

CURRICULUM VITAE

DIONISIO SALBADO BUCAO



PERSONAL PROFILE

1. **Date and Place of Birth:** June 17, 1970 - Caloocan City

2. **Civil Status:** Married

3. **Educational Background:**

Doctor of Philosophy in Soil Science – May 2010, UPLB College, Laguna

Master of Science in Agriculture – Crop Science – April 2003, MMSU,
City of Batac, Ilocos Norte

Bachelor of Science in Agricultural Engineering – October 1993 – MMSU

4. Work Experience

POSITION	INSTITUTION	DATES OF SERVICES	
		FROM	TO
Supervising Education Program Specialist	MMSU	11-03-2015	present
Senior Science Research Specialist	MMSU	12-04-2012	11-02-2015
Science Research Analyst	MMSU	11-04-2002	12-03-2012
Science Research Assistant	MMSU	04-15-1999	11-03-2002
Contractual Research Assistant	MMSU-RLRRC	02-01-1996	04-14-1999
Contractual Science Aide	MMSU-RLRRC	04-01-1995	01-31-1996

5. Administrative Designation

Director, Research

: MMSU
September 4, 2023 – present

Director, Innovation and Technology

: MMSU
January 17, 2022 – July 14, 2025

Chief, Garlic Center

: MMSU
October 2017 – January 16, 2022

*Chief, University Innovation and
Technology Support Office*

: MMSU
April 2013 – January 16, 2022

6. Accomplishments

MEETINGS AND TRAINING-WORKSHOPS ATTENDED (Annex A)

TITLE OF LEARNING AND DEVELOPMENT INTERVENTIONS/TRAI NING PROGRAMS (Write in full)	INCLUSIVE DATES OF ATTENDANCE (mm/dd/yyyy)		NUMBE R OF HOURS	Type of LD (Managerial/ Supervisory/ Technical/etc)	CONDUCTED/ SPONSORED BY (Write in full)
	From	To			
Good Clinical Practice Workshop and Training	May 20, 2024	May 20, 2024	8	Technical	Philippine Clinical Research Professionals Inc.
Startup Enablers Training	February 15, 2024			Technical	Department of Science and Technology – Sillag DOST regional office 1
REvolution: A Symposium on Research Evolution towards a Society Centric R&D	November 8, 2021	November 8, 2021	4	Technical	Department of Science and Technology – Science for Change Program
Investing in R&D: Shaping the Philippine	October 8, 2021	October 8, 2021	4	Technical	Department of Science and Technology – Science

Innovation Landscape					forChange Program
Regional Resiliency: Equipping Agriculture for the Future	September 14, 2021	September 14, 2021	4	Technical	Department of Science and Technology – Science for Change Program
Korea's Science & Technology Park Training	August 9, 2021	August 27, 2021	60	Managerial	Korea Innovation Foundation
Training Workshop on Technology Commercialization and Pitch Day	July 19, 2021	July 26 2021	48	Managerial	IP-TBM Ilocos Region State Universities and Colleges
Luzon Regional Scientific Meeting 2021	May 11, 2021	May 11, 2021	8	Managerial	Department of Science and Technology – National Academy of Science and Technology
Training-Workshop on Strengthening Policy Analysis in the Regions	May 3, 2021	May 7, 2021	35	Managerial	Department of Science and Technology (DOST), Philippine Council for Agriculture, Aquatic and Natural Resources Research and Development (PCAARRD) and Central Luzon State University (CLSU)
Best Practices in Writing and Publishing Your Research Paper	April 16, 2021	April 16, 2021	8	Managerial	Research Academy
Capability Building of IP Formality Examination	April 12, 2021	April 13, 2021	16	Managerial	Intellectual Property Office of the Philippines
Building Research Capability Gaps in the Region	March 2, 2021	March 2, 2021	8	Managerial	National Research Council of the Philippines (NRCP)
IP Basics, Invention Spotting and Patent Drafting	February 1, 2021	February 5, 2021	40	Managerial	Faculty and Full-time Researchers
Webinar Series On PRIME-HRM For Performance Management	January 26, 2021	January 26 2021	8	Managerial	Civil Service Commission
Leadership And Research Management In Agriculture Online Training Program	December 7, 2020	December 11, 2020	40	Managerial	International Rice Research Institute
Fundamental In Data Analytics In Collaborative Research	December 3, 2020	December 3, 2020	8	Technical	Commission On Higher Education And Philippine-California Advanced Research Institute
Basic Research Ethics Training	November 16, 2020	November 17, 2020	16	Technical	Philippine Health Research Ethics Board And Dost-Philippine Council For Health Research And Development
Webinar Series On Intellectual Property And Technology Transfer: Guidelines In Securing A Fairness Opinion Report	October 13, 2020	October 13, 2020	8	Managerial	DOST-Philippine Council For Health Research And Development
Webinar On Writing Policy	September 28, 2020	September 30, 2020	24	Technical	ILAARRDEC

