PANGASINAN STATE UNIVERSITY

Project Proposal for the
Department of Agriculture High Value Crops and Rural Credit
MASSIVE SEEDLING DISTRIBUTION PROGRAM FOR MORINGA

Advancing the Moringa Industry: Strengthening the Organic Moringa Stakeholders Network in Pangasinan through Participatory Research, Production, and Extension

A. BASIC INFORMATION

1. TITLE OF THE PROJECT

Advancing the Moringa Industry: Strengthening the Organic Moringa Stakeholders Network in Pangasinan through Participatory Research, Production, and Extension

(The Massive Moringa Seedling Production and Distribution Project of PSU-DA RFO1 under Bayanihan We Recover as One Act or Bayanihan II and Plant Plant Plant Program)

2. PROPONENTS

Project Leader

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- Engr. Romeo Ancheta
- Engr. Jerves Geron
- Mr. Robert Paduga
- Mr. Mark Argyll Tabaoan

Co-implementer from DA
- Dr. Marvin Quilates

Co-implementer from Moringaling Philippines Foundation Inc. and SBE Farm Inc.
- Dr. Bernadette Estrella-Arellano

3. IMPLEMENTING AGENCIES

a. Lead Agency: Pangasinan State University

b. Collaborating Agencies

DA RFO1

MPFI and SBE Farm Inc.

4. PROJECT DURATION

January to June, 2021

5. PROJECT LOCATION

Project Site: PSU Sta. Maria Campus
Identified production sites:
Malasiqui, Pangasinan
Natividad, Pangasinan
Asingan, Pangasinan
San Fabian, Pangasinan
Dasol, Pangasinan
San Manuel, Pangasinan

6. TOTAL BUDGET REQUIREMENT

6.1 Budget Requested: Php4,000,000.00 (DA)
6.2 Agency Counterpart: Php400,000.00 (PSU)
1 ha. area for germplasm center at PSU and nursery
2 units of Greenhouse for seedling nursery
6.3 Other sources: additional 8-ha. area for seedling nursery and moringa plantation in various locations

B. TECHNICAL DESCRIPTION

1. RATIONALE

Globally, Moringa or malunggay (*Moringa oleifera*) is being marketed as a "Superfood", a "Miracle Plant" and a "Green Gold" by nutraceutical, pharmaceutical, personal care, food, and beverage companies. The current supply of Organic Moringa for local and export market is not enough. Due to CoVid-19 pandemic, farmers and other stakeholders suffer from fluctuating

prices of commodities, lack of buyers or market for their products and lack of opportunities for alternative source of income.

One of the most active and the largest network of Moringa stakeholders, the Moringaling Philippines Foundation Inc (MPFI), became the industry partner of PSU last August 17, 2020 through a memorandum of agreement. PSU proposes the establishment of Organic Moringa plantation in Pangasinan and the establishment a Moringa genebank/germplasm collection center at PSU Sta. Maria Campus in support to massive seedling production, conservation and propagation of Moringa species and varieties for research, production, instruction, and extension purposes under the Moringa Production Program. Farmers associations in Pangasinan who are engaged in organic farming will be assisted in establishing their organic moringa farms to produce organic moringa leaves and seeds which are currently in high demand due to their nutraceutical and pharmaceutical properties.

Figure 1. PSU-MPFI MOA Signing to promote Moringa on August 7, 2020

Agriculture Secretary William D. Dar reiterated the government's commitment to help farmers through the Ahon Lahat, Pagkaing Sapat or ALPAS COVID-19, otherwise called the Plant, Plant, Plant program. Under the Bayanihan We Recover as One Act, farmers will be the primary beneficiaries of the Massive Seedling Distribution Program to plant high value crops including Moringa to help them earn income for their families and help them recover from the economic crises brought by CoVid-19 pandemic.

Moringa oleifera is native to India but has become a traditional vegetable plant in the Philippines. Moringa, malunggay, or marungay is a popular Ilokano vegetable and is often used as ingredient in many Ilokano dishes. It is also used an added ingredient for the famous Filipino bread "Pandesal" for additional nutrients. Though popular because of its nutritional and health benefits, it is not grown as a main product in rural communities. It grows in backyards and roadsides and used as perimeter fence, but most farmers have not considered this as a main crop.

For the last 10 years, however, Moringa in the Philippines as an industry has seen significant progress with more farms devoting large areas for Moringa leaf production such as those in Rosales, Pangasinan, Laguna, Cavite, Batangas, Bicol, Zamboanga because of the rising awareness among the consumers regarding the benefits of moringa, good export value and the increasing demand from pharmaceutical companies marketing Moringa leaf powder as food supplement. The oil extracted from the seeds is also a product with very high potential in the export market.

The demand for moringa products has been increasing worldwide. The Asia-Pacific region is the largest producer of Moringa products and also accounted for 35.60% of the global demand. The increasing demand for Moringa products has created opportunities for this industry to grow. Moringa leaf and leaf segment dominated the market with 41% share in 2018 according to Market Research Future (2018).

