University of Puerto Rico
Mayagüez Campus
COLLEGE OF AGRICULTURAL SCIENCES

Strategic Plan to Foster Sustainable Agriculture in Puerto Rico

2023

COLLEGE OF AGRICULTURAL SCIENCES (CCA)
MAYAGÜEZ CAMPUS
UNIVERSITY OF PUERTO RICO

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INTRODUCTION

The College of Agricultural Sciences (CCA) of the University of Puerto Rico is committed to encouraging sustainable agriculture in Puerto Rico. With this purpose in mind, the Dean and Director of the CCA organized a committee composed of researchers, extensionists, and professors to develop an effective strategic plan. The committee was named the *Sustainable Agriculture Committee of the College of Agricultural Sciences (CASCCA)*.

The nature of agricultural production is complex and requires an ample understanding of the many types of relationships that farmers have with consumers, crops, animals, soils, pests, climate, technology, production costs, marketing, public policies, farm infrastructure, and local ecosystems. Furthermore, to attain sustainability in agricultural production, the role of Puerto Rico's extensive forest cover must be considered (Gould et al. 2017). Forests currently comprise 55% of the land cover of Puerto Rico (Álvarez et al. 2013, Marcano-Vega 2019). Incorporating agricultural practices into existing forests by means of agroforestry, including shade coffee, cacao, and other multi-layer systems, promoting forest management for wood and other forest products, and the incorporation of silvopastoral systems can be a way to increase the production capacity of the island at the same time that ecosystem services are secured. To take care of the needs of farmers and consumers efficiently and to safeguard agricultural land for the use of future generations, the CCA has set as its immediate goal the development of a strategic plan to encourage sustainable agriculture in Puerto Rico. This plan will help to coordinate relevant agricultural research and development, education, and the disclosure of information for the implementation of sustainable agriculture practices. This plan's purpose is to facilitate the dissemination of information and create the mechanisms to make responsible decisions related to sustainable agriculture within the island's complex social-economic-political-environmental-technical framework.

By creating this plan, the CCA recognizes that changes must be made in the performance, management, and implementation of current agricultural practices that will promote sustainability. Including changes in the disclosure of information, research and other educational activities which

must provide formal and informal students access to courses and professional careers focused on sustainable agriculture. The CASCCA has adopted from the Food and Agriculture Organization of the United Nations (FAO, 2018), the definition of sustainable agriculture. "To be sustainable, agriculture must meet the needs of present and future generations, while ensuring profitability, environmental health, and social and economic equity. Sustainable food and agriculture contribute to all four pillars of food security – availability, access, utilization, and stability – and the dimensions of sustainability (environmental, social, and economic)."

- Satisfy human food needs for present and future generations;[1]
- Protect and enhance natural resources.
- Improve livelihoods and foster inclusive growth.
- Increase productivity, employment, and value addition in food and agroforestry systems.
- enhance the resilience of people, communities, and ecosystems.
- Adapt governance to new challenges.

The stated proposal is a pragmatic plan to develop a sustainable agriculture initiative within the CCA. It does not pretend to be an overall plan for the agricultural development of Puerto Rico. The **Strategic Plan to Foster Sustainable Agriculture in Puerto Rico** should not be mistaken for the comprehensive Strategic Plan of the College of Agricultural Sciences. Nevertheless, its intentions are complementary to those of the Strategic Plan of the CCA, as it contributes specific strategies that are related to the sustainable agriculture initiative. This plan should be adopted as a working agenda for the next five years but without imposing limits on the academic personnel's creativity and imagination. It is of vital importance that the CCA achieve the acceptance and recognition among farmers, professors, students, government officials, and society as a whole of the social, nutritional, environmental, and economic benefits that can be derived from the implementation of a sustainable agriculture program for Puerto Rico.

[1] The definition of sustainable agriculture as stated in the Federal Food, Agriculture, Conservation and Trade Act of 1990 includes "satisfy human food and fiber needs." However, to adapt the definition to Puerto Rico's characteristics the element of "fiber needs" was eliminated because there is no production of textile fibers in Puerto Rico.