Briefs					
Farm Management Planning- Workshop for MMSU Research, Extension, and Business Project Leaders	September 8, 2020	September 9, 2020	16	Managerial	Mariano Marcos StateUniversity
Webinar Series on Intellectual Property And Technology Transfer: IP Policy	September 1, 2020	September 1, 2020	8	Managerial	DOST-Philippine Council For Health Research And Development
Training Workshop on Technology Commercialization and Pitch Day	August 18, 2020	August 25, 2020	48	Managerial	Faculty and Full-time Researchers
Enhancement Training – Workshop on Outcomes-based Planning, Monitoring and Evaluation of Programs, Projects, and Activities	August 5, 2020	August 5, 2020	6	Technical	Mariano Marcos StateUniversity
Hands-on-Training Workshop on the Presentation of Online Project Procurement Management Plan (PPMP), Obligation Request, and Disbursement Voucher (Phase 2)	July 2, 2020	July 2, 2020	4	Technical	Mariano Marcos StateUniversity
National Conference on Higher Education Institutions' Extension Best Practices and Innovations	November 25, 2019	November 26, 2019	16	Technical	Philippine Association of Extension Program Implementation, Inc.
Financial Viability and Profitability Analysis of Agricultural Technologies and Enterprise	June 3, 2019	June 8, 2019		Managerial	SEAMEO - SEARCA
30 th Regional Symposium on R&D Highlights	November 27, 2018	November 29, 2018	24	Managerial	Ilocos Agriculture, Aquatic and Natural Resources, Research and Development
2018 Commodity Review on Legumes, Vegetables, Ornamentals, Medicinals, Vanishing Plants, Bulb and Root Crops	September 12, 2018	September 12, 2018	8	Managerial	Ilocos Agriculture, Aquatic and Natural Resources, Research and Development
Advanced IP Valuation Training Valuation of Emerging Technologies and Negotiating Licensing	August 30, 2018	August 31, 2018	16	Managerial	Business Development Academy
Proposal Presentation and Packaging of Industry Strategic S&T Plans and Programs (ISPs)	August 13, 2018	August 17, 2018	40	Managerial	DOST- Philippine Council for Agriculture, Aquatic and Natural Resources Research And Development

DOST-PCAARRD IP Master Class	July 2018	December 2018		Managerial	DOST- Philippine Council for Agriculture, Aquatic and Natural Resources Research And Development
Value Chain Development of Industry Strategic Plans and Programs	July 9, 2018	July 13, 2018	40	Managerial	DOST- Philippine Council for Agriculture, Aquatic and Natural Resources Research And Development
ITSO General Assembly	July 3, 2018	July 4, 2018		Managerial	Intellectual Property Office
Technology Licensing CapacityBuilding Program	June 7, 2018	June 8, 2018	16	Managerial	Technology Application andPromotion Institute of the Department of Science Technology
Training on Patent Search andInvention Spotting	May 29, 2018	May 31, 2018	24	Managerial	DOST- Philippine Council for Agriculture, Aquatic and Natural Resources Research And Development
Fellowship Program on IntellectualProperty System	August 31, 2017	September 20,2017	168	Managerial	Korean International Cooperating Agency
Scientific Writing for Publication inRefereed Journal	March 6, 2017	March 10, 2017	35	Technical	Mariano Marcos StateUniversity
AMIA2-CIAT Project: Workshop onFinalizing Results on CRA Prioritization, CRVA and ExtendedCBA	March 1, 2017	March 3, 2017	24	Managerial	Department of Agriculture System Wide Climate Change Office, International Center for tropical Agriculture
AMIA2-CIAT Project: Results Sharing and Validation Workshop on CRVA &CRA Decision Support	February 6, 2017	February 7, 2017	16	Managerial	Department of Agriculture System Wide Climate Change Office, International Center for tropical Agriculture
AMIA2-CIAT Project: Workshop onClimate Risk Vulnerability Assessment (CRVA)	January 10, 2017	January 12, 2017	24	Managerial	Department of Agriculture System Wide Climate Change Office, International Center for tropical Agriculture
National Advanced Training Program on Successful Technology Licensing (STL)	September 1, 2014	September 4, 2014		Technical	WIPO and IPOPHL
Successful Technology Licensing	May 5, 2014	May 9, 2014		Technical	WIPO
WIPO Patent Search Training Workshop	March 10, 2014	March 11, 2014		Technical	IPOPHL
Techniques on Soil, Water and Crop Nutrition Management	October 14, 2013	October 17, 2013		Technical	Philipiine Council for Agriculture, Aquatic and Natural Resources Research & Dev't (PCAARRD) and PNRI
Training on Terminal Report Writing	July 5, 2013	July 5, 2013		Technical	PCAARRD