The establishment of a one-hectare Moringa genebank/germplasm collection center in PSU and 8 seedling nurseries strategically located within Pangasinan will support the massive seedling production of organic Moringa, conservation and propagation of Moringa species and varieties for research, production, instruction, and extension purposes. With MPFI and DA Region1 as collaborative partners, 8 farmers associations in Pangasinan will be assisted in establishing their own seedling nursery and organic moringa farm. The MPFI through SBE Farm Inc in Rosales, Pangasinan will provide the technical expertise for capability enhancement. An internal control system (ICS) operations manual proposed by DA Region 1 Organic Agriculture Program will be used to guide, monitor, and evaluate organic farm operations and compliance. SBE Farm Inc through their owner Dr. Bernadette E. Arellano, the managing director of MPFI, will assist PSU and DA Region 1 in the training or capability building and will provide technical support to operations, monitoring and evaluation.

2. OBJECTIVES

Goal: To increase the Organic Moringa production in Pangasinan and increase the livelihood opportunities for farmers and farmers associations to recover from economic crisis brought by CoVid-19 pandemic

General Objectives:

1. To establish seedling nursery to produce at least 40,000 Organic Moringa seedlings ready for distribution to beneficiaries
2. To establish a Moringa germplasm collection and conservation center to evaluate accessions and ensure quality of seeds
3. To establish a network of Organic Moringa Producers in Pangasinan with internal control system to ensure good quality of produced leaves and seeds

3. GENERAL METHODOLOGY

I. LOCATION

9 Seedling Production Sites:
Site 1. PSU Sta. Maria Campus
Site 2. Brgy. Bacundao West, Malasiqui, Pangasinan
Site 3. Brgy. Warey, Malasiqui, Pangasinan
Site 4. Brgy. Poblacion West, Natividad, Pangasinan
Site 5. Brgy. Poblacion East, Natividad, Pangasinan
Site 6. Asingan, Pangasinan
Site 7. Brgy. Lipit-Tomeeng, San Fabian, Pangasinan
Site 8. Brgy. Malimpin, Dasol, Pangasinan
Site 9. San Manuel, Pangasinan

II. BENEFICIARIES

1. Nagkakaisang Organikong Magsasaka ng Bacundao, Inc.
2. Grain Seeds Farmers Association, Inc.
3. Casamuob Farmers Association, Inc.
4. Natividad United Farmers Association, Inc.
5. Rang-Ay Asingan Farmers Association, Inc.
6. San Fabian Organic Farmers & Fisherfolks Association, Inc.
7. Dasol P4MP Incorporation
8. Timpuyog ti San Manuel Upland Farmers Association, Inc.

III. COMPONENTS

1. Establishment of 9 seedling nurseries to produce at least 40,000 Organic Moringa Seedlings ready for distribution to beneficiaries
2. Establishment of Moringa germplasm collection and conservation center to evaluate accessions and to ensure quality seeds

3. Eight organized Organic Moringa Producers in Pangasinan with internal control system

Project component 1. Establishment of Moringa Seedling Nurseries in 9 locations and One Hectare Seedbank or Germplasm Collection and Conservation Center in PSU

Location: PSU Sta. Maria Campus and 8 on-farm sites (Farmers' organizations)

Objectives:

1. To construct seedling nurseries in 9 sites in Pangasinan
2. To immediately produce at least 40,000 Moringa Seedlings from Organic-certified seeds ready for distribution to farmers
3. To collect and preserve Moringa seeds from different provinces and regions of the country.
4. To characterize Moringa germplasm accessions (identification, classification, estimate variation)
5. To identify accessions with desired characteristics/traits: seed germination, fast growing, resistance to pest, diseases, and abiotic stresses, high yield (leaves/seed/oil), and highest nutritional value (preliminary study)
6. To select best accession and produce seeds for propagation/future seed production
7. To monitor and evaluate the growth and yield performance of planted Moringa in 9 locations to ensure sustainability.

Organic-certified seeds of *Moringa oleifera* from MPFI members will be purchased to produce the initial 40,000 seedlings ready for distribution to identified beneficiaries which is required output of this project. However, a total of 54,000 seedlings will be produced. The seedlings will be produced from seeds at the 9 seedling nurseries located in western, central and eastern part of Pangasinan. The seedling production sites will be located in PSU Sta. Maria Campus; and in the Farmers' organization located in 1.) Brgy. Bacundao West, Malasiqui, Pangasinan; 2.) Brgy. Warey, Malasiqui, Pangasinan; 3.) Brgy. Poblacion West, Natividad, Pangasinan; 4.) Brgy. Poblacion East, Natividad, Pangasinan; 5.) Asingan, Pangasinan; 6.) Brgy. Lipit-Tomeeng, San Fabian, Pangasinan; 7.) Brgy. Malimpin, Dasol, Pangasinan; and 8.) San Manuel, Pangasinan. Each site will allocate at least 1 hectare for the initial production of Organic Moringa. Each site will plant 5,000-6000 seedlings depending on the preferred planting distance and intended purpose of production. Each site can produce both moringa leaves and seeds.

Moringa oleifera grown in different regions will be collected, germinated, and transplanted to the field for characterization and evaluation. Moringa accessions will be germinated and transplanted to the field for seed multiplication, characterization and evaluation. Promising accessions from different Moringa

farms of MPFI members will be evaluated. Variability of Moringa accessions in terms of horticultural traits will be assessed. Nutrient content of Moringa lines or ecotypes will also be investigated as our preliminary study on nutritional value of the accessions.

