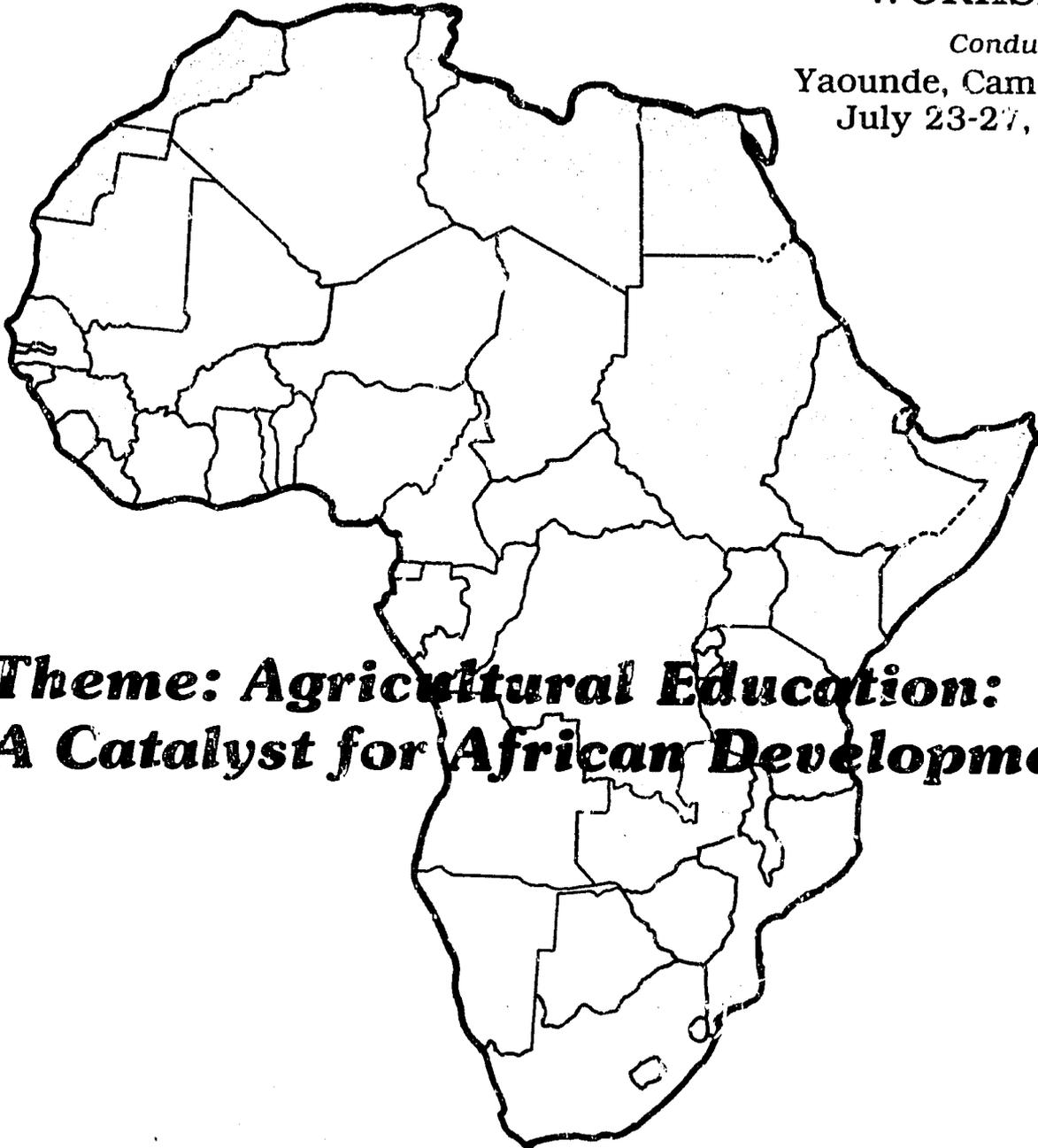


**GENERAL PROCEEDINGS**  
of the  
**AGRICULTURAL  
EDUCATION  
WORKSHOP**

Conducted in  
Yaounde, Cameroon  
July 23-27, 1984



***Theme: Agricultural Education:  
A Catalyst for African Development***

**Sponsored by:  
The Education and Human Resources  
Development Division \* The Agriculture and  
Rural Development Division \* Office of  
Technical Resources, Africa Bureau \* and  
USAID Mission, Cameroon**

Agency for International Development  
Washington, DC

WORKSHOP PROCEEDINGS

of the

AGRICULTURAL EDUCATION WORKSHOP  
Yaounde, Cameroon  
July 23-27, 1984

THEME: AGRICULTURAL EDUCATION:  
A CATALYST FOR AFRICAN DEVELOPMENT

Sponsored by

The Education and Human Resources Development Division;  
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I. AGRICULTURAL EDUCATION WORKSHOP  
AGENDA

THEME: AGRICULTURAL EDUCATION: A CATALYST FOR AFRICAN DEVELOPMENT

Convener: Dr. Cynthia S. Perry, Chief, Education and Human Resources  
Division, Office of Technical Resources, Africa Bureau,  
AID/Washington.

Monday, July 23

- 13:00 - 17:00 Workshop registration, Hotel des Deputes
- 15:00 - 16:00 Preliminary meeting with panel moderators - Dr. C.S.  
Perry.
- 16:00 - 17:00 Preliminary meeting with group leaders and rapporteurs:  
Dr. Ray Morton and Dr. Edna McBreen.
- 16:00 - 18:00 Open House, Hotel des Deputes

DAY ONE - Tuesday, July 24

- 8:00 Buses depart for Palais des Congres
- 8:30 Opening Address - Dr. Solomon Nfor Gwei, Vice Minister  
of Agriculture, Government of Cameroon
- Break
- 9:30 Opening Remarks: Dr. Cynthia S. Perry, Convener  
Welcome: U.S. Ambassador Myles Frechette  
Welcome: Mr. Ron Levin, USAID Mission Director
- 10:00 Keynote Address I: Agricultural Education in  
Africa: The Problems and Priorities.  
- Professor Richard Musangi, Egerton College, Kenya
- 10:55 Keynote Address II: The Status of Agricultural  
Education Training Capacity in Africa.  
- Dr. Burton Swanson, Department of Agricultural  
Education, University of Illinois

11:40 Buses depart for hotel

12:30 Luncheon

14:30 Buses depart for Palais des Congres

15:00 Introduction to Basic Workshop Format - Dr. Stanley Handleman, Chief HRDO, USAID/Cameroon

15:30 Break; small group meetings

16:00 PANEL: AGRICULTURE IN THE GENERAL EDUCATION CURRICULUM

Moderator: Dr. Raymond H. Morton, Division of Agriculture and Rural Development, Africa Bureau, AID/W.

Panelists:

Mr. Kajih John Tansam, Director, IPAR/Buea, Cameroon

Dr. Babs Fafunwa, Education Consultant, Nigeria

Dr. David Gooday, World Bank

Mr. David Winkelmann, Agriculture in the Classroom Project, USDA

17:00 General Discussion

17:30 Buses depart for Hotel des Deputes

20:30 Dinner Session: Hotel des Deputes  
Topic: The Impact of Government Policy on Agricultural Education Programs in Africa

Professor Asavia Wandira, Vice Chancellor Makerere University, Uganda

DAY TWO - Wednesday, July 25

8:00 Buses depart for Palais des Congres

8:30 PANEL: TECHNICAL/VOCATIONAL AGRICULTURE AT THE SECONDARY AND POST-SECONDARY LEVELS IN AFRICA.

Moderator: Dr. John Kamara, Principal, Njala College, Sierra Leone

Panelists: Mr. J. Meka NGamba, Head of Agricultural Education, Ministry of Agriculture, Cameroon.

Dr. James Christiansen, Department of Agricultural Education, Texas A&M University.

Dr. Earl Russell, Department of Agricultural Education, University of Illinois.

Dr. Roger Steinkamp, Ministry of Education, Rwanda

- 9:30 Discussion
- 10:15 Break
- 10:30 Small Group Meetings
- Topics: Status of and priorities in agricultural education.  
Agriculture in the general education curriculum.  
Technical/vocational agriculture at the secondary and post-secondary levels.
- 12:00 Lunch (Catered at the Palais des Congres)
- 14:00 FAO Study of Agricultural Manpower and African Agricultural Institutions  
- Dr. Heinrich Hoffman, FAO/Rome
- 14:30 Report of small groups - Dr. Edna McBreen
- 15:00 Break
- 15:15 PANEL: WOMEN AND AGRICULTURAL EDUCATION
- Moderator: Dr. Eudora Pettigrew, Associate Provost, University of Delaware
- Panelists: Dr. Mary Rojas, Office of International Extension, Virginia Polytechnic Institute and State University
- Dr. Timothy Ngwira, Vice Principal, Bunda College, Malawi
- Dr. Terry Hardt, Agricultural Development Officer, USAID/Sudan
- Dr. Maria Mullei, Rural Development Officer, USAID/Kenya

16:15 Discussion  
17:00 Open Forum  
18:30 Buses depart for Hotel des Deputes

DAY THREE - Thursday, July 26

8:00 Buses depart for Palais des Congres  
8:30 PANEL: HIGHER EDUCATION IN AGRICULTURE  
Moderator: Dr. N. Jean Anderson, Associate Dean of  
Education, University of Massachusetts  
Panelists: Dr. Rene Owona, Director General,  
University Center at Dschang, Cameroon  
Dr. Glen Magagula, Dean of the Faculty of  
Agriculture, University of Swaziland  
Dr. O. Donald Meaders, Department of  
Agricultural and Adult Education, Michigan  
State University  
Mr. Fomba Kourouma, Ministry of Higher  
Education, Guinea.  
9:30 Discussion  
10:00 Break  
10:15 Small Group Meetings  
Topics: Women and agricultural education  
Higher education in agriculture  
11:30 Buses depart for hotel  
Afternoon free

DAY FOUR - Friday, July 27

8:00 Buses depart for Palais des Congres.  
8:30 Report of small groups - Dr. Edna McBreen  
9:00 PANEL: EXTENSION AND NONFORMAL AGRICULTURAL EDUCATION

Moderator: Dr. Maiza N. Shandomo, School of Veterinary  
Medicine, University of Zambia

Panelists: Dr. K.J.B. Keregero, Head, Department of  
Education and Extension, University of Dar  
es Salaam, Morogoro, Tanzania

Dr. Joe Busby, University of Florida and  
Chief of Party, Dschang University  
Project, Cameroon

Mr. Mahluli Mngadi, Director of Lesotho  
Distant Teaching Center, Maseru, Lesotho

Mr. Benoit Ouedraogo, Director, Young  
Farmer Training Program, Ministry of Rural  
Development, Burkina Faso

10:00 Break

10:15 Discussion

11:30 Buses depart for hotel

12:00 Lunch

14:00 Buses return to Palais des Congres

14:30 Small Group Meetings  
Topic: Extension and Non-Formal Agricultural Education

15:15 Break

15:30 Small Group Meetings (to finalize reports)

16:30 SYNTHESIS OF WORKSHOP CONCLUSIONS AND RECOMMENDATIONS  
- Dr. William Drake, Agricultural and Occupational  
Education, Cornell University

General Discussion

17:30 Wrap-up: Dr. Cynthia S. Perry

Expression of Gratitude: Dr. Babs Fafunwa, Nigeria

18:00 Closing Address:  
  
The Honorable Dr. B. Kouesseu, Secretary General,  
Ministry of Agriculture, Government of Cameroon

Adjournment

19:00

State Reception

Hosted by the Ministry of Agriculture, Government of  
Cameroon - Hotel Mont Febe Sofitel.

## II. PREFACE

The Agricultural Education Workshop held in Yaounde, Cameroon represented a fulfillment of a central purpose to engage African and American educators in a professional dialogue on the total continuum of agricultural education in Africa. This focus sought to consider education as part of a long term solution to Africa's food crisis and agricultural education programs that would assist African nations to grow sufficient food and fiber, for food self-sufficiency. The goal of increased food production in Africa is basic to the mission of the Africa Bureau and basic to the goals of most African nations.

This Workshop brought into sharp focus five major themes related to agricultural education:

- Agriculture in the general education curriculum;
- Vocational and technical agriculture at the secondary level;
- Higher education in agriculture;
- Women in African agriculture; and
- Extension and non-formal agricultural education.

It also produced positive insights for problem solving, interdisciplinary and integrative approaches to Agricultural Education, including the following.

- Agricultural Education should be a continuum of learning from primary level through secondary and higher education to adult education. At the primary level the focus is primarily affective, presenting an early and continuing positive image for agriculture. At the secondary level it becomes more vocational (or avocational) while the higher education levels focus on careers in professional agriculture.
- The success of any agricultural education system is dependent upon the policies of the government. The integration of economic, educational and governmental policies must insure a fair return on farm investments.
- To insure the inclusion of women, who produce over 40 percent of Africa's food, in the development of African agriculture requires full integration and participation of women in agriculture training programs.

The workshop results are a step forward in that certain educational gaps in African Agricultural Education have been identified for governmental or university focus and/or for future support assistance, be it from a bilateral, regional or bureau funding source. Moreover, it is hoped that information derived from this report may provide guidance to Africa Bureau personnel,

field missions and regional offices in planning education and assistance training programs for Africa. Only when Agricultural Education planners provide a clear picture of the alternative costs and benefits of an Agricultural Education program, designed to develop the human capacity for food production and self-reliance, can policy makers make rational decisions as to how to acquire and effectively use the needed resources.

This volume is the second of two which constitute the total proceedings of the Agricultural Education Workshop. The first, the Executive Summary, is a cursory look at the workshop and its outcomes.

### III. SUMMARY

#### AGRICULTURAL EDUCATION MAGAZINE AGRICULTURAL EDUCATION...CATALYST FOR AFRICAN DEVELOPMENT\*

The Agricultural Education Workshop held in Yaounde, Cameroon, July 23-27, 1984 addressed the issues inherent in Agricultural Education as a catalyst for African development. The workshop was sponsored by the Education and Human Resources Division of the Africa Bureau of the U.S. Agency for International Development (AID). It was hosted by the AID mission in Cameroon and the Ministry of Agriculture of the United Republic of Cameroon. Over 100 participants were in attendance including representatives from 22 U.S. universities and 20 African nations: Cameroon, Guinea, Ivory Coast, Lesotho, Malawi, Mali, Mauritius, Nigeria, Rwanda, Senegal, Sierra Leone, Sudan, Swaziland, Tanzania, Togo, Uganda, Upper Volta, Zambia, and Zimbabwe.

The workshop focused on five major areas: (1) the inclusion of agricultural content in the general education curriculum at the primary level; (2) vocational and technical agriculture at the secondary and post-secondary levels; (3) women in agricultural education; (4) higher education in agriculture; and (5) extension and non-formal agricultural education.

The similarities between the concerns of the African agricultural educators and those facing their counterparts in the United States were numerous. Concerns about inequities in food pricing, lack of support mechanisms for rural families, policies which deny a fair return on investment to farmers and an inability to attract young people to agriculture as a profession were voiced throughout the workshop. While the concerns are similar, the degree of urgency is very different. As Dr. Solomon Nfor Gwei, Vice Minister of Agriculture of Cameroon, said in his opening remarks to the workshop,

The food question...is the number one problem facing Africa today. It is a problem which we must solve urgently in order to save the lives of millions of our sons and daughters. Hunger, malnutrition and consequent diseases stare us straight in the face. Food, food, food, is the outcry in many corners of the continent. Food importation and gifts of food by benevolent organizations are only temporary relief measures. Food self-sufficiency is the answer. The means to this end is agricultural development and there can be no real and effective agricultural development...except through agricultural education. (Nfor Gwei, 1984)

The problems are urgent, the concerns are real and Africa is looking to agricultural education for some solutions.

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\*Adapted from McBreen, Edna L. and Perry, Cynthia S. "Catalyst for African Development," The Agricultural Education Magazine 57 (January, 1985) 7, pp. 16-19.

While participants at the workshop were cautious to avoid presenting agricultural education as a panacea, they did see it as an essential element in any long term solution to Africa's food problems. The conclusions stemming from each of the five areas discussed help define that element. Additionally, the conclusions were formulated within the context of the following generalizations.

- Interdisciplinary, integrative approaches to agricultural education are essential. Thus, an overall understanding of agriculture must include understanding of such concepts as the farm family, sociology, management, and decision making.
- Agricultural education is a continuum of learning from primary through secondary and higher education to adult education. Denying a need for programs at any level will inhibit success at other levels.
- In light of the previous generalization, priority should be given to those efforts which will have an impact upon basic education and skills development in agriculture. Programs should target (1) farm families for immediate impact on agricultural development and food production, (2) primary level students for long term impact, and (3) agricultural professionals to develop and extend the technology needed for increased food production.

#### IV. WORKSHOP CONCLUSIONS

The following conclusions are organized around each of the major areas of concern considered during the workshop. There is much overlap and interaction among the areas accentuating the importance of the continuum approach to agricultural education. The conclusions represent the general agreement of the participants reached in small group meetings and during the larger, total workshop meetings.

##### AGRICULTURE IN THE GENERAL EDUCATION CURRICULUM

The situation in Africa's rural schools is such that those individuals who will become farmers rarely progress beyond a primary level education. This, teamed with evidence supporting the positive correlation between literacy and numeracy of farmers and increased food production, when there is access to appropriate technology, provides support for the introduction of agriculture concepts in the very earliest of education programs. Infusing agriculture into the general education curriculum, especially as a part of primary science education, will seek to make the curriculum more relevant to the students, increase awareness of options in agriculture among youth, help improve the image of agriculture which is currently one of a harsh lifestyle to be escaped, and consequently reduce and reverse patterns of migration to urban centers.

There should be continuity in agricultural education from the primary to the Ph.D. levels and students should have applicable skills for a gainful livelihood at any stage on that continuum. Agriculture should be incorporated into the teacher education curriculum emphasizing theory, practices and attitudes relevant to food production and rural living as well as optimum methods for teaching those concepts.

##### VOCATIONAL AND TECHNICAL AGRICULTURE AT THE SECONDARY LEVEL

Secondary schools in Africa are generally seen by rural youth as a means of escape from rural areas and farming. Until greater agricultural development occurs increasing the quality of rural life, there will be a limited demand for secondary vocational agriculture programs.

There is, however, a role for vocational agriculture programs in Africa. Where countries can make an investment in secondary agriculture programs, those programs can: (1) provide high quality, motivate students to attend agriculture universities and become agricultural professionals; (2) provide trained individuals to fill technical positions in the agriculture sector; (3) serve as an avenue for rural women to move into professional agriculture positions; and, (4) as agricultural development proceeds, train students to be capable farmers with skills essential to the effective use of new agricultural technology.

Education in Africa is adapted from the colonial models which allowed little room for practical learning experiences. For agriculture programs in Africa to be successful, there must be a shift away from teacher centered methods of instruction; school farm facilities and equipment for practical instruction must be made available or up-graded; and the lack of agricultural youth clubs must be remedied.

#### HIGHER EDUCATION IN AGRICULTURE

A total program package in higher education in agriculture for Africa should involve not only the training of professionals but also the building of institutions to continue training needed personnel. Degree programs at U.S. universities help provide the seed for growth of African universities. The African universities themselves need strengthened linkages with other universities - African professionals need the support systems offered by linkages with others in their respective fields. A key to effecting such linkages is faculty exchanges among African institutions, international organizations and U.S. universities.

The focus by African universities on practical, applied research based on local needs and priorities is essential to the solution of Africa's food problems. The integration of teaching, research and extension that exists in the U.S. Land Grant model is equally necessary in African institutions. This does not mean that the U.S. model should be cloned in Africa but that an African hybrid should be developed to accommodate local culture, government, priorities, needs, and agricultural systems.