SCOPE OF THE STRATEGIC PLAN

This plan is directed at:

- **farmers and farm workers of Puerto Rico** – to enable them to improve their standard of living and working conditions, reducing poverty and food insecurity.
- **agriculture and forestry professionals** – to gain support for a program of sustainable agriculture information flow and exchange; Ensuring that farmers have access and control of productive resources.
- **all the agricultural and forestry sector** – to develop environmentally friendly, economically viable, and sustainable agricultural systems, including those that combine agriculture with forestry;
- **students –** to offer learning opportunities and professional development (at the university and high school levels) focused on sustainable agriculture and natural resource management and conservation.
- **consumers and society –** to encourage the production of nutritious fruits, vegetables, grains, and other crops to satisfy most of the local demand.
- **environment and ecosystem services –** to conserve and improve the quality of the environment, conserve natural resources and secure ecosystem services in demand by the archipelago's population.

This plan consists of the following elements: mission, vision, and goals; justification; process to create the strategic plan; challenges, strengths, and opportunities; time span and evaluation; goals, objectives, and strategies.

MISSION

The mission of the CASCCA in the field of sustainable agriculture is to coordinate all efforts that are being or will be made to encourage the education, research and development, and the disclosure of information for the implementation of a sustainable agriculture in Puerto Rico.

VISION

The vision of CASCCA is to promote in the College of Agricultural Sciences as an entity that generates and provides information and knowledge about sustainable agriculture through its connections with farmers**,** agricultural workers, researchers, extensionists, professors, students, consumers, government agencies, nongovernmental organizations, and society.

GOALS

1. To produce and promote the understanding, knowledge, and acceptance of sustainable agriculture among agricultural and forestry professionals, farmers, university and K-12 students, and society in general.

2. Support a permanent educational program in the College of Agricultural Science in sustainable agriculture production systems in order to spread knowledge among Puerto Rico's population about the importance and benefits of sustainable agriculture.

3. To strengthen the research and extension programs focused on the development and dissemination of information and technology needed for the sustainable management of agriculture in Puerto Rico.

JUSTIFICATION

During the 1950s, the Government of Puerto Rico began a vigorous and successful development of the industrial, tourism, and construction sectors of its economy. The best human and capital resources were employed; and, in only three decades, the economic base of Puerto Rico became industrial rather than agricultural. However, contrary to other industrialized countries, Puerto Rico did not upgrade and modernize its agricultural sector during this time.[5-22]

Even though during the last 45 years the agricultural sector has improved and updated its technology, and production has slowly but consistently increased in some crop enterprises, its gross income is still far below that of other economic sectors.[24] According to the *Informe Económico al Gobernador, 1998*,[18] (*The Governor's Economic Report, 1998, 2021*), agricultural production represented only 0.75% of the gross internal product and in 2020 was 0.66%. Twenty years ago, approximately 70% of the food consumed in Puerto Rico was imported, and this figure has risen to 85% (Comas 2009). Due to the extensive changes that the archipelago's land cover has undergone, a transformation in the way that agricultural practices are adopted and incorporated into existing forested land cover types must occur so that forested lands can contribute to economic productivity in the way of forest crops, wood, resins, inks, cellulose and other products (Gould et al. 2017).