Foundation Course on IP	April 24, 2013	April 25, 2013		Technical	IPOPHL
Capacity Building on Land Use Planning for SAFDZ Delineations and Ground Truthing: Framework and Principles	April 8, 2013	April 19, 2013		Technical	BSWM and UPLB
Intellectual Property Management March 20-22, 2013 Training Cum Writeshop on Technology Disclosure and Claim Drafting	March 20, 2013	March 22, 2013		Technical	PCAARRD
Training Workshop on the Preparation of a Multimedia Presentation	August 28, 2012	August 31, 2012		Managerial	ILAARRDEC
2 nd National Training-Workshop on Remote Sensing, Geographic Information System and Crop Modelling Applications	June 15, 2012	June 24, 2012		Technical	MMSU
Training on Information Technology for Research	June 4, 2012	June 8, 2012		Technical	PCAARRD
Training-Workshop on Iluko Writing	May 23, 2012	May 24, 2012		Technical	PCAARRD
In-Country Training Course on Strengthening Rainfed Agriculture Research, Development & Extension in the Philippines	May 6, 2012	May 11, 2012		Technical	Department of Agriculture - Bureau of Agricultural Research & International Crop Research Institute for the Semi-Arid Tropics (ICRISAT)
Training-Workshop on Satellite Remote Sensing and Its Applications	April 24, 2012	May 1, 2012		Technical	MMSU
Training on the Preparation of Multimedia Presentation	February 28, 2012	March 1, 2012		Managerial	ILAARRDEC
In-House Training on Geographic Information System	November 16, 2011	November 18, 2011		Technical	MMSU
Satellite Remote Sensing and Applications	June 1, 2011	June 8, 2011		Technical	MMSU
NIR Spectroscopy and Hyperspectral Imaging	February 22, 24, 28, 2011	March 3, 2011		Technical	MMSU
GIS Training Course on Both Commercial and Open Source GIS Softwares	July 12, 2010	July 22, 2010		Technical	MMSU, ILAARRDEC

Measuring Water Quantity and Quality	June 30, 2008	July 3-4, 2008		Technical	Scientific and Industrial Research Organization (CSIRO), Australian Center for International Agricultural Research (ACIAR), and UPLB
Training/Workshop on Groundwater Investigation and Management	February 22, 2005	February 24, 2005		Technical	ACIAR, CSIRO and BSWM
Integrated Field Water Management in Rice Production	November 8, 2004	November 12, 2004		Technical	International Rice Research Institute
Data Standardization and Information Systems Customization	November 11, 2002	November 15, 2002		Technical	DA-BAR
Introduction to New Development in GxE Analysis and Interpretation of Results	August 6, 2001	August 17, 2001		Technical	IRRI
Geographic Information System Application in Agriculture and Fisheries Research & Dev't.	July 2, 2001	July 6, 2001		Technical	DA-BAR

RESOURCE SPEAKER IN VARIOUS TECHNOLOGY FORUMS (Annex B)

TITLE OF LEARNING AND DEVELOPMENT INTERVENTIONS/TRAININGPROGRAMS (Write in full)	INCLUSIVE DATES OF ATTENDANCE (mm/dd/yyyy)	NUMBER OF HOURS	Type of LD	CONDUCTED/ SPONSORED BY (Write in full)
IFP Probiotics and Functional Foods Consortium and Garlic and Other Agri-Foods	December 13, 2023		Plenary Speaker	ILAARRDEC
Technology Forum on Human-Wellbeing and Wealth-Creation featuring Food Innovation and Processing Technologies – FPIC developed products of MMSU	July 5, 2024		Resource Speaker	DOST Regional Office 1
Technology Forum on Human-Wellbeing and Wealth-Creation featuring Food Innovation and Processing Technologies – Drip irrigation system for peanut and sugarcane	July 5, 2024		Resource Speaker	DOST Regional Office 1
2024 Journey to Growth Forum	June 25-28, 2024		Resource Speaker	Jollibee Group Foundation
Garlic Information Caravan	April 29, 2024		Resource Speaker	DA Regional Field No. 2 Batanes Experiment Station Basco, Batanes

Regional Caravan Membership (PARTH)	February 23, 2024		Resource Speaker	Philippine Association for Tourism and Hospitality Inc.
Research, Innovation and Technology – knowledge sharing session with the NEDA social development staff	February 20, 2024		Resource Speaker	National Economic and Development Authority
2024 Peanut Fiesta	January 24, 2024		Resource Speaker	DOST-PCAARRD CVAARRD ILAARRDEC
Training Course on Peanut Production and Processing	March 16, 2023		Resource Speaker	Agricultural Training Institute- Regional Training Center 1
Regional Resiliency: Equipping Agriculture for the Future A Virtual Presser on New Nice Centers in the Regions for R&D (NICER) under the Agriculture, Aquatic and Natural Resources (AANR) Sector	September 12, 2021	2	Resource Speaker	Department of Science and Technology – Philippine Council Agriculture, Aquatic,
Research Colloquium cum Undergraduate Thesis Competition	June 28, 2019	2	Resource Speaker	Mariano Marcos State University
School-in-the-Air (SOA) on Accelerating the Promotion of Crops and Livestock Technologies in Ilocos Norte	November 14, 2018	2	Resource Speaker	Mariano Marcos State University
“BICENTENNIAL TIENDA NI GOB” – AGRICULTURE DAY	May 17-18, 2018	4	Resource Speaker	Provincial Government of Ilocos Norte
18 th PSM-NL Regional Convention and Scientific Meeting with the theme “Bridging the ACADEME and INDUSTRY through MICROBIOLOGY”	March 7-8, 2018	4	Resource Speaker	Philippine Society for Microbiology Inc. – Northern Luzon (PSM-NL) Chapter in cooperation with University of Northern Philippines – Department of Biology (DB)

