

PART I



ENTOMOLOGY: FULFILLING THE  
LAND GRANT UNIVERSITY MISSION



## CHAPTER I

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# *Contributions of Entomology to the Mission of the Twenty-First-Century Land Grant University*



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The major challenge facing a twenty-first-century Department of Entomology in a Land Grant University (LGU) is to remain relevant in a changing environment. To remain relevant as departments we must continuously adapt. To do this successfully, we must know where our science is going, where the LGU is going, and where society in general is going. All of these entities are constantly coping with a rapidly changing environment; therefore, change is critical to our success. The Department of Entomology, and for that matter any department, will be successful to the extent to which it continually adapts to contribute to the LGU success. Consequently, we should look at factors impacting future directions of the LGU. This chapter discusses new directions of the LGU, new directions and issues in agriculture and natural resources, new directions for a Department of Entomology, and a few points about planning.

### **NEW DIRECTIONS OF THE LAND GRANT UNIVERSITY**

The key to any success is performance. Beyond that, such performance must be in areas important to society. As I stated, our success as a department should be keyed to the success of the LGU. The directions taken by the twenty-first-century LGU will be driven largely by accountability: accountability to our overriding mission to serve the public. Over the past fifteen to

twenty years, the LGU has undergone much criticism. This criticism comes from our clientele and from our political leadership. It has focused on our undergraduate program and specifically, on low graduation rates, poor attention to student needs, an obsession with research and its resultant scramble for grant dollars, a faculty that is invisible, and an attitude of arrogance among faculty. We are fortunate that the traditional Land Grant component of the LGU that I will refer to broadly as agriculture is often cited as an exception, and in fact, a good example. There are several reasons behind this. For one, our departments have faculty teaching in the classroom. In addition, we pursue problem-solving research and we boast a customer-friendly extension program. However, even though we have been pointed out as examples for the rest of the LGU to follow, we must not become complacent.

The roots of criticism against the LGU can be attributed largely to a loss of contact and communication with our clientele. To some extent, the LGU has forgotten for whom it works, and our attitudes often *are* arrogant. A recent study commissioned by the Kellogg Foundation titled “Returning to Our Roots: The Engaged Institution” (NASULGC, 1999), addresses these issues. The theme of this report is that we must re-engage with our clientele. An important feature of this study is a seven-part test to assess our level of engagement. The seven parts of the test include responsiveness, respect for partners, academic neutrality (objectivity as information source), accessibility, integration (of teaching, research, and extension functions), coordination (across units), and resource partnerships. Along with the commission, I believe these seven issues are key indicators of successful Land Grant universities of the future. In fact, they were the strengths upon which the LGU system was built. They will be key indicators of performance for a Department of Entomology or any other unit of the university in the future.

The seven issues addressed by the Kellogg Foundation report, dealing with contact and communication with our clientele, are equally applicable within a university, within a department, and between our partners and us. If we analyze our failures over recent years, most would fall under one or more of the seven characteristics. For example, how often do we hear from our clientele that we are not responsive or that we are not accessible? On the other hand, how often do we have organized listening sessions or joint planning sessions with our clientele? How often do we, usually as individuals, ridicule the opinions of the public, the press, or politicians? How objective are our recommendations now that we profit from intellectual property ownership, both as an institution, as units, and as individuals? Recommendations on plant cultivars now take on a different light. Are we accessible? Institutions are confus-

ing, and as it has often been said, clientele have problems and the LGU has departments. We must be user friendly. Are teaching, research, and extension optimally integrated? Do we have faculty sending in proposals to do the same thing from multiple departments or from multiple units? Coordination is important. Partnerships will be essential—partnerships with the corporate world as well as partnerships with the rest of our clientele. However, partnerships must not compromise our mission to serve the public good. The successful department of tomorrow will aggressively address all of these issues to maximize its performance.

Another important component of performance, along with emphasis areas and clientele, is that of quality. All LGUs strive to be in the top ten or the top five. At the University of Florida we pride ourselves as a member of the Association of American Universities (AAU), but not resting on our laurels, we are pressing hard to be among the top institutions within AAU. This means increasing graduate education, increasing grant success, increasing merit scholars, and increasing graduation rates. These are worthwhile endeavors for they mean that taxpayers are getting a greater return on their investment. But a drive for quality based entirely on these criteria can be a tradeoff with accessibility and perhaps with academic neutrality. Striving for increased grant funds can be counterproductive to our mission, especially in the Experiment Station, and it can also interfere with our partnerships. We must identify quality factors that address all seven traits of the engaged institution.