As in the United States, Puerto Rico lives under the constant pressure of urban and industrial development. The reduction of the quantity of land available for agricultural use is a consequence

of the continual construction of highways, horizontal low-density housing facilities, and industrial and commercial complexes (López et al. 2001, Álvarez et al. 2013). The rate of loss of land suitable for agricultural use is disproportionate for such a small, densely populated country.[2] According to the 1997 soil inventory of the U. S. Department of Agriculture (USDA), from 1982 to 1992 the United States lost 1.4 million acres per year of both agricultural land and open areas. However, from 1992 to 1997, the loss increased to 3.2 million acres per year, which is more than double what it had previously lost per year. Puerto Rico observed a similar pattern for the same periods. From 1982 to 1992, approximately 12,460 acres per year were lost and, from 1992 to 1997, 30,620 acres per year. Statistics from the National Resources Inventory of the USDA indicate that, from 1982 to 1999, Puerto Rico lost more agricultural land and open areas than Oregon, Montana, Idaho, Colorado, Utah, Iowa, Nebraska, South Dakota, Wyoming, North Dakota, Nevada, Delaware, Vermont, Rhode Island, or Hawaii. These states, with the exception of Delaware and Rhode Island, each have a geographic area several times larger than that of Puerto Rico. Except for the valleys of Lajas and Aguada, which were recently reserved through public policy exclusively for agricultural use, cultivable land in Puerto Rico is threatened by constant development pressures from both the private and public sectors. Land cover changes from agriculture to urban development increased sharply between the 1990's and the first five years of the 21st century due to an increase in prospective construction for housing followed by near economic collapse (López-Marrero et al. 2001, Gonzalez and Ma 2019). The current lands under agricultural production do not necessarily match the best and prime agricultural lands found in the archipelago, and urban development currently covers some of these prime lands (Gould et al. 2017).

At the present time, Puerto Rico has an excellent opportunity to transform, rescue and develop its agriculture. Fortunately, certain political, public, private and community groups on the archipelago have shown an interest in strengthening its agriculture. Resources for the development of a vigorous agricultural system such as land, water, infrastructure, capital, markets, management capacity, and professional and scientific personnel are available. If they

[2] Puerto Rico has a geographic area of approximately 3,435 square miles, and its topography is highly mountainous. In 1994, the population density was approximately 1,077 people per square mile. For the year 2025, the population is expected to rise to 4.7 million, with a density of 1,368 people per square mile.

are used efficiently, Puerto Rico could produce a large percentage of the food its residents consume, which would contribute significantly to its gross internal production and elevate its economy. It could also increase the economic activity stemming from forest conservation and management, not only by agroforestry and wood products, but by fostering and promoting recreational and tourism activities that can boost the revenue of landowners and managers. According to the 2012 (update Census, 2012, 2018) Agricultural Census of the USDA, there were still 584,988 cuerdas in 13,159 farms at that time. The agricultural work force in Puerto Rico is composed of approximately 30,000 workers, and several thousand other jobs are created indirectly through the manufacturing sector of the economy utilizing agricultural products.

Although the agricultural segment is vital to the development of a healthy economy, the CASCCA is conscious of the difficult task involved in the recovery and development of agriculture in Puerto Rico. To rehabilitate agriculture will require serious and continuous commitment from the public sector, researchers, extensionists, professors, farmers, students, consumers, and society as a whole. This effort cannot simply utilize conventional methods of improving production based on intensive use of fertilizers, pesticides, animal feed, and other imported materials, which reduce the economic viability of agricultural enterprises. The technological packages and financial models developed by the College of Agricultural Sciences show that the direct costs for concentrated fertilizers and synthetic pesticides represent 35% of the production costs. In the cattle and poultry enterprises, the use of imported, concentrated feed surpasses 50% of these costs.

The redevelopment of agriculture must focus on all parameters of sustainability, which are: use nonrenewable and local resources efficiently; integrate biological cycles and controls into farm management practices; encourage and support self-sufficient farm economic viability; and improve the general standard of living of farmers and society. The agricultural sector should be reorganized into new areas of production that are profitable and highly competitive with imported food products, such as intensively operated small farms; gourmet food production; urban agriculture; organic food production, agroecological, other concepts of sustainable agriculture and agribusinesses for local commodities. Also, it is necessary to redevelop cooperatives within the agricultural community. The cooperative movement has been and is an efficacious tool for the successful production and marketing of agricultural products. Also, the adoption of

