

service clubs, or at 4-H or FFA meetings in their home communities.

About a month after our return, we invited all the participants to our home for a light meal and had each participant show 10 to 12 favorite slides. That created an opportunity to exchange and/or borrow slides for duplication. Reports were collected at this meeting and everyone seemed to enjoy the opportunity to see each other once again and "relive" the tour through the slides. The Kansas State-University of Missouri football weekend in the fall provides an excellent opportunity for students on the European Tour of the previous summer to get together again.

Based upon comments received from participants, the international agricultural study tour is an extremely worthwhile endeavor. Most agree that although a study tour is expensive, the benefits far outweigh the costs. It becomes an important life-long investment. Some students participate because of potential interest in agricultural missionary work through their church or the Peace Corps. Others seem primarily interested in comparing the livestock, cropping, and/or marketing practices, and still others go just for the opportunity to learn from travel.

Summary

Vast differences exist among agricultural production systems throughout the world. International agricultural study tours offer undergraduate students a unique opportunity to study these systems. Careful planning and considerable preparation are required for a successful study tour. The tour leader plays a key role in the success of the study tour. Student response indicates that study tours are extremely beneficial to participants. We believe that international agricultural study tours greatly broaden the perspectives of all participants and should be offered whenever possible to strengthen undergraduate programs.

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International Crop Production Course

An Investigation of The Agronomic Dimension of World Hunger

David J. Sammons

Abstract

An upper level undergraduate course focusing on the agronomic dimensions of world hunger is described. The course focuses on the problems and potentials for increasing world food supply based on current agronomic knowledge. Emphasis is placed on the international aspects of food crop production, and the interrelationships between agriculture and human populations on small farms in the developing nations of the world.

Course Rationale

World hunger is a multi-dimensional global problem with profound and disturbing social implications for the late twentieth century. As such, it raises issues that must be resolved with intelligence and compassion. In an effort to examine one dimension (agronomic) of this complex problem, a course entitled "International Crop Production" has been developed in the agronomy curriculum at the University of Maryland.

In general, a course in International Crop Production is outside the mainstream of course offerings in a conventional agronomy curriculum. Nevertheless, there

are important reasons for its inclusion as part of the departmental offerings. A broad understanding of the nature of food crop production — its problems and potentials — is necessary for any professional in agriculture in today's world, in which nations are often intimately interconnected and interdependent. In a more general sense, it is important that all students confront the great and recurring public issues of our time — among which are starvation, malnutrition, and hunger. To deal effectively with these issues, whether as a professional or as a concerned citizen, one needs accurate and complete information. This course examines one dimension of the multi-dimensional problem of world hunger. It is necessary for a complete understanding of world hunger but is not in itself sufficient. Further study ought to focus on the social, political, economic, and moral dimensions of world hunger.¹

Course Organization

International Crop Production is taught as an upper level undergraduate course with an average enrollment of about 60 students. Most students who enroll are juniors

¹The University of Maryland is currently developing a cross-disciplinary curriculum module on Global Food Problems. The course described in this paper is designed, in part, to fit into that program. Complementary courses are being developed, or are already being taught, in such other areas as economics, political science, philosophy and morals, food science, and anthropology.

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or seniors and have had other courses in agricultural and/or biological sciences. An introductory botany or crops (agronomy) course is a prerequisite.

Table 1 presents the topic outline for International Crop Production. The course is divided into three sections. Section II (world hunger and agronomic interrelationships) contains the bulk of the material presented during the semester. The course meets for three hours per week.

The University of Maryland is on a semester system, with 16-week semesters. Table 1 suggests a course lecture schedule with appropriate time allotment for a semester system. If the course were to be modified to fit into a quarter system, it might best be abbreviated by condensing the historical material and by reducing the number of specific crops studied. It might also be divided into two courses, one focusing on issues and concepts relevant to agronomy in an international context, and the other focusing on specific food crops.

Course Description

The central theme of International Crop Production is that agriculture is a phenomenon resulting from the interplay of human populations, domesticated crops (and animals), and an environment which presents opportunities for, and constraints to, food production. An effort is made throughout the course to examine and compare agricultural practices in various parts of the world by relating these components.