#### WOMEN IN AGRICULTURAL EDUCATION

Women's roles in agriculture in Africa are becoming recognized more and more. Women produce 47 percent of the food in Africa but make up only 3.4 percent of the total trained agricultural personnel (FAO, 1984). In most sub-Saharan African countries, women are responsible for the production of food crops. However, educational programs and support systems for farmers do not always reach women. The workshop participants supported increasing efforts to identify, highlight, and promote the contributions women in agriculture are making to development. The numbers of women must be increased in all agricultural professions from teaching to research to policy making levels. Cultural barriers must be identified and, where necessary, special methods developed to insure the delivery of information to women. Full integration and participation of women in training programs must be guaranteed in order to be effective.

#### EXTENSION AND NON-FORMAL AGRICULTURAL EDUCATION

Extension in Africa faces the constraints of: a lack of research based technology to extend; poorly paid extension agents who lack transportation, supplies, and other elements of a support system; inadequate numbers of

subject matter specialists; and various bureaucratic and policy constraints. Top level government support is essential to the success of extension programs but the problem identification must be at the grassroots level to make extension the people's program.

Extension agents should be educators and not have other responsibilities such as regulation enforcement and credit administration as they often do in Africa. Reward and incentive systems for extension workers should be reviewed and improved to increase job satisfaction. Efforts must be made to involve both women and men in extension as professionals and as clients.

The rural populations of Africa are in need of politically astute leaders to represent them in nations that are becoming more and more influenced by urban areas despite the majority status of the rural population. The training of extension agents should include training in leadership and a focus of extension programs should be the development of leadership skills among women, men and youth.

Another crucial element to success lies in the appropriate choice of methodologies in extension. Emphasis should be on result demonstrations and farmer consultations. The technology and concepts disseminated through extension must be based on applied research. Local leadership, possibly in the form of advisory committees, should be sought and harnessed for design and implementation of projects.

The U.S. Agency for International Development sponsored the Yaounde workshop with an objective of providing an opportunity for the exchange of ideas among African and American agricultural educators. The Agency plans to incorporate many of the conclusions from the workshop into an Africa Bureau Agricultural Education Assistance Strategy which is currently being developed.

## V. PRELIMINARIES

### WELCOME ADDRESS

DR. SOLOMON NFOR GWEI  
VICE MINISTER OF AGRICULTURE  
CAMEROON

Your Excellency, Mr. Director, honorable workshop participants, honorable guests, ladies and gentlemen: on behalf of His Excellency, Paul Biya, President of the Republic of Cameroon and national President of the Cameroon National Union Party, on behalf of the people of the Cameroons, particularly those living in the rural sector, on behalf of the ministers of agriculture, and higher education and scientific and technical research, and on my personal behalf, I welcome all of you who have come from far and near to participate in the agricultural education workshop, taking place in our capital city, Yaounde, under the sponsorship of the United States Agency for International Development.

Permit me ladies and gentlemen to express our profound gratitude and appreciation to the United States of America, through the director of The United States Agency for International Development to the Cameroons, for choosing Cameroon as the venue for such an important workshop which has brought together about 100 of you from about 22 different countries, as well as many renowned international organizations and banks. The food question, ladies and gentlemen, is the number one problem facing Africa today, and which we must solve, urgently, in order to save the lives of millions of our sons and daughters from hunger, malnutrition and consequent diseases which stare us straight in the face. Food, food, food, is the outcry in many corners of our continent. Food importation and gifts of food by benevolent organizations are only temporary relief measures. Food self-sufficiency is the answer. The means to this end is agricultural development and there can be no real and effective agricultural development rendering those involved in its efficiency, except through agricultural education.

That is why the theme of this workshop "Agriculture Education: A Catalyst for African Development" is so vital, so appropriate and raises the hopes of so many Africans. The importance attached to the workshop is evidenced not only by the enormous sacrifice of its sponsors, but also by those invited to participate. Key African educators, agricultural experts, eminent scholars, government officials, USAID experts in planning strategies, and projects in agricultural education, representatives of renown American and African universities, donor organizations, the African Development Bank, the World Bank, the OAU etc., your Excellencies, distinguished guests, ladies and gentlemen, you can now understand why we are pinning so much hope on the outcome of this workshop, whose goal is to improve the quality of agricultural education in Africa.

We in Africa believe very much in education as the fundamental basis of sound agricultural development. We are quite aware of the land-grant colleges dedicated to training agriculturalists and mechanics which have contributed to the development of agriculture in the United States of America. Education has revolutionized agriculture in developed countries. Africa needs the type of agricultural education that will vitalize and enhance agricultural development. Agricultural education is not something to be introduced in Africa today. Colonial Africa was involved in agricultural education. Independent African states are involved in it today.

Yet agricultural development in most of Africa is far from satisfactory, in spite of the enormous sacrifices in terms of finance, time and effort put into it. No African government seems to be satisfied with the present state of agricultural development. Most people seem not to be quite satisfied with the performance of the product of our agricultural training and educational institutions. This is where the greatest challenge lies today, for the efficiency of any educational or training system is seen in the satisfactory performance of its end product. That is why we expect workshops like this to come out with a clear definition of agricultural education and agricultural training in terms of the end product and this within the African context, the scene of product performance.

The peasant farmer is the main actor on the scene in most African countries today. The amount of energy he puts into his agricultural activity is not commensurate with the results he gets. He is faced with many constraints and mountains of problems in his day to day activities. Farming, whether of perennial or food crops is becoming more of a burden and does not seem to interest many farmers any more. The rural sector is becoming more and more unattractive and being abandoned. Our extension workers, products of our agricultural education system, seem not to deal effectively with the peasant farmer problems.

More than 70 percent of the population of the majority of African countries are actively involved in agriculture and will continue to do so for many years to come. Agriculture being the bulwark of African development and the single activity that offers the greatest employment opportunities in Africa today deserves our greatest attention. This means that both the peasant farmer and the rural sector must be the focus of attention when dealing with agricultural education. Through education, research, and extension, our main objective should be to render the farmer and his milieu more capable of supplying on a continuous or permanent basis, the agricultural produce we need for our survival. Agricultural education which leads to agricultural development and abundant food is the sharpest weapon African governments need in waging their relentless war against hunger, malnutrition, poverty, disease and rural exodus.

Distinguished participants, ladies and gentlemen, I have only lightly touched on the subject of your workshop, leaving to you, the specialist, the task of scaling its depth and breadth through the keynote addresses, the panel presentations and discussions of the various topics on your agenda, as well as the exchanges of concepts and experiences in agricultural education. I am sure you will come out with elements of an agricultural education strategy that will lead to agricultural development and consequently to an improvement

in the quality of life in Africa. It is also my hope that the four-day workshop will offer an excellent forum for the exchange of ideas and experiences which will culminate in improving communication links between African countries and those of the rest of the world. I also hope that you will bring agriculture education, research and extension into a real wedlock; the results of your deliberations will undoubtedly help friends of Africa to gain a correct perspective of the problem we face in agricultural education and what type of help they can give us.

I am indeed pleased, ladies and gentlemen, that my country was chosen to host such an important workshop. I do not know why it was chosen, but my guess is because of our agricultural policies as regards agricultural education and research as propounded by our beloved head of state, His Excellency, Paul Biya. Convinced that the development of Africa depends, to a large extent, on its agricultural development through a sound educational system I am hoping that you will carry out your deliberations with vigor, moralization, and a spirit of obligation and objectivity.

I declare open the four-day Agricultural Education Workshop and wish you all the best in your deliberation. Long live international cooperation. Thank you.

#### OPENING REMARKS

DR. CYNTHIA S. PERRY  
CHIEF, EDUCATION AND HUMAN RESOURCES DEVELOPMENT DIVISION  
BUREAU FOR AFRICA, USAID

Your Excellencies, Mr. Ambassador, workshop participants, ladies and gentlemen: it is my pleasure to welcome you to the Agricultural Education Workshop for Africa and to bring you greetings on behalf of the Administrator of the Agency for International Development, Peter McPherson, and the Acting Assistant Administrator for Africa Bureau, Mark Edelman. This workshop is symbolic of the level of importance that AID places upon agriculture and food production in Africa and the development of human capital to support food security throughout the Continent.

One of the major purposes of this workshop is to engage African and American educators and agriculturalists in a professional dialogue on the melding of these two priorities for dealing effectively with the questions of how to grow sufficient food and fibre and then how to distribute it efficiently to the increasing million who need it. We are here, not for purely intellectual discourse on the concept of "agricultural education" nor to struggle for acceptable definition, but rather to focus upon the types and levels of educational experiences which will more fully and more rapidly develop the human capacity for food security and self reliance.

The current food crisis in Africa has become the focus of government and donor efforts to assist the region in regaining a balance between subsistence farming and self-sufficiency. We all seem to agree that reaching farmers--whether large or small, men or women--with sound agricultural advice and services is essential if food self-sufficiency is to be achieved in the foreseeable future, and if sustained and equitable rural development is to be successfully promoted. The achievement of these goals, in all the countries, is dependent upon the availability of well-trained sufficiently numerous and strategically placed groups of technical and field personnel--all of which rests upon a nurturing policy environment within local governments.

Each time I see a portrait of a starving African child, I am reminded that man's level of knowledge and his current grasp of technology is sufficient to prevent the death of a single child from starvation, malnutrition or dehydration. One questions why this technology is not extended to Africa. Another questions Africa's ability to embrace such technology and to adopt it or modify it to serve its own goals. Perhaps in these few short days, you will debate these questions and make recommendations for their resolutions.

As you may know, FAO recently completed a Training Agricultural Manpower Assessment covering 46 African nations and nearly 426,000 trained personnel in the areas of agriculture, forestry, fisheries and livestock. The results of this assessment are being discussed this week at FAO's Regional Conference in Harare. It is unfortunate that this workshop could not have been delayed to take advantage of the outcomes of that conference which may have provided an excellent data base for this workshop.

I received, however, a preconference copy of FAO's study which includes an action plan for agricultural manpower development in Africa and I thought it might be helpful and perhaps instructive to share some of their conclusions and recommendations.

The paper states in the beginning that in a region with much diversity, and with extreme variations in population densities, agricultural potential, climatic conditions, political philosophies and educational approaches, it is difficult to generalize with any degree of accuracy the existing problems related to agricultural manpower.

- (1) Interestingly, the FAO study did not isolate the shortage of trained personnel as a major constraint, but rather the lack of efficient use and management of available human resources.
- (2) Unemployment of agriculturally educated personnel was not seen as a widespread problem, but a growing concern for countries like Nigeria, Egypt and Sudan regarding university trained personnel. An overproduction of degree-level manpower coincides with an underproduction of technically trained personnel and has in effect created an imbalance leading to dissatisfaction of the graduates and an expensive top-heavy organizational pattern within the government sector.

From an economic point of view, this is untenable. From a needs point of view, the rural poor are not well served because degree graduates usually do not work at field level.

- (3) The number of professional personnel, however, were still inadequate in the forestry and fisheries subsectors as well as in specialized fields within agriculture.
- (4) Level of training and quality of training are priority areas in terms of planning for the future. In many countries, capital investment in physical facilities may now be less important than competency-based curriculum development designed to improve the quality of instruction in the training institutions. Special attention is required for strengthening intermediate level training.
- (5) Most countries which have a deficit of trained personnel also lack the institutional capacity to meet human resources requirements. From a utilization and efficiency point of view, this situation justifies the development of specialized centers of advanced study and research in Africa. For both financial and political reasons, strengthening national training institutions to serve regional needs is a viable alternative to the truly regional institutional development approach.
- (6) The results of the FAO study strengthen the argument for more and better trained female agriculturalists and extensionists. The tiny fraction of trained agricultural personnel who are women is entirely disproportionate to the millions of women who care for their families and work in the fields to produce a major portion of African foodstuffs. More and better training opportunities for women is an issue requiring immediate attention.

The FAO study pinpoints major constraints to effective manpower utilization which I urge you to consider in your deliberations.

- (1) Personnel policy issues, unattractive pay scales, lack of material support, lack of incentives of career prospects, inadequate funds for training, inequities in training opportunities for women, inadequately trained supervisors and managers as well as specialists.
- (2) Organization and management constraints were identified as lack of coordination among existing services, inefficient fiscal management leading to shortage of funds, transport and supplies where most needed by farmers; and competition for scarce resources such as staff, finances and transport.
- (3) Under methods, training and attitudes, great need for adaptive research suited to local conditions and local farmer's needs; small farmers and women seriously neglected.

- (4) An important quantitative issue is increasing financial pressures felt by every government in terms of recurrent costs for program activities. This requires every government and non-government organization to make some very hard decisions in terms of priorities.
- (5) There are questions regarding ratio between professional personnel to technical field staff. Agricultural education must consider four basic groups within the agricultural sector:
  - (a) professional specialists to staff the research, extension and teaching programs, as well as services supporting production;
  - (b) technical staff to assist in the implementation of extension programs, support research activities, help with teaching efforts and support production - to provide linkages between theoretical and applied knowledge;
  - (c) farmers who will always remain the base clientele; and
  - (d) a group of administrators and managers whose mandate is to give leadership, organization and direction to agricultural programs.

Time will not allow a complete summary of FAO initiatives in their action plan, but they include:

- strengthening existing national training institutes which have a capacity to train foreign nationals in specialized areas;
- strengthening of national training institutions and assisting with inservice training for faculty and staff;
- assisting governments with specific manpower planning and analysis activities aimed at identifying national training needs and priorities;
- increased scholarships and training opportunities for higher education and technical training in developed countries; and
- assistance in development management for better utilization of trained personnel.

FAO's action plan is strikingly similar to AID's policies and strategies for education and training for Africa. AID's strategy prioritizes, additionally, support to basic education, to the formal schooling of children to place in motion the long-range solutions to development problems and the quest for self-reliance. I submit to you that unless the formal schooling of children is the focus of agricultural education (while attending to shorter term training needs in the subsectors) twenty years from now we shall be no better off than twenty years ago when we began serious discussion of Africa's development problems.

Both FAO and AID's action plans include an increased role for the private sector in education and training which you may also wish to consider in your deliberations.

May I say again how extremely pleased I am to welcome you here and how impressed I am with the level of dialogue and professional sharing I have witnessed over the past three days. All of you are professionals, extremely bright, competent and well placed. In fact, if we tried to sort you out, it would produce a terrible protocol problem in terms of who's who in agriculture education and education in general. I appreciate your willingness to suspend protocol and to establish common grounds for communication and sharing of ideas. There is a tremendous need for an ongoing dialogue and interworking of ideas and professional concerns in agricultural education between African and American educators.

Perhaps this workshop is a good beginning. I am looking forward to your various discussions and to the sets of conclusions and recommendations which will form the basis of an implementable assistance strategy which is truly reflective of African needs and concerns. Thank you.

#### WELCOME REMARKS

MYLES FRECHETTE  
U.S. AMBASSADOR TO CAMEROON

Mr. Minister, Mr. Director, Dr. Perry, ladies and gentlemen: I have not planned to make a presentation today but I want you to know that I welcome this opportunity to say a few brief words of welcome to you.

You hardly need to hear from me how important agriculture is to Africa, indeed you wouldn't be here if you didn't believe in that. It is a source of great satisfaction and pride for me as a representative of the United States government to the Cameroons. The U.S. government attaches such great importance to supporting agriculture and agricultural education in Africa. We are committed to that, and as most of you know our USAID program in Cameroon is concentrated primarily in those areas.

Therefore ladies and gentlemen, on behalf of President Reagan and on behalf of U.S. government, I also welcome you to this Agricultural Education Workshop. I wish you the best possible deliberations and I hope you will all find this as useful as we all hope it will be. Thank you very much.

#### WELCOME REMARKS

RON LEVIN  
MISSION DIRECTOR  
USAID/CAMEROON

Ladies and gentlemen, after listening to the talk we just heard from Dr. Perry about the FAO priorities, I am ready to tear up my speech because we

are doing exactly what they think is important. With the enthusiastic cooperation of the Cameroon government, so clearly the lessons that have already been learned can be taught right here. What a nice place to have your conference, and what a nice opportunity you will have to interact with Cameroonian thinkers who have approached agriculture education along the lines FAO is now recommending. In any case, the Workshop is hosted by the government of Cameroon and USAID. It will serve as a catalyst for the necessary cohesion of education and agriculture. Its focus is development through agricultural education. The top priority for Africa is to increase food production, and education in agriculture is one of the roads to that end. Cameroon and most African countries have adopted these rules of Food Self-Sufficiency.

Turning agriculture research and technique into practical training is an approach which will require a change of attitudes among those professionals in widely varied disciplines, who often go their own way. This often means that the process must start with primary school children and continue throughout their lives. The fact that Cameroon is hosting this conference is clear evidence that it is doing something about this problem, as are all the countries represented here today. For example, the government and USAID is developing Dschang University which has adopted the United States Land Grant University system, which means teaching research and extension, practically and theoretically. A new concept in Africa, this has required major policy decisions which have had to be made decisively and at the highest level.

Cameroon is also changing the role of extension agents, training them to be educators, and eliminating their conflicting responsibilities as census takers or providers of agriculture supplies. Three elements, teaching, research and extension are essential to increasing food production. None of them can stand on its own, but combined, they provide the foundation for agricultural development. This mission is honored to host professionals from 30 African countries, several international organizations and the United States. The ultimate goal of this interaction is to develop a set of recommendations which will provide the basis for the United States Agency for International Development strategy in agriculture education development for Africa.

To all of you on behalf of the Yaounde USAID Mission, my Cameroon counterparts and myself, may I extend a hearty welcome to the participants in the Agriculture Education Workshop in Africa, with the hope that the next four days will be productive for all of us. Thank you.

## VI. KEYNOTE PRESENTATIONS

### AGRICULTURAL EDUCATION IN AFRICA: THE PROBLEMS AND PRIORITIES

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#### Introduction

Over the past few years Africa has been plagued with several natural calamities, most notably, the lack of rain in most parts of the continent. The continent is also faced with rapid population growth which calls not only for concerted efforts to reduce population growth rates but also to increase food production. Furthermore, for non-oil producing countries in Africa, increased agricultural production of "cash" crops means additional foreign exchange earnings are necessary for the importation of capital goods needed in the development of these countries. If, therefore, there is any continent that should worry about agricultural production efficiency, both economically and technically, that continent is Africa. It is in this respect that we should place great emphasis on agricultural education in all its forms so as to identify target areas that need attention with regard to increased food and other forms of agricultural production.

The prevention of malnutrition throughout Africa through the provision of adequate diets for a rapidly expanding population is a task of staggering proportions. A solution to this problem is perhaps the greatest challenge facing nations of the continent today. The United Nations World Food Conference, held in Rome in November 1974, called on Governments and the international community to eradicate hunger and malnutrition in the world within a decade. In arriving at this decision the conference participants were well aware of the nutritional problems facing much of the world, especially the developing countries. It should, however, be noted here that it is exactly a decade ago since the World Food Conference took place in Rome and the continent of Africa is no better in terms of food supplies. In fact, since then the situation has deteriorated.

In many African countries, the main problem is not only the periodic lack of adequate food supplies but also that when the food is available, it is imbalanced in terms of proteins and energy. The main defect, however, is a general shortage of protein, producing its most severe and tragic effects in children leading to a condition commonly known as Kwashiorkor (an extreme deficiency of protein in the diet).