EVALUATOR IN UNDERGRADUATE THESIS COMPETITIONS, IN-HOUSE AND ILAARRDEC COMMODITY REVIEWS (Annex C)

TITLE OF LEARNING AND DEVELOPMENT INTERVENTIONS/TRAINING PROGRAMS (Write in full)	INCLUSIVE DATES OF ATTENDANCE (mm/dd/yyyy)		NUMBER OF HOURS	Type of LD	CONDUCTED/ SPONSORED BY (Write in full)
	From	To			
34 th CVAARRD Regional Symposium	November 28, 2024	November 29, 2024		Evaluator	CVAARRD
2023 Commodity Research Review on Rice, Corn, and Tobacco	September 19, 2023			Evaluator	DA-Philrice Batac
2023 Agency In-House Research Review	August 16, 2023	August 18, 2023		Evaluator	Mariano Marcos State

					University
2023 Agency In-House Research Review	August 16, 2023	August 18, 2023		Committee member	Mariano Marcos State University
2023 Agency In-House Research Proposal Review	July 5, 2023			Evaluator	Mariano Marcos State University
2023 Agency In-House Research Proposal Review	July 5, 2023			Committee member	Mariano Marcos State University
PSHS-IRC Science Immersion Program (SIP) 2024	July 2, 2024			Evaluator	Philippine Science High School Ilocos Region Campus
College of Engineering 2 nd Annual Research Colloquim 2023	June 20, 2023	June 20, 2023		Evaluator	MMSU College of Engineering
2020 Commodity Review on Rice and Other Cereals	October 14, 2020		8	Evaluator	PhilRice Batac
2019 Agency In-House Proposal Review	December 18, 2019	December 19, 2019	16	Evaluator	Mariano Marcos State University
2018 Commodity Review on Rice & Rice-Based Farming System and Tobacco	September 28, 2018		8	Evaluator	Ilocos Agriculture, Aquatic Resources, Research and Development Consortium (ILAARRDEC)
Review of Research and Development (R&D) Project Proposal	November 16, 2017	November 17, 2017	16	Evaluator	Department of Agriculture – Regional Field Office 1

A. RESEARCH CONDUCTED (*Annex D*)

On going

a. National scope

Program Leader: Strengthening the Regional Agri-Aqua Innovation System Enhancement (RAISE) Program in Ilocos Region (Phase 2)

Project Leader: Advance the IP-TBM Offices' initiatives among ILAARDEC CMIs through the RAISE Program

Funded by the Philippine Council for Agriculture, Aquatic and Natural Resources Research and Development.

October 1, 2024 – September 30, 2026

Budget - 31,430,470

Project Staff: Development of Integrated Management Strategies for Sustained Garlic Productivity in Ilocos Norte,

Funded by the Department of Agriculture - Bureau of Agricultural Research

Budget – 5,000,000

April 1, 2024 - March 31, 2026

Project Leader: Advancing Ilocos IFP Food Systems Through Academia-Industry Collaborative Research and Innovations toward Healthy Food Security,

Funded by the Commission on Higher Education, Funded by the Commission on Higher Education

Budget – 250,000,000

January 1, 2023 – December 31, 2025

b. Regional in scope

Project Staff: Multiplication of Garlic Clean Planting materials through Tissue Culture and Bulbils
Funded by Department of Agriculture – Bureau of Plant Industry
Budget – 6 M January 2020 – present

Completed Projects

a. National scope

Program Leader: Garlic and other Agri-Food Condiments R&D Center

Project Leader: Improvement of Garlic and Other Agri-Food Condiments Productivity through Integrated Crop Management System,

Funded by the Philippine Council for Agriculture, Aquatic and Natural Resources Research and Development.

Budget – 35,523,230.80

May 1, 2021 – April 30, 2025

Program Leader: Regional Agri-aqua Innovation System Enhancement (RAISE) Program in Ilocos Region

Project Leader: Strengthening the Intellectual Property Technology Business Management Offices in ILAARRDEC's CMIS through the RAISE Program

Funded by the Philippine Council for Agriculture, Aquatic and Natural Resources Research and Development

Budget – 22,200,000

January 1, 2022 – December 31, 2023

Project Leader: Sustaining MMSU's IP-TBM Office and Enhancing IP-TBM Offices among member agencies of ILAARRDEC,

Funded by the Philippine Council for Agriculture, Aquatic and Natural Resources Research and Development

Budget – 4.2 M

January 1, 2020 – June 30, 2022

Project Leader: Multi-Location and Adaptability Trial of Registered Garlic Varieties in Regions 1, 2 and CAR

Funded by Department of Agriculture – Bureau of Agricultural

Research Budget – 4.99 M September 16, 2018 – March 31, 2021

Project Leader: Strengthening and Sustaining the Operation of Intellectual Property and Technology Business Management of MMSU