sustainable agriculture practices in Puerto Rico is feasible because approximately 60% of the farms are small (20 acres or less). According to the USDA, sustainable agriculture is the only solution for the survival of small farms.[16] All of these initiatives must be supported by an efficacious agrarian policy to protect agricultural land and keep it productive. It is of vital importance to protect this valuable natural resource to develop the agriculture that Puerto Rico needs now and will need in the future. Moreover, given that most of Puerto Rico's forest cover (~85%) is on private lands, incentivizing practices that enrich the conservation or agroforestry production value of forest stands on small farms can complement agricultural productivity and increase the resilience of small farm landowners by monetary benefits from incentives and production of fruit crops, wood and other non-wood forest products to their production portfolio (Gould et al. 2017). Forested lands also provide ecosystem services of crop pollination, water, soil and nutrient capture, retention and incorporation into the soil, and can complement farmer's income by adding recreational value to their farms, and adopting strategies where eco-tours on farm and forested land complement the income of farmers and rural communities that manage forested lands. Research into and adoption of sustainable agriculture practices that include composting of agricultural or forestry wood and non-wood by-products, or their conversion to biogas or biochar for input into crop soils, can further increase the efficiency of local small-scale farm operations.

To utilize available natural resources (climate, forests, land, soils, and water) effectively to increase food production and related jobs and economic benefits, it is imperative to develop a vigorous, sustainable agricultural system for the island. The importation of agricultural products, which amounts to approximately $4 billion per year, can be reduced dramatically, allowing for investments in other sectors of the economy. The development of the agricultural sector will improve the total economy of Puerto Rico since each dollar earned in agricultural production at the farm level has a multiplier effect and will benefit not only the farmers but other segments of the population as well. With greater agricultural production, there will be fewer imports of raw materials, and a higher percentage of the farmer's income will remain in Puerto Rico. However, the importance of the agricultural sector's development is not just the generation of income and creation of jobs. Agriculture is the only sector of the economy that can provide food, which is essential for human life. It is also an intrinsic part of our culture and way of life. The local

production and consumption of fresh, nutritious, high-quality food items contribute to the development of high esteem among their producers and a healthy population.

Because of its large population and the great distance that separates this island from the rest of the continent, it is imperative that Puerto Rico has an agricultural sector which can satisfy the food needs of most of its people. In the event of a hurricane or any other natural or human made disaster, the population could suffer from hunger. Also, U. S. agricultural production, which supplies Puerto Rico with most of its goods, has an uncertain future. It is expected that, by the year 2025, the increase in population (approximately 1.1% annually) and the loss of land suitable for agricultural use (approximately 1 acre per additional inhabitant) will force the U. S. to stop the exportation of agricultural products as they will be needed for local consumption.[20] In addition, it is expected that food prices in the U. S. will increase and be 3 to 5 times higher than they are currently.

The College of Agricultural Sciences of the University of Puerto Rico at Mayagüez has the capacity and the resources to contribute significantly to the recovery and sustainability of our agriculture. It is the only academic institution in Puerto Rico supported by the Morrill Law, which created Land Grant colleges in the U. S. This law, signed by Abraham Lincoln in 1862, authorized land and Federal grants for the development of agricultural sciences and mechanical arts by higher education institutions. The tree which integrates the CCA [the Teaching Faculty, Agricultural Extension Service (SEA), Agricultural Experiment Station, are part of an institution, which has capably served the agricultural sector and society for the last 90 years. The CCA relies on competent professionals and community resources: (a) a prestigious institution for higher education, research, and development which is not limited to the Mayagüez Campus and includes six agriculture experiment substations, two agriculture research centers and 42 offices of the SEA located around Puerto Rico; (b) a broad spectrum of internationally renowned scientists and teaching personnel; (c) graduate and postgraduate students; and (d) community leaders for the SEA programs involving *Ciencias de la Familia y el Consumidor* (Family and Consumer Sciences); *Juventud y 4-H* (Youth and 4-H); and *Desarrollo de los Recursos de la Comunidad* (Community Resources Development). Some CCA curriculum is being revised with the intention of introducing initiatives, courses, and specialized programs to satisfy the different needs of the agricultural sector.