#### World Food Production Potential

In order to understand the importance of agricultural production in developing countries, it is perhaps necessary at this stage to give a brief survey of the production potential, especially of food and feed on the African continent. While most developing countries have increased their agricultural

output, increases in production have not kept pace with increases in consumption due to rapid population growth. It is apparent that world food and feed production have not kept pace with population growth, and reserve stocks have continued to decline. The International Food Policy Research Institute (1) reported in 1976 that during 1960-74 the volume of food imports into developing countries grew at the rate of 4.4 percent per year. During the last four years of that period, at the time of rising prices occasioned by high oil prices, they grew at 6.2 percent annually. Thus the food's share of the import bill for developing countries rose, and continues to rise drastically. These developments suggest that the problem of financing adequate food imports may become a major barrier to adequate consumption in the Sahel region of Eastern and Southern Africa. This unfortunate situation may already have been reached due to prolonged droughts as these countries depend on farm outputs to earn foreign exchange needed to finance imports.

For developing countries with chronic food deficits, there is need for a further warning. Leaving aside the problems of financing large food imports in order to feed a rapid population growth, it is difficult to foresee the needed supplies forthcoming. On the trade side, the major developed grain exporters (the United States, Canada and Australia) would need to approach annual increases in production of about 4 percent, compared with their long-term growth rate of 2.5 percent, in order to accommodate only the aggregate market and calorie gaps of the developing countries. If such large supplies are to be produced by developed countries, which is at least questionable, they would be forthcoming only at higher prices thus aggravating the transfer problem between the exporters and the needy importers. The developing countries, for their part, need to increase their food production growth rate from the present 3 percent to almost 6 percent annually in order to meet their food needs. This is an unlikely prospect considering the long gestation period between investment in agricultural projects and the realization of significant gains in production.

Efforts to increase agricultural production, particularly in developing countries, must start with increased farm production and bring more land under cultivation. According to a U.S. government source, out of nearly 3,190 million hectares of potentially arable land in the world, 1,406 million hectares (44 percent) are currently under cultivation. This percentage varies between regions as shown in the table below:

POTENTIALLY CULTIVABLE LAND BY REGION (2)

REGION	POTENTIALLY CULTIVABLE LAND IN MILLION HECTARES	% OF CULTIVATED TO POTENTIALLY CULTIVABLE LAND
AFRICA	733	22
ASIA	628	83
AUSTRALIA/NEW ZEALAND	154	2
EUROPE	174	88
N. AMERICA	465	51
S. AMERICA	680	11
USSR	356	65

The greatest part of the potentially cultivable land which is presently uncultivated falls in Africa, South America and Australia/New Zealand. For Africa, as in many continents, this situation varies from country to country. It is estimated that in Egypt, cultivated land per person has fallen from about 0.39 acres in 1930 to the present 0.17 acres. In the corresponding period, the population has increased from 20 million to about 70 million. The decline is believed to be mainly due to industrial and urban sprawl despite efforts to reclaim land by increased investment in irrigation facilities.

For most African countries, especially in sub-Sahara Africa, a major threat to cultivable land is the desert encroachment. This is due to many factors including overgrazing and tree-cutting. For example, it is known that the area between Alexandria and the Libyan border used to be well populated and a prosperous vineyard of ancient Rome. Today it is a desert. Also to the south of Khartoum in the Sudan, the acacia Scrub-zone is known to have marched 90 kilometers southwards in the past 20 years. It is further pointed out by Flohn (3) that estimates of the areas of man-made desert worldwide, are now over 900 million square kilometers of once arable land. This situation must again be worse in developing countries rather than developed countries because it is in the developing countries where the bulk of the people depend on wood-fuel for cooking.

There are however, three major problems associated with bringing new land under cultivation. The first is that potentially arable land is remote from the sources of energy and high technology. Secondly, farmers throughout the world have traditionally farmed their best land before using land of lesser

productivity. Nearly 700 million hectares of the potentially arable lands are classified as lateritic which are low or very low in fertility and if developed, would require very large quantities of fertilizers and other capital inputs. Thirdly, the cost of bringing new land into cultivation is just too high.

In view of the above problems, it seems unlikely that the future world's, and more specifically African agricultural demands will have to be met by increasing production on much more than the equivalent of the current cultivated acreage. The limits we face will be largely determined by productive capacity. However, with known technology fully utilized in developing countries, through for example the use of fertilizers, the development of high-yield varieties of animals, crops and reduction in post-harvest losses, the current agricultural land of the African continent particularly should be able to produce more than at present. The development of a sound policy on agricultural education should largely help in this respect.

Since the dawn of African Independence in the early 1960's, many governments have changed the previous colonial educational policies, and while still preserving the literary examination oriented systems, have also gradually introduced those subjects which are considered to promote the prestige of practical work. In rural schools, the emphasis has been placed on those subjects that are likely to contribute to the development of rural areas. These subjects include agriculture, home economics and other industrial related subjects. The successful teaching of these subjects do require not only the change of policy and curriculum, but also the training or retraining of teachers and the provision of certain facilities. In the following part of this paper, an attempt will be made to highlight the development of these activities with respect to agricultural education and with examples where they are known.

### Historical Development of Agricultural Education in Africa

Throughout its history, African education has struggled between a rural orientation to satisfy the needs of the local people and an orientation towards a European system in keeping with the policies of the various former colonial administrations. As early as 1922, with the exceptions of South Africa and Gold Coast (now Ghana), when African educational systems were just taking shape, the Jones Commission (4) commented that:

The adoption of education to the needs of the people, is urged as the first requisition to school activities. Much of the difference and even opposition to education in Africa is due to the failure to adopt school work being discarded in Europe and America, are still too frequently found. It is little wonder that those who have seen the failure of unrelated education in the home countries should question the application of similar methods under the pioneer conditions of Colonial Africa.

This commission found that the basic adaptation of education to the needs of the individual and the community, which were already being emphasized in Europe, America, Japan, China and India were not being applied to Africa and as a result of this, undesirable consequences were developing. The African chiefs reported that their youth were becoming estranged, from their own people and were no longer willing to cooperate in the life of their native communities. Consequently, the Commission urged that African education should be adapted to the local environment with respect to health, the use of the resources of the environment, preparation for home life recreation and leisure. The implementation of this general recommendation was left to individual colonial governments. The Commission report also led to the publication by the British of an educational memorandum entitled "Educational Policy in Tropical Africa." (5) One of the principal recommendations contained in this memorandum was that education should be adopted to the needs of the local community, preserving the best of traditional society and preparing students for the world.

In many African countries, the missionaries had the major share in educational control. (6) European settlers in many African countries, on the other hand, did not want Africans to get liberal education fearing that educated Africans were potential malcontents. To them the best thing was to give the Africans technical and vocational education rather than academic.

The establishment of the Jeans School for example in 1925 in Kenya was testimony to the intentions of prompting education which is relevant to the needs of rural people. The training of the Jeans School teachers included both husbands and wives. At the completion of training the teachers were posted to serve the total community. At the village, the women teachers gave instructions to village women in health, sanitation, child care and general home economics. The men on the other hand demonstrated practical agricultural techniques. This system had many admirers and spread throughout Africa.

The early mission schools made agriculture part of their curriculum. For instance, at Alliance School in Kenya, agriculture was introduced in the third year during which time the curriculum was decidedly vocational. But agricultural education in many mission schools declined due to opposition from the European settlers who ironically did not want Africans to know much about such useful cash crops as tea, coffee and pyrethrum, and from the natives who in fact preferred liberal education unless they were taught the agriculture which the European practiced. Besides, friction developed between agricultural experts in the Department of Agriculture and Educators as to what should constitute proper agriculture teaching in the schools. In reference to the decline of agriculture at Alliance High School in Kenya, a former teacher at the school, Mr. J.S. Smith (7) had the following to say:

By this time (1931) agriculture was flourishing at Alliance High School. Ploughs and cultivators had been purchased and were being sold into the reserves at cut-out prices. These had become popular when it was seen that at the school crops were earlier, and better than in village gardens. At the end of the agricultural course, students were given a few fowls of good strain to take home...continuity of plans was thus broken and gradually interest was lost...and by then agriculture had given way to biology at Alliance High School.

In many countries, the desire of the relevant education departments to teach agriculture in schools was thwarted by the departments of Agriculture without any compromise. The education departments of Kenya, Uganda and Tanzania raised three major issues concerning the subject in 1933 as reported by John Morris. (8) These issues were:

1. that education in Africa should have an agricultural basis;
2. that the education departments would not build up their own grade of agricultural educators; and
3. that teachers of agriculture should act only under the jurisdiction of the agricultural departments, which was also responsible for teacher training.

These issues were common to many African countries and lack of effective implementation of any practical policy made it difficult to promote agricultural education. As a matter of fact the whole educational policy in colonial Africa was in total conflict with the aspirations of the natives, especially as seen from the point of view of job opportunities in urban areas and European farms and plantations.

The eruption of the world war in 1939 did not help the cause of the African in his campaign for better education. The colonial governments found in Africa a great source of raw materials and manpower to support their own respective war efforts. Education was ignored and therefore, stagnated. Many of the able-bodied young men were conscripted to join the colonial armies in support of their embattled forces. But the end of this war provided the Africans new vigor to demand for better education (and indeed independence), and therefore proved of great catalytic value. The Africans had gone to war overseas and had many contacts which broadened their understanding of colonial policies and practices. They also acquired new courage having heard of the independence movements existing in other countries such as India and South America.

In order to counteract this new spirit in the African, the colonial powers made certain moves to appease them. In French and Portuguese countries, local institutions were opened in certain regions to train African paraprofessionals in agriculture, medicine and education. Such institutions were opened in favored spots such as Dakar, Ivory Coast and Brazzaville. The British on the other hand set up the Binns Commission (9) and gave it the following mandate, "to study the present position of African primary and secondary education and to consult those working in the field, both African and European about future progress . . ."

Inevitably this Commission had to consider technical, agricultural and University education in order to make a comprehensive report. The Commission was significant in that it was the first of its kind since 1924. The Commission made several recommendations regarding education in general, but with respect to agricultural education they made the following recommendations.

1. To integrate agriculture in the school curriculum as much as possible.

2. Practical work in the schools to have real meaning to the pupils and not to be allowed to become a mechanical drudgery.
3. In middle schools, agriculture should form part of the core curriculum, and in secondary schools, the school farms should be emphasized and agriculture should be taught up to school certificate.
4. All teachers should have some training in agriculture as part of their courses, at least for appreciation.
5. There should be close cooperation between agriculture and education departments.
6. Agricultural ignorance should be attacked by both formal and informal education.

The Binns recommendations were soon followed by the Cambridge Conference on Education (1952) (5) which, among other things, placed emphasis on agricultural education and recommended the following.

1. Agriculture should be made a constituent subject in the school curriculum at all levels.
2. Good demonstration farms should be provided in schools to encourage pupils to take active share in the farm work voluntarily.
3. Early years of schooling should be given an agricultural flavor by grouping subjects and providing courses that are integrated around agriculture while retaining in the secondary school a wider science course as a basis for later specialization in agriculture.

As mentioned earlier, the implementation of these recommendations and similar ones before them were hardly affected and therefore, were by and large insignificant. Besides, there had never been any specific syllabuses delineating subject content to be taught in agriculture as was the case with other subjects. Thus, African countries entered the independent phase of their political development without any clear policy and curriculum on agricultural education. However, independent African states did not abandon the long standing desire to integrate agriculture into their formal school curriculum. In 1961 at the Conference on African Education held in Addis Ababa (10) and attended by ministers of education, directors and heads of higher academic institutions on the continent, a resolution supporting the introduction of vocational subjects, particularly agriculture and technical subjects in the schools was passed. A follow-up of this conference attended by senior educators held in 1962 in Madagascar (11) endorsed these resolutions and urged all African governments to consider education that would be "relevant to the people and their aspirations." These resolutions were significant in that they encouraged governments to re-examine their school curricula and restructure them away from colonial policy so that they would reflect greater local needs.

## Agricultural Education in Schools

Even though agriculture has been recommended to be included as a school subject since the Jones Commission in 1922-24, a brief survey of the African countries reveals a striking lack of this effort all over. Prior to 1966 (12), only few countries had any emphasis of agriculture at primary and secondary levels of schooling. In North Africa, only Algeria had agriculture included in the primary school curriculum. Tunisia had vocational training centers of various kinds, and agriculture was given emphasis in similarity to the German approach of promoting agriculture through farm schools. East African countries appear to have the best recorded effort of promoting agriculture at school level. In Ethiopia, agriculture has appeared off and on in the primary school curriculum for many years. Since 1963 the subject has been taught in selected secondary schools throughout the country and this effort appears to expand. Uganda and Tanzania introduced agriculture in some secondary schools using the syllabus developed for Kenya and preparing pupils for a common East African examination. In Tanzania agriculture was made compulsory for all primary schools following the "Arusha Declaration" emphasizing self-reliance. In this policy, each school is supposed to have a farm and the produce is sold to the villages nearby.

In West Africa, Nigeria started experimenting with Junior Agricultural Schools since 1960 and included agriculture as an option in the fourth year of secondary education, allowing no less than nine hours per week in the school timetable. Ghana now includes gardening to be taught in primary schools but no effort is made at secondary level. In Liberia where education is structured along American lines, agriculture is taught, I think, in only one special high school.

In southern Africa, only Lesotho allows agriculture to be taught at lower primary school. Other countries in the region tend to ignore the subject. In the countries which were previously French, Belgian, Spanish and Portuguese colonies, the emphasis on the policy of assimilation made it impossible to introduce a subject such as agriculture. Even in countries with agricultural potential such as Ivory Coast, Rwanda, Guinea, Zaire and Angola, the primary syllabus emphasized subjects such as language (either French or Portuguese), history (of France, etc.) and philosophy. Thus learning was intended to prepare the African to fit mainly in the French, Belgian or Portuguese society as opposed to that of Chad, Cameroon, Angola and Zaire.

As far back as 1952, the Binn report made specific recommendations on how agriculture could be introduced into the school curriculum and become integrated with biology. Their recommendation which suggested that agriculture becomes the practical part and biology the theoretical part provided the following combinations:

<u>AGRICULTURE</u>	<u>BIOLOGY</u>
1. Water supply and provision of water	1. Rainfall, springs, rivers, water-flow maps
2. Contour ridging and terracing	2. Relation of vegetation to contours

- |                               |  |
|-------------------------------|--|
| 3. Irrigation                 | 3. Solubility, filtration and evaporation          |
| 4. Land preparation           | 4. Soil chemistry acids and alkalis                |
| 5. Composting and fertilizers | 5. Bacteria, fermentation, fertilizer chemistry    |
| 6. The seasons in agriculture | 6. Keeping of seasonal biological records          |
| 7. Plant cultivation          | 7. Feeding and respiration in plants               |
| 8. Insect pests               | 8. Life cycle of insects                           |
| 9. Fruit cultivation          | 9. Responses to gravity, light and water           |
| 10. Birds and cultivation     | 10. Reproduction in animals                        |
| 11. Trees and forestry        | 11. Seeds, roots, leaves, flowers and pollination  |
| 12. Domestic animals          | 12. Feeding, digestion, reproduction and diseases. |

Whereas it appears that some consideration has been given to these recommendations in curriculum planning in English speaking African nations, the Francophone States appear to have maintained educational systems which lead to high development only in the traditional subjects of language, religion, mathematics, history and philosophy.

#### Middle Level and University Agricultural Education

A survey of the curriculum on African education also reveals, surprisingly, that at post-secondary levels of education, agriculture is regularly offered as an option for professional or paraprofessional training. In many of the countries, there are middle level training institutions which prepare youths either for higher education or for services in the governments' agricultural regulatory, extension and research services. In Kenya, there are now two institutions--Egerton College and Jomo Kenyatta College of Agriculture and Technology--that offer training at diploma level, while five others offer certificates in agriculture. Uganda and Tanzania also do the same. At university level, the institutions of Africa offer many qualifications in agriculture including veterinary and specialized plant and animal sciences. However, the graduates of these institutions end up in institutions as teachers, researchers, extension workers and in the private sector. The trend is likely to continue unless the curricula for primary and secondary schools is changed to favor agricultural education and thus to require more teachers and agricultural scientists in general, at these respective levels, to take up teaching at schools, colleges and Farmer Training Centers.

## Teacher Education in Agriculture

One professional area which has failed to receive continued support in agricultural education has been teacher education. Since the Jones Report, many countries have made little effort to train teachers specially for agriculture as a subject. The Jeans Schools established around 1925 in most English speaking African countries and their equivalents in French, Spanish and Portuguese speaking countries, were an effort to train an overall teacher for the rural villages with agriculture as one of the main subjects for emphasis. When these institutions were replaced by Native Industrial Training Depots (NITD's) in the late twenties and early thirties, the emphasis tended to switch towards such subjects as carpentry, masonry, building, tailoring and smithing. These subjects were popular with farmers, government departments of works, railway organizations and training institutions where the graduates found ready employment. The strong disagreements existing between departments of agriculture and education regarding which one of them should be responsible for agricultural education, also contributed to this factor. We are reminded that agricultural experts insisted that they had to be responsible for agriculture in schools to ensure the correct principles and practices were taught, while at the same time they had no personnel, time and commitment to do so.

Attempts have therefore been made over the years to find suitable teachers of agriculture for the schools without much success. For the primary schools, an attempt has been made to use local staff trained at low level/middle level agricultural institutions, and for the secondary schools university graduates and diplomates have been tried, but without much success in both cases. These people have found extension work among farmers to be more lucrative and promising in terms monetary reward, comfort and opportunity for advancement.

In recent years attempts have been made to train agricultural teachers for the schools. Some of the countries which have developed acceptable curricula in agricultural teacher education include Nigeria, Kenya, Liberia, Swaziland and Tanzania. These programs, although relatively successful, have however been questioned regarding their balance in providing knowledge in agriculture and basic education subjects. Agricultural protagonists are still at each others necks and cannot agree easily on an integrated program which can produce an accomplished agriculturalist and teacher. This problem is likely to hinder the desirable training of teachers. An attempt at the University of Nairobi in the mid-seventies to train a general agriculturalist and take him or her for a year's diploma in education did not succeed because of the scheme of service problem.

## Issues in Agricultural Education

In Africa there are many issues facing education in general, and agricultural education in particular. These issues revolve around the basic concept of relevance in education.

As many African countries try to provide relevant education, the first issue is to whom this relevance applies. In many countries education is supposed to be relevant to the youth who undergo it. However, educators have not come up with specific recommendations regarding the content of curricula

and shown how specifically it is relevant to the learners, especially in terms of utilization. Agriculture is one of these practical subjects which receive constant mention and praise about their usefulness, but which for many reasons receive very little support to be taught practically. Like other technical subjects, it is lauded by politicians and planners who would nonetheless fail to choose it even for their own children. It would then be suitable only for the children of the rural poor.

The second issue is whether agriculture is relevant to the job opportunities or careers available to the youth. At the moment, agricultural development in many African countries is so basic that it offers little career opportunity for many youth. It would take many years to develop the agro-based opportunities to make the teaching of agriculture meaningful to the youth looking for careers. Their future expectations may not be presently associated with agriculture because many of the job opportunities presently existing in agriculture do not require high intellectual ability and inquiry. Their intellectual competence can therefore be directed towards other pursuits.

The third issue related to agricultural education touches on African values, especially those values which are related to education. Many of the African educational systems emphasize a relationship with white collar jobs provided by the existing government establishment. Emphasis on work done by hand is considered secondary in many cases. This is a legacy left by colonial influence and unless African concepts and values towards work change, the school system will continue to spend more funds, curriculum effort and personnel on traditional subjects at the expense of practical subjects. And in this dilemma agricultural education will remain. I hope not.

#### Priorities in Agricultural Education

From the foregoing, it appears that the historical development in agriculture particularly during pre-independent days, created a 'stagnation' among the native Africans which did not favor the training in agriculture. However, since these countries have been independent for over 20 years now, there has been enough room for them during this period to develop their own policies and even correct the mistakes done during the pre-independent days. Africa, therefore, has itself to blame.

The survey of the food and feed situation and the development of agricultural education in Africa given above would indicate the following as priority areas in the field of agricultural education.

