Commentary

A Case for Globalizing Undergraduate Education and Student Learning at Colleges of Agriculture

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Abstract

This is a commentary on the rationale for globalizing programs in research and graduate education at agricultural universities. The case of U.S. land-grant universities is used to present the argument that globalizing research and graduate education has numerous advantages. However, the concepts may apply to agricultural universities in many countries. The authors make the case that the advantages for globalizing research and graduate education greatly outweigh any disadvantages and that globalization provides one strategy towards the continued improvement of research and graduate education at agricultural universities.

Introduction

In a previous commentary, published in this journal by the authors, it was argued that international components are essential, integral, and central to the education, research, and outreach missions of agricultural universities (Acker and Scanes, 1998). The present commentary discusses in some detail the *raison d'être* for globalizing research and graduate education in agriculture and focuses on the case of U.S. agricultural universities. The core thesis is that by providing an international component, the quality of research and graduate education is markedly improved and frequently made more relevant. Cautionary notes are also included. As with so many approaches, globalization is important but not a panacea. It is a reasonable approach when used as an adjunct to a series of strategies to achieve quality and relevance.

As late as the 1980's, thoughtful commentaries on U.S. land-grant universities, their agricultural colleges and their research, teaching, and extension programs could be written where the global perspective was completely absent (e.g. McDowell, 1988; Beattie, 1983; Ladd, 1991). This may reflect other issues being viewed as more critical or that international aspects of programs were so intuitively obvious and hence, not worthy of mention or that the question had not arisen.

More recently, there have been changes in attitude coupled with more frequent discussion on the subject of globalization. For example, the implications of international issues was ranked as one of the most important challenges for the research program for U.S. agricultural universities in a 1992 survey of land-grant university administrators (Meyers, 1992). The general category of “international issues” was ranked seventh on a list of top challenges as perceived by administrators.

Globalizing Research and Science

The importance of both an international research experience and on-going scientific research collaborations has been recognized as vital to a scientist’s development. This view is becoming increasingly prevalent throughout both the developed and developing worlds. Such experiences have particular relevance to quality research in agricultural and environmental sciences which benefit from testing across a wide range of ecological or social conditions.
An international research experience may include being part of one of the best "laboratories" or research groups in the world. For example, in the first third of this century, many scientists, particularly chemists, spent part of their training in Germany, the locale of the finest scholars in the field. The value to the host research group is the ability to have some of the best minds in the world together focusing on a specific research problem.

Table 1

Examples of sources of support for international research cooperation in agriculture

- Bilateral Agricultural Research and Development (BARD) (For example, U.S. and Israel)
- National Science Foundation Grants
- Fogarty Fellowships
- Ford Fellowships
- Fulbright Fellowships
- North Atlantic Treaty Organization Grants
- Rockefeller Fellowships
- United States Department of Agriculture Research Exchange Program
- Wellcome Fellowships
- Multinational research programs under the auspices of the European Union

The value of international scientific cooperation in developing mutual understanding is almost axiomatic. David Sammons (1999) captures a key element of international agricultural research when he states, "knowledge knows no geographic boundaries." There are numerous, although arguably still insufficient, programs to support this (see Table 1 for examples of sources). The advantages to the host and recipient of this symbiosis are numerous, including the strong research results from the cumulative experimental efforts, the ability to access different equipment, germplasm, environments, and sources of funding, the strength derived from combining very different perspectives in a research group, and the commitment of scientists to key societal problems such as food security and environmental sustainability.

No discussion of international agriculture research and graduate education would be complete without a treatment of the role of national funding for agricultural research and its implications for food security. At a national policy level in most countries, the rationale for funding research in support of production agriculture rests on both the moral imperative of food security (local or global) and the pragmatism of competitiveness of a nation's agricultural sector. According to Tweeten (1998), global agricultural productivity is increasing in a linear manner with the rate of increase declining over time. For example, cereals had yield increases in 1961 of 3.2 percent; in 1971, it was 2.4 percent and by 1996, it had declined to 1.5 percent (Tweeten, 1998 a,b). In developing countries, grain production (per capita) has been stagnant since 1980 (IFPRI, 1994). Increases in agricultural productivity (excluding changes/increases in land area being employed) are not keeping pace with human population growth. The picture of food security is much more complex when food distribution, access, and quality are considered.

