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Sustainable Agriculture Education and Research at the University of the Philippines Los Baños: Status, Challenges, and Needs

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Since its founding in 1909, the University of the Philippines Los Baños (UPLB) has focused its instruction and its research and development (R&D) activities on developing component technologies to support national agriculture programs and government productivity goals. In the last decade, R&D at the UPLB College of Agriculture (UPLBCA) has focused on the accumulation of knowledge on environmentally benign component technologies and methodologies that will increase the efficiency of applied inputs in crop production.

The UPLB Graduate School currently has 906 students enrolled in 92 graduate degree programs, including PhD programs. The most popular programs in terms of numbers of students are Environmental Science, Development Management, Community Development, Development Communications, Forestry, Agriculture, and Agricultural Economics.

At the undergraduate level, the current Bachelor of Science in Agriculture (BSA) program, with sustainable agriculture (SA) as the overall philosophy, was first implemented in 1997. It aims to educate students in science-based agriculture, giving them a holistic understanding of agricultural sustainability, and to prepare them as socially committed professionals. An innovation in the present BSA curriculum is allowing students to choose among a thesis, major (farm) practice, research internship, extension and community internship, teaching, and agricultural entrepreneurship.

UPLBCA's shift from mainstream to SA was not an easy task. At the national level, SA is not the mainstream model of agricultural development, because trade policies support liberalization of trade in agriculture, which reinforces the primacy of the market-driven agriculture that rewards short-term productivity gains rather than long-term sustainable production.

At the university level, advocates of SA have to face various forces, problems, and obstacles encompassing the emotional and personal, institutional, administrative, policy-based, and funding-driven, and scientific biases.

Looking forward, UPLBCA is continuously fine-tuning and enriching its curricula towards SA. It has also explored the possibility of offering other integrative fields in the BSA curriculum, such as agricultural systems (including policy formulation and analyses), agroforestry, urban/peri-urban SA, and environmental agriculture.

Key words: sustainable agriculture, education, research and development, curriculum

Introduction

The Philippines is an agricultural country of small farms, humid tropical climate and variable weather, varying topographies, and diverse soil types, flora and fauna, and cultures in distinct communities.

The rapid change in the Asian natural landscape in the last decade is closely linked with a decline in environmental quality and breakdown of the agroecosystem (Boyd, 2002) There are many reasons for this, the most pervasive of which are rapid population growth, unabated and reckless urbanization, growing consumerism, expanding market demand at both the local and international levels, and global climate change. These factors put tremendous pressure on the sustainability of agricultural production systems, in turn jeopardizing society's

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ability to produce enough food for the present and future generations.

Given these conditions, the challenge for an academic institution such as UPLB is to develop environmentally benign technologies and approaches, and to train professionals who are capable of conducting R&D that will maintain and enhance the integrity of the agro-ecosystem to achieve long-term productivity. Agriculturists should be able to develop technologies and agricultural systems that advance agricultural and agro-industrial development that is productive and sustainable, especially in resource-limited rural and urban/peri-urban communities.

The aim of this paper is to share UPLBCA's experiences in its attempt to fine-tune its curriculum, with SA as the overarching philosophy, towards relevance to both the university's academic pursuits and Philippine agriculture's practical requirements.

UPLB in the Forefront of Agricultural Education and R&D

1. Undergraduate Program

The need to keep abreast with the developments in the dynamic field of agriculture has molded and changed the Bachelor of Science in Agriculture (BSA) curriculum at UPLB. Over the years, UPLB's College of Agriculture (UPLBCA) has continuously refined its BSA curriculum to meet the challenge of offering an undergraduate agriculture program that can cope with both the rapid advances in science and technology and the increasing demands on and of the agricultural sector.

The important role of UPLBCA in Philippine agriculture was highlighted in a report that showed that among 101 employers of agriculture graduates, UPLB's share of the market for BSA graduates in the Philippines was about 24%; the remaining 76% was shared by other state colleges and universities (48%), private schools (21%), and other colleges (7%) (Mancebo *et al.,* 1992). Among the institutions offering the BSA then, UPLBCA was largest source of BSA graduates entering the job market in the Philippines. The same is true at present.

