU's dragon fruit production project was proving itself a very lucrative agribusiness venture as shown by the figures obtained from the sales of the fruit.

From the 648 posts planted in three strategic sites in the main campus, the university was harvesting about 700 kilos of fresh fruits from January to July, which gave a little less than P70,000 gross. The plants were still at their peak production period until September.

While other dragon cactus growers in the province harvested the fruits of their crop once a year within the July to September regular season, the university was harvesting the fruits twice because

of the application of the off-season production technology for the crop.

There were other factors that hampered the smooth production of quality fruits, such as fruit flies that destroy the emerging fruits. The pest buries its eggs in the fruit and the larva will soon eat its way out, thus, making the fruit unmarketable.

However, MMSU research showed that this was easily solved through bagging. Since the Saniata variety of

dragon cactus has become a very profitable agribusiness venture in the university during those years, the demand for the fruit starts ahead of the regular season, thus, the university applies the off-season production technology to meet the demand.

The off-season production technology was applied in November when the plants receive less amount of sunlight due to the effect of the incoming winter solstice – a situation when the earth is at its farthest axis from the sun. During this period, the dragon cactus cannot produce enough hormones to induce itself to flower. Thus, the technology involved the use of 6-watt Light Emitting Diode (LED) bulbs, and 26-watt compact fluorescent lamps (CFL) which were used to light the plants between 10:00 pm to 2:00 am.

The demand for dragon fruit increased by more than two times higher in off-season months than in regular season. In Ilocos Norte alone, market demand started in early parts of January. In most cases during regular and off-season months, harvesting dragon fruits in the university was done by order due to limited supply. Usually, the harvest was done twice a week with a minimum of 80 kilos per harvest.

The selling price per kilo depended on the season and the volume of harvest. From January to March, the fruit was sold at P150 to P180 per kilo, while it dipped to P75 to P80 per kilo from July to September. 🌱



# MMSU sees bountiful rice harvest this year-end

By REYNALDO E. ANDRES



**D**espite being slightly battered by successive typhoons this year and the adverse effects of the COVID-19 pandemic in the country, the Mariano Marcos State University (MMSU) is still expecting a bountiful rice harvest, boosting chances it could help sustain the staple grain consumption of the province this year.

Mr. Raymond Rahon of the university's Rice Seed Production Project said MMSU will likely produce 120 tons (2,400 sacks) of fresh and unmilled rice, which is way above its previous average productions of about 45 to 50 tons per hectare.

Last August, the university planted registered and foundation seeds to its 30-hectare production farms designated for its rice production project and for the MMSU-CARES program, or the Coordinated Agribusiness, Research, and Extension Strategies.

Ms. Cleofe Tolentino, in-charge of the MMSU-CARES, said the registered seeds are NSIC Rc160 and PSB Rc82 and these were planted in the 27-hectare CARES area by 88 farmers who belong to the 5 cluster groups, while foundation seeds of NSIC Rc222 were

planted in the 3-hectare production area.

Registered seeds produced from the foundation variety may be used as seed stocks for the university's Rice Seed Dispersal Project, while those harvested from the registered variety may be used as commercial stocks.

These varieties are usually preferred by many farmers because they have good eating quality and are resistant to common pests and diseases of rice.

NSIC Rc160, or commonly known as Tubigan 14, has a yield potential of up to 8.2 tons per hectare under favorable irrigated lowland condition. It has intermediate reactions to two major rice diseases — blast and bacterial leaf blight – and is resistant to yellow stem borer, but moderately resistant to white stem borer.

This variety is resistant to flood-prone rice areas in the country, which are estimated at 0.14 million hectares.

On the other hand, PSB Rc82 is an early-maturing variety which is most suitable in lowland areas like those in Region 1. It matures at 107 days after sowing and can be planted through broadcast, direct seeding, or transplanting.

Meanwhile, NSIC Rc222, or commonly known as Tubigan 18, has a yield potential of 10 tons per hectare. It has intermediate resistance to pest and diseases, and is also adapted to multi-stress conditions and performs well in different rice environments such as rainfed, submerged, and saline (concentration of salt dissolved in water) areas.

Last November 26, the MMSU Extension Directorate conducted a cross-farm visit in these areas to showcase the improved rice production technologies that were applied so that farmers may duplicate them in their farms. Some 40 farmers and 10 seed growers in the City of Batac attended the cross-farm visit.

Yearly, the MMSU is joining the Department of Agriculture in boosting rice production in the province by having a part in the estimated 4.10 percent increase of rice production in the first quarter of 2020.

