Appendix I.

Research, Development and Extension Agenda
Natural Product Research and Innovation Center (NPRIC)

Goal: To become a production center for personal and home care products, herbal formulations, functional and fortified food products, biofertilizers, and biopesticides.

Objectives:

1. Generation of New Natural Product Knowledge
2. New and Improved Natural Product Technology
3. Production of Raw Materials for Developed Natural Product Technology
4. Commercialization of New and Improved Natural Product Technology including Training on New and Improved Natural Product Technologies Generated

Challenges:

1. Research for Development and Extension Skills of the Faculty Researchers, namely:
   a. Research skills
   b. Product development skills
   c. Extension skills
   d. Writing for publication skills
2. Lack of Laboratories (Analytical Chemistry and Cell Culture Laboratories w/ Complete Equipment) for the conduct of the protocols of the Center
3. Additional Funding Sources
4. Procurement concerns particularly delivery concerns especially for chemicals with reagent/technical grade,

Plan strategy:

1. Research Capacity Building particularly on the following:
   a. Research skills
   b. Product development skills
   c. Extension skills
   d. Writing for publication skills
2. Propose for a Laboratory Building under Tier 2 DBM Funding or CHED Institutional Development Program or any other funding agency with an Analytical Chemistry Laboratory, a Cell Culture Laboratory, an Animal House and a Product Development Laboratory complete with equipment.
3. Create research collaboration with funding agencies like PCHRD, PITAHC, CHED, DA, DA-BAR and other funding agencies.
4. Start the procurement process before the first month of the Fiscal Year so that the purchase request will be implementation ready.

Natural Product Research and Innovation Center
University Wide
Expected Outcomes: Products, Utility Models, Publication, Researchers with Track Records on Specializations

Priorities/ Research Area	Program/Project/Study	TIMEFRAME					EXPECTED OUTPUT				
		2018	2019	2020	2021	2022	2018	2019	2020	2021	2022
Health and Nutrition	Project 1: The Profile, Bioactivity, and Innovation Potentials of Terrestial Plants	X	X	X	X	X					
	Study 1.1: The Morphological Characteristics of Terrestial Plants	X	X	X	X	X	Physical Characteristics of the Collection Areas Physical, Chemical, and Microbial Characteristics of the Sediments in the Collection Areas] Morphological Characteristics of the Selected Plants Presence or Absence of Contaminants (Pesticide Residues and Heavy Metals) in the Collection Areas				
	Study 1.2: The Chemical Characteristics of Terrestial Plants	X	X	X	X	X	Type of Phytochemicals Present in Selected Plants Amount of Phytochemicals Present in Selected Plants Presence or Absence of Contaminants (Pesticide Residues and Heavy Metals) in the Selected Plants				
	Study 1.3: Cell Toxicity Assays of Selected Terrestial Plants	X	X	X	X	X	Levels of Toxicity of the Extracts from Selected Plants on the Cells of the Liver, Intestines, Brain, Kidneys, and Other Sensitive Human Organs				
	Study 1.4: Acute Toxicity Assays of Selected Terrestial Plants	X	X	X	X	X	Levels of Toxicity of the Extracts from Selected Plants on the Organs of Mice				
	Study 1.5: Anti – viral, Anti – bacterial, & Antifungal bioassays on Selected Terrestial Plants	X	X	X	X	X	Presence or Absence of Anti – Viral, Anti – Bacterial, and Antifungal Properties in the Extracts from Selected Plants				

Health and Nutrition	Study 1.6: Biological Markers of Metabolic Conditions Using Selected Terrestial Plants	X	X	X	X	X	Presence or Absence of Biological Markers for Hyperuricemia, Hyperglycemia, Hyperlipidemia, Inflammation, High Blood Pressure, and other Metabolic Conditions in Target Cells Using Extracts from Selected Plants
	Study 1.7: Skin Irritation Assays of Selected Terrestial Plants Using Rabbits	X	X	X	X	X	Presence or Absence of Anti Skin Irritants in the Extracts from Selected Plants
	Study 1.8: Biological Assay for Allergic Rhinitis	X	X	X	X	X	Presence or Absence of Anti Allergic Rhinitis Properties in the Extracts from Selected Plants
	Study 1.9: Biological Assay for Urinary Tract Conditions	X	X	X	X	X	Presence or Absence of Anti Urinary Tract Conditions in the Extracts from Selected Plants
Agriculture & Fisheries	Study 1.10: Pesticidal Properties of the Extracts from Terrestial Plants	X	X	X	X	X	Presence or Absence of Pesticidal Properties in the Extracts from Selected Plants
Health and Nutrition	Study 1.11: Product Development for Personal Care and Home Care Products From Selected Terrestial Plants	X	X	X	X	X	Developed Personal and Home Care Products Utilizing Extracts from Selected Plants
	Study 1.12: Product Development for Herbal Formulations	X	X	X	X	X	Developed Products for the Mitigation of Viral and Microbial Infections, Metabolic Conditions, Skin Irritation, Allergic Rhinitis, Urinary Tract Conditions, etc.
	Study 1.13: Development of Functional Food	X	X	X	X	X	Developed Food Products from Indigenous Plant Sources
	Study 1.13: Development of Fortified Food (Nutraceuticals)	X	X	X	X	X	Fortified Food Products from Indigenous Plant Sources
Agriculture & Fisheries	Study 1.14: Development of Organic Pesticides	X	X	X	X	X	Development of Organic Pesticide from the Extracts of Selected Terrestial Plants