As a result of these self-assessments ("autoestudios") to the CCA curriculum, the Department of Agro-Environmental Sciences developed a Curricular Sequence (CS; "Secuencia Curricular") in Natural Resources that was implemented in 2015. The CS includes two core courses on natural resources (AGRO 4035: Introduction to Natural Resource Conservation and AGRO 5015: Conservation, Development and Management of Natural Resources), three credits on any of four elective courses related to natural resource economy and sociology (courses coded as ECAG, ECON and SOCI), and six credits on elective general courses related to natural resources and spanning the Departments corresponding to the following course codes (AGRO, BIOL, CMOB, GEOL and SAGA). As of 2019, the date of the last self-assessment of the CS, only one student had graduated from the CS. However, the enrolment in 2019 was high (40 students) and has increased to 70 enrolled students and 21 graduated students as of this date. The self-assessment of the CS conducted in 2019 suggests some changes in course requirements and additions to the core, elective courses in economy and sociology, and elective general courses. These changes are now being considered for implementation by the Academic Matters Committee of the Department of Agro-Environmental Sciences.

A new Ph.D is in the process of being in Tropical Agriculture. The CCA wants to continue fostering the benefits of sustainable agriculture among farmers, children, parents, teachers, and society. This contribution will consist of workshops, intensive counseling, and the development of research and/or demonstration projects within the different experiment substations, farms, and private units of agricultural production.

PROCESS TO CREATE THE STRATEGIC PLAN

Creating a strategic plan requires four broad steps. First, the specific situation which needs to be improved must be precisely determined and defined. Second, after research, interviews, and discussions, the mission must be articulated.

Third, the specific goals, objectives, and strategies which will help to achieve the mission must be defined. The objectives, which are quantifiable in terms of timing and resources, help structure the specific action plan to reach each specific goal. The individual strategies represent the course of action needed to achieve each one of the objectives. The specific strategies are also quantifiable.

Finally, the implementation of the action plan begins. Once the implementation has started, specific parameters, previously defined, are used to compare expected with actual results.

CASCCA went through the process of formulating the necessary goals, objectives, and strategies. This process took place through the continuous exchange of information, analyses, discussions, and synthesis of ideas among the members of CASCCA, professors, farmers, scientists, students, segments of society, employees of private enterprises, and professional personnel from local and Federal agencies.

The next section defines the CCA internal and external challenges, its strengths, and the opportunities which the CCA has for the development of its plan for sustainable agriculture in Puerto Rico. Also, included are the goals, objectives, and strategies for the plan.

CHALENGES, STRENGHTS, AND OPPORTUNITIES

Internal Challenges

- Create a more effective communication network at all levels.
- Promote teamwork and collaboration.
- Improve networking with public agencies, nongovernmental organizations, farmers, and society.
- Promote and coordinate research development, and disclosure of information concerning sustainable agriculture among the different CCA units and programs.
- Encourage CCA professors to include agro-ecological and sustainable agriculture topics in their curricula discussions.
- Develop a research program aimed at developing sustainable agricultural systems on the island.
- Include forestry as an agricultural activity that is fostered by the institution and increase personnel trained in this field to support research and extension activities.

Internal Strengths

- CCA is:
  - a prestigious higher education institution.
  - an excellent academic center consisting of researchers, extensionists, professors, and administrators committed to sustainable agriculture.
- CCA has a broad-based infrastructure with organized services, and research facilities spread throughout Puerto Rico: Four agricultural extension regions with 42 offices and approximately 26 specialists, 54 agricultural agents, 46 home economists, and two agriculture experiment station, six experiment substations with 38 researchers. Many of the new specialists are doing specialist and research work.