Funded by Philippine Council for Agriculture, Aquatic and Natural Resources Research and Development

Budget – 1.92 M July 16, 2018- June 15, 2020

Project Leader: Sustaining Crop Productivity in Climate Vulnerable Areas in Ilocos Norte Through STCBF on Climate Resilient Technologies

Funded by Philippine Council for Agriculture, Aquatic and Natural Resources Research and Development

Budget – 4.9 M June 2017- May 2019

Project Leader: Collection, Purification and Multiplication of Garlic for the Multi- Location Trial in Regions 1, 2 and CAR

Funded by Department of Agriculture – Bureau of Agricultural Research Budget – 1 M January 2018 – December 2018

Project Staff: Enhancing Peanut Production through Innovative Water Management Strategies

Funded by the Department of Science and Technology – Philippine Council for Agriculture, Aquatic and Resources Research and Development

Budget – 3 M 2015-2017

Project Leader: Suitability of assessment of garlic growing areas in Region 1

Funded by the Department of Agriculture – Bureau

of Agricultural Research
Budget – 1.5 M 2014 - June 2017

Project staff: Revitalizing the garlic industry through sustainable seed support systemFunded by the Department of Agriculture
Budget – 10 M 2013 – present

Project Leader: Regional Climate-Resilient Agri-fisheries (CRA) Assessment, Targeting and Prioritization in Region 1 for the Adaptation and Mitigation Initiative in Agriculture (AMIA) Phase 2
Funded by the Department of Agriculture – Bureau of Agricultural ResearchBudget – 1 M - 2016

Project Leader: Enhancing Rice based Productivity Through Utilization of High Yielding, Drought Resistant and Need-Based Technologies”
Funded by the Commission on Higher Education
Budget – 3 M 2015-March 2017

Project staff: Multi-Environment Rice Varietal testing (MET) for rainfed lowland – 2014

Project leader: Harnessing GIS and remote sensing technologies for improved governance and agricultural productivity - 2014

Project staff: Adopting to climate change in tomato production through S&T intervention - 2012-2015

Project staff: Organic fertilizers and microbials for improved soil fertility in organic vergatable production enterprise and in support to the national program on enhancing the demand for AFFNR graduates in the Philippines intervention - 2011-2012

Project staff: Systems research for intergrated resource management and land use analysis graduates - 2002

Regional scope

Project Leader: Massive Malungay Seedling Production
Funded by Department of Agriculture – Regional Field Office
Budget – 4 M January 2021 – June 2021

PUBLICATIONS (Annex E)

Journal

- a. Johnmel A. Valerozo ^{a b}, Daniel Rice ^a, DIONISIO S. BUCAO ^b, Rhian Jaymar D. Ramil ^b, Shirley C. Agrupis ^c, Anil Kumar Anal ^a Integrative approaches in microbial fermentation of underutilized crops for enhanced nutritional and bioactive functionalities, *Food Bioscience Volume 69*, July 2025,
- b. Jimenez, J. I., Bucao, D. S., Bernabe, J. A., Rosales, R. G., N. B. Legaspi, M. A. Antonio (2024). Influence of Planting Distances, Boron Application and Varying Fertilizer Levels on the yield Performance of Shallot (*Allium Cepa* var. *Aggregatum*) Across Season in Ilocos Norte, Philippines. *East African Scholars J Agri Life Sci*, 7(11), 149-164.
- c. BUCAO DS & Jilves I. Jimenez (2024). Modified Double Row Spacing and Fertilizer Rate for Improved Productivity of Glutinous Corn. *EAS J Vet Med Sci*, 6(4), 86-100.
- d. GANN, P.J.I., Fabia, J.Z.P., Pagurayan, A.G.B., Agcaoili, M.J.T., Pascual, R.J.J., Baranda, S.M., Racho, A.J.J., Olivar, M.P., Cariaga, J.F., Domingo, A., BUCAO, D.S., and Agrupis, S.C. (2024). Carbohydrate Hydrolytic Activity, Antimicrobial Resistance, and Stress Tolerance of *Lacticaseibacillus paracasei* BCRC-16100 and *Lacticaseibacillus paracasei* ZFM54 for Probiotics Using Genomic and Biochemical Approaches. *Journal of Pure and Applied Microbiology*, 18(4), pp. 2806-2822.