Moringa grows in tropical zone. Optimal growth is between 25 to 35^{o}C but will survive up to 48^{o}C. Well established Moringa trees are drought-tolerant but grows well in areas with annual rainfall ranging from 250 to 1500 mm. Moringa grows best below 600 m but can grow in altitudes up to 1200 m in the tropics. Moringa prefers a well-drained sandy loam or loamy soils. It does not tolerate waterlogged soil or with prolonged flooding or poorly drained clay soils. It can tolerate wider range of soil pH (5.0–9.0). Moringa oleifera is the most widely cultivated. Superior types must have wide and dark green leaves, long and tender pods, bushy habit, and rapid regeneration after trimming. PKM1 which was derived from *M. oleifera* is one of the Moringa accessions to be grown in the center. It has heavy biomass and tender leaves. However, it is highly recommended that growers use locally adapted lines or ecotypes. An ecotype is a population of plant adapted to a particular set of local environmental conditions. The researchers will determine if native Moringa accessions in the center belong to one ecotype, have similar or different traits, and if all lines or ecotypes can adapt to Pangasinan conditions. The farms of eight farmers' group in this project will also serve as seedbank and trial sites for the promising lines or ecotypes.

Soil Testing. Prior to planting, soil samples from the site and from the candidate production areas of the farmer groups will be taken and composites will be sent to soil lab for analysis. The following soil parameters will be determined: Total Nitrogen (N), Available Phosphorus (P), Exchangeable Potassium(K), Calcium (Ca), Magnesium (Mg), Sodium (Na), Electrical Conductivity (EC), pH, Organic Matter (OM), Cation Exchange Capacity (CEC), Trace elements (Cu, Zn, Mn, Fe), Soil Texture, Heavy metals (Lead, Arsenic, Cadmium, Mercury, and Glyphosate Residue Analysis.

Experimental design. The field trial at PSU Sta. Maria Campus will be laid out in a randomized complete block design (RCB) with 3 replications following the recommendation from AVRDC (Dinssa et al., 2015). Moringa accessions in the farms of 8 associations under Project component 2 will not be replicated but will serve as one replicate for our on-farm trials (under different conditions).

Data collection. For the evaluation of Moringa accessions' the horticultural traits. The following parameters will be collected including plant height, canopy width, stem diameter, number of side shoots or branches after pruning, growth habit, number of days from transplanting to flower formation and fruit (pod) development, leaf and stem biomass and incidence of insect pests and diseases. Additional data will be collected such as pod size at maturity, seed weight, flower color and size, number of seeds per pod, seed oil content, tolerance to flooding and survival after heavy rainfall and strong wind (caused by Typhoon/Tropical cyclones), daily meteorological data, chlorophyll content, soil moisture and pH, pest damage and disease severity.

For the Moringa leaf tissue analysis, fresh or dried harvested leaves of each accession will be subjected to analyses. The following parameters will be determined: Moisture, Total Fat, Crude Protein, Ash, Total Dietary Fiber, Total Carbohydrate, Sodium, Iron, Calcium, Potassium, Zinc, Beta-carotene and Ascorbic Acid.

Superior and promising accessions will be selected for multiplication to meet the increasing demand for quality seed and planting materials of Moringa. Also, sufficient seeds will also be needed for future replicated evaluation trials and seed distribution/dispersal to farm communities to utilize marginal lands.

Planned Activities:

1. Purchase of organic-certified seeds on Moringa
2. Construction of seedling nurseries
3. Production of seedlings
4. Distribute and plant seedlings
5. Germplasm collection/seed acquisition from MPFI members
6. Soil testing and analysis (Germplasm site and the 8 farms)
7. Perimeter Fencing for 1ha site of the seedbank/germplasm center
8. Sowing and Seedling care and management
9. Land Preparation and lay-out
10. Transplanting
11. Production management
12. Plant tissue sampling and analysis
13. Data collection, Monitoring, and Evaluation.
14. Data analysis and evaluation of results
15. Harvesting, selection, seed storage
16. Seed production
17. Standardization of germplasm conservation (handling, seed storage)