- CCA faculty has five interdisciplinary departments dedicated to research, education and extension.SEA has an integrated education program carried out by voluntary leaders who reach different community groups. The program areas are *Ciencias de la Familia y el Consumidor* (Family and Consumer Sciences); *Juventud y 4-H* (Youth and 4-H); *Desarrollo de los Recursos de la Comunidad* (Community Resources Development); and *Agricultura, Mercadeo, y Recursos Naturales* (Agriculture, Marketing, and Natural Resources).

External Challenges

- Rapid losses and speculation of agricultural land due to horizontal urban development.
- The allocation by the local (Puerto Rico) government of more resources and attention to other sectors of the economy.
- Agricultural enterprises that are developed with high dependance of non-sustainable external inputs.
- Lack of government incentives to foster sustainable agricultural practices and/or lack of knowledge on how to apply practices fostered by government incentives.
- High cost and lack of access to agricultural land and water.
- Climate change challenges related to natural resource conservation, water scarcity and land productivity.
- Dependance of imported inputs and high cost of transportation.
- Lack of financing for new sustainable agriculture projects.
- Erosion of institutional capacity, such as limited personnel and lack of funds, in state agencies that mediate in agriculture and forestry in Puerto Rico (e.g., DAPR, DRNA).

External Opportunities

- Increasing concern of society regarding climate change problems and food sovereignty.
- Growing interest in the consumption of local and nutritious fresh foods without agrochemical residues.

Create and promote political policy regarding sustainable agriculture Growing interest among youngers to work and develop sustainable or agroecological agricultural projects. Opportunity to promote more collaboration and partnership for outreach in sustainable agriculture. High access to social media for education and marketing. Availability of federal funds for underserved communities/minorities.

TIME SPAN OF THE STRATEGIC PLAN AND EVALUATION

One of the principles of sustainable agriculture is to support long-term efficient ways to manage agricultural systems. The intention is to promote the use of conservation practices which will

make agricultural activities sustainable and profitable. As a tool to assure the continuity of sustainable island agriculture, this plan will be in a constant state of development and evolution and must be updated with the newest techniques and information available on sustainable agriculture.

Once the implementation of the plan has begun, CASCCA will be reorganized. Its members will be volunteers who have demonstrated leadership and serious commitment to Puerto Rico's agriculture. The following should be members of CASCCA: Professional Development Program State Coordinator, at least three to five members of the CCA with representation of the tree units, a planner, an evaluator, two farmers one that have crops and one with livestock, one representative from the USDA e, one representative from Government of Puerto Rico's (Department of Agriculture and/or Department of Natural Resources and Environment), and one representatives from nongovernmental organizations. The minimum number for having a quorum to make decisions is 7 members.

CASCCA will be responsible for evaluating the effectiveness and efficiency of the plan. The committee will meet every semester to review the implementation and progress of the objectives and goals of the plan and make updates to the plan as needed. In addition, the plan will be evaluated every 4 years by CASCCA, and an in-depth report will be prepared to communicate the results achieved at the time of the evaluation. The report will be submitted to the Dean and Director of CCA. When approved, its findings will be provided to scientists, farmers, students, government officials, and the public.

The impact of the results will be measured through evaluation tools that will be utilized specifically for the stated objectives and strategies. Emphasis will be given to the parameters that:

- satisfy human food needs.
- enhance environmental quality and efficiently utilize natural resources.
- make the most efficient use of nonrenewable and on-farm resources.
- integrate, where appropriate, natural biological cycles and controls.
- sustain the economic viability of farm operations.
- enhance the quality of life for farmers and society.

promote the efficient and effective distribution of local agricultural products dependance to external inputs.

Some of the parameters that will be used to measure the results and effectiveness of the plan are:

Output Indicators

1. A number of pamphlets, technical guides, information sheets, and other types of publications developed.
2. Number of conferences, seminars, workshops, farm demonstrations, farm visits, and other educational activities offered to children, teachers, university students, agricultural professionals, farmers, and society in topics related to sustainable agriculture.
3. Number of new or updated courses which include sustainable agriculture components.
4. Number of sustainable agriculture research and demonstration projects implemented.
5. Number of research and demonstration projects implemented on farms.
6. Number of farmers who have benefited from sustainable agriculture research and demonstration projects.