The course begins with a brief examination of the experience of pre-agricultural human populations, and a summary of theories concerning the transition to agriculture as a lifestyle 10,000 years ago (the "Agricultural Revolution"). Crop domestication, the event parallel to and necessary for the occurrence of an agricultural revolution, is then considered in enough detail to understand the explosive evolutionary nature of the process.

The foregoing topics complete the introductory portion of the course. They also set the stage for a study of the present state of subsistence and small farm agriculture in the developing world. Basic to this section of the course is a statement of two underlying concepts essential to an accurate and sensitive view of agriculture as it currently exists:

- 1) Farmers everywhere do the same things. They simply do these things in differing ways. The specific operations are:
 - a. selection of land suitable for crop production;
 - b. preparation of a seed bed;
 - c. planting of the seeds or other propagules;
 - d. protection and enhancement of the plant's growing environment;
 - e. harvesting of the crop;
 - f. storage of the harvested product either for future food use or for future use in establishing a new crop.
- 2) Farmers in the developing world generally know what they are doing and are frequently

good at it, within the constraints posed by available resources and the local environment; it is erroneous to view world hunger as the fault of "lazy, ignorant, or backward" farmers as is often done.

It is important that these concepts be presented and clarified at the start of the course because students must recognize subsistence agriculturalists for what they are — capable farmers. This recognition is the key to any accurate assessment of subsistence agriculture. Any approach to a study of agriculture in the developing world that fails to recognize the competence of poor farmers is guilty of perpetuating the condescending attitudes that have contributed to the frequent failures of agricultural development schemes in the past. All that follows in this course, particularly as it relates to contrasting agricultural systems and to agricultural change and development, must be interpreted in light of these important understandings. At the same time, it must be recognized that rural poverty, hunger, and malnutrition are critical and continuing global problems, and that the agricultural sciences have a role to play in ending the human suffering these problems create. This implies that agricultural changes must and will take place.

Thus, following an examination of the nature and dimension of world hunger, an overview of the "Green Revolution" is presented. This overview is put in the context of an international response to hunger through agri-

Table 1. Topic outline for course in international crop production with suggested time allotments for 16-week semester.

Week	I. World Agriculture in Historical Perspective
1	a. Pre-agricultural man
2	b. The origins of agriculture; the agricultural revolution and its impact on human populations
2	c. The evolution and domestication of agricultural crops
3	d. Subsistence farming and the major food-producing areas of the world today
	II. World Hunger and Agronomic Interrelationships
3	a. The nature and dimension of world hunger
4	b. The international response to world hunger; agricultural research, the international centers, and the "Green Revolution"
	c. Aspects of crop production in an international context:
5	1. The tropical environment and crop production potential
6	2. Crop production and cropping systems
7	3. Crop protection: diseases, insects, weeds
8	4. Crop improvement: the exploitation of genetic resources
9	5. Appropriate technology for the developing world
	d. Agronomic features of major food crops
10	1. Cereal Crops: Wheat, Rice, Corn, Sorghum, Millets
11	2. Starch Crops: Potato, Cassava, Sweet Potato, Banana
12	3. Pulse Crops: Common Bean, Cowpea, Chick Pea, Mung Bean
13	4. Oil Crops: Peanut, Oil Palm, Soybean, Coconut
	III. Agricultural Development and Change in the Less Developed Countries - An Agronomic Perspective
14	a. Agriculture in traditional societies
15	b. Agricultural change; the impact of the "Green Revolution" on agricultural development
16	c. Problems in the dissemination of agronomic knowledge and technology in developing countries.

cultural research that is directed towards generating knowledge appropriate to the needs of subsistence and small farm agriculture. It is made clear that agricultural production strategies suitable in the industrialized world are often entirely inappropriate for the needs of the developing world. Following the overview of the "Green Revolution," a series of topics are covered that are designed to examine specific aspects of improved crop production in an international context. The limitations and potentials of the tropics (where most of the world's poor nations are located) as an agricultural environment are studied. Attention then turns to an analysis of crop production strategies, crop protection methodologies, crop breeding goals, and agricultural technologies appropriate for use on small farms in the developing world. Throughout this section of the course, it is important to stress that much can be learned from what is presently being done by subsistence farmers, and that change must be structured to fit these existing situations. In other words, change must augment and not displace human populations and cultural norms.