1. There has been no major emphasis on the training of agricultural teachers throughout the continent of Africa, and yet there has been a lot of talk regarding the need to teach agriculture in schools and other places. It is only the University of Ahmadu Bello in Nigeria that trains agricultural teachers at degree level. In East Africa, Egerton College has been, since 1968, training agricultural teachers at diploma level. In my view, this should be regarded as a priority area number one, if we have to implement our goal of popularizing agriculture particularly at school level.

2. The agricultural education policies should be defined in most African countries to bring them in line with the changing agricultural pattern in these countries. As the food situation becomes critical, it is important that teaching of agriculture should be constantly reviewed in order to not only popularize it, but also to keep pace with the changing pattern of the industry.
3. Emphasis should be placed on the relationship between schools that teach agriculture and the neighboring community of farmers. The school farms can become centers for teaching the local farmers modern methods while also being able to supply, if they are big enough, materials for farmers. In this regard, I have the example of Kabarak High School in Kenya where the school hatcheries help in providing day-old chicks to the farmers in the vicinity.
4. There is a major constraint in the provision of the relevant facilities at schools not only sizeable farms but also other agricultural teaching materials. This should be given priority if agriculture is to be adopted effectively.
5. Finally, the preparation of textbooks at schools for the teaching of agriculture should be intensified in all countries in Africa to provide help in this respect. To ensure this, two centers for the preparation of teaching materials should, as a start, be set up in Africa.

In conclusion, although the food situation in Africa is desperate at the moment, it is my view that the vitalization of agricultural education at all levels will go a long way in helping to increase food production on the continent. Since agriculture is rural based, advantage should also be taken of designing curricula in agriculture to show the interrelationships of population control and agricultural production and development.

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# AGRICULTURAL EDUCATION IN AFRICAN AGRICULTURAL DEVELOPMENT: CURRENT TRENDS AND FUTURE PRIORITIES

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The purpose of this paper is to provide a theoretical framework for viewing agricultural education and its role in agricultural development, and then to present some descriptive data on the capacity of agricultural education institutions in Africa around 1980. From this theoretical perspective and the subsequent analysis, it is possible to reach some tentative conclusions about the adequacy of current educational capacity and to make some tentative recommendations about future directions.

## Basic Concepts

### Technical Change: The Cornerstone of Agricultural Development Strategy

The cornerstone of the agricultural development strategy being pursued by donor agencies and many developing countries is based on technological change. Increased productivity in agriculture is expected to come, in large part, from new technological components such as improved varieties, fertilizer and pesticides, and/or new cropping or farming systems. The justification for this approach was stated by Schultz in his influential work, Transforming Traditional Agriculture (1964). The success of the high yielding varieties of wheat and rice, particularly in Asia, have supported and further encouraged this agricultural development strategy. To be successful in bringing about sustained technological change in agriculture, a nation must have in place a system for technology development and transfer. It also needs a policy framework and other supporting institutions that will both encourage and assist farmers in utilizing new technology.

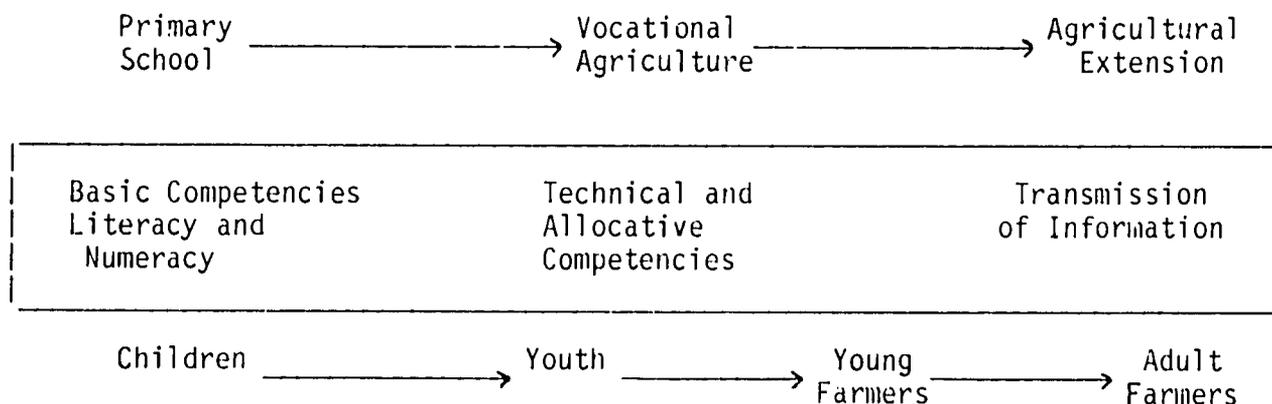
An analysis of the institutional components and other factors that are necessary to bring about continuing technological change include a capacity for technology transfer (including agricultural extension, input supply, credit and other agri-services), reliable markets and a policy environment that sends appropriate signals to farmers (i.e. incentives or profits) to support the utilization of more productive technology.

The central figure in this technology development, transfer and utilization system is the farmer. The success or failure of agricultural development efforts rests on his or her shoulders. Therefore, the skills, knowledge and attitudes farmers need to successfully utilize improved technology become central to our analysis and will be addressed first in this paper. In addition, agricultural education plays an essential role in educating and training the personnel needed to carry out the technology development and transfer functions. Therefore, nations need sufficient educational capacity to train the agricultural personnel needed to staff those institutions that serve farmers.

## Agricultural Education for Farmers

A useful framework for viewing farmer education was suggested by Bowman (1976). She proposed viewing farmer education as a continuum, the poles of which range from the "formation of competencies" on one side to the "transmission of information" on the other. To elaborate on this useful concept, the basic competencies such as literacy, numeracy and general cognitive skills are probably best formed in schools, generally through primary education. The technical and allocative (or farm management) competencies farmers need to utilize efficiently are probably best taught in schools through vocational agriculture programs for rural young people; but can be taught to adult farmers in farmer training centers and enhanced through agricultural extension programs. The transmission of information on new technical inputs, improved farm practices, marketing information and so forth, is generally viewed as primary function of agricultural extension. Figure I depicts an elaboration of the farmer education continuum, showing possible institutional relationships in a developmental arrangement.

Figure I: Farmer Education Continuum



### Basic Skills: Literacy and Numeracy

Access to information about improved agricultural technology is greatly enhanced if farmers have basic literacy and numeracy skills. General information on new farm practices can be transmitted by radio and more detailed information by extension personnel. However, these sources of information are frequently not present when farmers need the information. Furthermore, the ability to read labels and other instructions are frequently essential to the safe and effective use of many agricultural inputs.

In analyzing thirty-one data sets from different developing countries, Jamison and Lau (1982) concluded that "farm productivity increases on average by 8.7 percent as a result of a farmer's completing four years of elementary education" (p.8). They go on to say that, "the effects of education were much more likely to be positive in modernizing agricultural environments rather than in traditional ones . . ." (p.8). They found, "the mean increase in

output from four years of education under traditional conditions was 1.3 percent compared with 9.5 percent under modern or modernizing conditions" (Jamison and Lau, 1982, p.38). This empirical work gives strong support to the proposition about the perceived value of literacy and numeracy in increasing farm productivity, particularly when improved technology is available.

### Technical and Allocative Competencies

In traditional agriculture, resources are generally efficiently allocated by subsistence farms (Schultz, 1963). The transition to a modern, technically dynamic agriculture requires both technical and allocative competence, if the new technology and existing resources are to be efficiently and effectively utilized (Huffman, forthcoming). As farmers make this transition into the market economy of the nation, their need for both technical and allocative competencies to process farm-level information will continue to increase.

Technical competencies refer to those sets of technical skills and knowledge that are required to effectively and safely use a new technological input, practice or process. In common-sense terms, this refers to the how-to-do-it skills and knowledge, and may also include some understanding of the basic principles involved.

Allocative competencies refer to the management skills and knowledge farmers need to make given available resources; intelligent choices between different types of technological components, practices and process. These evaluative skills operate in a decision framework which include the values (criteria) of the farmer and farm household. In subsistence agriculture where most production is consumed within the home, criteria such as risk aversion and stability of production at or above the subsistence level, may be the dominant values affecting decision-making.

In modern agriculture, where most production is sold in the market economy, profit maximization and/or income stability may predominate. It is during the transition from subsistence to modern agricultural production, and the growing importance of economic criteria in decision-making, that management skills become increasingly important. Changing economic conditions and new technological alternatives soon surpass the innate abilities of most farmers to make sound decisions about increasing production and incomes. As Huffman (forthcoming) observed, "in a dynamic technical environment, where evaluative skills are at a premium, the comparative advantage of basic formal schooling over on-site experiences. . . is likely to be substantial" (Chapter 1, p.10).

Teaching rural young people (and adults) to increase their technical and allocative competencies has important implications for the curriculum and methodology of instruction used in schools and other educational settings. These implications and alternative approaches to agricultural education will be considered briefly at the end of this section.

## Transmission of Information

As discussed above, basic competencies, such as literacy and numeracy, increase farmer's access to new technical information by opening new channels or sources of information. Technical and allocative skills, in turn, increase the ability of farmers to understand and then to process this information vis-a-vis its potential usefulness to them. As farmers become active consumers of new technology, they in turn create a demand on the technology development and transfer system for new technology that will enable them to achieve their production and family goals (such as increased output, reduced cost per unit of production and/or increased farm income).

Agricultural extension, particularly in the early stages of agricultural development, must help develop the technical and managerial competencies of farmers, as well as being an efficient purveyor of agricultural information. In fact, there is presumed to be considerable complementarity between the transmission of information and teaching farmers how to use it effectively. However, as rural young people acquire technical and management skills in school settings, the role of agricultural extension will increasingly be one of communicating agricultural information to farmers.

If private industry begins to play an active role in technology development, it may also establish its own channels of communicating knowledge and information to farmers, to further accelerate the technology transfer process through the sale of technical inputs and services to farmers. In many developing countries, private companies or parastatals have already established these independent technology transfer systems as part of high value or export commodity production systems.

## Leadership and Organizational Skills

Local level participation has been identified as a factor that is closely associated with the success of agricultural and rural development programs. Morss, Hatch, Mikkellwait and Sweet, in evaluating 36 agricultural and rural development projects in Latin America and Africa, found that .49 of the variance, in explaining the success of such projects, could be attributed to local level participation.

To increase the level and quality of local level participation, farmers need basic leadership and organizational skills. Such skills are an important dimension of rural youth clubs and programs; they can be acquired later through farm organization, such as cooperatives, credit societies and so forth. The Anand Dairy Cooperatives in India are an excellent example of where the leadership and organizational skills of adult farmers have been systematically treated in a farmers organization.

Generally, leadership and organizational skills are developed in the context of rural youth clubs or programs. However, because these clubs do not contribute directly to increased productivity, they are generally given low priority by donor agencies and many developing countries.

It must be emphasized that while leadership and organizational skills do not contribute directly to the increased productivity of farms, based on the empirical work by Morss et. al., farm organizations appear essential to agricultural and rural development (also, see Bonnem, forthcoming). Organizations, such as cooperatives, are very important in increasing small farmer access to technology. Farm organizations also are an essential part of the feedback system to agricultural research and extension, as well as to policy makers to maintain public support for agricultural institutions. Given the importance of leadership and organizational skills to local level participation, it appears that these educational needs should be given priority.

#### Implications for Agricultural Education

Given the theoretical framework advanced by Schultz (1964, 1975), Bowman (1976) and others, and the empirical findings of Jamison and Lau (1982), a strong case can be made for increasing primary education (especially literacy, numeracy and basic cognitive skills) in rural areas. Furthermore, adult literacy programs also merit attention.

The importance of improving the technical and allocative skills of farmers, in a technically dynamic agricultural sector, has been advanced and empirically validated (in the United States) by Huffman (1974, 1976). It is beyond the scope of this paper to systematically assess secondary level agricultural science programs in Africa. However, a cursory examination of the agricultural science syllabus of some African countries suggests that an academic approach to agricultural education is being followed, with little attention being given to the practical application of agricultural knowledge or (farm) management skills of students. It is recognized that many of these students do not go into farming; however, many will enter some type of agricultural occupation and such decision-making skills will likely be very valuable.

It is recommended that an alternative approach to agricultural education be considered that would more directly address the longer-term educational needs of farmers. The problem solving methodology of teaching agriculture, with its concomitant implications for a vocational agriculture curriculum, appears to meet these needs and merits attention. This approach puts equal stress on technical and allocative skill development, and information once engaged in agricultural production.

The repeated use of the problem solving methods in the classroom, dealing with successively more complex agricultural problems, and the practical application of this knowledge in student or group projects, helps students develop decision or management skills. They learn how to seek out technical information to solve production problems and they learn how to evaluate this information in a decision framework vis-a-vis specific criteria that are important to them (such as profitability, increased farm income and so forth). The problem solving approach to agricultural teaching and curriculum is described elsewhere (Crunkilton and Krebs, 1982, Phipps, 1980 and Swanson, 1984) and should be given careful attention as an appropriate approach to

develop the technical and allocative skills needed by farmers.

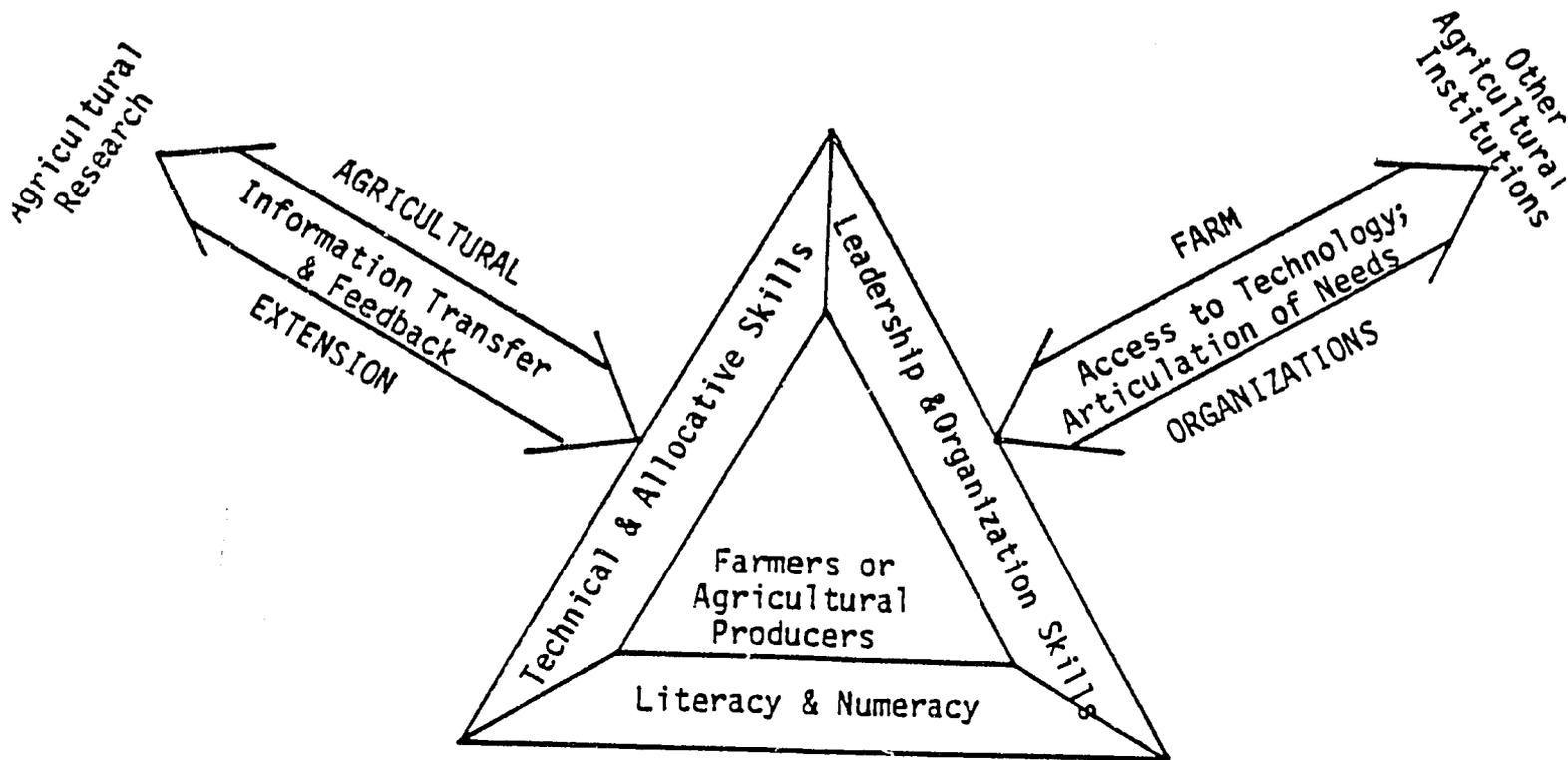
As agricultural research begins to generate a continuing flow of new technology, the effective transmission of this information to farmers will become important. Much of the responsibility for this information transfer process will rest with agricultural extension. However, until schools reach the majority of rural young people with basic technical and allocative skills that will enable them to be effective consumers of agricultural information, agricultural extension must help farmers develop these skills as well as transmit appropriate agricultural information. Unfortunately, most agricultural extension personnel learn their agricultural knowledge through an academic approach and are poorly prepared, in terms of practical skills and a problem solving approach to farmer education, to carry out both the information transfer and teaching functions. This conclusion has major implications for training extension personnel and it will be discussed further in the section on extension training.

It has been empirically established that local level participation is important in explaining the success of agricultural and rural development programs. The educational implications of this finding suggest that farmers need basic organizational and leadership skills to enable their effective participation in these local institutions. Farm organizations will increase the access of farmers to new technology and will enable them to more effectively articulate their needs to agricultural institutions and to policy makers (the feedback loop).

Developing leadership and organizational skills takes considerable time and generally is not given systematic attention when farm organizations, such as cooperatives, are established. Such training can be effectively taught to adults, however, agricultural educations generally have greater access to rural youth and young farmers and have greater opportunity to impart these skills to these groups. Because rural youth clubs and young farmer organizations are not viewed as directly contributing to agricultural productivity, they have been given low priority in the past. However, given the importance of these skills to local level participation, and the importance of these organizations to building group solidarity and increasing the self-esteem of rural young people, they should be given high priority in the future. Such organizations contribute greatly to community and self-development, and can begin to change the negative opinions that many rural people hold about themselves and their future (see Swanson, Roling and Jiggins, 1984, pp. 103-104).

Figure 2 attempts to summarize the three basic skill areas that appear to be needed by farmers. These skill areas make up the three sides of an equilateral triangle, with literacy and numeracy forming the foundation. Technical and allocative skills are needed by farmers to process farm level information that they receive from agricultural extension and other sources. Leadership and organizational skills increase the potential for local level participation, which should give greater access to technology and enable farmers to more effectively articulate their needs to agricultural institutions and policy makers.

Figure 2: The Educational Needs of Farmers

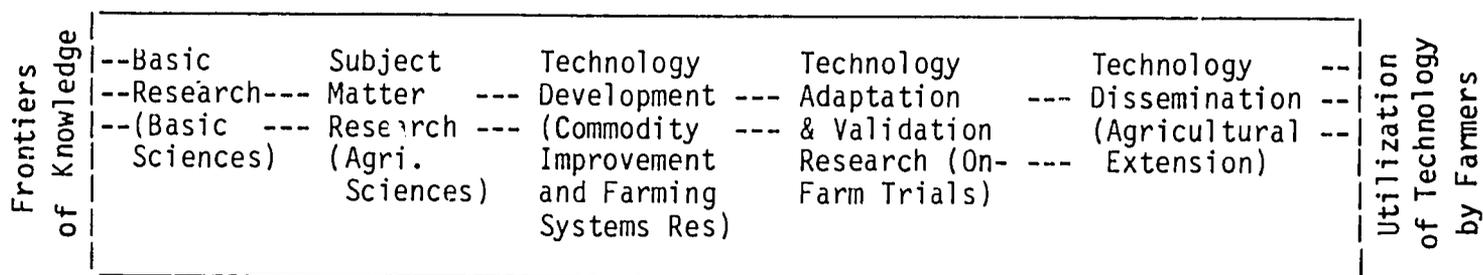


### Training Agricultural Research Personnel

A nation needs some level of agricultural research capacity if it is to meet the technology needs of its farmers. Although the international agricultural research centers (IARCs) were established to assist nations with their technology needs, there was never any intention that IARCs would replace national research capacity. In fact, nations need a minimum research capacity in their basic commodities if they are to effectively borrow and test new technology from other national programs or from the international system.