In general, the traditional employers of agriculture graduates are educational institutions, research agencies, government service agencies, banks, international organizations, and private business organizations and corporations. Since the last decade or so, the job market for BSA graduates, particularly those from UPLB, has expanded to include non-government organizations (NGOs) involved in development work and people's organizations (POs). In the Philippines, there are more than 60,000 registered NGOs, most of which are involved in grass-roots development.

Since UPLBCA was founded in 1909, the BSA curriculum has been revised or modified 12 times (Mancebo *et al.,* 1992). In the last revision, in 1997, the curriculum was revised in response to:

- the need to strengthen the balance between theory and practice in agriculture
- the need to emphasize resource-poor agriculture as much as large-scale and resource-endowed agriculture
- the need to focus on the interdisciplinary nature of agriculture and balance the emphasis on its biophysical, ecological, socio-cultural, and political dimensions
- the need to provide increased and better opportunities for the student to internalize and gain field exposure and in-depth understanding of the realities of scientific farming while developing a pro-farmer orientation.

2. Graduate Degree Programs

The UPLB Graduate School was established in 1972 to administer all graduate programs of the campus. At present, it offers 92 graduate degree programs, including the Straight PhD and PhD by research, and is the only the graduate school in the Philippines that offers the Master of Science (MS) in Wildlife Studies program. Students enrolled in the MS program may opt for the straight PhD program if they show exemplary performance in their first year of enrolment and pass a departmental written and oral comprehensive examination administered by a department committee. Other areas of specialization in botany (plant systematics) and entomology (systematics, acarology, and aphidology) are unique to UPLB (http: //www.uplb.edu.ph/briefhistory).

At present, there are 900 master's and PhD students enrolled at UPLB, 14% of whom are from overseas. Among the top ten degree programs in terms of enrolment, six are directly related to SA: MS in Environmental Science (1st); Master of Management in Development Management (2nd);

MS in Development Communication (4th); PhD in Environmental Science (5th); MS in Animal Science (8th); and MS in Agricultural Economics (10 th) (Fig. 1).

Since 1972, about 40% of those conferred graduate degrees at UPLB have come from overseas, many from Thailand, Indonesia, Nepal, Bangladesh, Vietnam, and China. About a third have specialized in agronomy, agricultural economics, forestry, nutrition planning, community development, animal science, and soil science. Many of these graduates now hold key positions in their respective countries and are at the forefront of development initiatives and of policy formulation and implementation.

The Sustainable Agriculture Framework at UPLB

The term "sustainability" has entered common use in recent years. However, widespread agreement on a definition of SA remains elusive. The task of unifying the diverse elements of sustainability into a comprehensive, working definition of SA was mandated to the Sustainable Agriculture R&D Committee, created by then Dean Ruben L. Villareal, in 1990. The committee defined **sustainable agriculture** as:

> "any practice, method, technique/technology, philosophy or system of production that makes agriculture economically feasible, ecologically sound, socially just and humane (equitable), culturally appropriate and grounded on holistic (systems and integrative) science" (Zamora, 1995).

The SA definition by the Sustainable Agriculture R&D UPLB Committee encompasses a wide range of farming systems, including those referred to as (in no particular order) organic, sustainable, alternative, integrated, regenerative, low-external input, balanced-input, precision farming, targeted input, a "wise-use" of inputs, resource-conserving, biological, natural, ecological, agroecological, biodynamic, permaculture, natural, and nature farming. All these systems are sustainable in differing degrees but all fall within the boundaries of the description above. Some of these have precisely defined standards, but most have not.

The goals for sustainability can also be applied to all aspects of any agricultural system, from production and marketing to processing and consumption. Rather than dictating what methods can and cannot be used, UPLB's definition of SA establishes basic standards by which widely divergent agricultural practices and conditions can be evaluated and modified to create sustainable systems. The result is agriculture that is designed to last and be passed on to future generations.