This situation is accentuated as economic growth and personal spending power are accompanied by shifts in the types of food consumed. It is calculated that global agricultural production will not meet the demands for food for the first 30 to 40 years of the 21st century (Tweeten, 1998 a). The analysis assumed that agricultural research in both the public and private sectors will continue at the present rate.

In the U.S. context, the drive to keep U.S. agriculture competition in a global market provides a strong rationale for domestic agricultural research funding. Exports represent
30 percent of the U.S. agricultural economy. Some examples of commodities for which exports represent a key marketing outlet include almonds (exports = 70 percent); wheat (exports = 54 percent); cotton (exports = 45 percent); and soybeans (exports = 30 percent) (Dwyer, 1998). One of the key components of globalized trade is that increasing global trade and economic development is best served when regions/countries compete based on their competitive advantage. Research is a key enabling factor in this system. It is argued that investing public and private funds in agricultural research will be critical to a nation’s competitive trade position, as well as people's quality of life, health, and even survival throughout the world.

However, public funding of agricultural research has not been the highest priority. In the cases of the U.S., Canada, and Europe, the rate of growth of funding for agricultural research has declined. For instance, growth in constant dollars in public funding for agriculture research in the U.S. was 2.7 percent for the decade of the 1970's, 2.0 percent for the 1980's, and less than 1.0 percent for the 1990's (based on Huffman and Just, 1998).

Further exacerbating this situation of limited funding at domestic levels is the recent and precipitous decline in support of international agricultural research funding at the 16 International Agricultural Research Centers of the Consultative Group on International Agricultural Research (Table 2).

These International Agricultural Research Centers are funded by donor countries and agencies including the U.S. through the United States Agency for International Development (USAID) (12.4 percent of funding in 1995), Japan (11.4 percent of funding), and Europe (34.4 percent of funding); international agencies like World Bank (15.2 percent of funding); and foundations (2.0 percent of funding) (Pardey, et al., 1996). There is convincing evidence that the International Agricultural Research Centers have been very successful with IRRI and CIMMYT playing a pivotal role in the green revolution. Moreover, Pardey and colleagues (1996) provided a strong case that a major component in the increases in wheat and rice yields in the United States are based on germplasm from CIMMYT and IRRI, and that the cost benefit analysis of United States contributions versus benefits to U.S. producers and consumers are in excess of 1:15.

It is intuitively obvious that strong links between the agricultural universities and the International Agricultural Research Centers would be mutually beneficial. There is a history of linkages particularly at the scientist-to-scientist level and through graduate students spending time at centers. There have been efforts recently to enhance interactions. However, it seems to be unlikely that relationships can move to a new level until there are sources of funds for joint research proposals, reciprocal visits of scientists to each other’s laboratory or research facility, and for effective sharing of specialized research equipment.

Role of Faculty in Globalizing Agricultural Research

The faculty member/scientist is of paramount importance to the success of internationally relevant agricultural research. Beattie (1983) reminded us that universities are built on the creativity, imagination, and intellectual horsepower of individual faculty members. Collaborative research with scientists on
Table 2