In considering the education and training needs of a national research system, it is helpful to know what type of research capacity is needed and how research personnel will be deployed. The agricultural research continuum is a useful concept in thinking about this problem. As shown in Figure 3, the continuum stretches from the "frontiers of knowledge" on one side to the "utilization of technology" by farmers on the other.

Figure 3: The Agricultural Research Continuum



In the context of this paper, there are two important factors to consider. First, each phase of the research continuum requires a somewhat different set of research skills, knowledge and attitudes on the part of research personnel. Second, the teaching or acquisition of these research and related skills occurs in different educational and/or research institutions.

All research scientists should share a basic understanding and philosophy of the research process. However, where they work along the research continuum determines the specific type of research skills they will need. For example, researchers conducting subject matter research engage in analytic research with the objective of knowledge generation in one of the agricultural science disciplines. To be successful, they need the basic theoretical knowledge and analytical skills used in their discipline.

On the other hand, technology development research is concerned with the application of knowledge and the manipulation of different biological, chemical or production factors to create a new technological component, product or process. To conduct technology development research, scientists also require a basic set of research skills and an understanding of one or more agricultural disciplines. However, in the case of technology development, the research task itself is one of repeated creation (synthesis) and testing (evaluation); of trying different approaches and new combinations of factors with the view to solving a particular production problem or to achieving a technological breakthrough. It is important to remember the technology development research generally does not result in publishable papers; rather it results in new technology that can be utilized by farmers. This fact has major implications for the reward system that research institutions must have in place to encourage this type of research.

On-farm research trials, aimed at the adaptation and/or validation of new agricultural technology, can use standard research methods and tools to collect a maximum amount of information quickly and accurately. The research objective in this phase of the continuum is technology assessment; this type of evaluation research also required that researchers have good production skills. They must be able to grow crops as well as farmers, if their results are to be useful in evaluating the usefulness of new technology under farmer conditions in a particular ecological zone.

Given that different research and related skills are needed for each phase of the research continuum, where should a nation begin to build national research capacity, and how and where should researchers be trained to acquire the necessary research skills? For a nation to bring about technological change in its agricultural sector, it needs the capacity to evaluate technology from the international system as well as some capacity to develop and/or modify technology. This research capacity is also the most difficult part of the system to build, because of the lack of incentives for researchers to conduct this type of research and because it generally involves hard, physical work. It is unrealistic for a nation to expect that it can start at the basic or subject matter research side of the research continuum and to expect that new agricultural technology will automatically "trickle down" to farmers. Rather, in terms of the agricultural research system, it must start on the technology side of the continuum and, after establishing this minimum research capacity, build toward the basic sciences.

Agricultural universities engage in two basic types of higher agricultural education. The first university degree (B.Sc. degree) prepares students in a specific subject matter area, or in the agricultural sciences in general. Post-graduate education, resulting in either a M.Sc. or Ph.D. degree, is the level where research training occurs.

Most research personnel in developing countries, when they enter the national agricultural research system, hold only the first university degree and have not acquired a basic understanding of the research process, nor elementary research skills. These "untrained" research personnel can acquire some research understanding and skills on-the-job, but it is important that they acquire the first research degree (M.Sc. degree) as soon as possible. They need this training so they have the basic educational foundation on which to build the additional research skills that they will need to function effectively in the national system.

International Agricultural Research Centers (IARCs) are the only institutions that have organized training programs to impart technology development and evaluation research skills. IARCs also offer subject matter research training, generally as part of a graduate degree program; therefore, these two types of research training should not be confused.

To provide the personnel needed for a national research system a country requires the minimum educational capacity of a Faculty of Agriculture or an Agricultural University to produce a continuing flow of students with the first university degree. In the short run, it may be necessary to obtain post-graduate education in a foreign university. However, as soon as possible, a post-graduate program (M.Sc. degree) should be established in the major disciplines, such as agronomy, animal science, agricultural economics and so forth. For the majority of African nations more advanced research education (Ph.D. degrees) will need to be obtained at foreign universities and research training at IARCs.

## Training Agricultural Extension Personnel

Agricultural extension personnel have the educational and communicational task of linking agricultural researchers who develop new technology, with farmers who utilize it. This linkage would provide for a two-way flow of information.

There are generally four major categories of extension personnel: (1) administrative and supervisory, (2) subject matter specialists, (3) extension officers or agents, and (4) paraprofessionals or extension assistants. In this paper, attention is focused on subject matter specialists (SMS) and extension officers, since these categories of personnel are most affected by agricultural education capacity.

Subject matter specialists provide the essential interface between agricultural researchers and field-level extension personnel. They provide much of the in-service technical training for the field staff as well as technical backstopping when new problems occur. In the industrialized countries of North America and Europe, SMS make up 18-19 percent of the total extension staff (Swanson and Rassi, 1981). In addition, most have post-graduate degrees, many at the Ph.D. level.

In Africa, SMS comprise only 6 percent of the extension staff (Swanson and Rassi, 1981) and most would only have a B.Sc. or equivalent degree. Furthermore, many lack farm backgrounds and the practical orientation and skills that SMS require. In addition, because there are few opportunities for students who complete their training at intermediate schools of agriculture (which provide more practical skill training) to continue their studies at universities (which pursue an academic curriculum), most university graduates lack those production skills which SMS require.

Extension officers generally complete two to three years of intermediate-level training at schools of agriculture. These institutions have been largely established to provide trained personnel for national extension organizations. However, in a recent study (Sigman and Swanson, 1984), African extension directors ranked the lack of adequate training in extension methods for field-level extension personnel as the most serious problem faced by their organizations. Because of the seriousness of these training problems, the type and quality of intermediate-level training will be considered further.

The typical method of instruction in intermediate-level schools of agriculture is by lecture and other teacher-centered techniques of instruction. The teacher is viewed as the source of knowledge and students are passive recipients in the "teaching-learning" process. Students learn to respect authority and not to question the validity of the subject matter presented. The philosophy of education underlying this approach is "top-down" in nature, and is opposite to what students will need to become effective extension workers in the field. In addition, as Benor and Harrison (1977, p.7) have observed, ". . . pre-service training . . . is often too theoretical and provides little opportunity to apply in practice what has been learned."

Farmers, on the other hand, are by nature problem solvers. However, in traditional production systems, their production alternatives have been limited. As national research systems begin to function, there will be an increasing number of technological alternatives available for farmers to consider and possibly use.

The process of considering, trying and perhaps adopting new technology is known as the adoption process (see Fliegall, 1984). Its implication for extension methods is that farmers must be active participants in the teaching-learning process. "Top-down," teacher-centered approaches to agricultural extension will seldom be as effective; in many situations, particularly in working with small, subsistence farmers, top-down approaches may actually be ineffective.

Instead, extension workers must use interactive methods for program planning and instruction that focus on problem solving. Both the extension worker and the farmers he or she works with must be active participants in seeking ways to increase the productivity and income of farm families and households. Extension workers bring knowledge about new technology and related information to the learning environment, while farmers bring knowledge about their farming situation and of their current farming practices. Together, they must seek ways to overcome production problems and, in the process, to increase farm output and incomes.

If the premise is accepted that extension personnel need to utilize a problem-solving approach in their extension activities, then it seems appropriate to ask the rhetorical question, "Where are extension workers expected to learn these pedagogical skills?" They have little knowledge of or experience with problem-solving skills, if they are only taught using teacher-centered methods of instruction. What may be called for is a major revamping of the curriculum and method of instruction used in those agricultural education institutions that prepare field-level extension personnel.

What must be kept in mind is the importance of preparing extension agents to work effectively at the village level. Often there is too little emphasis placed upon having extension agents master the art of listening and reacting with a carefully measured problem-solving (Maalouf, 1983, p.8).

This conclusion is based on the assumption that extension personnel cannot utilize teaching skills they have never seen practiced. It is beyond the scope of this paper to show how a practical, problem solving, instructional program might be organized. However, such an approach has been outlined elsewhere (see Swanson, 1984, p.197-205), which includes information on teaching methods, curriculum, the use of professional internships and a social laboratory to increase the technical and professional competence of field level agricultural extension personnel.

Given this conceptual framework for viewing the educational and training needs of farmers and agricultural research and extension personnel, the second

part of the paper will describe and assess current agricultural education capacity in Africa, particularly at the intermediate and higher education levels.

## Agricultural Education Capacity in Africa

### Agricultural Education for Rural Youth and Adults

Data are not available to provide a comprehensive picture of agricultural education services available to farmers. As pointed out in the first part of this paper, literacy is directly associated with increased productivity of farmers in a technically dynamic environment. Therefore, the adult literacy rates of different African nations are presented in Table 1 to provide a general profile of the situation. Although these rates are low, the high proportion of young people attending primary school in most African countries will have a positive impact on adult literacy in the future.

Comprehensive data on the number of students studying rural and/or agricultural science in African primary and secondary schools are not available. Information on the percentage of young people attending secondary schools is included in Table 1 and these rates are generally quite low (less than 25 percent participation in 1980). Some individual country studies of agricultural education at the secondary level have been completed (for example, see Tucker, 1981 and Sibuga, 1983) and provide a general picture of how agricultural education is conducted in those countries. However, most African nations have very limited resources available for secondary education in rural areas. Therefore, new resources must be found and much work will be required in the future if rural young people are to have access to agricultural education.

Table 1:  
Participation of Youth in Primary and Secondary  
Education and Adult Literacy Rates (1980)

Country	Number Enrolled in Primary School as Percentage of Age Group		Number Enrolled in Secondary School as Percentage of Age Group	Adult Literacy Rate (Percent)
	Male	Female		
Algeria	108%	81%	33%	35%
Angola	n/a	n/a	n/a	n/a
Benin	84%	39%	16%	28%
Botswana	n/a	n/a	n/a	n/a
Burundi	35%	23%	3%	25%
Cameroon	113%	94%	18%	-
Cent Afr Repub.	33%	92%	49%	10%
Chad	51%	19%	3%	15%
Congo	163%	148%	69%	-
Egypt	89%	63%	52%	44%
Ethiopia	56%	30%	11%	15%
Gabon	n/a	n/a	n/a	n/a
Gambia	n/a	n/a	n/a	n/a
Ghana	77%	60%	36%	n/a
Guinea	44%	22%	16%	20%
Ivory Coast	92%	60%	36%	n/a
Kenya	114%	101%	18%	47%
Lesotho	84%	123%	17%	52%
Liberia	82%	50%	20%	25%
Libya	n/a	n/a	n/a	n/a
Madagascar	n/a	n/a	n/a	n/a
Malawi	73%	51%	4%	25%
Mali	35%	20%	28%	10%
Mauritania	43%	23%	10%	17%
Morocco	95%	58%	24%	28%
Mozambique	107%	79%	6%	33%
Namibia	n/a	n/a	16%	34%
Niger	29%	17%	4%	10%
Nigeria	n/a	n/a	16%	34%
Rwanda	74%	67%	2%	50%
Senegal	53%	35%	10%	10%
Sierra Leone	45%	30%	12%	15%
Somalia	53%	29%	6%	60%
Sudan	60%	43%	16%	32%
Swaziland	n/a	n/a	n/a	n/a
Tanzania	110%	98%	4%	79%
Togo	144%	89%	33%	18%
Tunisia	118%	88%	27%	62%
Uganda	58%	42%	5%	52%
Upper Volta	24%	14%	3%	5%
Zaire	104%	75%	23%	55%
Zambia	101%	89%	17%	44%
Zimbabwe	118%	113%	13%	69%

Source of Data: World Bank Report 1983, Washington, D.C.: International Bank for Reconstruction and Development, 1984, p. 196-197.

Data on the availability of agricultural extension services to farmers in Africa is also incomplete. An earlier study by Swanson and Rassi (1981) found nearly 25,000 agricultural extension personnel in eighteen African countries in 1980. However, to date the level and quality of these extension services to farmers in Africa have not been assessed and this is an important area of inquiry requiring attention.

It should be noted, however, that in the Swanson and Rassi study, only 3 percent of the extension personnel in Africa were reported to be women. Since 47 percent of all farmers in Africa are reported to be women (FAO, 1982), this fact raises important questions about the availability of extension services to women farmers. Again, this is an area requiring careful attention by researchers and planners concerned with agricultural and extension education services for farmers in Africa.

### Intermediate and Higher Agricultural Education

The lack of data on the agricultural education capacity of developing countries stimulated the author to undertake such a study, starting in 1978. The study encompassed over 130 developing countries and nearly 1,500 intermediate and higher agricultural education institutions.

In terms of the African data set, 230 intermediate and 95 higher agricultural education institutions were identified by the author and usable responses were received from 111 schools and 49 faculties of agriculture. This represents about a 48 percent and 52 percent response rate, respectively. The data reported in this paper, are from this study and are estimated to represent about 50 percent of the educational capacity in Africa during 1979-80.

It should be noted that in 1983, the Food and Agriculture Organization of the United Nations (FAO) conducted a more comprehensive and complete study of agricultural education institutions in Africa. These FAO data, which are forthcoming shortly, should provide a much more comprehensive and up-to-date profile of agricultural enrollments and outputs.

### Intermediate Agricultural Education Capacity

Intermediate agricultural education includes those schools of agriculture that train people for work at the field level in agricultural extension organizations and other agricultural institutions that directly or indirectly serve farmers. Some of these institutions are technical high schools which provide 2-3 years of training in some technical field of agriculture, or in related subjects, such as animal or veterinary science, water and forests, fisheries and so forth. Others are post-secondary institutions which also provide 2-3 years of training in agriculture resulting in a diploma; some may also offer a 1-2 year practical course resulting in a certificate.

In this section, enrollment and output data for the 111 intermediate schools included in the study will be examined first. Then, selected data on other characteristics of these schools will be presented.

Table 2 includes enrollment data for these intermediate institutions in 1979, with the information differentiated by sub-region and gender. Western Africa had the highest enrollment levels, with Nigeria and Ghana training the largest numbers. Eastern Africa had the second highest enrollments, with Tanzania and Kenya having the greatest educational capacity.

Table 2:  
Enrollments in Intermediate Level Schools of Agriculture in 1979,  
Differentiated by Sub-Region and Gender

	Males		Females		Number	Percent
	Number	Percent	Number	Percent		
Northern Africa	2,099	90%	237	10%	2,365	100%
Western Africa	6,032	81%	1,456	19%	7,488	100%
Eastern Africa	3,583	73%	1,351	27%	4,934	100%
Middle Africa	532	93%	41	7%	573	100%
Southern Africa	790	68%	364	32%	1,154	100%
Totals	13,038	79%	3,449	21%	16,485	100%

Note: Includes some home economics schools and departments.

Overall, about 21 percent of the students in these institutions were women. However, since the survey included some departments and schools that provided home economics training, the proportion of women studying agriculture and related fields was determined to be about 10 percent (Sigman, 1984).

The graduate output from these institutions in 1978 is presented in Table 3. These data have been differentiated by length of curriculum and sub-region. The fact that several of the institutions in Southern Africa were quite new when surveyed accounts for the low output (students have yet to graduate).

Table 3:  
Output of Intermediate Level Schools of Agriculture in 1978,  
Differentiated by Sub-Region and Length of Curriculum

Sub-Region	Length of Curriculum			N	Total Percent
	1 Year	2 Years	3 Years		
Northern Africa	143	284	531	958	14.2%
Western Africa	521	1,090	1,554	3,165	46.9%
Eastern Africa	273	1,539	372	2,184	32.4%
Middle Africa	27	148	56	231	3.4%
Southern Africa	2	129	76	207	3.1%
Totals	966	3,190	2,589	6,745	100.0%

The breakdowns of graduate output from these institutions by field of study can be found in Table 4. Data on graduate output for 1970 and 1974 is also included in this Table. Overall, there has been about a 14 percent annual increase in the output from these intermediate institutions.

Table 4:  
Output of Graduates from Intermediate Agricultural  
Education Institutions by Field of Study  
for 1970, 1974, and 1978

Curriculum	Number of Graduates		
	1970	1974	1978
<b>One-Year Curriculum</b>			
General Agriculture	396	457	457
Technical Agriculture	33	15	178
Forestry	34	84	132
Fisheries	25	-	11
Veterinary Science	-	-	-
Home Economics	-	-	29
Other	120	157	159
<b>Subtotal</b>	<b>608</b>	<b>713</b>	<b>966</b>
<b>Two-Year Curriculum</b>			
General Agriculture	977	999	1,420
Technical Agriculture	336	549	707
Forestry	96	185	203
Fisheries	42	35	60
Veterinary Science	74	73	65
Home Economics	21	46	215
Other	231	361	520
<b>Subtotal</b>	<b>1,777</b>	<b>2,248</b>	<b>3,190</b>
<b>Three-Year Curriculum</b>			
General Agriculture	587	954	1,430
Technical Agriculture	29	82	281
Forestry	32	63	201
Fisheries	-	20	24
Veterinary Science	73	60	129
Home Economics	65	229	309
Other	6	79	215
<b>Subtotal</b>	<b>792</b>	<b>1,487</b>	<b>2,589</b>
<b>Total Graduates</b>	<b>3,168</b>	<b>4,448</b>	<b>6,745</b>

In considering the need for increased educational capacity at the intermediate level, it is useful to have information on how current graduates are being utilized. This information also has curriculum implications. In the intermediate survey, principals or directors of these schools were asked to estimate the proportion of their graduates who enter different types of employment each year, as well as the percent of students who continued their

education or were unemployed. These responses have been aggregated to produce Table 5, which is a general estimate of how graduates from these institutions have been utilized.

Table 5:  
General Estimate of the Type of Employment Pursued by  
Graduates of African Intermediate Schools of Agriculture

	<u>Percent</u>
Extension Services	65%
Teaching in Schools	9%
Technicians	7%
Agric. Bank: Cooperatives	2%
Agri-Business	2%
Farming or Farm Management	7%
Non-Agricultural Jobs	2%
Continued Education	5%
Unemployed	1%
	100%

The vast majority of graduates enter the agricultural extension service with small percentages entering other institutions that serve agriculture. In spite of this substantial flow of graduates into agricultural extension, data from a companion study of African extension organizations in 1980 found that new extension personnel were still in short supply. While these organizations were adding 6.6 percent new employees each year, these numbers were being offset by a 4.3 percent annual wastage rate for retirements, resignations and deaths. Directors of these extension services reported having a 15.4 percent vacancy rate. It is presumed that these were funded positions that were unfilled due to the lack of supply of trained personnel. This was by far the highest vacancy rate reported in the Third World (Latin America was next at 9.85%).

In terms of educational planning, it should also be expected that as agricultural development begins to occur more widely in Africa, the demand for trained personnel in agri-business and other institutions that serve farmers will also increase. Therefore, in spite of a 14 percent annual growth rate in supply, it would appear that the demand for trained agricultural personnel at the intermediate level will continue to exceed supply in the foreseeable future.