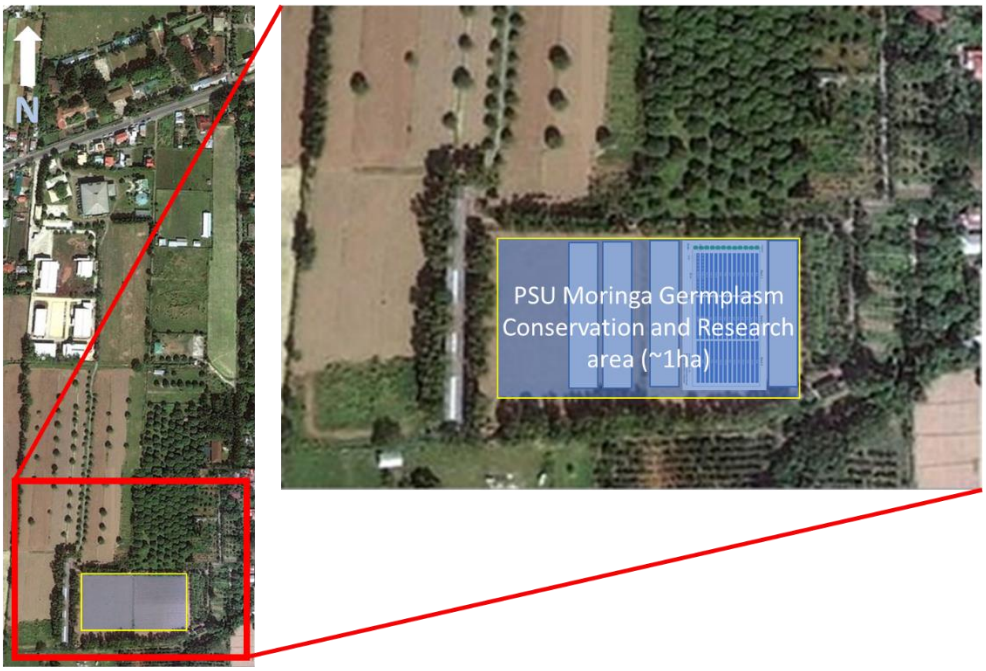
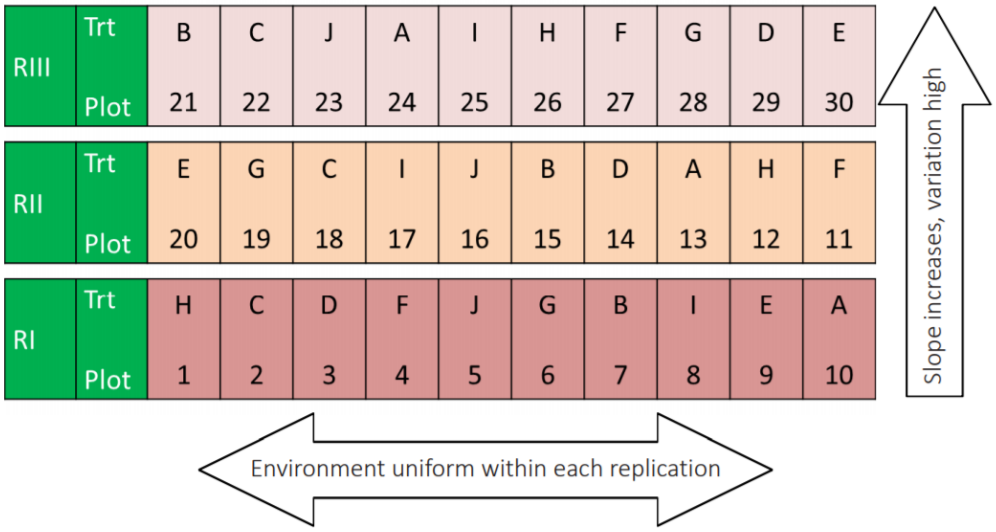


Figure 2. Selected site for PSU Germplasm Collection and Research area at PSU Sta. Maria Campus

Figure 3. Greenhouses at PSU Sta. Maria Campus



(Recommendation from Fekadu F. Dinssa et al. 2015)

Figure 4. Sample Experimental Lay-out for the Performance Evaluation of Moringa Accessions

Table 1. Schedule of Activities

Starting Date: Jan. 2021		Completion Date: June 2021			Duration			
Activity No.	**Major/Sub-Activity**	**Anticipated Results**	**Responsible Person(s)**	**Resources / Documents Required**	**Year 1**			
					Q1 2021	**Q2 2021**	**Q23 2021**	**Q4 2021**
Pre-implementation	MOA Signing Briefings, Launching	MOA, Organized network of potential organic moringa producers	PSU, DA	Draft MOA, Presentation				
1	Request purchase of supplies and equipment	Purchased supplies and equipment	Project leader Supply Officer Accountant	Request letters, approved budget releases				
2	Soil Sampling for testing, send samples to laboratory	Results of Soil Analysis	PSU soil scientist	Soil auger and sampling bucket				
3	Preparation of seedling soil media including soil sterilization	Prepared soil media	Hired laborers Farm assistant	Cocopeat, vermicompost, CRH, soil, Shovels				
3	Sowing of moringa seeds in pots	Moringa seedlings	Hired laborers	Compost & plastic pots				
4	Clearing of the area	The area should be clear of weeds prior to land preparation	Hired laborers	Grass cutters				
5	Fencing of site perimeter (1ha area)	Fenced protected site	Hired laborers	Fencing materials and tools				
6	Land preparation	The area should be well prepared prior to establishment of planting holes	Hired laborers	Tractor				
7	Establishment of planting holes	Holes 1 foot deep will be dug within the area of planting	Hired laborers	Pole digger & shovels				
8	Application of compost (prior to planting)	Compost will be applied in each hole	Hired laborers	Compost				
6	Transplanting	Seedlings will be transplanted	Hired laborers	Shovels & other implements				
7	Irrigation	Watering must be done after transplanting	Hired laborers	Hose & water pump				
8	Weeding (monthly)	Monthly clearing of the area must be done to avoid weed competition	Hired laborers	Clearing implements				
9	Application of compost (6mos after)	Replenishment of source of nutrition must be done	Hired laborers	Compost				

10	Harvesting	Harvesting of matured leaves base on requirement	Hired laborers	Crates and harvesting materials				
11	Sampling, Data Collection and analysis	Data for all parameters	Research Assistant	Appropriate equipment and tools				

Project Component 2. Organic Moringa Production through Farmers Participation in research, production, and extension

A community-based participatory research, production, and extension approach using a focused, single-theme collaboration among the parties namely: the Pangasinan State University, the Moringaling Philippines Foundation Inc., the Department of Agriculture Region 1, and the farmers' organizations will be used as a model. In this model, we will see a convergence of academic and farmers' interests and shared goals. Organic farmers' groups will be selected and trained. A farmers' group with a similar mission to implement and promote Organic Moringa will be selected. They must have a strong leadership and cooperative members. In this project, eight farmers' groups will participate. A need assessment and a consultative meeting was conducted during the preparation of this project proposal. Briefings and trainings will be conducted. The eight organizations will participate fully in all aspects of the research, production, and extension activities.

