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# CAN AMERICAN UNIVERSITIES PROVIDE APPROPRIATE GRADUATE EDUCATION IN HORTICULTURE FOR STUDENTS FROM THE LESS-AFFLUENT COUNTRIES?

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Although I left the field of horticulture in 1934 and returned to it (as an administrator at that) only in 1972, I have been involved during the past two decades to some degree with graduate education and other training programs for foreign students. I shall rely here on whatever I have gained from that experience, which should contain a few common denominators applicable to the problems of training horticulturists.

### Background of average foreign student

First, I feel, we should attempt to characterize the typical foreign student from a less-developed country, in spite of the fact that there will be exceptions to any generalizations.

Most students who are qualified to undertake study abroad are city raised. Too few of the rural youth in the less-affluent countries have an opportunity to go to college; indeed, many of them never finish high school. The disadvantages of having no farm background are obvious. Principally the students lack a sense of practicality, an alert perception and ordinary common sense in seeking solutions to agricultural problems. One who has never grown a horticultural crop, for example, is hardly well prepared to undertake teaching, research or extension work in horticulture, even though he may have a bachelor's degree in that discipline from the national university in his country.

Also, the average foreign student sent abroad for advanced study, has studied largely from books and lectures; he has had little practical experience. Although he may have read about mineral deficiency symptoms, for instance, he has seldom observed them on plants. The

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same can be said for the signs of disease and insect attack.

In Asia at least, the "good" student is the one who gives back to the professor just what the professor gave to him; the student, in short, who pays close attention and has a good memory. Little credit is given for exercising powers of imagination and ingenuity. Attempts to question theory or data are discouraged, if not sharply criticized. Rote, not reasoning, is the age-old method.

In too many of the less-developed countries, the social environment is that of a highly stratified society. The educated and the well-to-do consider themselves to be superior, while the lowly farmer is generally held to be uncultured, ignorant, and by some at least, downright stupid. The student ready to go abroad usually comes from the upper stratum of society. He has been taught by his family and associates to think more about his own professional advancement than about preparing himself to help develop a better life for the rural people of his country by adapting modern scientific knowledge to local conditions.

These negative factors give some idea of the problems universities and colleges in the developed countries face when such students arrive for advanced study.

On the other hand, we should not lose sight of the fact that, for all the deficiencies of his preparation, each foreign student from abroad has undergone successfully a certain amount of screening by his own university, by the agency that supports his scholarship, by the university admissions office abroad, etc. So, generally, the professor in an American university gets a rather more than usually intelligent and promising student, one who has hurdled a series of barriers and is ambitious to succeed. Surely he deserves serious attention in working out an appropriate training course.

### The graduate program

I am not familiar with current horticultural curricula, and shall not attempt to go into detail as to an appropriate course of study for foreign horticultural students. I shall confine myself, instead, to a few principles which may have some application to the foreign graduate student majoring in horticulture.

The course program for a foreign student should not be downgraded just because he comes from a non-English-speaking country or from one where educational standards are low. Too often the foreign student, pitied because of background deficiencies, is given a light and inadequate course of study. In my opinion, if he is unqualified for normal graduate study, he should be encouraged either to undertake further preparatory work or to enroll in a more practical, non-degree course of study.

No horticultural student (or a student in any other branch of natural science) should be permitted to pursue a graduate curriculum without a thesis problem. I know that in some reputable graduate schools here, a special program is available whereby a student can get a master's degree without going through the process of carrying out a research project and writing up the results in the form of a thesis.

In my opinion, considering the fact that most foreign students have done no research before undertaking graduate study (there are exceptions, such as those from the University of the Philippines), the process of helping select a thesis problem, of discovering how to attack it, of carrying out the research itself, and of analyzing and writing up the data, constitutes an essential part of the student's preparation to undertake his duties back in the home country, whether they turn out to be teaching, research or extension.

The selection of the major professor for each graduate student is of obvious importance. Although, as suggested earlier, he should not be one who lowers standards to make life easier for the student, he should have a high degree of patience and understanding, and, if at all possible, he should have had personal experience in the region of the world where the student comes from. For example, let us suppose that a student from Shri Lanka wishes to obtain further training for work with tropical fruits. How much better it would be for him to study with someone who has had experience in the humid tropics, rather than with one who has never seen a growing mango, papaya, mangosteen or rambutan. Furthermore, the professor with foreign experience understands better the background – education, social and cultural – of his student.