Following the analysis of the foregoing aspects of crop production, the course focuses on some major food crops of the developing world. Crops considered are grouped into four categories for convenience: cereals, starch crops, pulse (legume) crops, and oil crops. The crop study portion of the course examines each crop according to the following outline:

- a. crop history, origin, and evolution;
- b. geography and volume of contemporary production;
- c. crop utilization, particularly how the crop contributes to human nutrition;
- d. plant morphology, characteristics, growth habit, physiological features, and adaptation;
- e. standard cultural practices, particularly in the developing world;
- f. current research priorities for improving crop production.

This completes the portion of the course dealing with agronomic interrelationships with world hunger.

The final portion of the course attempts to draw together the conceptual and factual areas previously described through an examination of the dynamics of agricultural change in the developing world. Important considerations in this concluding section include an assessment of the desirability of agricultural change, its impact (both positive and negative) on poor people, and the problems associated with the dissemination of new agronomic knowledge and technology to small farmers.

Course Reading

A unique aspect of this course is the nature of the supplementary reading. The reference section at the end of this paper includes an assortment of texts that deal with the major conceptual and factual areas explored. As is clear, a large volume of conventional literature can be

used appropriately in a course of this sort. No single text is fully suited, although four are suggested in the reference list that, in combination, could be used as main texts. It is also desirable to assign readings from many of the other texts listed.

In addition to the material described above, several unconventional books are listed under the heading "Special Reading." Use of these books stems from recognition that a full understanding of the problems of agriculture and agricultural change in the developing world requires not only a working knowledge of the process of crop production and plant biology (supplied by conventional texts) but also a sensitivity to the crushing realities of rural life and the environment of the people in these nations who are responsible for that agriculture. No ordinary agronomy text explores this human dimension of agricultural production. Therefore, assigning reading from books that are not generally used in "science" courses has been helpful. Listed below are three such books. (Others probably could similarly be used.) Each of these books describes the impact of hunger, rural poverty, and change in the lives of agricultural people in a separate area of the developing world.

1. Gay, John. 1973. *Red Dust on the Green Leaves*. Thompson, Connecticut: Inter Culture Associates.

This book explores the tension between tradition and change among the Kpelle tribe people in Liberia through the lives of twin boys who make alternative choices about their lives as they grow up in a small African village.

2. Markandaya, Kamala. 1954. *Nectar in a Sieve*. New York: Signet Books.

This book traces the adult life of an Indian woman married at a young age to a subsistence farmer, and her struggles to raise a family, assist with the farm, and endure the changes that constantly threaten her survival.

3. Thomsen, Moritz. 1969. *Living Poor*. New York: Ballantine, Inc.

This book is an account of a Peace Corps volunteer's experiences in Ecuador living and working in a remote village, and attempting to understand and to deal with hunger, poverty, and unchanging traditions in a virtually impenetrable culture.

Conclusions

The overall objective of this course in International Crop Production is to provide students with an insight into the role of the applied crop sciences in meeting the challenge to provide for global food needs, especially in the poorest nations. A major secondary goal is to create in students a sensitivity to the realities of life in rural areas of the developing world. Hopefully students will recognize that improved crop production is a critical part of the solution to world hunger. The problem of global hunger is not fully understood if a student has not viewed it from the perspective of the crop sciences. This course provides that opportunity. Students who complete International Crop Production should be better able to articulate the potential contribution of agronomy to the alleviation of world hunger and, at the same time, should recognize the need for an interdisciplinary approach to

the solution of the problem. Additional course work in related areas such as economics, political science, food science, philosophy, and anthropology would be valuable.

Literature Resources

Suggested Main Texts

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2. Janick, Jules et al. 1969. **Plant Science - An Introduction to World Crops**. San Francisco: W. H. Freeman and Co.
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3. Coombs, P. H. 1974. **Attacking Rural Poverty**. Baltimore: The Johns Hopkins University Press.
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