Planned Activities.

1. Conduct of Consultative Meeting/ Briefing Orientation with Moringa Stakeholders
2. Technical Briefing on Organic Moringa Production
3. Technical Briefing on the Installation of Internal Control System (ICS) Manual for 8 Farmers Associations
4. Monthly Project Assessment cum consultation with 8 Farmers Association
5. Conduct of Community Participatory Action Research & Extension (CPARE) c/o PSU

   Briefing/Orientation/Consultative Meeting with Participating 8 Farmers Associations (FA) in Malasiqui (2); Asingan (1); Natividad (2); Dasol (1); San Manuel (1); &San Fabian (1)

Table 2. LIST OF ASSOCIATIONS FOR ORGANIC MORINGA PRODUCTION

Name of farmer organization	Municipality	Pilot Area
1. Nagkakaisang Organikong Magsasaka ng Bacundao, Inc.	Brgy. Bacundao West, Malasiqui, Pangasinan	1.0 hectare
2. Grain Seeds Farmers Association, Inc.	Brgy. Warey, Malasiqui, Pangasinan	1.0 hectare
3. Casamuob Farmers Association, Inc.	Brgy. Poblacion West, Natividad, Pangasinan	1.0 hectare

4. Natividad United Farmers Association, Inc.	Brgy. Poblacion East, Natividad, Pangasinan	1.0 hectare
5. Rang-Ay Asingan Farmers Association, Inc.	Asingan, Pangasinan	1.0 hectare
6. San Fabian Organic Farmers & Fisherfolks Association, Inc.	Brgy. Lipit-Tomeeng, San Fabian, Pangasinan	1.0 hectare
7. Dasol P4MP Incorporation	Brgy. Malimpin, Dasol, Pangasinan	1.0 hectare
8. Timpuyog ti San Manuel Upland Farmers Association, Inc.	San Manuel, Pangasinan	1.0 hectare

Table 3. Seedling Production Schedule (2,000 seedlings per month) for the project

Organization	Feb-Mar 2021	Mar-Apr 2021	Apr-May 2021	Total
PSU	2,000	2,000	2,000	6,000
Nagkakaisang Organikong Magsasaka ng Bacundao, Inc.	2,000	2,000	2,000	6,000
Grain Seeds Farmers Association, Inc.	2,000	2,000	2,000	6,000
Casamuob Farmers Association, Inc.	2,000	2,000	2,000	6,000
Natividad United Farmers Association, Inc.	2,000	2,000	2,000	6,000
Rang-Ay Asingan Farmers Association, Inc.	2,000	2,000	2,000	6,000
San Fabian Organic Farmers & Fisherfolks Association, Inc.	2,000	2,000	2,000	6,000
Dasol P4MP Incorporation	2,000	2,000	2,000	6,000
Timpuyog ti San Manuel Upland Farmers Association, Inc.	2,000	2,000	2,000	6,000
TOTAL	**18,000**	**18,000**	**18,000**	**54,000[1]**

[1]Target output: at least 40,000 seedlings with additional seedlings for distribution to schools and LGUs

SUSTAINABILITY PLAN

The germplasm center and nurseries will have perimeter fences to ensure biosafety. The clonal propagation center and the two existing greenhouses of PSU will be used as the nursery area for the seedlings. A hardening area for seedling will be constructed. An approximately 20 sq.m. storage room for the seeds shall be allocated for the project. The germplasm center will monitor the moringa plantation of farmer-cooperators and ensure that moringa plants are healthy and highly productive and thus are profitable.

The 9 farms will be using various combinations of organic fertilization and organic production protocol. There will be a cost/benefit analysis as to which protocol will be best for the farmers. Soil testing and water source testing will be conducted to ensure that identified areas are free from heavy metals. Additional seedlings produced by PSU and farmers will be distributed to other farmers, schools, and government agencies to comply with the requirements of the project. Documentation of best practices will be done to produce a manual to guide farmers in the profitable operation of moringa plantations. The Pilot farms will be converted into regular farms but data collection will continue until the

planting materials are replaced. The owners of the farm will share in the cost of operations.

GAP or Organic Certification will be sought after an internal control system and manuals have been prepared with the help of DA Organic Agriculture Program. PSU, MPFI, DA RFO1 will closely monitor the implementation of the project. To ensure profitable operations, PSU with the assistance of MPFI will link the farmers to the market. The President of MPFI, Mrs. Genara Matsuoka, will be the primary buyer of organic moringa leaves whereas seeds can be processed and sold to other nurseries and farmers. PSU, MPFI, and DA RFO1 will conduct trainings on management of organic moringa farm, seedling care and management, financial management, marketing and value-adding.

4. EXPECTED OUTPUT

a. Production of at least 40,000 organic moringa seedlings ready for massive distribution
b. Nine (9) established moringa seedling nurseries in various locations
c. Established moringa plantation at 9 locations in Pangasinan with a total land area of 9 hectares.