#### Theoretical vs. practical

It is no easy matter to decide how much theoretical vs. practical course work a foreign student should take. First, the amount of theoretical and fundamental scientific training the foreign graduate student gets should depend largely on the major subject he selects and on the degree of sophistication of the scientific environment in his own country, to which presumably he will return. Second, no matter how much basic scientific training he gets, his major advisor and the other faculty members with whom he associates should impress upon the student not only that agricultural science is a worthy profession, but also that the solution of practical agricultural problems at home should earn more glory than returning to become an isolated fundamental scientist. To use a horticultural example in the area of plant breeding and plant pathology, how satisfying it should be to develop a set of papaya cultivars that are highly resistant to *Phytopthera palmivora*, a fungus disease that afflicts papaya plantations throughout the humid tropics.

Let me add one more thought on this subject. Occasionally in any country, there is the highly gifted person who can make unusual contributions to basic scientific knowledge. When this person is identified, all rules are off. He should be enlisted, either in his own country or abroad, to help solve the "mysteries of the universe." However, his kind is so rare as not to interfere with this discussion of typical situations.

In recent years there has been a tendency for graduate schools of American universities to arrange for some of their foreign agricultural students working toward the Ph.D. to do most of their thesis work in their native country. This has worked out very well in most instances. It has the distinct advantage of integrating course work in a foreign country (the USA, for example) with research work in the student's own country. This process tends to turn out a much better oriented student, who is well prepared to take up significant work on his return. Obviously it is more expensive than it would be if the student completed his Ph.D. requirements during his stay abroad, for most universities require that the graduate student return to the degree-granting university to have his oral examinations and to put the final touches on his doctoral dissertation.

#### Practical training

One other aspect is the matter of practical training in modern crop management. This usually should be done in the developing country itself, using methods and materials available there.

My experience with this type of training was gained at the International Rice Research Institute in the Philippines. After we had been operating for a couple of years, we became acutely aware of the fact that the average extension worker, and often the research scientist as well, did not know how to grow a good crop of rice. He could not identify the symptoms of the common limiting factors in rice production under field conditions. He was unable to face the farmer with confidence and advise him about such practical matters as cultivars, water management methods, fertilizer applications, or insect- and disease-control practices. This defect seemed to be present in all the rice-growing countries of Southeast Asia.

Based on these observations, the Institute started "Rice Production Training", a six months course. Each year some 35 students learned how to grow a rice crop, using the most modern cultivars and cultural practices. The students learned by doing. Every practice in rice growing from land preparation to harvest was carried out by the students themselves. Generally, mornings were spent in the field, while afternoons were used for classroom instruction not only in the science of rice production but in the principles of extension and communication. Furthermore, the participants received instruction in how to conduct a similar training course in their own countries.

This program, which has been going on for 7 or 8 years now, proved to be highly successful. From the 35 students a year, distributed among 20 countries, literally thousands have been tra in their own countries, using similar techniques.

This same general method, it seems to me, could be used to 5. at benefit in training horticulturists. Indeed, by 1975 the Asian Vegetable Research and Development Center will inaugurate such a program at Shanhua, Taiwan.

In answer to the question posed in the title of this discussion paper, U.S. universities *can* provide appropriate graduate education for foreign students in horticulture. They have been doing it for some time.

## SCHOLARSHIPS FOR DEVELOPMENT

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In promoting the advancement of knowledge and its application to human needs, scholarships have proven to be highly effective instruments. The concern of the ASHS for advanced training of foreign scholars in horticulture as a means of increasing food production and enhancing the quality of life in developing nations is clearly reflected in the convening of this symposium.

My remarks will draw heavily upon personal experience in

selection of foreign scholars and in field training prior to award of scholarships to Latin Americans. The Rockefeller Foundation has provided international support for fellowships and scholarships for the past 56 years. Initially, fellowships were awarded to individuals who had achieved the doctorate or had considerable experience in their field of specialization. At that time, fellowships provided for training in public health and medical education. As the Foundation's activities broadened, fellowships were extended to include other scientific and cultural fields. Awards have been made to scholars of more than 85 nations, and to staff members of several international organizations.

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