Effectiveness Indicators

1. Number of trained farmers who have implemented integrated pest management and sustainable agriculture.
2. Number of farmers who have improved their product-marketing capabilities.
3. Number of children, teachers, agricultural professionals, farmers, and society who have adopted sustainable agriculture practices and are utilizing them in gardens, on farms, nurseries, and other units of agricultural production.
4. Number of children, teachers, and society members who have had orientation on the importance of consumption of locally produced food.

GOALS, OBJECTIVES, AND STRATEGIES

GOAL 1

To promote the understanding, knowledge, and acceptance of sustainable agriculture systems among agricultural professionals, farmers, university and k-12 students, and other stakeholders.

Objective 1

To create a knowledge base of feasible sustainable agricultural practices to be implemented in Puerto Rico and disseminate this information among all stakeholders. Including a broad-based systematic training program on sustainable agricultural practices to farmers, agricultural professionals, researchers, extensionists, professors, students, and other stakeholders.

Strategies

1. Use the SEA database and webpage to gather and disperse information concerning sustainable agriculture practices available from:

- literature (essays, project reports, articles, and publications of students, researchers, extensionists, professors, professional and nonprofessional farmers, among others).
- Promote knowledge developed through the experience and traditions of farmers and agricultural professionals in universities, industries, and government (by means of workshops, focal groups, and individual and group interviews).

2. Create a survey mechanism to gather the feedback of students, faculty, professionals and practitioners about information available on sustainable agricultural practices.
3. Use the existing magazine SEA del Oeste to publish findings, news and other relevant information related to sustainable agriculture.
4. Offer workshops and field demonstrations on topics related to sustainable agriculture.
5. Design new university courses about agroecology and sustainable agriculture.
6. Update existing university courses so that they include sustainable agriculture principles.
7. Encourage government agencies to offer incentives such as insurance and other types of subsidies for sustainable agricultural systems.
8. Educate children, elementary and high school teachers, university professors and students, government officials, farmers, and stakeholders about the importance of the conservation of land with high agricultural value or potential and the consumption of locally produced food.

GOAL 2

To strengthen the research and extension programs focused on the generation and dissemination of information and technology needed for the sustainable development and utilization of farmland, home fruit and vegetable gardens, urban land for agricultural production, plant nurseries, and forests in Puerto Rico.

Objective 2

To carry out multidisciplinary, cooperative, and participatory research and/or extension projects on sustainable agriculture. Including the development and validation of the economic viability of production and marketing strategies which are environmentally and/or socially equitable.

Strategies

1. Develop research and extension projects involving the members of the different departments of the CCA and other faculties and institutions.
2. Foster the research and extension activities of agro entrepreneurs, government agencies, nongovernmental organizations, and private entities.
3. Develop research and extension projects on farms, nurseries, and other units of private agricultural production.

4. Foster university and high school students' participation in research and extension projects involving sustainable agriculture practices.
5. Identify and promote the use of local crop varieties (ancestral crops).
6. Identify and promote the use management practices for forested lands for increasing their conservation and agroforestry production value to farmers
6. Evaluate the economic viability of sustainable practices developed by farmers and/or demonstration and research projects.
7. Identify and develop soil and crop management practices that can reduce erosion and maintain or enhance soil fertility and agricultural production.
8. Develop alternate methods to the use of pesticides and inorganic fertilizers using beneficial organisms, agricultural residues, green manure, cover crops, intercrops, and other acceptable practices for the management of agricultural enterprises.
9. When necessary, develop practices for the judicious use of pesticides.

SCHEDULE

The implementation of the plan will begin in or before August 2023. Since the plan is continuous and, consequently, does not have an end, CASCCA will update and revalidate it through every four years of the evaluation.

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