5. POTENTIAL IMPACT

This project will give the farmer-members affected by economic crisis an alternative livelihood to help them recover fast. Farmers' groups will directly benefit from the project. Each organization will receive a total amount of Php348,120.00 in the form of supplies, irrigation system, and farm equipment. This will serve as a start-up capital or investment for their Moringa business project. The project is sustainable as it can be replicated in other farms. More seedlings can be produced within 6-month production period.

For the first 6 months, the Germplasm center in PSU Sta. Maria will serve as a techno-demo farm and venue for Moringa Techno-Forum, Symposia, and Farmer Congress. The Germplasm center will be an important component of the project as it will ensure that Moringa varieties and ecotypes all over the Philippines are deposited and kept in one location and seeds can be accessed by all the members of MPFI and farmer groups who are interested in starting their own Moringa plantations. The Germplasm Center will serve as research hub for Region 1.

6. MILESTONE

a. Launching of the project and briefing with the farmers is done by end of January
b. Groups of farmers are organized and trained by mid-February, 2021
c. 9 nurseries are established by the end of February, 2021
d. 40,000 seedlings produced by the end of June, 2021

e. 75% of the produced seedlings are already distributed and planted in identified moringa plantations by the end of June, 2021

7. USERS

- End users are the farmers' associations that are willing to engage in organic moringa production and are willing partners in seedling production.

- Seedlings produced by the project will also be distributed to schools and LGUs that are interested in establishing their own moringa plantation.

8. BUDGET REQUIREMENT

8.1 Personnel Services (PS)

Salary and Wages:	Php 276,800.00

8.2 Maintenance and Other Operating Expenses (MOOE)

Supplies and Materials (seeds, fertilizer, etc.)	1,051,650.00
Soil tests and water source microbial analysis	502,060.00
Printing services (brochures, protocol)	15,000.00
Cost to train the farmers	64,000.00
Contingencies/Miscellaneous Expenses	83,490.00

8.3 Equipment Outlay

Equipment (For field, postharvest, office, data collection)	1,337,000.00
Shallow tube well installation	180,000.00

8.4 Administrative Cost

Admin Cost	40,000.00

8.5 Construction/Rehabilitation

Construction of Nursery/Hardening Area	450,000.00

TABLE 4. LINE ITEM BUDGET

Item	Categories/Description	Quantity	Amount	Total
A. Germplasm Establishment in 9 Sites (PSU and 8 Organic Farmers' Organizations)				
Supplies/Materials	Moringa Seeds	30 kg	2,000.00	**90,000.00**
	Polyethylene bags	72,000 pcs	2.00	**144,000.00**
	Cocopeat)	90 bags	200.00	**18,000.00**
	Carbonized rice hull	4,500 kg	5.00	**22,500.00**
	Vermicompost	450 bags	300.00	**135,000.00**
	Hog wire	135 rolls	1,500.00	**270,000.00**
	Concrete post (pcs)	155 pcs	1000.00	**155,000.00**
	G.I. wire # 16	70 kg	150.00	**2,700.00**
	Chicken Wire	20 rolls	2,500.00	**50,000.00**
	Barbed Wire	36 rolls	1,200.00	**43,200.00**
	Plastic Drum with cover	9 pcs	1,500.00	**13,500.00**
	Molasses	210 L	45.00	**9,450.00**
	Cement	100 bags	25.00	**25,000.00**
	Galvanized Iron Corrugated Roofing Sheets	120 sheets	600.00	**72,000.00**
Facility/ Machinery/ Equipment	Battery-Operated Knapsack Sprayer (1 pc @ 9 sites)	9	3,500.00	**31,500.00**
	Irrigation Equipment or Water Pump with complete accessories (1 set @ 9 sites)	9	50,000.00	**450,000.00**
	Establishment of Shallow Tube Well	9	10,000.00	**90,000.00**
	Soil Auger	9	10,000.00	**90,000.00**
	Grass cutter	9	8,000.00	**72,000.00**
Labor and Wages				
(Pakyaw Services for PSU germplasm center)	Fencing		2,000.00	**2,000.00**
	Plowing		1,800.00	**1,800.00**
	Harrowing		3,600.00	