In previous coping seasons, the MMSU's rice output was boosted by ample rains that led to the bountiful harvests, and the repair and rehabilitation of irrigation systems in the campus, along with better rains, were the primary factors behind the university's farm production sector's recovery.

Since the university is selling a slightly lower price of rice than the local commercial markets, grain traders in the province are looking for signs that they might not need to import rice from other provinces, which usually give potentially exceeding prices above that which was imposed by the National Foods Authority.

With the continuing increase of rice yield, the university might be confident to claim that its *palay* output performance this year is a step toward rice self-sufficiency of its employees by 2021, one key area of MMSU President Shirley C. Agrupis' 7-point agenda in line with agricultural productivity. 

# MMSU, DOST promote loom weaving

By DANIEL P. TAPAOAN, JR.

**T**he Mariano Marcos State University (MMSU) and the Department of Science and Technology in Region I launched the INABEL project in Dumalneg town to promote the culture of the indigenous peoples (IPs) and communities through weaving of ethnic attires.

Launched last November 10 at the town's municipal hall, the INABEL, or the Innovations on Native Attires, Bracing and Encouraging Livelihood, also aims to provide livelihood opportunities to the town folks especially those differently-abled individuals.

Mr. Jordan Abad, science research specialist of DOST Region I, said the first component of the project is called Panagabel, which is a training on the use of traditional hand loom weaving equipment that runs from November 10-13. Here, DOST will also introduce the loom weaving machine of the Philippine Textile Research Institute.

During the training, Dr. Lawrence Eclarin, MMSU's associate professor and the principal investigator of the

Abel Iloko Project, discussed "Weaving and Mathematics" and taught the participants on how to formulate *abel* designs. Meanwhile, Ms. Leonica Rico, a handicraft worker of the MMSU loom weaving center, led the hands-on operation of the warping tool and the loom weaving machine.



Ms. Leonica Rico, handicraft worker of MMSU loom weaving center, demonstrates the operation of the loom-weaving machine. (Photo courtesy of DOST Region I).

Aside from the training, four theraloam machines were also awarded to the local government unit of Dumalneg on November 13 to be used by the community for livelihood activities. This donation aims to encourage the formation of a town's association of loom-weavers.

Dumalneg Mayor Lairvee Espiritu expressed her gratitude to DOST-1 and MMSU in this undertaking, hoping that this intervention will boost the weaving

industry in the municipality by producing their own native attires.

This activity is in line with the Community Empowerment through Science and Technology (CEST) Project in Dumalneg town which the MMSU and DOST-1 are currently implementing. This includes various technological interventions and training programs that would help increase the productivity of townspeople. 🇵🇭

## NEW TEACHERS.../from P9

one from the College of Medicine (COM).

Formerly called the Teaching Competency Enhancement Seminar-Workshop (TCESW), Prof. Martin said the training was revised to make it suitable for the needs of the

flexible learning under the new normal.

The following professors served as the resource persons in the activity: Dr. Jovenita A. Aragon (Outcomes-Based Education); Dr. Estrella R. Pacis (the University's Standards on OBE Syllabi-Making); Prof. Gerry D. Abad (Formulating Learning Outcomes); and

Dr. Lilybeth C. Agno (Assessment in OBE Curriculum); Dr. Lilibeth G. Abrogena (Traditional Assessment), Prof. Neil Christian T. Corales (Authentic Assessment), Dr. Rosabel L. Acosta (Designing Table of Specifications), and Dr. Madeline T. Fernando (Effective Lecturing Strategies); Dr. Jahnese D. Asuncion (Teaching Critical Thinking), Prof. Tristan Deo M. Parinas (Developing Problem Solving Skills), Prof. Julius C. Pumaras (Deepening Collaboration among Students), and Dr. Ronald Candy S. Lasaten (Designing Instructional Materials).

MMSU President Shirley C. Agrupis urged the new teachers to get involved in the university's academic endeavors by bringing their ideas and experiences to the forefront. "A great university is defined by having engaged teachers and scholars who bring new energy, and perspectives to our students, to each other, and to the university," she said. 🇵🇭



New faculty members of MMSU attend the seminar-workshop on University's standards for curriculum and instruction held at CTEX Hall. (Photo by Enrik Kristoffer Paulino of CTE)

# Farmers, fisherfolk trained on financial literacy



Farmers and fisherfolk from selected towns in Ilocos Norte attend the training on financial literacy organized by MMSU and Land Bank of the Philippines. (Photo courtesy of Extension Directorate)

By **KIMBERLY S. MIGUEL**  
Correspondent

**A** total of 702 farmers and fisherfolk from the towns of Burgos, Adams, Dumalneg, and Carasi in Ilocos Norte may soon improve their socio-economic conditions by becoming more productive and bankable through access to relevant financial services and opportunities.