The quality of instruction at intermediate schools of agriculture is influenced by the quality of the teaching staff and the instructional resources they have available. While educational qualifications are not an adequate predictor of the technical and professional competence of teachers, it is one general indicator of quality. Table 6 represents the number and educational qualifications of the teaching staff at the 111 institutions included in the intermediate survey. The fact that over one-half of the

teaching staff at these institutions hold less than a university degree (most are probably graduates from these same institutions) is suggestive that considerable staff development work will probably be necessary to help improve the performance of these institutions.

Table 6:  
Number and Educational Level of Teaching Staff  
in African Intermediate Schools of Agriculture

Educational Level	Number	Percent
Less than B.Sc. Degree	1,720	56.2%
B.Sc. Degree or equivalent	689	22.5%
Ingenieur Agronome	102	3.4%
M.Sc. Degree or equivalent*	331	10.8%
Doctoral Degree*	217	7.1%
Total	3,059	100.0%

\*These figures may be somewhat inflated; includes some universities where the teaching staff for both the Faculty and School of Agriculture were listed together.

Another area of concern was practical training in agriculture. Given that the graduates of these institutions generally work at the field level in agricultural extension organizations, the availability of a well developed school farm to teach production agriculture and related professional skills, such as conducting demonstration plots and field trials, is viewed as important. Therefore, some general information was collected on the availability and use of school farms in instruction.

Seventy-eight schools, or 70 percent reported having a school farm, which ranged in size from 1 to over 4,000 hectares. The mean size was 354 hectares. The major purpose for which these school farms were used is reported in Table 7. As indicated in this Table, most schools use their school farm for teaching technical agriculture skills. Professional and technical skill training, as represented in the three categories of conducting demonstrations and field trials, and then holding field days for farmers, is somewhat less important.

Table 7:  
Major Uses of School Farms and Level of Importance

Types of Use	Not Important	Somewhat Important	Very Important	Total
Hands-on Farm Experience (T)	1%	7%	93%	100%
Teaching Agriculture Skills (T)	5%	8%	87%	100%
Conducting Demonstrations (P)	3%	35%	62%	100%
Conducting Field Trials (P)	14%	41%	45%	100%
Growing Food for School	28%	32%	40%	100%
Holding Farmer Field-Days (P)	41%	38%	21%	100%

Note: (T) = Technical Skill Training only; (P) = Professional and Technical Skill Training.

The fact that only 70 percent of the intermediate schools of agriculture reported having school farms is a matter of concern. Most schools that reported having school farms generally appear to be using them appropriately. How well this practical training is integrated into the curriculum, as well as how other factors may be affecting the quality of this instruction, is unknown.

#### Higher Agricultural Education Capacity

Higher agricultural education includes those institutions that offer the first university degree (B.Sc. or equivalent) or the qualification of Ingenieur Agronome, or higher qualifications. As mentioned earlier, the data reported in this paper was collected in 1980 and includes responses from 49 universities, representing about one-half of the institutions that existed in Africa when the survey was conducted.

The first measure of educational capacity to be examined is overall enrollment. Table 8 presents enrollment data for these higher agricultural education institutions for both 1970 and 1980, with the data differentiated by academic level and gender. Overall, there was an 11.5% annual increase in educational capacity within institutions at this level, with the participation of women in agricultural fields of study being about one-fifth of total enrollment (Sigman, 1984).

Table 8:  
Enrollments in Higher Agricultural Education Institutions in Africa,  
Differentiated by Gender for 1970 and 1980\*

Degree Level and Gender	1970		1980		Percent Annual Growth
	Number	Percent	Number	Percent	
B.Sc. Males	10,984	79%	20,674	74%	8.0%
B.Sc. Females	2,908	21%	7,218	26%	13.5%
Total B.Sc.	13,892	100%	27,892	100%	9.2%
Ing. Agr. Males	410	95%	2,961	93%	56.6%
Ing. Agr. Females	23	5%	238	7%	85.0%
Total Ing. Agr.	433	100%	3,199	100%	58.1%
Post-Grad Males	838	84%	3,077	86%	24.3%
Post-Grad Females	159	16%	497	14%	19.3%
Total Post-Grad	997	100%	3,574	100%	23.5%
Total Enroll/Male	12,232	80%	26,712	77%	10.8%
Total Enroll/Female	3,090	20%	7,953	23%	14.3%
Total Enrollment	15,322	100%	34,665	100%	11.5%

\*Note: Includes students studying home economics and other fields of study related to agricultural science.

It must be pointed out, however, that this enrollment data (and the output data to be presented next) are greatly affected by the capacity of Egyptian universities which are included in this data set. For example, in 1980

Egyptian universities enrolled 23,685 of the B.Sc. degree students and 1,541 of the post-graduate students reported in Table 8. Therefore, the enrollment in the remaining African agricultural universities, that responded to the survey, was only 4,207 B.Sc. and 2,033 post-graduate students (plus the ingenieur agronome students that are reported in Table 8).

The major impact of Egyptian universities is also reflected on the output side as reported in Table 9. This Table presents the number of university degrees conferred by higher agricultural education institutions in Africa. Egyptian universities contributed 3,140 B.Sc. degrees, 184 M.Sc. degrees, 38 Ph.D degrees and 8 DVM degrees to the total number reported. Nigeria was the second major producer of agricultural graduates at the university level with 541 B.Sc., 41 M.Sc. and 14 Ph.D. degrees being reported.

Table 9:  
Degrees Conferred by Higher Agricultural Institutions in Africa,  
Differentiated by Sub-Region (1979)

Sub-Region	Degree Conferred				
	B.Sc.	Ing. Agr.	M.Sc.	Ph.D.	Total
Northern Africa	4,052	480	332	74	4,938
Western Africa	716	299	41	35	1,091
Eastern Africa	373	-	13	1	387
Middle Africa	7	158	-	28*	193
Southern Africa	9	-	-	-	9
Total	5,157	937	386	138	6,618

\*These were all DVM graduates from one institution in Zaire.

Therefore, the higher agricultural education institutions in the rest of Africa reported conferring only 1,476 B.Sc. degrees, 937 Ingenieur Agronomes, 161 M.Sc. degrees, 48 DVM degrees and 30 Ph.D. degrees. These data provide a much more accurate profile of educational capacity in the other 49 countries in Africa.

Table 10 presents these same output data by field of study. About two-thirds of the degrees conferred by these institutions are in the agricultural sciences, with the remainder being conferred in related fields.

Table 10:  
Degrees Conferred by Higher Agricultural Education  
Institutions in Africa in 1979

Field of Study	B.Sc.	Ing. Agr.	M.Sc.	Ph.D.	Total
Agricultural Sc.	2,347	477	164	28	3,016
Animal Science	498	128	35	12	673
Agricultural Econ.	43	2	-	-	45
Agri. & Ext. Educ.	294	10	23	10	337
Agri Mech/Eng.	225	118	19	-	362
Subtotal (Agri)	(3,407)	(735)	(241)	(50)	(4,433)
Forestry	98	103	14	1	216
Fisheries	-	11	-	-	11
Veterinary Sc.	413	69	18	56	556
Home Economics	87	-	8	2	97
Other	1,152	19	105	29	1,305
Total Degrees Conferred	5,157	937	386	138	6,618

Since strengthening agricultural research capacity is so central to the objective of technological change and agricultural development, one additional data set is included here. The availability of agricultural scientists, with

post-graduate education is essential to building strong national research institutions. Educational capacity of African universities at the post-graduate level was known to be limited. Therefore, it seemed useful to have information about the number of African students receiving post-graduate degrees from foreign universities. Comprehensive information was available on doctoral degree programs at U.S. universities and is presented in Table 11. Similar data on the number of M.Sc. degrees granted to African students is not readily available, but is estimated to be about two and one-half times the number of doctoral recipients per year.

Table 11:  
Number of Doctoral Degrees Conferred to African Students  
Studying Agriculture at U.S. Universities (1973-82)  
and Percent Planning to Return Home

Sub-Region	Total Number of Degrees Conferred 1973-1982	Average Number Degrees Conferred/ Year	% Planning to Return Home
N. Africa	206	20.5	64%
W. Africa	196	19.5	66%
E. Africa	53	5	53%
S. Africa	57	6	72%
Total	512	51	65%

Source of Data: National Research Council, Office of Scientific and Engineering Personnel, Doctorate Records File.

In considering foreign university training, the issue of "brain drain" always becomes a concern. Data on the percentage of African doctoral recipients planning to return home is also included in Table 11 and these data suggest that this issue may be an increasing problem.

#### CONCLUDING OBSERVATIONS

One of the dangers in presenting an analysis of agricultural education capacity for the entire continent is that it tends to mask country differences. Therefore, it is impossible to make specific recommendations

about how to improve agricultural education in Africa as a whole. Clearly each country is unique and to strengthen its agricultural education capacity requires systematic analysis (to determine needs) and then concerted action. Given that caveat, some general observations and recommendations will be suggested based on the theoretical framework and subsequent analysis.

First, the overall inadequacy of agricultural and related education, at all levels, is apparent from the data presented. Adult literacy rates, which affect access to new agricultural technology, are low for most countries in Africa (i.e. under 50%), but are improving due to major investments in primary education. The availability of secondary education is generally very limited (i.e. less than 25% of school age youth participating in most countries), therefore, opportunities for widespread agricultural education at the secondary school level will not be possible in the foreseeable future.

Second, intermediate and higher agricultural education capacity is steadily increasing, but compared with Latin America and Asia, the existing capacity in Africa is very small and considered to be grossly inadequate. Major investments will be required by the countries themselves and by donor agencies to both increase the capacity and to improve the quality of these agricultural education institutions.

In making future investments in education aimed at the overall objective of agricultural development, it is important for agricultural educators in a country to pursue a strategy that is consistent with this overall objective. As suggested in the first part of the paper, most countries explicitly or implicitly pursue an agricultural development strategy built on the premise of technological change.

To achieve sustained technological change in agriculture requires sufficient agricultural research capacity to at least borrow, modify and test new technology from the international system or from neighboring countries. With the exception of a very few countries in Africa, the agricultural research systems of most nations are very weak and nearly all lack sufficient numbers of trained agricultural research personnel (see Oram and Bindlish, 1981). Furthermore, given the current output of post-graduate students from both African and U.S. universities this research personnel situation is unlikely to change substantially over the next decade or two. It seems apparent that immediate and substantial inputs are needed to increase the numbers and quality of agricultural research personnel.

As agricultural research capacity is strengthened, then the factors limiting technology transfer become important. Adult literacy seems to be an important factor affecting access to and the utilization of improved technology. While current adult literacy rates are relatively low, the high proportion of youth attending primary schools should steadily improve this situation.

It appears to be time to begin focusing more attention on improving the technical and managerial skills of farmers, so they can become effective consumers of new technology (as it becomes available). Over the long run, these skills are readily transmitted to young people through vocational agriculture programs in formal school settings. However, given the low

percentage of students currently attending secondary schools, over the short run, alternative approaches will be necessary. Agricultural extension will need to take the leadership in this area, concentrating on both information transfer as well as the technical and managerial skills farmers need to utilize technology. This conclusion has important curriculum implications for intermediate level schools of agriculture. In addition, primary schools may be able to supplement the efforts of extension by providing basic cognitive skills to rural young people, using agricultural and related examples in these instructional programs.

It also seems important that appropriate agricultural education be included in the curriculum of rural secondary schools, so that as these educational services expand, then agricultural training for rural young people will expand with it. Finally, opportunities for rural young people to develop leadership and organizational skills, as well as to develop self confidence and self esteem through participation in rural youth organizations, also appear necessary to achieve broad based agricultural development in Africa.

All of these programs require substantial resources. One important objective of this conference should be to establish priorities and then to determine how individual African nations might proceed to both train essential personnel and to provide the educational services rural people will need to increase agricultural productivity and farm incomes.

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## VII. PANEL PRESENTATIONS AND DISCUSSIONS

### A. AGRICULTURE IN THE GENERAL CURRICULUM

Moderator: Dr. Kaymond H. Morton, Division of Agriculture and Rural Development, Africa Bureau, AID/Washington.

#### Panel and Paper Presenters:

Mr. Kajih John Tansam, Director, IPAR/Buea, Cameroon

Dr. Babs Fafunwa, Education Consultant and Teacher Educator, Nigeria

Mr. David Gooday, World Bank

Mr. David Winkelmann, Agriculture in the Classroom Project, USDA

Mr. Basantjy, Mauritius Institute of Education, Mauritius

#### Agriculture in the General Curriculum: IPAR/Buea, Cameroon

Panel Presentation by Kajih John Tansam, Director of IPAR/Buea, Cameroon and Representative of the Cameroon Ministry of National Education.

Prior to the attainment of independence, there existed two different colonial systems of education in Cameroon, the French and English systems.

At the dawn of independence there came the need to reform and harmonize the two systems since neither reflected the immediate needs of Cameroon. It became necessary to develop an educational system which would be practical and would develop appropriate skills in the youths of Cameroon. As a result, the Government set up IPAR/Yaounde in 1967 and started training teachers who were to carry out the reform in the eight Francophone provinces while in 1974, IPAR/Buea was established to work for reform in the anglophone primary schools and teacher training colleges. IPAR means Institute du Pedagogie Appliqué a Vocation Rurale which, when vaguely translated means an Institute of Education giving a Rural Orientation.

#### IPAR/Buea Organization

IPAR/Buea conducted two years of field research from 1974-1976 to collect data which was to be drawn out of the immediate environment for the reform. The data pointed to an organization divided into four content sections:

1. mathematics,
2. english language,
3. arts and crafts or village technology, and
4. environmental studies which are in
  - (a) agricultural
  - (b) social aspects.

Each of the sections designed questionnaires; interviewed parents, pupils, teachers, educationists, etc.; and then analyzed the data. The result was the IPAR/Buea Report, April 1977 which gave the findings and recommendations for the development of primary school curriculum in the four integrated disciplines, which correspond to the four sections mentioned above.

The Ministry of National Education is still studying this document and in 1979, we developed a tentative national syllabus for a six-year primary school course. Currently IPAR/Buea has, under the directives of the Honorable Minister of National Education, provided a seven-year educational program in primary school agriculture which could conveniently be reduced to a six-year course. Teaching materials are also provided which are now being used at teacher training colleges.

#### Government Interest in Agricultural Education

- The President has introduced the Grand Manual Prize Award in Agriculture for which primary schools and colleges compete on equal terms.
- Provincial agricultural shows have been introduced and the current one will be in Bamenda in November 1984. Work is now in progress.
- The Honorable Minister of National Education has authorized IPAR/Buea and the two anglophone provinces of South West and North West to represent the Ministry of National Education in dual capacities in four assigned pavilions as follows:
  1. Compete with farmers at the shows.
  2. Display teaching materials and the materials produced by the Arts and Crafts section or Village Technology section.
  3. Display agricultural products from the provinces.
  4. Display animals and birds (which should include rabbits and poultry supplied by USAID to promote the current program).

The students of GTTC, Kumba have always participated in this program as teachers and evaluators.

## IPAR/BUEA CONTRIBUTION IN PRIMARY SCHOOL AGRICULTURAL CURRICULUM

To accelerate both the pace and interest in the current agricultural curriculum in primary and teacher education, IPAR/Buea has, with the approval of the Honorable Minister of National Education, introduced (at experimental level) the following. Initial introduction is in the two anglophone provinces with hopes for eventual adoption in the eight francophone provinces when the Reform of Primary and Teacher Education is officially launched.

### Revolving School Farm Loan Scheme

The German and Cameroon Governments introduced a Revolving Farm Credit Scheme to a few interested schools in the North West and South West provinces after inspection.

The award started with equal numbers in both provinces but today there are 40 in the North West province as against about 20 schools in the South West province. Depending upon interest and output, IPAR awards credit for needed tools, seeds, crops and fencing materials. The loans are repayable in cash after the first two years of harvest. The German Agency for Technical Development has, since its inception, been interested in the follow-up to assess the success or failure of the programs.

### Creation of Two Demonstration Farms

Currently two Demonstration Farms have been established in the anglophone provinces with the ultimate motive of establishing similar facilities in the rest of the other eight provinces. The demonstration farms are a laboratory for theory and practice of education with the following curriculum focus.

- Pupils are introduced to measurement.
- Pupils are introduced to accurate record keeping and sensible interpretation.
- Pupils are introduced to simple farm experiments thus drawing out conclusions.
- Pupils are led to be creative.
- Pupils are taught to keep actual crop records including: yields, manpower, profits and loss, storage, crop protection, etc.

### Mile 17 Demonstration Farm

The Mile 17 Demonstration Farm was established by the Cameroon Government and the German Agency for Technical Corporation as a laboratory for IPAR/Buea. This demonstration farm services the needs of the South West province in primary school agriculture.

Research staff from IPAR/Buea teach classes of primary school pupils from Muea Catholic School, Muea Government School, Molyko Government school, and Bolifamba Cameroon Baptist Convention (CBC) on scheduled dates; with two schools coming first from 9-10:30 p.m. and the other from 10:30 a.m. to 12:00 noon in the first and second terms.

A similar demonstration farm has been established at the Bamenda Government Teacher Training College to service the needs of the North West province at both primary and teacher education levels.

### Agriculture in the General Curriculum: Reappraisal and Unconventional Solutions

Panel Presentation by Professor. A. Babs Fafunwa, Educational Consultant, Nigeria

Western education as imported to Africa with particular reference to primary and to some extent secondary education, has failed substantially because the present goals of African schools are by and large the same as the goals of education in the metropolitan countries. Except for a few modifications, the structure, the content and the teaching methods in the African schools follow closely those of Europe in spite of marked cultural, political, economic and technological differences which exist between the two continents and among the several countries which make up Africa and Europe. Of all the countries of Africa with an estimated population of 300 million, the French influence is felt on about 80 million, while the British influence cover 120 million. An educational system that is designed to assimilate young Africans to the culture of the French or the one that was originally designed to train young English gentlemen without any pretensions for a vocation cannot by any stretch of imagination meet the needs of any developing country. Consequently the present formal school system trains youth for a cultural and economic system that is beyond the reach of the majority of them; what is more neither the British nor the French has a primary or secondary school system that is oriented to agriculture or agriculture related activities.

Does Formal Schooling Push Young People Out of Agriculture?

It is Cameroon Duodu's "Bad Boy" who supplied the best answer yet on this issue.

We respected nothing and nobody, and in turn no one respected us or cared two hoots about us. We had all 'finished' school and yet we had no work . . . If we had no work we thought, it was not because we were bad but because there were no jobs. Tell us to go back and work on our parents' farm--to 'go back to the land,' as politicians' cliches ran--and we would say: 'Look here, Sir, if we wanted to be peasant farmers, we would not have wasted a full ten years at school learning to read and write. If we are to be farmers at all, we don't simply want to weed a piece of land and plant yam or plantain or cocoyam or cassava or vegetables on it in the

topsy-turvy way we've seen our fathers do for years, which barely gives them enough food to live on, let alone brings them money. No, Sir.' Ask us: 'But do you know any better way of farming than your fathers?' Our answer would still be a big 'No' . . . Our teachers had no specialized training in agriculture. How could they teach us agriculture? They just gave us a plot to plant things on. And the things grew, thanks to the good soil. Any ass can do that. (1)

At present we teach agriculture in English and French but the farmers farm in the mother tongue.

The consequence of formal education will continue to be rising expectations among the African youth for a long time to come and one answer to the drift to cities for better opportunities is certainly not the discontinuance of formal education but a realistic curriculum that will recognize this possibility and at the same time prepare youth for a vocation. Many educators erroneously believe that primary education does not prepare and should not attempt to prepare primary school leavers for a job. They argue that an eleven or twelve year old is too young to train for a vocation.