Perhaps the most important quality aspect of any organization is its human resource base. The most important quality decisions at the LGU are the hiring and tenure of faculty. Maintenance of strong faculty development programs after employment is also important. As a rule, the LGU does a poor job in this area and it must be improved. In addition, quality and any other desirable trait must be rewarded. Once the department has decided the direction it must take, it must reward those employees who contribute the greatest to move the department in that direction.

Measurements of quality in research are particularly difficult to demonstrate to the public. Grant resources are inputs that can be helpful in assessing quality when all other things are equal—which they rarely are. Quality is really assessed best by peers, but even then it is hard to completely remove the human element. Of course the best measure of quality is the outcome. How has the research impacted society? Citation indexes are often suggested and often used to assess quality. To some extent they are being used at the University of Florida. But citation indexes are only useful within narrowly defined

parameters. A scientist's publication on corn will get cited a lot more than the same research conducted on strawberries, but we must work on strawberries anyway. Research on fundamental methods will be cited more often than research on applications.

Another aspect of performance is productivity. We are constantly asked: how can the LGU be more productive? How can we run faster? This is a special challenge for the LGU. Attempts to deal with perceived less-than-optimum productivity of faculty by legislative bodies has resulted in some undesirable consequences. At the University of Florida, components of research and service have been virtually eliminated from the effort allocation of academic faculty. The purpose of this is to increase the effective number of faculty Full-Time Equivalents (FTEs) in the classroom, but it was done at a cost to the other two missions of the LGU.

Measurements of productivity are a special challenge with research and extension. If one ignores quality, outputs are easy to measure—publications, patents, contacts, and such, but outcomes are more difficult. Outcomes are the answer to the question, “So what?” Outcomes serve the public good. They are the real purpose of our work and it is the outcome in which the clientele are interested. What impact has the release of a new variety had on the economic well-being of the industry, or what is the impact of a new rotation or a new tillage method? Of what benefit were these new outputs to the consumer? How has the adoption of Integrated Pest Management (IPM) practices enhanced public well-being? The cost of making these assessments across the board is extensive, but we will have to find a way. Concerns about performance and accountability have led the University of Florida to publish quarterly “Measuring University of Florida Performance.” Examples of topics over the past several months include efficiency, research productivity, improvement, graduate growth, and undergraduate program enhancements. Within these categories the University of Florida is compared to peer institutions. Such parameters can serve also as guideposts for departmental success.

### **FACTORS IMPACTING CHANGE IN OUR TRADITIONAL LGU PROGRAMS**

Agriculture is changing. It is becoming larger, more integrated, and much more technological. Environmental integrity has become more important. The corporation is more deeply involved in production research such as vari-

ety development and even extension education, activities that were once a hallmark of the LGU but now are being done in the private sector. These changes in the agricultural sector are impacting the Florida Agricultural Experiment Station (AES) and the Cooperative Extension Service. In response to these changes the AES can pursue three avenues with respect to research programs. We can either collaborate with private industry, compete head to head with industry, or we can do something different. I am not sure we can compete head to head. Compared to private industry, our resources are limited. Some major corporations have as many as 300 or more scientists working on one or two crops, for example. But there are other opportunities and agriculture is more and more a global system. The only way for the United States to compete is with new production technology. We will play a greater role in this area. In addition, good production technology, plus good management, plus skilled labor can lead to success, even when labor costs are high.

I believe we will see more collaborative arrangements with the private industry, and if done properly this can be a mutually beneficial arrangement. These arrangements range from sponsored research agreements to industry-funded centers. But we must remember that our first commitment is to our clientele, and we must work for their best interest. Many of the challenges facing agriculture and natural resources management will have solutions based on knowledge that can't be packaged and sold. In fact, this knowledge probably represents our greatest opportunity. Thurow (1993) says the future is not in product technologies but in process technologies. I believe this applies to agriculture. As an example, Thurow cites electronics in Japan. While the United States concentrated on development of new products, Japan concentrated on the development of new processes to manufacture those products. Consequently, Japan was able to pay higher wages and still make the products to sell at a lower price than we could in the United States. There is an important lesson here for U.S. agriculture.

Among the biggest challenges to agriculture are the environmental challenges. At the University of Florida we conduct research and offer educational programs in the development and use of the best management practices. For example, how to grow sugar cane in South Florida and keep phosphorus in the run-off below 5 ppb? The solution here will be knowledge and management (process technology) with minimal opportunity for a use of new products. Much research work needs to be done, so lots of opportunities exist. The same is true for animal waste management and integrated pest management. In fact, to effectively implement many of our biological control programs, the

producer will need to be involved in management, or very specialized businesses will be required, or in some cases, government involvement will be needed. But knowledge and management will be key and more important than product.