This was expected by Dr. Aris Reynold V. Cajigal, director for

extension, after they have completed the series of training on financial literacy from October 19-30.

The training program dubbed “Pagsasanay para sa mga Magsasaka at Mangangisda” was initiated by the Mariano Marcos State University (MMSU) through the Extension Directorate, Land Bank of the Philippines (LBP), along with Land Bank Countryside Development Foundation and the local government units of the said towns.

The participants came from nine barangays in Burgos (Bayog, Ablan,

Agaga, Buduan, Nagsurot, Paayas, Saoit, Poblacion, and Tanap); five in Adams (Poblacion, Sinadangan, Bucarot, Kadisan, and Maligligay); four in Dumalneg (Cabaritan, Kalaw, Quibel, and San Isidro); and three in Carasi (Barbaqueso, Virbira, and Angset). Specifically, the training was held last October 19-23, 27, 28, and 30, respectively.

Topics on financial literacy and ‘*pamamahala sa panganiib*’ were discussed by selected faculty from the College of Business, Economics and Accountancy (CBEA) and College of Agriculture, Food and Sustainable Development (CAFSD).

The training was conducted in 68 batches with 15-20 participants each, and health protocols were observed.

“*Dakkel a tulong daytoy nga aktibidad para kadakami, aglalo ti panangmanehar iti mapastreke a kuarta ken paggastuan,*” (This training is a big help to us, particularly on how to manage my income and expenses.) said one of the participants as he thanked the university and the agencies for reaching them through the program. 🇵🇭

## Aspiring goat raisers trained

By **KIMBERLY S. MIGUEL**  
Correspondent

**F**ifteen farmers and jail officers, including interested farm workers of the Extension Directorate (ED), were trained on Goat Production Technology (GTP) last November 12 at the MMSU Function Hall as part of the ED’s pre-dispersal training for goat.

The trainees were three officers of the Bureau of Jail Management and Penology (BJMP) of Batac City, two from the Ilocos Norte Agricultural College (INAC) in Pasuquin, Ilocos Norte; and ten farm workers of MMSU.

They were trained on the latest GPT by Ms. Joan Rarogal, a faculty of the College of Agriculture, Food, and Sustainable Development (CAFSD); Forage Production by Mr. Jerold Labii of the Technology

Demonstration (TD) section of the Extension Directorate; and Farm Record Keeping by Dr. Sosima Demandante, chief of TD section of the extension directorate.

Ms. Bella Gervacio, chief of the training and continuing education (TCE) section, presented the Scheme of Implementation of the Livestock Dispersal Project of the Directorate.

Participants were also given brochures on *Paaduentayo ken Taginayontayo ti Kanen dagiti Dingo, Organiko a Wagas ti Panangtaraon kadagiti Mula ken Taraken a Dingo, Agaramidatayo iti Binuro a Ruruot, Tapno Alisto a Dumakkel dagiti Taraken a Dingo; Pakanenda iti Urea-Molasses-Mineral Block (UMMB) ken Concentrates, Tarabay iti Naballigi a Panagtaraken iti Dingo, Tarabay iti Panagtaraken iti Dingo iti Panawen ti Tikag, and Agmulatayo iti Madre de Agua* to support the discussion of the different topics.

The pre-dispersal training was the response of the University to the request of a group of aspiring goat raisers who hope to make their farmlands more productive through integrated farming. The BJMP officials also signified their interest for a new room of growth, noting how BJMP and MMSU nurtured a withstanding project since 2009. The MMSU farm workers also joined the training to enhance their knowledge and skills as they manage the ED’s SHIFT project.

The pre-dispersal training is a requisite of the Livestock Dispersal Project of the MMSU-ED to ensure that the participants are equipped with the necessary knowledge and skills in managing the goats and their farms.

After the training and signing of contract, improved breeds of goat were given to the participants. These were accompanied by bunches of *madre de agua* and *napier* grass as a start-up of their pasture development activities. 🇵🇭

# Rejuvenate old bamboo clumps for bigger income

By REYNALDO E. ANDRES  
and KIMBERLY S. MIGUEL

**I**nstead of establishing new bamboo stands, farmers can bring back the healthy condition of their old bamboo clumps through cleaning and fertilizer application, thus, resulting in quicker return of investment.

This is the assurance given by Prof. Charlie Batin, bamboo production expert from the Mariano Marcos State University (MMSU), to farmers who own unproductive bamboo stands.