Developments at UPLB in Response to Changing Agricultural Scenarios

1. Shifting Foci in R&D

Since its founding in 1909, UPLBCA has focused its R&D activities on developing component tech-

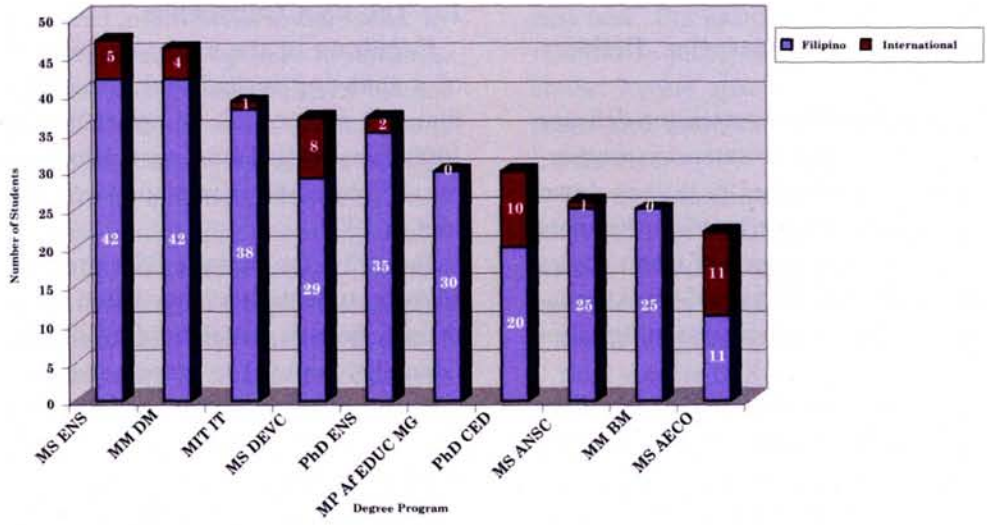

Fig. 1. Top ten degree programs in terms of enrollment (2008–2009)

nologies that support national agriculture programs and productivity goals. This is because UPLB's traditional sources of funds for R&D are government line agencies. Thus, UPLBCA has focused on the development of universal technologies and yield-increasing technologies to meet government productivity goals.

In the last decade, the focus of R&D at UPLBCA, despite differing foci of funding sources, has been steadily veering towards the accumulation of knowledge on environmentally benign component technologies and methodologies that will increase the efficiency of applied inputs in crop production. For example (Velasco and Zamora, 2000):

- the use of *Azolla,* other biofertilizers, and naturally occurring microorganisms to reduce the use of inorganic fertilizers
- integrated pest management (IPM) to reduce, if not avoid, the use of pesticides
- crop production systems in marginal environments (acidic upland, saline, and calcareous soils, and marginal hilly lands) to enhance productivity and prevent further deterioration
- soil and water conservation technologies (e.g., alley cropping, strip planting, sloping agriculture land technology, and other agroforestry systems)
- appropriate postharvest and village-level processing technologies (e.g., use of safe antimicrobial agents to prolong shelf life, and other village-level technologies)
- cultivars of vegetables and other major crop commodities that are resistant to environmental stresses and pests.

2. Paradigm Shift in the Extension Delivery System

For many decades, the norm in extension delivery has emphasized the researcher-to-extension-worker-to-farmer continuum, emphasized in the top-down transfer of technology extension model. Farmers are often regarded as passive targets of technologies and are commonly referred to as end-users, beneficiaries, or clients, rather than partners in development.