- e. BUCAO, D.S., Utrera, R.T., Galacgac, E.S., and Sagsagat, F.C. (2023). Land Suitability Assessment for Garlic in Region I. *MMSU Science and Technology Journal*, 10(1), pp. 41-56.
- f. Acang, J.P.A., Contillo, G.L., BUCAO, D.S., Alibuyog, N.R., Pascual, R.J., Galacgac, E.S., Manuel, M.B., Dadoy, K.C.A. (2023). Mitigating Garlic Insect Pests and Diseases Using Knowledge-Driven Decision Support System. In *2023 IEEE 15th International Conference on Humanoid, Nanotechnology, Information Technology, Communication and Control, Environment, and Management (HNICEM 2023)*. DOI: 10.1109/HNICEM60674.2023.10589179.
- g. Bucao, D.S., & Bucao, X.E.N. (2023). Food to Medicine: The Impact of Soil and Climatic Factors on the Phytochemical Property of Anahaw (*Saribus rotundifolius* (Lam.) Blume) Shoot. In *Plant Diversity in Biocultural Landscapes*, pp. 259-276. Springer Nature Singapore.
- h. Acang, J.P.A., Contillo, G.L., Bucao, D.S., Alibuyog, N.R., Pascual, R.J., Galacgac, E.S., Manuel, M.B., Dadoy, K.C.A. (2023). Towards Automatic Detection of Garlic Insect Pests and Diseases in Digital Images. In *2023 IEEE 15th International Conference on Humanoid, Nanotechnology, Information Technology, Communication and Control, Environment, and Management (HNICEM 2023)*. DOI: 10.1109/HNICEM60674.2023.10589168.
- i. BUCAO, DS, Yapit R.H., Gabriel M.L.S. (2019) Biochemical Characterization of Microbials and Their Effects on the Growth and Yield of Multiplier Onion (*Allium ascalonicum* L.) in Northwestern Philippines. In: Sayyed R., Reddy M., Antonius S. (eds) Plant Growth Promoting Rhizobacteria (PGPR): Prospects for Sustainable Agriculture. Springer, Singapore pp 75-91.
- j. BUCAO, DS, Gano, MR, Nicolas, SB, Cajigal, ARV, Lucas, MP, Demandante, SR, Labii, J, Aganus,CMB. (2018). Sustaining Crop Productivity in Climate-Vulnerable Areas in Ilocos Norte Through Science and Technology Community-Based Farm Project on Climate-Resilient Production Technologies. ILAARRDEC 2018 R&D Highlights
- k. Badar, AJ, Antonio, MA, Agustin, EO, BUCAO, DS, Gorospe, M.A.B. (2017) Growth and Yield Performance of Traditional Upland Rice Varieties in Low Elevation Upland Agro-Ecosystem.MMSU Science and Technology Journal, Vol. VII No. 2 July – December 2017
- l. BUCAO, DS, RS Yapit, MLS Gabriel, and DRS de Leon. 2015. Effectiveness of Potential Biofertilizers, Organic and Inorganic Fertilizers on the Growth and Yield of Multiplier Onion (*Allium ascalonicum* L.).Journal in Organic Agriculture. Vo1. 1:81-100.
- m. BUCAO, DS and DRS de Leon. 2014. Isolation, Characterization, and Evaluation of Plant Growth-Promoting Rhizobacteria from Rhizospheres of Sugarcane (*Sacharum officinarum*) and wild Lily sp. Science and Technology Journal. Vol. 4 No.1:1-11.
- n. BUCAO, DS, AB Alcoy, EO Agustin, and CG Acosta. 2010. Irrigation and Nitrogen Fertilization Strategies for Bontoc Pepper. MMSU Information and Technology Book 1 pp 59-60.
- o. BUCAO, DS, RJ Gumtang, NR Alibuyog, EO Agustin, and TP Tuong. 2010. Crop Diversification and Intensification Impacts on Groundwater Resource. MMSU Information and Technology Book 1 pp 105-109.
- p. Pascua, ME, MA Antonio, DS BUCAO, EO Agustin, MLS Gabriel, and SMA. Publico. 2010. Vanishing Plant Species in the Ilocos. MMSU Information and Technology Book 1 pp 59-60.
- q. BUCAO, DS, RT Utrera, MCB Birginias, and ES Galacgac. 2009. Effect of Tillage Practices and Fertilizer Levels on the Performance of Major Rice-Based Crops Under Rainfed Lowland Condition inMMSU. In: Agriculture in the Ilocos – Farm Technologies & Information Vol. 4. pp 150-158.
- r. BUCAO, DS, RT Utrera, MCB Birginias, and ES Galacgac. 2008. Effect of Tillage Practices and Fertilizer Levels on the Performance of Major Rice-Based Crops Under Rainfed Lowland Condition. Philippine Journal of Crop Science Vol. 35. ISSN – 0155-463x.
- s. BUCAO, DS, AB ALCOY, EO AGUSTIN, and CG ACOSTA. 2004. Recommended Irrigation and N Fertilization Strategies for Bontoc Pepper. In: Agriculture in the Ilocos – Farm Technologies & Information Vol. 3. pp 206-235.
- t. CASTAÑEDA AR, BAM BOUMAN, TP TUONG, AND DS BUCAO. 2003. Nitrate Contamination of Groundwater Impact from Intensive Rice-Based Cropping Systems Across Ilocos Norte. The Philippine Journal of Crop Science Vol. 26 (1):29-34.
- u. PASCUA, SR., JR., MP LUCAS, EO AGUSTIN, NR ALIBUYOG, TF MARCOS, DA VALENCIA, DR CULANNAY, MCP BAGA, DS BUCAO, AND SR OBIEN. 2000. Sustainability of Diverse Cropping Systems with Special Reference to Nutrient, Water and Pest Management in the Rainfed Lowlands of Ilocos. PhilRice Technical Bulletin Vol. 5 (2):70-82.
- v. AGUSTIN, EO, RK SHRESTHA, BP TRIPATHI, MP LUCAS, SR PASCUA JR., JK LADHA, TF MARCOS, DR CULANNAY, MCP BAGA, DS BUCAO, V BALASUBRAMANIAN, AC MORALES, SMA PABLICO, & SR OBIEN. 2000. Sustainable soil management options for highly intensified and diversified rainfed lowland rice-based cropping systems. In: Agriculture in the Ilocos – FarmTechnologies & Information Vol. 2