				3,600.00
	Layout (MD)	2	400.00	**800.00**
	Canal and plot prep (MD)	10	400.00	**4,000.00**
	Seedling care and mgt		3,000.00	**3,000.00**
	Transplanting		3,000.00	**3,000.00**
	Irrigation and Weeding and other mgt (MD)	120	400	**48,000.00**
	Data Recording and Analysis (MD)	120	400	**48,000.00**
Soil Testing (complete with heavy metal - pls see breakdown)	PSU Site (samples)	5	12,880.00	**64,400.00**
Water microbial analysis	10 Sites (source of water for washing leaves) PSU, 8 FOs, SBE (demo farm)	10	2,550.00	**25,500.00**
Establishment of 9 Nursery/Hardening Area for Seedlings (construction)	Screenhouse/nursery in PSU and 8 FOs	9	50,000.00	**450,000.00**
Laboratory/Field/Facility/Equipment upgrade	Portable Weather Data Logger	1	200,000.00	**200,000.00**
	Chlorophyll content meter	1	210,000.00	**210,000.00**
	Soil Moisture and pH meter	1	10,000.00	**10,000.00**
	Electronic Grain Moisture meter	1	35,000.00	**35,000.00**
	Laboratory Cabinet with Temperature and humidity control	1	50,000.00	**50,000.00**
	GPS Device compatible with the chlorophyll content meter	1	30,000.00	**30,000.00**
Production of IEC Materials	Comics, Brochures, Pamphlets, Manuals			**15,000.00**
Office Equipment	Printer and scanner with built-in ink tank	1	10,000	**10,000.00**
			Sub-Total	**2,967,750.00**
B. Establishment of Organic Moringa Farms				
Land Preparation	Plowing (8 sites)		1,800.00	**14,400.00**
	Harrowing (8 sites)		3,600.00	**28,800.00**
	Layout (2MD) (8 sites)	16	400.00	**6,400.00**
	Canal and plot prep. (8 sites)	8	4,000.00	**32,000.00**
Soil Testing (complete with heavy metals)	Farmer Association # 1 (samples)	4	12,880.00	**51,520.00**
	Farmer Association # 2 (samples)	4	12,880.00	**51,520.00**
	Farmer Association # 3 (samples)	4	12,880.00	**51,520.00**
	Farmer Association # 4 (samples)	4	12,880.00	**51,520.00**
	Farmer Association # 5 (samples)	4	12,880.00	**51,520.00**

	Farmer Association # 6 (samples)	4	12,880.00	**51,520.00**
	Farmer Association # 7 (samples)	4	12,880.00	**51,520.00**
	Farmer Association # 8 (samples)	4	12,880.00	**51,520.00**
Basal Application of vermicompost	Labor, 10 mandays x 9 sites,	90	400.00	**36,000.00**
Transplanting	Transplanting (5,000 @ 9 sites)	9	5,000.00	**45,000.00**
Post-Harvest Equipment	Stainless Washing Table (1 set @ 9 sites)	9	30,000.00	**270,000.00**
			Sub-Total	**844,760.00**
C. Trainings, Launching events, catering				
Conduct of Community Participatory Action Research & Extension (CPARE) c/o PSU	Briefing/Orientation/Consultative Meeting with Participating 8 Farmers Associations (FA) in Malasiqui (2); Asingan (1); Natividad (2); Dasol (1); San Manuel (1); &San Fabian (1)- (4pax per FA @ 2 months @ 8 FA	64	400.00	**25,600.00**
	Monthly Project Monitoring and Assessment cum consultation with 8 Farmers Association (4 pax @ 8 FA x 3 months)	96	400.00	**38,400.00**
			Sub-Total	**64,000.00**
D. Contingencies/Miscellaneous Expenses/Admin Cost (1% of total budget)				**123,490.00**
TOTAL Project cost (A+B+C+D)				**4,000,000.00**

Table 5. Investment per Organization

Name of Organization	Amount in Php
Pangasinan State University (Germplasm Center, Nursery, Equipment, Training funds)	1,215,040.00
Nagkakaisang Organikong Magsasaka ng Bacundao, Inc.	348,120.00
Grain Seeds Farmers Association, Inc.	348,120.00
Casamuob Farmers Association, Inc.	348,120.00
Natividad United Farmers Association, Inc.	348,120.00
Rang-Ay Asingan Farmers Association, Inc.	348,120.00
San Fabian Organic Farmers & Fisherfolks Association, Inc.	348,120.00
Dasol P4MP Incorporation	348,120.00
Timpuyog ti San Manuel Upland Farmers Association, Inc.	348,120.00
Total Proposed Budget	**4,000,000.00**

9. LOGICAL FRAMEWORK

LOGICAL FRAMEWORK

Project Title: Advancing the Moringa Industry: Strengthening the Organic Moringa Stakeholders Network in Pangasinan through Participatory Research, Production, and Extension

(The Massive Moringa Seedling Production and Distribution Project of PSU-DA RFO1 under Bayanihan We Recover as One Act or Bayanihan II and Plant Plant Plant Program)

Agency: Pangasinan State University
Proponents: Dr. Oliver C. Caasi (Project leader)
Dr. Paulo V. Cenas
Dr. Larry S. Santos
Prof. Francis Argente
Dr. Armando D. Junio
Prof. Ronel Ali Omolida
Mrs. Catherine May M. Rama
Engr. Romeo Ancheta
Engr. Jerves Geron
Mr. Robert Paduga
Mr. Mark Argyll Tabaoan
Co-implementer from DA
Dr. Marvin Quilates
Co-implementer representing Moringaling Philippines Foundation Inc. and SBE Farm Inc.
Dr. Bernadette Estrella-Arellano
Budget Requested: Php4,000,000.00 (Four Million Pesos)