Agriculture & Fisheries	Project 2: The Profile, Bioactivity, and Innovation Potentials of Edible and Non - Edible Macroalgae	X	X	X	X	X					
	The Morphological Characteristics of Edible and Non - Edible Macroalgae	X	X	X	X	X	Physical Characteristics of the Collection Areas Physical, Chemical, and Microbial Characteristics of the Sediments in the Collection Areas] Morphological Characteristics of the Macroalgae Presence or Absence of Contaminants (Pesticide Residues and Heavy Metals) in the Collection Areas				
	The Chemical Characteristics of Selected Macroalgae	X	X	X	X	X	Type of Phytochemicals Present in Macroalgae Amount of Phytochemicals Present in Macroalgae Amount of Iron Present in Macroalgae Presence or Absence of Contaminants (Pesticide Residues and Heavy Metals) in the Macroalgae				
Health and Nutrition	Cytotoxicity Assays	X	X	X	X	X	Levels of Toxicity of the Extracts from Macroalgae on the Cells of the Liver, Intestines, Brain, Kidneys, and Other Sensitive Human Organs				
	Acute Toxicity Assays	X	X	X	X	X	Levels of Toxicity of the Extracts from Macroalgae on the Organs of Mice				
	Biological Activity Assays	X	X	X	X	X	Presence or Absence of Biological Activity in Selected Macroalgae				
	Development of Herbal Teas for Mitigation of Iron Deficiency Anemia and other Metabolic Conditions	X	X	X	X	X	Tea Products for Mitigation of Iron Deficiency Anemia and Other Metabolic Conditions from non – edible Macroalgae				
	Development of Functional Food Products	X	X	X	X	X	Food Products from Edible Seaweeds				
	Development of Iron Fortified Food Products	X	X	X	X	X	Food Products with Iron Supplements from Non – Edible Seaweeds				

Agriculture and Fisheries	Project 3: The Profile, Bioactivity, and Innovation Potentials of Mollusks	X	X	X	X	X					
	Study 3.1: The Morphological Characteristics of Mollusks	X	X	X	X	X	Physical Characteristics of the Collection Areas Physical, Chemical, and Microbial Characteristics of the Sediments in the Collection Areas Morphological Characteristics of the Selected Mollusks Presence or Absence of Contaminants (Pesticide Residues and Heavy Metals) in the Collection Areas				
	Study 3.2: The Chemical Characteristics of Mollusks	X	X	X	X	X	Type of Phytochemicals Present in Selected Mollusks Amount of Phytochemicals Present in Selected Mollusks Amount of Chitosan Extracted Presence or Absence of Contaminants (Pesticide Residues and Heavy Metals) in the Selected Plants				
Health and Nutrition	Study 3.3: Cell Toxicity Assays of Mollusks	X	X	X	X	X	Levels of Toxicity of the Extracts from Selected Mollusks on the Cells of the Liver, Intestines, Brain, Kidneys, and Other Sensitive Human Organs				
	Study 3.4: Acute Toxicity Assays of Mollusks	X	X	X	X	X	Levels of Toxicity of the Extracts from Selected Plants on the Organs of Mice				
	Study 3.5: Development of Chitosan Based Products: Antimicrobial and Anti - hyperglycemia Products, Ointments, and other Products	X	X	X	X	X	Developed Chitosan Based Products				
Environment and Climate Change	Study 3.6: Development of Biodegradable Plastics and Organic Preservatives from Chitosan	X	X	X	X	X	Developed Biodegradable Plastics and Organic Preservatives				
Health and Nutrition	Study 3.6: Development of Functional Food Products from Mollusks	X	X	X	X	X	Developed Functional Food Products				

Environment and Climate Change	Project 4: The Profile, Bioactivity, and Innovation Potentials of Isolated Beneficial Microbes	X	X	X	X	X					
	Study 4.1: Isolation and Efficacy Testing of Phosphate and Potassium Solubilizing and Nitrogen Fixing Microbes	X	X	X	X	X	Isolated Efficient Phosphate & Potassium and Nitrogen Fixing Beneficial Microbes				
	Study 4.2: Identification of Phosphate and Potassium Solubilizing and Nitrogen Fixing Microbes	X	X	X	X	X	Identified Phosphate & Potassium and Nitrogen Fixing Beneficial Microbes				
Agriculture and Fisheries	Study 4.3: Biopesticidal Activity Assay on Isolated and Identified Microbes	X	X	X	X	X	Presence or Absence of Biopesticidal Properties of Isolated and Identified Microbes				
	Study 4.4: Biocontrol Properties of Isolated and Identified Microbes	X	X	X	X	X	Presence or Absence of Biocontrol Properties of Isolated and Identified Microbes				
	Study 4.5: Development of Biofertilizers	X	X	X	X	X	Developed Biofertilizers				
	Study 4.6: Development of Biopesticides	X	X	X	X	X	Developed Biopesticides				