This again is another example of wholesale importation of European ideas of primary education. What, we may ask, are the millions of African children not at school doing right now? If they are busy and between the ages of eight and ten, they are helping their parents with sowing, harvesting, cattle rearing, fishing, weaving and the like and by the time they are twelve or fourteen years old, they probably have their own plot to farm or a net for fishing. If they are girls, they assist their parents with sowing, dyeing and designing as well as with general domestic duties in the household or compound. "In addition to this side of the child's education, there are social and cultural demands from the community that encourage early maturity--an aspect that has long been forgotten in Europe and America." (2)

At present, once the child goes to school almost all other activities are submerged and both parents and relatives tend to exempt him from most of the duties and training given to other children who are not sent to school, a good example of how to educate the child out of his society. Once in the formal education stream, both the child's aspirations and those of his parents are conterminous: to achieve higher earning power by moving away from the drudgery of farming and by going to the big city where thousands of educated ones like him are making it or trying to make it and sending money home. It is the hiatus between the formal and the traditional education that pushes young people out of agriculture and sends them to the big towns and cities to join thousands of unemployed applicants for jobs that do not exist.

### Need for Agonizing Reappraisal and Unconventional Solutions

The problem that confronts re-education in Africa is not dissimilar from the one connected with technology. African countries are forced to develop

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(1)Cameroon Duodu: The Bad Boys, Deutsch, London, 1968.

(2)A.B. Fafunwa, New Perspectives in African Education, Macmillan and Co. Ltd., 1967, P. 37.

with an alien technology which in many instances is directly antagonistic to their own interests; consequently these countries find that meaningful development is an uphill task. Capital-intensive technology for a small market strengthens instead of weakening the developing countries' dependence on imported technology from developed countries. For instance, one will like to remove tedium from African agriculture by introducing small tractors that do not cost more than the price of a bicycle or motor bicycle, a price many farmers can pay--as indeed they pay for their pedal bicycles.

But this was not forthcoming for a long time because the industrialized countries were not interested in improving the lot of the African small farmer but in selling surplus tractors for whatever they are worth. Indeed some industrialists in advanced countries would rather give away ten tractors to some developing countries in their attempt to whet their appetites for more because the low marginal costs of producing established brands are more profitable than running the risk of financing a new model, which is less profitable and whose marketability is yet to be determined. On the other hand, the African governments and scientists themselves have been too slow in responding to these challenges.

First and foremost, we must admit that while agriculture is the major mainstay of the African economy, this situation will not remain so indefinitely. Moreover, even if we are able to persuade all jobless African youths to go back to the land, there is the danger of over-production and surplus produce. It is necessary, therefore, for economic and educational planners to think of other vocational channels, e.g. arts and crafts or village industries and technologies.

As we mentioned earlier, the first major task is to reconstruct the structure and design the type of curriculum that will respond to the needs of the child and his society. These needs do change and the curriculum must be flexible enough to cope with the inevitable changes. This is not a new problem and a number of people have proposed different kinds of solutions. In my view, we need to build a 2-2-2 primary school system. The first two years should be devoted to the basics--the three R's. This should be followed by two years of practical work at home or industry in agriculture, fishery, weaving or trading taught by parents and guardians or those competent to teach these skills. The child can then return to school for the last two years. During this period he will combine theory with practice in one specific skill. The major objective of this 2-2-2 system is threefold:

1. To train; for citizenship which includes dignity of labor.
2. To develop reading, writing and speaking skills.
3. To learn a specific skill or skills.

The traditional apprenticeship system which has been virtually ignored by educators and government officials should be incorporated into the new structure.

Since movement from rural areas to the cities is inevitable and can only at best be reduced to a minimum but cannot be stopped completely either in Africa or anywhere else, it is essential that part of the aim of education should be for mobility as well as for improving the rural community. Agricultural implements should be modernized as soon as practicable if farming

is to attract school leavers. In all frankness, a poorly paid job at the dock with a guaranteed income is at present more lucrative to the average worker than farm work which requires more physical exertion and promises little return. An unusually heavy rainfall or drought may reduce the farmer's return to naught. The least we can do to help the average African farmer is to take the tedium out of his already strenuous task. He rises early at 5 a.m., works on bended back with an ancient hoe from sunrise to sunset and returns home at 6 or 7 p.m. tired and good for little else. It is almost an act of malevolence to ask a school leaver or anyone else for that matter to go back to the farm in this late 20th century without any improved implements to work with, assuming that there is a farm to work on. We need to help the farmer half way up at least. Some useful experiments and innovations are being carried out in some African countries in the use of simple implements and in the use of horses. It should be possible to grow yam, cassava, cocoa or coffee by scattering the seeds from a distance, irrespective of whether the field is cleared of trees or not. It is this kind of unusual method that typifies the kind of thinking that must be done in Africa today.

Diversification of the economy, establishment of numerous small and cottage industries, emphasis on technical and commercial skills as opposed to literacy education are some of the urgent steps to be taken. Rapid retraining of the existing teachers and the recruitment of teachers with innovative ideas and skills, and the rapid introduction of free basic and universal education for every child with emphasis on citizenship training and vocationally-oriented curriculum are some of the sweeping changes that have to be embarked upon in developing countries if they are to avoid making formal schooling an instrument of self destruction instead of an important tool for nation building.

Attitudinal change on the part of governments and leaders of thought in developing countries is an important pre-requisite for effective agricultural policy and meaningful curriculum design. Developing countries (including Nigeria) must pull themselves up by their own boot straps. It is then and only then that Africa will be empowered to move from the role of bystander and join a world that is technologically oriented.

#### Agriculture in the General Curriculum: A Swaziland Model for School Agriculture Curriculum Development

Paper Prepared by Mr. David Gooday, World Bank.

There are so many important factors in the administration of an educational system, such as the development of physical facilities, recruitment and training of teachers, the design of a salary structure which will attract and retain the right sort of entry into the teaching profession, finance and so on, that it is possible to lose sight of what the whole operation is primarily concerned with, namely what knowledge, skills and attitudes are the pupils desired to attain, and how this is to be achieved. Or to put it briefly, what really matters in the final analysis is the purpose, structure, content and methodology of the curriculum itself.

This paper is concerned with only one subject area, agriculture, but the point should be made that as this is a practical and economic activity central to the lives of a very large proportion of the population of Swaziland, it contains a great deal of materials usable in the teaching of other subjects, notably mathematics and science, and also language, geography and development studies.

### Agriculture Programs in African Schools

The first step in the development of a model for agriculture programs in Swaziland schools was to survey experience in Africa during the last half century and up to the present. A survey of literature was conducted at the University of London Institute of Education in 1971, and this revealed an unhappy state of affairs. In the early 1920s, the Phelps-Stokes Commissions (8) said that "the adaptation of education to the needs of the individual and the community is increasingly emphasized and thus the wholesale transfer of the educational conventions of Europe and America to the peoples of Africa has certainly not been an act of wisdom." In 1970, Professor C. De Marez Oyens (9) pointed out that the "closest possible tie (between the educational system and) local and national reality is seen as essential." This opinion prevailed throughout the period and yet it was possible for Robert Gardiner (10) to draw attention at the Commonwealth Conference on Education in Rural Areas in 1970 to the fact that "although there have been sporadic attempts to institute a more practical form of education related to agricultural and handicraft pursuits" nevertheless "these have never been seriously implemented and the problems inherent in them have never been sufficiently studied."

Time and again one comes across instances of excellent policies devised by governments, but the very great problems associated with slanting an educational system so that it relates to the economic and practical realities of life, have resulted in a low level of achievement. For example, Ghana's new educational policy (11) emphasizes the necessity of instilling "an appreciation of the need for change directed towards the development of the human and material resources of the country" and that in order to achieve this, "practical programs which lead to the acquisition of skills should be an essential part of all formal education." Such a policy is well in accord with views held by many governments and is pretty well vital, especially in the more remote areas where falling enrollments and a massive absenteeism indicate a rejection of formal education (12). Parents have developed this attitude because of:

- unsatisfied expectations that schooling would lead to paid employment;
- a feeling that the education provided is irrelevant;
- poor quality of instruction and inadequate supervision;
- alienation of pupils with a resultant exodus to towns in the south;
- consequent lack of availability of school leavers for essential farm work, necessitating use of younger children.

It is small wonder that in his book False Start in Africa, Rene Dumont (13) heads one chapter "If Your Sister Goes to School You Won't Have Anything to Eat." It is clear that during the colonial era, agriculture programs in schools were never fully tried (14); it was assumed that a subject syllabus was the principal requirement, but lack of trained teachers, good teaching materials and direction proved fatal. Coombs (15) points out that education is only a good investment when it fits the real needs of the people. Along these lines he adds that education must be provided with reasonable efficiency and then be used by the educated people.

In 1960, a new approach was pioneered at Chavakali Secondary School in Kenya (16). A Cambridge examination in Principles and Practice of Agriculture was devised in 1963, and the subject gradually gained acceptance (17, 18) until in 1975, 94 out of a total of nearly 1,000 (400 government-aided) secondary schools in Kenya offered this course. Another milestone in the resurgence of interest in agriculture programs was the Kericho Conference (19).

### Possibilities and Problems

These brief remarks serve to indicate that it was essential to identify first the possibilities inherent in the subject agriculture, and secondly the shortcomings and constraints which prevented these goals from being achieved. Only then would we be in a position to construct a model designed to fulfill these goals. It should be pointed out that Swaziland was initially fortunate in a number of respects:

- small size and consequent comparative ease of supervision;
- good road system;
- no on-going program. Since agriculture was not taught, there was no need to overcome opposition from an entrenched cadre of teachers.
- recently formulated government policy favoring school agriculture programs;
- positive and active support from relevant officials in the Ministry of Education; and
- good relationships with relevant supporting Ministries and para-statal e.g. agriculture, Development and Savings Bank, Cooperatives.

The possibilities of the school agriculture programs are succinctly stated by Jon Morris (20). Agriculture should accomplish three broad objectives. It should:

- give a foundation of general knowledge to enable the pupil to take advantage of subsequent extension;
- create an internalized commitment to farm improvement and rural development; and
- link agricultural interests to the pupils' success in educational mobility.

An important observation about the general aims of agriculture training is that the subject is not intended for purposes of immediate vocational training, but rather to provide concepts and vocabulary to give subsequent farmer training and extension a broad foundation on which to build specific techniques. Secondly, in addition to the traditional scientific foundation to the curriculum, there needs to be a strong emphasis on the economic aspects of farming, as well as on practical work. In the past, far too little emphasis has been placed on the management-business-money handling skills, and this is all the more surprising when one considers that the primary purpose of farming is not to do experiments, or to be able to plough in very straight lines, or to know the latest recommended varieties; it is to make a living, which is an essential economic activity.

The problems identified in other programs, about which some action had to be taken if success was to be achieved, were as follows (21).

- There were no clearly thought out basic principles.
- There was a lack of clear objectives.
- The syllabus content was insufficiently defined.
- There was very often a complete lack of relevant textbooks and other teaching materials.
- There was a lack of suitable buildings and equipment.
- The program had no place in the examination system.
- No attempt was made to evaluate the success of what was being done, with a view to altering things if necessary.
- The teachers were often untrained or inadequately trained, both for pre-service and in-service training.
- There was a lack of supervisory personnel.
- The levels of teaching were not clearly defined nor were they interrelated.
- Little effort was made to publicize to relevant groups (e.g., parents, other teachers, headmasters, the public) the purpose and methodology of the agriculture program.
- There was a lack of back-up support in the form of finance, transport and administrative personnel.

### Agriculture Programs in Swaziland Schools

With these aims, observations and problems of agriculture training in mind, this paper presents a broad outline of the Swaziland project to date. Included here are several problems faced, and how they were dealt with in this project.

**Implementation of the Model.** At the beginning of 1972, the agriculture program panel was formed within the Ministry of Education. During that year, discussions were held with all interested individuals and groups, and it was decided to introduce what was to be known as "modern agriculture" on a pilot basis into seven secondary schools and five primary schools. It was also decided for the present to delay action on the development of a school certificate course. Table 1 shows the number of schools developed during the pilot phase. Unlike SWISP, in which there were three clearly defined phases, pre-pilot, pilot and implementation, this project gradually expands and moves from one phase to the next less noticeably.

Table 1.  
S.A.P.P.: Number of Schools Starting by Year, 1973-76.

<u>Year</u>	<u>Primary</u>	<u>Secondary</u>
1973	5	7
1974	2	2
1975	8	6
1976	12	4
	<hr style="width: 50%; margin: 0 auto;"/> 27	<hr style="width: 50%; margin: 0 auto;"/> 19

Schools were selected on the basis of a number of principles including pragmatic reasons such as:

- geographical distribution;
- primary and secondary schools adjacent for ease of visiting;
- some government and some mission;
- presence of a teacher willing and able to teach agriculture; and
- presence of an able headmaster.

Visits were made to and discussions held at all selected schools. For the next three years school selection continued to be made in this way but the rate of expansion was limited. Most notably, limiting factors were insufficient finances, availability of teachers for secondary schools, and the difficulty supervisors experienced in developing and implementing these courses.

Finance. Before the pilot project could start, about E10,000 was required to cover estimated costs of development. E2,500 was found to be in the Ministry's budget, and at the beginning of December, a further E7,500 was donated by the U.S. Embassy, enabling the project to take off. At this stage it became apparent that we meant business, and the British Government agreed to finance developments for a period of five years in secondary schools, while the Swaziland Government would cover development costs in primary schools. Other sources of finance were located without which the development of the pilot project would have been impossible. The agencies providing funds and the main use of those funds are shown in Table 2.

Table 2.  
S.A.P.P. Sources of Finance and Main Uses, 1973-76.

<u>Source</u>	<u>Use</u>
ODA, United Kingdom	Development of buildings and other facilities in secondary schools
Swaziland Government	Ditto in primary schools
FAO/SIDA	Teacher training
Overseas Book Centre, Canada	Model Agricultural Workshop and printing of books
Mennonite Central Committee/CIDA US/Canada	Purchase of vehicles, provision of curriculum developer
Anglo-American Corp of SA	Buildings and vehicles, tools, printing of books etc.
Embassy of US	Initial buildings and tools
Trocaire, Ireland	Printing of books
Christian Aid, UK	Vehicles, printing of books
BP, Swaziland	Printing of books
Gorta, Ireland	Printing of books
UNA, UK	Vehicle parts

All the above figures refer to capital costs, with elements of recurrent costs included in some items. The main recurrent costs of teacher salaries, on-going costs, etc., were borne by the Swaziland Government. In order to keep recurrent costs to a minimum, schools are recommended to charge an agricultural fee, normally E1. This is used at the discretion of the teacher for purchase of inputs (after the first year when they are supplied free) and for repairs and replacement of tools. Accounts are required to be kept by teachers.

**Transport.** Initially, building materials and equipment had to be distributed on hired vehicles. Subsequently, two vehicles used by the School Gardens Scheme, a nutritional project at that time under the Ministry of Agriculture, were used for distribution of teaching materials, fertilizer and so on. I also had a large car at that time and used to devote weekends to the distribution of materials and supervision of the program. It was possible to visit all schools in two days, spending the night at the furthest school. When finances became available, more vehicles were purchased from private sources.

**Teachers.** In the initial stages, one of the reasons for selecting schools was because a teacher was able to teach agriculture. Subsequently, headmasters in primary schools have been requested to nominate an agriculture teacher to attend short courses and then teach the subject. Often this was the headmaster himself. In secondary schools, various overseas organizations have sent teachers to Swaziland, and they have been posted where required. Organizations sending teachers to Swaziland are listed in Table 3:

Table 3.  
S.A.P.P.: Sources of Secondary Teachers, 1973-76

<u>Organization</u>	<u>Number</u>
Local Citizens	10
Peace Corps, U.S.	9
IVS, UK	7
Mennonite Central Committee, US	5
ODM, UK	5
Locally recruited expatriates	5
Campus Crusade for Christ, US	4
Gorta, Ireland	3
Missionaries	2
	50

Regular training courses have been held, normally twice a year in January and July, for both primary and secondary teachers. A two-year diploma course in agricultural education was mounted by the faculty of agriculture of the University at Luyengok in May 1975. The current number of Swazi teachers are nine for 1975 and 14 for 1976.

**Supervision.** Initially, I acted as Administrator of the project. A great deal of assistance was rendered by the organizer of the Schools Gardens Scheme, and one diplomate was appointed in January 1973 as an assistant lecturer at the Teacher Training College, though spending most of his time in the school agriculture program. In July 1974, another officer was appointed whose main responsibility has been as a coordinator, and at the same time an officer was seconded from the Ministry of Agriculture. In March 1975, a senior inspector was appointed, and in June another coordinator was appointed.

There are no established posts for coordinators and these officers held various other posts simultaneously. They carry out most of the functions of the project, and it is difficult to see how the project could continue without

them. There are administrative meetings twice a month under the chairmanship of the senior inspector. The coordinators visit schools regularly, about once a month which is three times per term. In addition, there is a driver and a general assistant, one of whose main tasks is duplication of materials. The current staffing situation is shown in Table 4:

Table 4.  
S.A.P.P.: Staff, December 1976

Senior Inspector	1
Coordinators	3
Teacher trainer/Coordinator	1
* Curriculum writers	2
Driver	1
General assistant at U.C.S.	1
Lecturers in Agricultural Ed.	2

\*These are described in a subsequent paragraph.

**Buildings, Equipment and Materials.** The initial concept of the secondary laboratory/workshop/store was that it should resemble a potting shed with dirt floor and rough benches. Local builders were employed, a feature which was apparently regarded with favor by donors. Schools were supposed to supply labor. However good an idea this may have been, it did not work. The Mark 2 version of the building was greatly improved, and one of the pressures was to bring it more in line with other school buildings so that modern agriculture would not be regarded as a "poor relation." The current Mark 3 building is a further substantial improvement.

Although these buildings were built for use as a classroom or laboratory if necessary, they have rarely been used as such. Mostly they are used for storage and workshop purposes. It is puzzling that they are not more fully utilized. The present concept is that this building should be regarded as an agricultural center around which the program can operate. In the future, the livestock facilities, poultry house and rabbitry will be constructed at the same time, and not as previously done over a three-year period. The primary schools have a good tool store, reasonably theft-proof and well-utilized. Most schools have needed fencing materials which they erect themselves, and internal irrigation reticulation. Some schools have needed a pump and engine to supply water. All gardens have a 9,000 litre water storage tank. Standard issues of tools are provided in the first year. All school requirements of seed, fertilizer, garden chemicals, livestock and their feed, and laboratory chemicals are centrally purchased and sold at cost to schools. Marketing of eggs and rabbits is a school responsibility, and the ease with which this is organized seems to depend upon the initiative of the teacher, although more remote schools do have a problem.

**Publicity.** The items outlined in the last section have been put into operation. School selection visits are carefully organized. A newsletter has been circulated to donors and other interested parties. Articles have appeared in the press, the Swaziland Teachers' Journal and international journals. A number of political speeches have contained information about the project.

**Administration.** This is necessarily closely related to other items including transport and supervision, but there has been since the beginning a vital need for a center to provide storage space, duplication facilities, parking for transport, offices and so on, as well as housing for staff. The center has been successively room 9, then room 7 at Luyengo, then the vacant Crop Store at Luyengo until the roof was removed in a tornado, then my garage and two of my bedrooms, and now finally a proper center is operating at Swazi National High School.

**Curriculum.** All other items in this description are merely services to the curriculum itself. This is a brief description of the developments over the last four years.

**Objectives.** An overall objective was initially devised: to enable pupils to regard agriculture as an enjoyable and worthwhile activity when properly practiced, and to develop positive attitudes to development and conservation. Other objectives and outcomes were also developed. Then as the units were prepared, individual unit objectives were prepared. These have now been consolidated and are presented in the teachers' handbook for Form 1 (secondary) and Unit A (primary).