Lately, many faculty members and researchers have started working more directly with farmers using varying approaches, including farming systems research, participatory research, and ethnoscience. For example (Velasco and Zamora, 2000):

- IPM National Program—a national-level program on IPM for major economic crops, covering the generation of knowledge-based products and the grassroots-level use of these products. It aims to minimize the use of pesticides and other environmentally degrading farm inputs.
- Agro-Industrial Development Program—a UBLBCA college-wide initiated program to operationalize partnerships within agricultural communities for the effective and efficient delivery of agricultural extension services. It involves the binding of the different levels of local government units, local state colleges and universities, and other stakeholders through activities such as participatory planning, institutionalization of monitoring and evaluation systems, resource mobilization, and institution building and strengthening.
- On-farm research of locally adapted crop landraces and of location-specific technologies for production, post-production, and processing.
- Farmer—Scientist Program—a strategic program that promotes the collaboration between farmers and scientists (from the University) in the generation and validation of technologies to suit local conditions. The approach focuses on the principle that for SA to succeed, the proper mix between the intuitive wisdom of the experienced practitioners (farmers) and the best that science can offer must be found.

Elements and Features of UPLBCA Activities that Make it Attuned to Sustainable Agriculture

1. The BSA Curriculum

Cognizant of the need to address the challenges of a changing agricultural scenario, UPLBCA initiated a revision of its agriculture curriculum in 1990. The revised BSA curriculum (with SA as the overall philosophy) was approved for implementation in 1997.

Basically, the current BSA program aims (1) to educate students in science-based agriculture, giving them a holistic understanding of agricultural sustainability, and (2) to prepare them as socially committed professionals equipped with sufficient entry-level competencies in:

- learning new ideas and concepts, and assessing their value and importance in influencing agricultural development, the environment, and society

as a whole
- applying acquired knowledge and skills to promoting productivity, efficiency, sustainability, and stability of agricultural production systems to enhance quality of life
- effectively using the scientific method in promoting the sustainability of agricultural production systems
- communicating effectively and relating issues on the impacts of agriculture and on quality of life to the various sectors of society
- developing and effectively managing self-reliant, economically viable, ecologically sound, and culturally appropriate agricultural and related enterprises
- providing values and a global ethical perspective in the practice of their profession.

To achieve these objectives, the following elements and features were incorporated in the revised curriculum (Zamora and Sumayao, 1999):
- The courses required of all agriculture students regardless of major field were revised or reconstituted to increase the focus on the holistic understanding of agricultural production systems and the application of ecological principles in crop and animal production, management, improvement, and protection.
- All BSA students are now required to take courses on farming systems and ecological agriculture. These courses give students a systems perspective in agriculture, enabling them to understand and apply ecological principles in crop and animal production, management, and improvement.
- Students are offered alternatives to the thesis, including professional practice options, to suit those who would like to explore other fields of interest than research and academic work. In addition to the thesis, the revised curriculum allows students to take major (farm) practice, research internship, extension and community internship, teaching, and agricultural entrepreneurship. The various options are designed to temper the theories and principles learned in the classroom, which mainly emphasize ideal or assumed conditions, with realities and actual difficulties encountered on the farm.
- The curriculum provides 12 units of specialized field courses and 9 units of electives (Zamora and Sumayao, 1999) that may be taken from technical and social sciences. This revision aims to prepare students for any of the curriculum options (thesis or non-thesis) and strengthen their areas of specialization. Courses in the social sciences are expected to enable students to better understand the socio-cultural and political context of agriculture as they interact with the biophysical and technical elements of agriculture.
- Experiential learning processes are encouraged by field visits and exposure trips to actual farms and by inviting practitioners as guest lecturers.

2. R&D and Extension Activities

UPLBCA, with its rich pool of highly trained scientists, has an advantage in deepening the science and technology of SA. It recognizes the many sources of knowledge and expertise on SA outside academe, including farmers, indigenous peoples, POs, NGOs, and others.

Thus, UPLB's strategic role is to ensure that the SA knowledge base is scientifically grounded, replicable, promoted and made mainstream.