- (SMA Pablico & SC Malab, eds) pp 52-72.
- w. GUMTANG, RJ, MF PAMPOLINO, TP TUONG AND DS BUCAO. 1999. Groundwater Dynamics and Quality Under Intensive Cropping Systems. Experimental Agriculture. Cambridge University, Press, UK. Vol. 53:153-166.

TECHNICAL WORKING GROUP (*Annex F*)

- x. National Seed Industry Council – as Member of Seed Certification and Seed Standard Technical Working Group from 2019 to 2023.
- y. Emergency Response to COVID-19 Pandemic during the month of March to April 2020.
- z. National Seed Industry Council – as Member of Seed Certification and Seed Standard Technical Working Group from CY 2017-2018

PATENTED TECHNOLOGIES (*Annex G*)

Patent

12023050835 - Knowledge-Based Decision Support System for Mitigating Garlic Insect Pests and Diseases using Artificial Intelligence and Computer Vision

Utility Model

22023051797- Process of Making Spray dried Black Garlic Powder
 22022050892- Process of preparing mango sinigang powder mix with kamangeg
 22022050728- Composition of mango sinigang powder mix with kamangeg
 22022050893- Process of producing tomato-mango juice
 22022050729- Composition of tomango juice
 22022050895- Process in making tomango ketchup
 22022050730- Composition of tomato-mango ketchup

AWARDS RECEIVED (*Annex H*)

As Main Author and Co-author

- a. Outstanding Paper - Presentation Regional Agri-Aqua Innovation System Enhancement Program: The Case of Ilocos Region during the 6th IPOPHL-DLSU Intellectual Property and Innovation Research Conference on April 4, 2025
- b. Finalist – 2024 Government Best Practice Recognition (GBPR), Development Academy of the Philippines, November 29, 2024
- c. Outstanding Presentation Award - Soil Carbon Sequestration Assessment in Major Cropping Patterns of the City of Batac, Philippines, Faculty of Environment and Resource Studies, Mahidol University, Thailand on November 15, 2024
- d. First place (Oral Research Category) - Boosting Garlic (*Allium sativum L.*) Productivity through planting density and nutrient management optimization during the 36th Regional Symposium on R&D Highlights on November 13, 2024, in San Fernando City, La Union
- e. Best Paper Award – First Place (Oral Development Category) Regional Agri-aqua Innovation System Enhancement (RAISE): The Case of Ilocos Region during the 35th Regional Symposium on Regional Symposium on R&D Highlights on December 13-15, 2023, at the Golden Lion Hotel, Pangasinan State University, Lingayen, Pangasinan
- f. Best Paper Award – 2nd Place (Oral Research Category) Assessment of the Predominant Lowland Soils Across Selected Municipalities of Ilocos Norte during the 35th Regional Symposium on Regional Symposium on R&D Highlights on December 13-15, 2023, at the Golden Lion Hotel, Pangasinan State University, Lingayen, Pangasinan
- g. First Place – ILAARRDEC technology video competition “Turning the Ilocos White Gold into the Black Diamond of the North” during the Regional Science and Technology Week Celebration held on October 16-18, 2023
- h. Best Poster Award - Second Place (Poster Development Category) MMSU Agri-Aqua Technology Business Incubator (ATBI) during the 33rd Regional Symposium on R&D Highlights on December 1-

2, 2021, at the Mariano Marcos State University.