Food safety is another critical issue in want of research solutions that may not be addressed by private enterprise. Again, process technologies will be the driving forces leading to improvement. Agriculture and natural resources are biology-based systems. We live in a biology-dominated era, and as biologists (and entomologists) we are in an excellent position to contribute. Our AES mission has broadened beyond agriculture, and this is clearly reflected by the large number of LGU programs adding life sciences, or environment, or both to their name. Our research, extension, and teaching programs will continue to expand beyond traditional production issues to address basic questions in biology and to solve problems in agriculture and natural-resource management. This will include such topics as water conservation, natural ecosystems, species diversity, and the human dimension of our interactions with the environment.

### **WHAT ABOUT ENTOMOLOGY?**

The application of many previous statements to a Department of Entomology is clear. First, I would like to address the popular administration question of: Why do we have so many entomologists? This question is often raised because of invalid comparisons with other departments. It is noteworthy that faculty in a discipline only get summed when the discipline is coincident with a departmental name. The most common comparison of entomology is with plant pathology. But plant pathology is a specialization of microbiology. The fair comparison of numbers of entomologists is with microbiologists. The fair comparison of number of plant pathologists is with plant entomologists (a heretofore unrecognized subdiscipline). An illustration at the University of Florida is as follows: Statewide we have about seventy-two entomologists, twenty-six of whom work on plants. We have forty-one plant pathologists. The remaining forty-six entomologists work in areas of medical entomology, livestock entomology, apiculture, household/structures, and the basic entomological sciences (ecology, physiology, systematics, etc.). To continue with the analogy, microbiologists involved in medical issues work for the health sciences whereas medical entomologists are usually attached to Entomology

departments. The same is true for veterinary microbiologists and livestock entomologists, and for food microbiologists and apiculturists. The “basic” subdisciplines of microbiology are found in the Department of Microbiology and Cell Science (a faculty of seventeen at the University of Florida). Regardless of subdisciplines, we entomologists call ourselves entomologists, and we are usually aggregated in one department and hence, very visible. Decisions should not be based on total numbers of entomologists, but based on the amount of work needed to be done and the opportunity to make an impact.

The analogies between the number of entomologists and microbiologists can also be used to illustrate the diversity of entomological programs and their interface with society and its institutions. Diversity is a strength of a Department of Entomology because it provides multiple opportunities to contribute to the future of the LGU. I also believe that within agriculture, entomologists are the best all-around biologists. For example, few other disciplines in Colleges of Agriculture have faculty so broadly trained in the basic biological sciences including biology, ecology, evolutionary theory, zoogeography, and animal behavior.

One of the major challenges of our Department of Entomology continues to be pest control. I believe there will continue to be immense pressure to eliminate the use of conventional pesticides on our commodities, especially foods, both at pre- and post-harvest. Many of these pesticides are used to control insects, and the development of control alternatives will be an area of increased need.

Entomology has traditionally provided leadership in IPM programs, but a step further will be required for the future. We need better tools for the IPM toolbox. We must press forward with research into nonchemical methods such as cultural control, host plant resistance, and biological control. There are many opportunities in the more fundamental aspects of insect science, genetics and biochemistry to name two. Other focus areas include a growing urban entomology field, biodiversity, ecotourism, natural systems and ecology, and wetland conservation. We must also look at collaborative opportunities with the social sciences. E. O. Wilson (1998), in his recent book *Consilience* points out the need to communicate with the social sciences and to reach understanding levels that can lead to common goals. Much of science is now butting heads with social policy, and this is an interaction facing immense communication gaps. We must establish new linkages within the LGU. Scientific progress is made at disciplinary interfaces, and although interdepartmental research is to be pursued, the need to interface is often found within

departments as well. Parrella et al. (1998) provides an excellent overview of the ways one Department of Entomology is positioning itself to meet the Land Grant mission in the next millennium. Entomology has a potential for interactions with other disciplines. We have many opportunities for joint programs with education, the health sciences, architecture, landscape architecture, and human ecology.

In addition to pest control, one of the traditional challenges of the Department of Entomology is graduate education. To remain competitive in the LGU system, we must have strong graduate programs. At a minimum, we must maintain graduate programs at their current level and perhaps even promote the growth of these programs. Most of our graduate programs in agriculture have remained constant in numbers for the past decade or more. To overcome this lack of growth we must address the two major challenges: financial support and job placement after graduation. We must direct additional resources into financial support of graduate students, and we cannot allow research efforts to shift entirely to post-doctoral scientists for productivity reasons. We should look for help in the private sector in this regard. In addition, we must be innovative in training for job placement. Traditionally, we have trained Ph.D.s for research. That market has been saturated for years in many disciplines. We should think more about professional degrees. Our industries are now more technologically oriented than in the past, and consequently industry needs more extensively trained employees. At the University of Florida, we have just approved a Doctor of Plant Medicine program. We know there is a risk in this decision but also know there is a market, and if our first graduates prove successful the program should grow.