Lessons Learned in Activities Related to Sustainable Agriculture

1. Facilitating Factors in Curriculum Development

After a series of consultations, meetings, workshops, and a number of studies (Adriano, 1990; Mancebo *et al.* 1992, and Sulabo *et al.* 1993) to determine the nature of curriculum that the UPLBCA should offer, the UPLBCA faculty decided to shift from mainstream to SA. However, this was not an easy task. For example, the revision of the BSA curriculum to incorporate the philosophy of SA took almost 7 years, spanning the terms of two UPLBCA deans and three chairs of the College Curriculum Committee.

The main facilitating factor that allowed the paradigm shift of UPLBCA towards SA was the strong political will of three successive Deans. Other factors (Zamora and Sumayao, 1999) include:
- the in-house expertise on the conceptual and practical aspects of SA
- the creation of the Sustainable Agriculture R&D Committee in 1990, which laid the groundwork and strongly advocated for SA in instruction, R &D, and extension
- the strong linkage of some faculty members with

local and international POs and NGOs identified as SA advocates
- the rich collection of SA instructional materials in private collections of some faculty members
- the availability of expertise at UPLB in many component technologies of SA, as evidenced by the wide variety of major courses and training programs available in the departments and institutes of UPLBCA
- the financial and moral support of other institutions (such as the Southeast Asian Regional Center for Graduate Study and Research in Agriculture and the Philippine Rice Research Institute) in faculty conferences, seminars, workshops, and meetings designed for the faculty to come up with a common understanding of SA and to prepare the faculty for the shift towards SA
- support from the Central Administration of the university (e.g., the President of UP and the Chancellor of UPLB).

2. Barriers and Constraints to Change Towards Sustainable Agriculture

National level—At the national level, SA is not the mainstream model of agricultural development, because when the Philippine Senate ratified the country's membership to the World Trade Organization in 1996, national trade policies support liberalization of trade in agriculture. The Philippine government's commitments to regional and international trade organizations such as Asia-Pacific Economic Cooperation, and the ASEAN Free Trade Association reinforce the primacy of the market-driven agriculture that rewards short-term productivity gains rather than long-term sustainable production. The current agricultural programs being implemented by the government emphasize the application of modern (reductionist) science, expansion of (productivity) programs to rainfed and marginal areas, promotion of biofuel production even in food production areas, promotion and increased use of hybrid seeds and genetically modified organisms, planting of high-value crops for export, and support for corporate farming.

A feature of the system of production being promoted is the increasing shift from "agri-culture" to "agri-business" (Zamora, 1999). This reflects a fundamental shift to a monetized economy in which everything, including human beings, is assigned a value. Such a system leads to an increased sense of competition, isolation, and alienation and can lead to the breakdown of rural societies; their values are lost as the backbone of the larger society. Without such a backbone, agriculture can not be equitable, humane, and sustainable.

University level—In general, academic institutions are traditionally slow to respond to demands for change, and UPLBCA is no exception. Advocates for the incorporation of the philosophy of SA in the BSA curriculum have to contend with the fact that this new direction does not fit predominant paradigms. They have to face various forces, problems, and obstacles encompassing emotional and personal, institutional, administrative, policy, and financial, and scientific biases (Zamora and Sumayao, 1999).

The main emotional and personal constraint appears to be fear, in most cases unacknowledged. Some faculty members who, formally trained in the prevailing Western culture, have for many years equated control with progress and development (Leiss, 1972). According to this position, the failure to control is a signal of decay. In their view, to follow the SA path is to lose control to nature or even a return to an earlier, less developed or primitive stage (Coleman, 1982).

Many faculty members have produced research results and guided students in approaches that have become irrelevant to SA, or are potentially destructive to the environment. To some, shifting from conventional to sustainable agriculture is tantamount to rejection of an entire life's work (Macrae *et al.,* 1989). The unfounded threats of becoming irrelevant and losing career prospects are very real to them. In addition, some faculty members owe much of their success to having faithfully followed conventional approaches in their teaching of courses and in their work outside the classroom. Thus, it is natural to resist approaches and changes that challenge the orthodoxy that has helped them achieve their present positions.