Narrative Summary	Project Targets – Objectively Verifiable Indicators	Means of Verification	Assumptions
Goal: To help farmers and farmers associations recover from the economic crisis caused by the on-going CoVid-19 pandemic by training and engaging in Moringa production in Pangasinan using organic production protocol	Trained and Organized network of farmers and farmers' group that are engaged in organic moringa seedlings, moringa seed and leaf production as identified beneficiaries of the Bayanihan II program by June 2021	Monthly monitoring and evaluation by PSU, DARFO1 and RAFC Accomplishment/Terminal report	none
Purpose: To produce at least 40,000 Organic Moringa seedlings ready for distribution to beneficiaries and to establish Moringa germplasm center and a network of Organic Moringa Producers in Pangasinan	Produced at least 40,000 organic moringa seedlings; 9 established network of moringa seedling nurseries, and 9 ha of seed and leaf production areas in Pangasinan	Monitoring and Evaluation reports Site visits Progress/Accomplishment reports Terminal report	Identified beneficiaries are committed to continue the project beyond June 2021 and are willing to engage in Organic Moringa Production Sustainability plan is effective
Project Outputs: At least 40,000 organic moringa seedlings and 9 established seedling nurseries in Pangasinan	Produced seedlings Established moringa seedling nurseries Organized network of moringa producers that willing to adopt organic production protocol and are willing to apply for organic or GAP certification	Progress/Accomplishment reports Terminal report	The commitment of all stakeholders to implement and produce the deliverables of the project is stable and strong
Activities: 1. Organizing and Training of Farmers on Organic	Inputs: Budget of Php4,000,000	Certificate of Availability of Funds	There is timely release of budget

Narrative Summary	Project Targets – Objectively Verifiable Indicators	Means of Verification	Assumptions
Moringa Production 2. Site inspection and evaluation of potential organic moringa seedling nurseries and moringa seed and leaf production areas 3. Establishment of 9 nurseries for organic moringa seedlings production 4. Establishment of moringa production areas in Pangasinan	Items (DA) Budget of Php400,000 counterpart from PSU 2 greenhouses at PSU Sta. Maria 1 ha area for the germplasm center and production area at PSU Sta. Maria campus 8 ha area identified by farmer-cooperators	Result of site inspections MOU/MOA between PSU and Farmer-cooperators/Farmer associations Progress/Accomplishment reports Terminal report Financial Reports	and purchase of inputs for the project

10. FINANCIAL VIABILITY

The seedlings produced by PSU and farmers after the project implementation or beyond June 2021 can be sold to interested agencies, farmers, and schools to sustain the project operation. Based on the Gross and Net Margin Analysis prepared by Batangas State University for this program, each business module (20,000 seedlings at Php30.00 per seedling) will generate a gross revenue of PhP 600,000.00 and net margin of PhP 183,586.00 representing an ROI of 44% per nursery over 6 months.

Table 5. Gross Margin Analysis on Moringa Production of 20,0000 Seedlings at 5,000 Seedlings per cycle (1.5 Months) based on BSU Seedling Production Module

1. Gross Revenue (20,000 seedlings at PhP 30.00)	**PhP 600,000.00**
2. Fixed cost / 3 years lifespan	**PhP 93,450.00**
3. Variable cost (composting materials, manpower, transport) with subtotal of	**PhP 385,264.00**
4. Variable cost with contingency allowance of 10% total of	**PhP 458,055.40**
5. Net Margin:	**PhP 183,556.00**
6. ROI Percentage	**44%**

C. BRIEF PROFILE OF PROPONENT

Project Leader:

OLIVER C. CAASI, Ph.D.
Focal Person, Moringa R&D Program
Head, Integrated Agriculture R&D Center
Pangasinan State University

1. Education	Ph.D Environmental Horticulture (couse: Bioresource Science) Chiba University Graduate School of Horticulture Matsudo, Chiba, Japan October 2016-March 2020 MSc in Entomology and Plant Pathology Oklahoma State University Stillwater, Oklahoma USA July 2006-May 2008 BSc in Agriculture (Plant Pathology) University of the Philippines Los Baños Los Baños, Laguna June 1998-November 2002
2. Other Studies	Seminar on *Moringa oleifera* (Aug. 4 and 7, 2020 organized by MPFI and PSU) Training-Workshop on Moringa GAP, Production, Processing, and Value Chain (Sept. 4, 2020, SBE Farm Inc.) Training on Organic Moringa Production (Oct. 24-25, 2020, organized by MPFI, PSU, and ASCOT)
3. Publications and Research Experience	Principal author of the following published papers: The potential of using Sentinel-2 satellite imagery in assessing Bacterial blight on rice in West Java, Indonesia Phytopathology 100 (5), 415-423 (2020) Relationships between Bacterial Leaf Blight and Other Diseases Based on Field Assessment in Indonesia Tropical Agriculture and Development 63 (3),

	113-121 (2019) Infection and Colonization of Turf-Type Bermudagrass by Ophiosphaerella herpotricha Expressing Green or Red Fluorescent Proteins Phytopathology 100 (5), 415-423 (2010) Evaluation of transgenic Ophiosphaerella herpotricha expressing green and red fluorescent proteins in turf-type bermudagrass PHYTOPATHOLOGY 98 (6), S29-S29 (2008) Other projects: Advancing the Carabao Mango Industry: Production of Export-Quality Mango Project 2.1 and 2.2: S&T-based adoption of ICM and GAP on Mango in Region I (Pangasinan Cluster) Performance evaluation of sweet sorghum varieties in Pangasinan: Pest dynamics on sweet sorghum under PSU Sta. Maria condition Community-based climate change vulnerability and adaptive capacity assessment of mango production areas in Sta. Maria, Pangasinan using Vast-Agro

SUBMITTED BY:

OLIVER C. CAASI, Ph.D. Date:_____
Integrated Agriculture R&D Center (IARDC)
Pangasinan State University Designation: Head, IARDC

SUBMITTED BY: Pangasinan State University
Agency

DEXTER R. BUTED, DBA Date:_____
University President
Pangasinan State University