- i. Best Paper Award – First Place (Oral Development Category) Enhancing Intellectual Property and Technology Business Management of MMSU during the 32nd Regional Symposium on Regional Symposium on R&D Highlights on March 16-17, 2021, at the Mariano Marcos State University, City of Batac.
- j. 2020 Presidential Achieve Award – Strengthening and Sustaining the Intellectual Property and Technology Business Management for being granted technology support from the PCAARRD during the PRAISE Awarding Ceremony on the occasion of the 43rd Foundation Anniversary Celebration of the University on January 29, 2021
- k. Best Paper Award – Second Place (AANR and Climate Change Category) Promoting Innovative Climate-Resilient Production Technologies Through AEKMS Approach in Vulnerable Areas of Ilocos Norte for Sustained Crop Productivity during the National Conference on Higher Education Institutions’ Extension Best Practices and Innovations on November 25-26 2019 at the Century Park Hotel, Manila.
- l. 2018 Presidential Award – Best Performing Research and Extension Projects research project entitled “Harnessing GIS and Remote Sensing Technology towards Improved Agricultural Productivity and Governance” during the Program on Awards and Incentives for Service Excellence (PRAISE) ON 22nd January 2019 at Teatro Ilocandia, MMSU.
- m. 2018 Presidential Award – Special Citation to University Intellectual Property Office during the Program on Awards and Incentives for Service Excellence (PRAISE) ON 22nd January 2019 at Teatro Ilocandia, MMSU
- n. AFMA R&D Paper Award – for the paper entitled “Identification and Prioritization of Climate Resilient Agriculture (CRA) Practices and Adaptive Capacity Indices of Local Government Units of Ilocos Sur, Philippines” during the 30th National Research Symposium on 7 November 2018, at the International Convention Center, Vicente Sotto St., Pasay City
- o. Best Paper – “Sustaining Crop Productivity in Climate Vulnerable Areas in Ilocos Norte through STCBF on Climate Resilient Production Technologies” during the 2018 Agency In- house Research Review for Social Sciences, Education, Health and Related Fields on 24-25 July 2018, at the One-Stop Information Shop, Crops Research Laboratory, City of Batac, Ilocos Norte
- p. Best Presenter during the 2018 Agency In-house Research Review for Social Sciences, Education, Health and Related Fields on 24-25 July 2018, at the One-Stop Information Shop, Crops Research Laboratory, City of Batac, Ilocos Norte
- q. Best Poster Award – First Place (Development Category) for the poster paper titled “Napasayaat a Wagas iti Panagaramat Kadagiti Teknolohiya: Tulbek iti Mataginayon Ken Naprogresso a Panagtalon” during the 29th Regional Symposium on Regional Symposium on R&D Highlights on 27-29 November 2017, at the Mariano Marcos State University, City of Batac.
- r. Best Poster Award – Second Place (Research Category) for the poster paper titled “Land Suitability Assessment for Garlic in Ilocos Region” during the 29th Regional Symposium on Regional Symposium on R&D Highlights on 27-29 November 2017, at the Mariano Marcos State University, City of Batac.
- s. Best Poster Award – First Place (Research Category) for the poster paper titled “Climate Risk Vulnerability Assessment of Ilocos Sur” during the 29th Regional Symposium on Regional Symposium on R&D Highlights on 27-29 November 2017, at the Mariano Marcos State University, City of Batac.
- t. AFMA R&D Paper Award (Adaptive Research Category) for the paper entitled “Land Suitability Assessment for Garlic in Ilocos Region” during the 29th National Research Symposium at DA-BAR, Quezon City on November 22, 2017
- u. Best Paper Award – Third Place (Crops and Agroforestry Category) for the paper entitled “Enhancing rice-based productivity through the utilization of high yielding, drought resistant and need-based technology” during the 1st CHED NAFES National Symposium held on March 20-21, 2017 at Clark, Pampanga.

Institutional Award/Certificate of Distinction (Annex I)

- a. 2024 Outstanding Researcher Award given during the 47th Foundation Anniversary of the Mariano Marcos State University held at the Teatro Ilocandia, MMSU, City of Batac on January 27, 2025

- b. 2023 Outstanding Researcher – Directors Award given on October 9, 2023, at MMSU-CRL, City of Batac, Ilocos Norte
- c. 2020 Outstanding Researcher Award given during the 43rd Foundation Anniversary of the Mariano Marcos State University held at the Teatro Ilocandia, MMSU, City of Batac on January 29, 2020.
- d. 2014 Outstanding Researcher Award given during the 37th Foundation Anniversary of the Mariano Marcos State University held at the Teatro Ilocandia, MMSU City of Batac on January 7, 2015.
- e. Presidential Award for garnering the AFMA Best Paper Award (Bronze) for the paper entitled “Harnessing remote sensing and geographic information System technologies through improved governance and agricultural productivity given during the 36th Foundation Anniversary of the Mariano Marcos State University held at the Teatro Ilocandia, MMSU City of Batac on January 7, 2015.
- f. Plaque of Recognition for having completed the degree of Doctor of Philosophy in Soil Science under the DOST-SEI Accelerated S&T Human Resource Development Program during the DOST-Science and Technology Week on July 29, 2011.
- g. Plaque of Recognition for having completed the degree of Doctor of Philosophy in Soil Science under the DOST-PCARRD Scholarship Program during the DOST-Science and Technology Week on July 21, 2010.

DISSEMINATED/COMMERCIALIZED TECHNOLOGIES (*Annex J*)

- 1. Garlic and Other Agrifood Condiments R&D Center
- 2. Improving Garlic Productivity through an Integrated Crop Management System
- 3. Influence of Planting Distances, Boron Application and Varying Fertilizer Levels on the yield Performance of Shallot (*Allium Cepa* var. *Aggregatum*) Across Season in Ilocos Norte
- 4. Sustaining Crop Productivity in Climate Vulnerable Areas in Ilocos Norte Through Science and Technology-Community-Based Farm Project on Climate-Resilient Production Technologies

I hereby certify to the correctness of the information presented above.



DIONISIO S. BUCAO