Institutional constraints include initial lack of a unified institutional strategy to integrate SA into the curriculum; lack of hands-on experience of faculty in and exposure to SA; lack of contacts with SA practitioners; lack of institution-level resources on SA; and lack of a unified view on SA and its incorporation into the courses being taught.

Administrative constraints include bias of the existing rewards system in agricultural education towards conventional agriculture, and lack of incentives for faculty members who want to integrate SA into their instruction and other functions (Macrae, 1990). For example, the inter- and intra-disciplinary approach that is encouraged in SA education is discouraged in agricultural institutions where the credit load for a particular course is divided among the staff handling the course.

The dominant system of scientist evaluation likewise poses a major obstacle to the development of SA in academic institutions. Existing reward systems for those who conduct R&D tend to encourage academic rather than mission-oriented research. Reward in most research institutions is determined primarily by publications, and this sends a message that quantity is more important than quality. In an extensive survey conducted among academics, most of the scientists surveyed believed that publication record was overemphasized in evaluations (Busch and Lacy, 1983). In UPLB, as in most universities, the norm remains "to publish or perish". For example, accounted activities (other than teaching) for promotion purposes are reckoned in terms of publication equivalents.

Ideally, a paradigm shift in an academic institution such as UPLBCA would require well-prepared staff and adequate instructional resources and facilities. Unfortunately, although UPLBCA is considered a center of excellence in several domains, it is not well endowed in these areas. The availability of funds directs researchers to adapt their interests to the funding that is available. In this case, the "tyranny of the funding agency" prevails. This is especially problematic when funding is obtained from private sources, as is mostly the case in publicly funded academic institutions like UPLBCA.

Since the agenda of the private firm is not necessarily compatible with the public interest, researchers, either knowingly or unknowingly, end up using their publicly supported positions and resources to do private work that may be contrary to the public interest and not necessary supportive of SA. Thus, many scientists working simultaneously for public and private institutions are likely to adopt the firm's profit goals as their own. This problem is particularly acute in the emerging field of biotechnology, where there is substantial money to be made through patents and royalties. Working with the private sector still offers welcome opportunities, however, because as academics we should be able to provide objectivity, especially in the scientific interpretation of research results. It also opens an avenue for university researchers to contribute to private research from the SA point of view.

Another impediment is the availability of only short-term funding for research. This discourages researchers from undertaking long-term studies of the kind that is essential to furthering our understanding of SA. Three years' funding, common to many funding agencies, is too short to evaluate such things as the impact of SA practices (e.g., effects on soil organic matter and microbiology) or to determine the most effective crop rotation schemes to minimize soil erosion and reduce pest attack. The conduct of sustainable agriculture research is very difficult when the funding is not sustainable.

Plans for the Future

1. Academic Programs

Generally, UPLBCA plans to fine-tune and enrich its curricula towards SA. Among the immediate moves is the evaluation of the curriculum for further improvement. UPLBCA has also started to explore the possibility of offering other integrative major fields in the BSA curriculum: e.g., agricultural systems (including policy formulation and analyses), agroforestry (with the College of Forestry and Natural Resources); SA, urban/peri-urban agriculture, and environmental agriculture (with the School of Environmental Science). Likewise, the development of other degree programs (e.g. BS Landscape Ecology or Agriculture) is included in the University's Five-Year Development Plan.

2. R&D and Extension

To support SA research, UPLBCA hopes to enhance the current reward system to favor:

- long-term over short-term (preferably action research) projects
- multi-authored over single-authored publications
- farmer/extension/scientist/social scientist teams over teams of scientists (many farmers are interested in joining such teams) or individual scientists
- projects with an on-farm research focus over a laboratory focus

- high-quality popular (widely read) publications at least on par with high-quality scientific or economic (narrow-audience) papers.