What's more? The increased productivity of old bamboo clumps offers a quicker means of increasing the supply of bamboo, which is now slowly decreasing due to high demand. Increased productivity of the bamboo clumps would also result in increased income for their owners.

Batin, who lectured on how to properly take care of old bamboo clumps in a two-day lecture-training activity held at the MMSU Function Hall on November 19 to 20, said one reason why the bamboo industry in the Ilocos region is fast depleting is the lack of knowledge and information on how to rejuvenate the old bamboo stands to produce new shoots.

The training was attended by 22 farmers from the towns of Sarrat, Paoay, Currimao, and the City of Batac in Ilocos Norte who own old bamboo clumps. They were taught on the updated and science-based knowledge and technologies on how to grow bamboo and rejuvenate the existing clumps.

The activity was led by the MMSU Extension Directorate, in partnership with the Agricultural Training Institute (ATI) - Region 1, and the Provincial Government of Ilocos Norte – Office of Provincial Agriculturist. It is in support to the Ilokano bamboo growers through the Ilocos Norte Agriculture and Fisheries Extension System (INAFES) project.

Records show that as early as 1992, it was already observed that in the Ilocos region alone the existing bamboo



Prof. Charlie Batin (standing) shares the technology in producing and rejuvenating bamboo to the farmers from various towns in Ilocos Norte. (Photo courtesy of Extension Directorate)

stands could only satisfy 37 percent of the total demand for bamboo culms.

This situation is brought about by the increasing demand for culms, the decreasing yield of bamboo stands due to indiscriminate cutting and lack of maintenance, and the absence of systematic and deliberate effort to replenish the resource.

Batin said that any bamboo clump owner can easily adopt the rejuvenation and fertilization technology that he and other forestry experts are recommending, because it is simple and easy to apply.

Here's how: At the onset of the rainy season, remove all over mature and defective culms. Likewise, remove all the branches or spines up to two meters above the ground. Dig a trench, five centimeters deep, around the clump and then apply the fertilizer. Then, cover the fertilizer as well as the exposed rhizomes with soil.

A brochure published by the Philippine Council for Agriculture, Aquatic and Natural Resources Research and Development (PCAARRD) states that although bamboo may be able to grow and develop even without being fertilized if planted on good location, it is necessary to apply fertilizer since the areas most likely available for bamboo

production are less fertile and unproductive.

Batin also observed that the application of 2 kilograms of complete fertilizer (14-14-14) on each *kawayan tinik* clump is enough to produce bigger tillers and more culms.

He observed that the new shoots in the cleaned clumps had higher survival rate than those in the unclean clumps, resulting in the production of more new culms. It is apparent that application of higher level of complete fertilizer markedly increased the development of new culms. Cleaning the old clumps also prevented rats from feeding on the new shoots.

At four months after fertilization, the diameter of new culms in the cleaned clumps already reached 8.82 centimeters, while those in the unfertilized clumps had only 7.99 centimeters.

Experts from the Department of Forestry at the MMSU College of Agriculture, Food and Sustainable Development (CAFSD) assert that by cleaning old bamboo clumps plus the application of 2 kilograms complete fertilizer per clump, the farmer gets an income of about P5.00 for every peso he invests. 



## Mango trees need a lot of the right fertilizers

**F**armers in mango-growing areas in the country who used to get about 72 kilos of fruits per tree can now harvest 187 kilograms or more in one season alone.

That is, if they follow the new fertilization technology for mango developed by the researchers of the Department of Agriculture in Region I (DA-I) led by Consuelo N. Belarmino.

DA-1 is one of the 19 member-agencies that comprised the Ilocos Agriculture, Aquatic and Natural Resources Research and Development Consortium (ILAARRDEC), with headquarters located at the Crops Research Laboratory building in the main campus of the Mariano Marcos State University (MMSU), the lead agency of ILAARRDEC.

If the average farmgate price for one kilo of mango is P40, the yield could give a gross income of P7,480 from a single tree alone. If a farmer has one-hectare mango plantation with 100 fruit-bearing trees, conservative estimates indicate that he can easily gross about P748,000 per season.

It used to be that mango growers in Region 1, and elsewhere in the country, do not practice extensive fertilization of their trees. This is because they have observed that mango trees can survive in extreme conditions such as poor soil, and on hillsides and mountain slopes.

Besides, nutrients deficiency symptoms in mangoes are not easily detected. That's why in traditional practices under backyard cultivation, farmers put little attention to fertilization.

In like manner, continuous use of flower inducers, such as potassium nitrate ( $KNO_3$ ), makes mango trees

unproductive. In extreme cases, the trees die if not properly fertilized and managed.