International Agricultural Research Centers

- CIAT - Centro Internacional de Agricultura Tropical, Colombia
- CIFOR - Center for International Forestry Research, Indonesia
- CIMMYT - Centro Internacional de Mejoramiento de Maíz y Trigo, Mexico
- CIP - Centro Internacional de la Papa, Peru
- ICARDA - International Center for Agricultural Research in the Dry Areas, Syria
- ICLARM - International Center for Living Aquatic Resources Management, Philippines
- ICRAF - International Centre for Research in Agroforestry, Kenya
- ICRISAT - International Crops Research Institute for the Semi-Arid Tropics, India
- IFPRI - International Food Policy Research Institute, USA
- IWMI - International Water Management Institute, Sri Lanka
- IITA - International Institute of Tropical Agriculture, Nigeria
- ILRI - International Livestock Research Institute, Kenya
- IPGRI - International Plant Genetic Resources Institute, Italy
- IRRI - International Rice Research Institute, Philippines
- ISNAR - International Service for National Agricultural Research, The Netherlands
- WARDA - West Africa Rice Development Association, Ivory Coast

It should be noted that, in addition to inputs, there are many transaction costs in international agricultural research. These may include travel for proposal development, for data collection, and for presentation of results at international conferences. They may include time required to translate documents and time needed to fully understand the cultural context in which the research is undertaken. With greater emphasis on accountability, there are increasing costs associated with impact measurement and reporting. For national and international collaboration in research to be successful, transaction costs should be minimized and/or impacts and outcomes maximized. Communication over the internet combined with occasional face-to-face meetings can help reduce the costs associated with planning of research protocols and sharing of data. Faculty are central to the success of any effort to globalize agricultural research through their role as initiator, communicator, conceptualizer, and promoter.

International and Domestic Graduate Students

A clear and compelling case exists for the presence of international graduate students in graduate programs in United States agricultural universities. The case will likely have equal merit at agricultural universities anywhere in the world. International students bring different perspectives, and hence, provide a diversity of viewpoints and familiarity with different environments for faculty and fellow students alike. International students studying in colleges of agriculture have generally been vigorously screened, are well-educated, talented, and highly motivated. They bring these characteristics to the research program of the host institution. Therefore, a graduate program with some international students is almost invariably better than one with no international students.

Globalizing graduate education goes beyond having international students in graduate programs at U.S. agricultural universities. In view of the global nature of science and agriculture, innovative approaches need to be...
developed or implemented for broadly internationalized graduate education. These mechanisms include:

• The inclusion of faculty of universities outside of the United States on the thesis committees for graduate students;

• Joint graduate or "sandwich" degrees with foreign universities in which students take coursework at their home university, conduct their research at an international partner university, and return to their home university to complete their degree;

• Globalization of graduate curricula, especially coursework that provides opportunities for exploring the application of their discipline in another setting;

• Team investigations utilizing multi-national teams of graduate students; and,

• Graduate students spending sojourns in laboratory or conducting field research at a foreign university or international agricultural research center.

These and other innovative approaches improve the quality of graduate education in the United States per se as well as develop long-term partnerships with universities or research centers around the world.

Conclusion

Globalization of research and graduate education in agriculture is a key driver of quality improvement whether the context is the U.S. land-grant system or another agricultural university system. Engagement of multi-national teams of scientists and graduate students brings new perspectives and greater strength to research efforts.

Departments of agricultural and extension education can benefit from increased efforts to globalize both the coursework offered as well as the research undertaken by faculty and students. The extension leaders and teachers prepared in these departments will need to assist their students in understanding a globally interdependent agricultural system. Departments of agricultural and extension education must be responsible for educating future agricultural and extension education leaders to understand these forces. However, agricultural research and graduate education in general is suffering from a lack of international cooperation. The authors propose that to achieve greater international collaboration in agricultural research and graduate education requires a borderless system. Readers interested in examining what such systems might look like are advised to consult the Global Consortium of Higher Education and Research for Agriculture (http://www.gchera.iastate.edu) and the Global Forum on Agricultural Research (http://www.egfar.org).

Investments to date in cereals research have yielded significant returns on investment that benefit developing and developed countries. There needs to be a broader recognition of the importance of globalizing agricultural research and a commitment to increasing exchanges and funding related to research of this nature. International graduate students and exchanges of students and faculty members are critical mechanisms to globalizing agricultural research.

Literature Cited


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