Given the R&D and extension constraints discussed earlier, UPLBCA plans to explore other, non-traditional sources of funding. Other initiatives include:

- encouraging multi-, inter-, and intra-disciplinary modes of conducting R&D
- increasing the focus on R&D in marginal production areas
- formalizing linkages with institutions doing environmental work, both on- and off-campus (including NGOs and POs)
- encouraging staff to (more) directly involve farmers, POs, and indigenous peoples in their R&D.

3. Capacity Building

The most important element for a successful shift in focus and direction towards SA is the staff who will be involved in its implementation. In instruction, the success of an academic program depends largely on the teacher's grasp of the subject matter, as well as his or her ability to effectively teach this to specific groups of learners. Cognizant of this pedagogical principle, UPLBCA sees a need for the re-skilling of staff that are not confident of their knowledge of SA. UPLBCA is pursuing the following avenues for the re-skilling of staff:

- institutionalizing short courses, refresher courses, and non-degree programs on SA (according to clientele)
- providing post-doctoral places, fellowships, seminars and workshops, sabbaticals, and professorial chairs in SA
- building up, producing, and collecting resource materials on SA
- identifying, documenting, and multi-media packaging successful applications of SA and increasing the information's accessibility to staff
- faculty exchange, both national and international
- linking and networking with institutions involved in SA and related activities.

4. Structural and Institutional Changes

To ensure better delivery of an integrated graduate and undergraduate curriculum based on the SA philosophy, UPLBCA clustered its units for greater efficiency in teaching and in delivery of services and outputs. Thirteen distinct departments, institutes, and centers became six clusters within UPLBCA (Table 1).

The possibility of joint programs, to counter the compartmentalization of agriculture, is now being explored with other units and institutions within UPLB, including the College of Forestry and Natural Resources, the School of Environmental Science, the College of Public Affairs, and the College of Human Ecology.

Conclusion and Recommendations

The role of an academic institution like UPLB is to produce graduates who will eventually contribute to the promotion of SA. Thus, our graduates

Table 1. Departments, institutes, and centers comprising the present academic and R&D clusters of the UPLB College of Agriculture

Cluster	Units within the cluster
Crop Science	Department of Agronomy; Department of Horticulture; Institute of Plant Breeding; Post Harvest Research and Training Center
Crop Protection	Department of Plant Pathology; Department of Entomology; National Crop Protection Center; Weed Science Division of the Department of Agronomy
Animal and Dairy Science	Institute of Animal Science; Dairy Training Research Institute
Agricultural Systems	Farming Systems and Soil Resources Institute; Department of Soil Science; Department of Agricultural Extension and Rural Studies
Food Science	Institute of Food Science and Technology

must be:

- researchers and scientists with a balanced background in the technical and socio-economic aspects of agriculture
- agricultural and agro-industrial entrepreneurs with deeply ingrained values of societal wellbeing
- development managers trained to approach problems from various perspectives.

To achieve this, the curricula must be problem-solving-oriented, science-based, integrative, and based on a systems framework. The latter means that we should be able to anticipate and integrate all facets of agricultural sciences (including plant and animal science, crop protection, agricultural economics, policies and resource management, agricultural engineering, and postharvest technologies) and view them in a holistic manner.

Parallel to the direction of the academic programs, R&D and extension programs and activities should likewise be problem-solving-oriented, science-based, integrative, and holistic. R&D and extension work must consider SA expectations of economic feasibility, ecologically sound principles, equity, cultural appropriateness, and science fundamentals.

Finally, the socioeconomic and political developments from within and outside the country are continuously affecting Philippine agriculture, and the Filipino farmers remain the most marginalized sector of Philippine society. With this in mind, and amidst high expectations from the various sectors of Philippine agriculture, UPLBCA should continue to respond to the challenges of changing agriculture in a continuously changing world.

As state institutions morally responsible for instilling values for the common good, it is our duty in academe to ensure that our efforts have significant impact or relevance to society's objective of alleviating poverty and inequity (in both material and intangible wealth) and respond to current needs and priorities of the populace, particularly in the area of food security at both the macro and household levels.

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