Departments of Entomology must also be innovative at the undergraduate level. As the LGU strives to teach students such skills as critical thinking, writing, and teamwork, in addition to the basic biological sciences, entomology programs should be proactive in the provision of courses. Dollars will flow to credit hours. At the University of Florida, a "bank" has been established and money flows out based on credit hours. Successful undergraduate programs will assess the job markets and design innovative curricula to meet the market expectations. The design of curricula should have strong clientele input. The College of Agriculture at the University of Florida benefits from a strong pre-med/pre-vet program in the Department of Microbiology and Cell Science. Such professional school preparation could also be attained in a well-designed curriculum within the Department of Entomology.

The availability of technologies for distance education offers new teach-

ing opportunities. The University of Florida is presently collaborating with community colleges and other state universities to implement new University of Florida degree offerings at four distant locations. Community colleges and state universities provide the first two years of education or upper division supporting courses and we provide core disciplinary courses taught through distance education or by on-site scientists. These types of programs include, for example, a degree offering in urban entomology at Ft. Lauderdale.

Successful Entomology departments will address some of the key indicators noted earlier. As director of the Florida Agricultural Experiment Station, I look for a strong fundamental program that competes effectively and creatively for support funds and that is on the cutting edge of the science. I expect strong applied programs that address the needs of the clientele. I expect faculty to realize for whom they work, the clientele. A good new-faculty orientation program can accomplish this. I also expect faculty members to develop teamwork, collegiality, and to work for the good of the greater program. I expect responsiveness to the clientele. I am disturbed by calls indicating that Professor *Y* won't return calls, or won't address an industry problem; or about a department head who is not willing to address new issues without new faculty or dollars. I am much more inclined to award new positions and support to programs that strive to meet new clientele needs without excuses. It is often said that we cannot be everything to everyone, but instead we must assess our resources and focus our efforts. While this makes a lot of sense, in reality I believe specialization can be a recipe for disaster. The moment we start restricting our accessibility or responsiveness to any portion of our clientele, we will be planting seeds of discontent, and this discontent can take years to mend. As a public institution, we must be very judicious about what we decide not to do. Although we may not be able to be everything to everybody, we must continue to be something to all of our clientele.

### SETTING THE NEW DIRECTIONS

Strategic planning is essential for the survival and success of the twenty-first-century Department of Entomology. The most important aspect of strategic planning is strategic thinking, a component that is often under-emphasized. Planning structures must be implemented that foster extensive discussion and debate about (1) the strengths and weaknesses of the department as a unit, (2) the changing needs of society and institutional directions and their impact,

and (3) the actionable imperatives that the department must undertake. To be successful we must continue to assess our environment and act accordingly. We should make it a practice to look at futuristic ideas in articles and newsletters to position ourselves for upcoming changes. It is of interest to note that there are people who still think the Internet is a passing fad. Many opportunities can be seen in the recent article by Brown et al. (1998), analyzing the impact of the world's increasing population on our water supply, animals, crops, waste, forestry, biodiversity, and climate change, among others. A strategic plan must encompass a mission, a shared vision, and a set of shared values. In the book, *Built to Last* (Collins and Porras, 1998), a set of shared values was found to be the most consistent attribute of successful U.S. companies. It is also interesting to note that it didn't matter much what the values were, just that the companies had them. Common departmental goals are essential. No department can succeed as a collection of "cats." The most successful industries have learned this and practice it faithfully.

It is also important to remember that a strategic plan is dynamic. It should be regularly reexamined and refined. The plan should address programmatic goals as well as organizational goals. In other words, it should identify research, extension, and teaching imperatives, but it should also identify a strategy to succeed within the institution, to finance its operations, and to match the goals and expectations of the institution. To implement a strategic plan involves change. LGUs have taken a beating over the word change. We are perceived to be antichange. Faculty are perceived to be set in their ways, and the institution is often viewed as an unmanageable ship. This has not made sense to me because faculty, especially research faculty and their discoveries and inventions, are the instigators of change. We certainly are anxious to change to the latest equipment or the most up-to-date computers. To me, the problem is not change but failure to identify the objective of change. We are often encouraged to "change" for the sake of change and taught that we must change "to keep from being left behind." We must take the emphasis away from change itself and place it on the goal. First, identify where we want to be, and then design the change necessary to get there. Sometimes, our concern with change is a fear to be worse off after the change than we were before. It is common to read that for most of us, our aversion to loss is twice our desire to gain. If we get everyone on board and with a clear destination, then perhaps the journey will not be so controversial. In summary, the challenge to excel in the twenty-first century can be met by identifying and meeting the needs of our clientele and our institutions and by doing this better and more economically than our competitors.

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