But with the new fertilization technology, farmers can bring back the vitality and productivity of their trees for more profit. This new fertilization technology was the result of DA-1's three-year field experiments on the effects of ground and foliar fertilizer applications on mango conducted in Pangasinan and Ilocos Sur. The tests involved three trials.

The first experiments on ground application of nitrogen, phosphorus and potassium (NPK) fertilizer was conducted in Brgy. Tambak, Malasiqui, Pangasinan. Thirty-six fruit-bearing carabao mango trees, 15 years old, and of uniform size were used in the experiment. The trees had never been applied with any fertilizer.

The fertilizers used were 46 percent Urea (46-0-0), 18 percent ammonium sulfate, and 60 percent muriate of potash (0-0-60). Half of the recommended fertilizer rate was applied at the start of the rainy season, while the other half was applied before the end of the rainy season. The trees were sprayed with flower inducer (potassium nitrate) at the rate of 20 grams per liter of water.

The second test on foliar application of calcium, magnesium, zinc, and boron was done in Brgy. Tebag, Sta. Barbara, Pangasinan. Exactly 24 fruit-bearing mangoes, 20 years old and of uniform size were selected. Each tree was applied with 1.0 - 0.5 - 0.5 kg of NPK. The fertilizers used were similar to those used in the first trial. Also, the trees had never been applied with any fertilizer.

Half of the fertilizer rate was also applied at the onset of rainy season, and the other half was applied at the end of the season. The NPK fertilizers were applied in eight shallow holes around the tree crowns. The trees in the second experiment were also grouped into four, thus, formed six groups.

The treatment used were as follows: Treatment 1 — control (NPK alone at 1-0 - 0.5 - 0.5 kg per tree),





Treatment 2 — 8 percent calcium + NPK per tree, Treatment 3 — magnesium + NPK per tree, Treatment 4 — zinc + NPK per tree, Treatment 5 — boron + NPK per tree, and Treatment 6 — calcium + magnesium + zinc + boron + NPK per tree.

Calcium, magnesium, zinc and boron were applied at the rate of four tablespoons. Each element was dissolved in 16 liters of water. The solution was applied at 10 days after flower induction (DAFI). The trees were sprayed with flower inducer at the rate of 20 grams per liter of water.

The third experiment on timing and schedule of foliar fertilization was done among 14-year-old fruit-bearing mango trees in San Ildefonso, Ilocos Sur. The treatment used were: Treatment 1 — control (no foliar spray), Treatment 2 — 10 DAFI, Treatment 3 — 20 DAFI, Treatment 4 — 42 DAFI, Treatment 5 — 55 DAFI, and Treatment 6 — 10, 20, 42, and 55 DAFI.

### **The result**

Results of the test done in Malasiqui, Pangasinan showed that trees applied with NPK fertilizer produced more flowers than the unfertilized. Trees applied with 2.0 - 0.5 - 0.5 kg of NPK each yielded 187 kg of fruits per tree which was 157 percent higher than the control trees which gave only 72 kg of fruits per tree.

Also, those in Sta. Barbara town which were given foliar application of calcium + magnesium + zinc + boron, and single application of magnesium at 10 DAFI produced more flowers than those without fertilizer.

The trees applied with foliar fertilizer at 10 DAFI gave 123 kg of fruits per tree. Those that received single application of magnesium gave 111 kg of fruits per tree. Trees applied with NPK alone yielded 94 kg of fruits each.



The DA-1 researcher also attributed the high yield to the proper timing and schedule in applying foliar fertilizer. For instance, trees applied with foliar fertilizer consecutively at 10, 20, 42, and 55 DAFI gave 217 kg of fruits per tree, while the control trees gave only 72 kg of fruits each.

In terms of fruit quality, the new fertilization technology also improved the taste of the fruits. The researchers found out that those applied with 1.0 - 1.0 - 0.5 kg of NPK produced sweeter fruits with total soluble solids (TSS) of 18.10 percent. Those sprayed with foliar fertilizer also had sweeter fruits with TSS of 17.07 percent than those of the control trees.

Trees applied with 2.0 - 0.5 - 0.5 kg of NPK per tree had return on investment (ROI) of 424.59 percent. This means that for every peso spent, there was a P4.24 return as profit. The unfertilized trees gave only 131.86 percent ROI.

Those applied with foliar fertilizer gave an ROI of 228.24 percent, while the trees applied with magnesium alone had 265.53 percent ROI.

Trees consecutively sprayed with foliar fertilizer at 10, 20, 42, and 55 DAFI gave 270 percent ROI, while only 42 percent ROI was obtained from those which did not receive the treatment. 

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