**Syllabus.** A list of units was prepared, an order of presentation was established and from this an outline syllabus was prepared. As the units themselves were prepared their actual content then determined the syllabus. Thus to a large extent, objectives, syllabus, textbooks and handbooks were developed alongside one another, and there was constant feedback and interrelationship. The present primary and secondary syllabi have resulted from a series of developments throughout the period, and are now somewhat more finalized though they will doubtless remain subject to constant review. See Tables 5 and 6 for titles of units in December 1976.

Table 5.  
S.A.P.P.: Primary Units, December 1976

Finding out about nature  
Vegetable production  
Crops in Swaziland  
Crop production  
Crop harvesting and storage  
Farm records  
The soil  
Poultry-broilers  
Cattle in Swaziland

There are a number of principles underlying the program itself.

- All units are discrete within themselves but inter-related with units expected to precede, parallel or follow them.
- Although apparently a linear curriculum, there is in fact a substantial element of spirality, e.g.:

<u>Form 1</u>	<u>Form 2</u>	<u>Form 3</u>
Vegetable _____	Crops _____	Harvesting & Storage
Cattle _____	Poultry _____	Animal Husbandry
Soil & Conservation _____	Plant growth _____	Conservation
Farm records _____	Farm business _____	Rural Development Agencies

Units shown in this chart follow the newly adopted order from January 1977.

- All lesson outlines contain suggestions for practical activities and pupil participation.
- Three themes underlie the content: science, practice and business.

Table 6.  
S.A.P.P.: Secondary Units Until December 1976

Form 1	Plants and man Vegetable production Plant growth and environment Farm records
Form 2	Crop production Crops in Swaziland Crop harvesting and storage Poultry production Soil conservation 1 Fish farming Forestry Human nutrition Farm business
Form 3	Animal husbandry Cattle in Swaziland Pasture management Farm tools and machinery Soil conservation 2 Rural development agencies

Teaching materials. At secondary level, there have been three stages in preparation. Initially, textbooks and handbooks were prepared by local experts and edited by me. Then a full time curriculum writer was employed who prepared the second and third year materials. In March 1976, there was a major review involving most of the teachers and a number of changes were introduced, notably a changing in the order of presentation of certain units, a reorganization of the materials in some units, and an attempt to simplify the language. The initial materials were duplicated and used for two years. There were revised, offset litho printed and used for two years. Now in 1977 after the major revision, they have been printed by Oxford University Press. A secondary curriculum writer is currently employed to prepare and illustrate these materials. The primary materials have undergone a series of revision.

Primary pupils are each supplied with a workbook and teachers receive a handbook which is more comprehensive than the secondary ones, containing considerable content in addition to method. A primary curriculum writer is also employed who is responsible for these preparations. In addition to this, work is going on to prepare filmstrips, charts and posters to support certain units, and a small number of textbooks are supplied to secondary schools.

Examinations. The first Junior Certificate (J.C.) examinations were in 1974 along the lines already described. The results of the first two years are described in the next section. There are definite difficulties in practical assessment, but at present the examiner visits all schools and moderates the practical grades submitted by the teachers. It is intended that part of the primary "General Knowledge" paper should be on agriculture, but so far (1975 and 1976) this has not been possible.

## Evaluation

There are two aspects to this: the preparation of materials, and the achievement of objectives.

The Program. It is difficult for those involved to be objective in their evaluation of aspects of the program, and it is hoped that an external mission from the main donors will soon be carrying out such an exercise. However, the following are particular areas which need examination.

### Teacher Training.

- a. At only one of the short training courses, in May 1976, was an evaluation carried out. Teachers were asked to indicate to what extent they considered that the objectives of the course had been achieved, and also comment on time allocation, workshop content and organization. The indication was that it has been a helpful experience but two particular aspects became clear.

There was need for some methodology in the courses, where previously the concentration was on presentation of content and discussion of problems. This has subsequently been introduced. Also, a task force approach to textbook revision was likely to be more effective than general discussion. This method is now in operation, with task forces of two teachers considering each unit under revision.

- b. The Diploma course has not yet been completed so it is premature to carry out a major evaluation, but certain aspects need attention (23).

The order of presentation is not as well thought out as it should be. Education courses in the first year should concentrate on teaching method for class and practical work and building up the students' confidence. In the second year, the emphasis should be on broadening his perspective with regard to the role of the school in the community and the nation, and improving teaching techniques.

Secondly, there is a need for training in improvisation, a very essential quality in an agriculture teacher. This could include building, carpentry, plumbing and so on.

An evaluation team from the donors is expected shortly.

Buildings. The method of construction and design of the original buildings proved inadequate. As mentioned before, a second and then third design has been developed for the workshop. Livestock housing was adequate but very vulnerable to theft. A cement block poultry and rabbit house has replaced the original pole and wire netting building.

Equipment. The original range of tools and equipments has proved almost entirely adequate. A few unnecessary items have been omitted, and an effort has been made to purchase rather tougher tools.

Materials. This has had to change somewhat as the units have been changed or adapted. Each year a new list of requirements is prepared, and the indication is that they are adequate. Some schools experience difficulties in obtaining livestock feed, but most are able to make suitable arrangements. Feeds are only supplied at the initial stage.

Textbooks, Workbooks. The primary books have been evaluated each year and improved. The evaluation has been conducted by the coordinators who discussed them with teachers on an informal basis. Initial attempts were made to ask teachers to complete evaluation forms for the secondary text and workbooks, but these achieved a poor response.

The main method used for evaluation in the first three years was to visit schools and to discuss materials at the training courses (workshops). This review has resulted in the incorporation of many new ideas. The order of units has been improved, content has been rearranged for purposes of clarification, and the vocabulary has been limited to the standard 2,000 words, or else to words defined in a glossary. The appearance of the textbooks has also been greatly improved.

Other Teaching Materials. Handbooks, both primary and secondary, have been updated or rewritten each year in the light of experience. Workcards, prepared for use in secondary schools, were very little used. This may be because teachers were not familiar with their use, and efforts are being made to train students, but they are not currently being produced. Visual aids, notably filmstrips, have been very slow in development, but the current curriculum writer was initially employed to prepare filmstrips and is producing a range of illustrative material.

### The Achievement of Objectives

Cognitive Domain. The main focus here is the Junior Certificate (J.C.) examination, with which a preliminary testing was carried out in 1973.

1973. An evaluation was conducted to gauge the extent to which pupils at schools participating in the project knew more about agriculture than

those at schools which were not. A 90 question multiple-choice test was administered at five participating schools and three non-participating schools to act as controls. The comparability of the two groups of schools was tested using overall J.C. results in all subjects from the previous year. This showed that participating schools could be divided into two groups, two superior and three inferior with regard to quality of J.C. results. Using a chi-squared test of significance, it was shown that both groups of participating schools had a significantly better knowledge of agriculture than schools not participating at the 0,05 level of significance. This additional knowledge may have been acquired through means other than the project for agriculture programs in schools, but external factors (radio, extension, other subjects learned) are as likely to affect one group of schools as the other.

1974. Scores in the two parts of the J.C. examination (multiple-choice and short answer) were ranked in order and in reverse order. The rank correlation coefficients were 0,764 and 0,757, a highly significant correlation. This may indicate that there is no need to conduct both parts of the examination. The multiple choice is much easier to mark, and it may be unnecessary to include a section of short answer questions. The results of this examination are shown in Table 7.

Table 7.  
S.A.P.P.: Raw J.C. Examination Results, 1974.

<u>Grade</u>	<u>Number</u>
A	-
B	-
C	6
D	27
E	40
F	19
G	17
H	-

As there is nothing with which this may be compared, it is difficult to draw conclusions. It appears to be a fair result with a pass of 84.8 percent.

1975. Six schools took the examinations, and 86 percent of the pupils passed. The mean marks in the schools were 43 percent, 49 percent, 50 percent, 50 percent, 52 percent and 52 percent. The lowest mark was 27 percent and the highest was 70 percent. Out of a total of 301 pupils, 67 scored less than 40 percent. Again this was felt to be a fairly creditable performance, bearing in mind the following problems.

- The program was new to all teachers who were therefore inexperienced in teaching it.
- In a number of cases, changes of teachers occurred during the final year.

- In some cases materials were distributed late, making it difficult for teachers to cover the ground adequately.
- Although an effort was made to familiarize schools with the type of examination, it was the first time five of the schools had taken it.
- The practical assessment included an oral examination, and this may have been a new experience to many pupils.

Psycho-motor Domain. All units contain practical work. In practice it is very difficult to evaluate farming skills objectively. Some guidance was therefore given to teachers along the lines shown in Table 8. Teachers were requested to adhere to this scoring system, and scores were moderated by the examiner, in addition to short oral tests and visual inspection of work. The method of scoring shown in Table 10 was subsequently amended but the principle remains the same. Half the marks are for crop-related subjects (141 lessons or 54.6 percent) and half for livestock related subjects (99 lessons or 38.4 percent). Only two units can not be considered in either category (Nos. 1 and 19, 18 lessons or 7.0 percent).

Table 8.  
S.A.P.P.: Notes on Modern Agriculture Score Sheet

Scores

- 1. Very poor. Rarely given
- 2-4 Poor. Failing
- 5 Marginal
- 6 Satisfactory
- 7-9 Above average
- 10 Outstanding. Rarely given

Practical

These notes are intended as a guide. Each of the following is scored between 1-10.

Crops and Vegetables etc.

- 2.1 Land Preparation. Marking out, fencing, digging, preparing seedbeds, sowing direct, transplanting, spacing, row distance.
- 2.2 Maintenance. Watering, shading, thinning, weeding, pest and disease control.
- 2.3 Results. Quality, quantity, profit, appearance.
- 2.4 Record keeping. Accuracy, neatness and completeness
- 2.5 Enthusiasm/Attitude. Punctuality, hard work, reliability, cooperation with teacher and follows extra-curricular work.

Livestock, etc.

- 2.6 Handling skills. How to hold poultry, rabbits, feeling for egg production, gentleness, lack of fear of animals, quietness, firmness.
- 2.7 Husbandry skills. Regularity, use of correct food, ensuring adequate water, maintaining housing, cleanliness, recognition of disease signs, proper management (mating weaning, etc.).
- 2.8 Result. Quality, quantity, profit, appearance of livestock.
- 2.9 Record keeping. Accuracy, neatness, completeness.
- 2.10 Enthusiasm/Attitude. Punctuality, hard work, reliability, cooperation with teacher and fellows, extra-curricular work.

In addition to this formal evaluation, a visual appraisal of the development of practical facilities and their subsequent use has been made regularly throughout the period, leading to the following conclusions.

- Some teachers lack construction and repair skills.
- Some teachers lack husbandry, etc, skills.
- The teacher's enthusiasm is crucial.

The main conclusion to be drawn from this analysis is that no amount of advice, facilities, materials and supervision will overcome the inadequacies of a poor teacher; the most important aspect of this whole program is teacher development. As G.M. Maina, Swaziland's Chief Agricultural Officer, puts it (24) "the underdeveloped country agriculturalist might know the exact amount of total digestible nutrients to feed to a lactating bovine, but he does not know how much hay is needed for a cow." The most important fundamental required for success in agriculture programs is a down to earth, practical, dedicated, motivated teacher.

**Affective Domain.** Two attitude evaluations have been conducted, each in Form 1 of a group of participating schools.

- a. Attitude to the subject "modern agriculture". An instrument was developed using Osgood's semantic differential. Pupils were asked to discriminate on a seven point scale regarding their attitude to six aspects (easy-difficult; useless at home-useful at home; important to Swaziland-unimportant; interesting-dull; useless for studying other subjects-useful; helpful at work-not helpful) of four subjects (english, math, agriculture and science). The reliability was tested at one school where the test was given and repeated three weeks later. The correlation coefficients were calculated and are shown in Table 9.

Table 9.  
S.A.P.P.: Subject Evaluation Reliability Trial, 1976

<u>Subject</u>	<u>Correlation Coefficient</u>
English	0,69
Math	0,35
Agriculture	0,30
Science	0,27
Overall	0,47

This is rather a low level of correlation, but the decision was made to proceed even though Form 1 pupils may have difficulty with the test.

Validity was tested by showing the questionnaire to a number of colleagues for their views on whether the test was in fact likely to reveal the attitudes about which information was sought. The test was administered to Form 1 in five randomly selected participating schools in February, and again in November 1976. The results are shown in Table 10:

Table 10  
S.A.P.P.: Attitude to Subject 1976  
Z Values

<u>School</u>	<u>No. pupils</u>	<u>English</u>	<u>Maths</u>	<u>Agric</u>	<u>Science</u>
Mankayane	35	0,11	0,06	-2,07	1,77
Franson Christian	37	0,11	2,19	-1,89	0,38
Zombode	80	5,83	4,65	3,59	1,53
Edwaleni	82	-0,76	-1,46	-0,83	-1,44
St. Mary's	127	2,44	-2,00	1,00	1,35
All girls	182	2,08	-0,24	-0,41	1,53
All boys	179	3,88	2,08	1,78	0,87
Overall	361	4,08	1,12	0,89	1,68

A Z value of 1,64 is required to show significance at the 5 percent level and 2,33 at the 1 percent level. English, math and science were included partly as decoys, but also in order to observe differences in reaction.

English. The results in three schools were not significant. In one school the result was significant to the 1 percent level, and in one at 0,1 percent. The overall attitude to English was significantly favorable.

Math. Two schools were favorable, two not significant, and one unfavorable at a 2 1/3 percent level of significance. Boys reacted favorably, and with the girls the result was not significant.

Agriculture. One school reacted favorably, in three the result was not significant, and in one the result was unfavorable. Boys were favorable at the 2 1/3 percent level of significance, and with girls the result was not significant. The overall result was not significant.

Science. One school reacted favorably at the 5 percent level of significance, and the overall result was favorable at that level.

It is likely that in the first administration, pupils had not formed a clear picture of the subject agriculture, but these results certainly do not indicate a tremendous enthusiasm. More subjectively, those responsible for the project feel that attitudes to the subject have become more favorable, and this is indicated by a number of observations.

- In some schools, pupils come to school on Saturdays to attend to their vegetables. They also remain after class for the same purpose.
- Pupils making E2-3 each on their poultry were enthusiastic.
- In the one school where agriculture is an option, 80 percent of pupils opted to take the subject.

No attempt should be made at "proof by selected instances", but nevertheless a generally favorable impression is gained with regard to attitude change towards the subject.

b. Attitude to Farming. A test was devised on six aspects of farming:

- An enjoyable activity
- A worthwhile activity
- A science
- An economic activity
- Importance of conservation
- Importance of rural development workers' activities

Four statements were prepared on each of the above topics, one very favorable, one favorable, one mildly unfavorable and one very unfavorable. These were randomly ordered, making a total of 24 questions and pupils were asked to tick one of five columns opposite each question: strongly agree, agree, not sure, disagree, strongly disagree. In a test of validity using Guttman's approach (25), this instrument was given to one class. The results were scored 1 for favorable and 0 for unfavorable, and then placed in order from the highest to the lowest. Guttman's hypothesis is that if respondents are placed in order of their response, valid questions will have a minimum number of 'out of place' responses. In other words, if the responses to one question are examined, all responses above one point will be favorable and all below will be unfavorable. Questions with a large number of responses out of place are likely to be invalid. In this case, questions appearing to be invalid were recorded or altered.

The test was administered to Form 1 pupils in three randomly selected participating schools in February and again in November 1976. The results are shown in Table 11. With regard to all aspects there was considerable variation between schools. The good results of Eric Rosenberg and poor results at Ngwane are not what would be expected from a visual appraisal of the situations at those schools, and no clear expectations of this can be suggested. It can be noted that girls regard business and conservation aspects higher than boys do,

while boys regard the science aspects and the worthwhile nature of farming as more important than girls regard them. At the 5 percent level of significance, the change in attitude to business aspects of farming is not significant, and neither is the change in attitude to farming as an enjoyable activity. The overall attitude to farming is however very encouraging.

Table 11  
S.A.P.P.: Attitude to Farming 1976  
Z Values

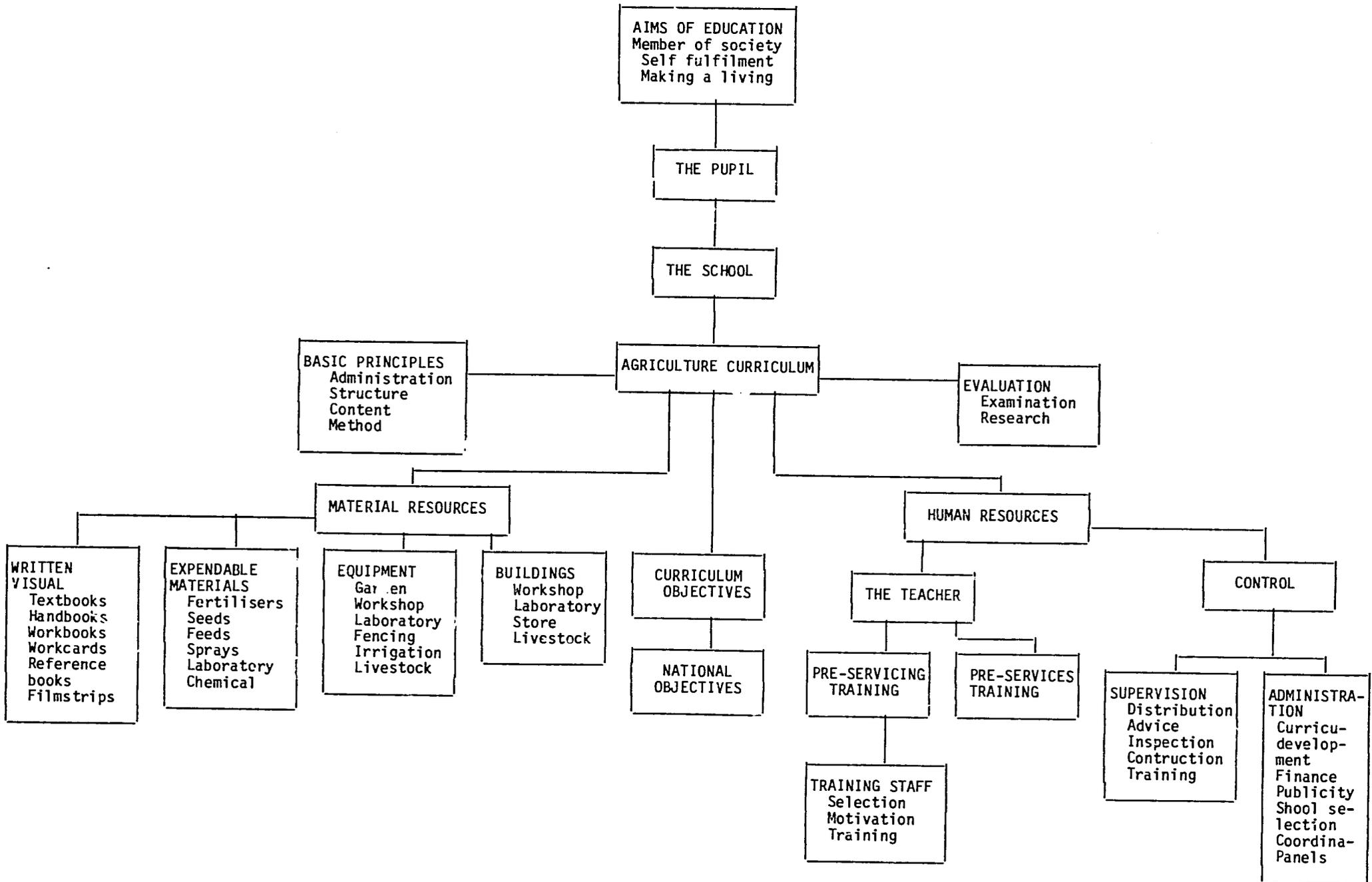
<u>School</u>	<u>No. pupils</u>	<u>Science</u>	<u>Conser- vation</u>	<u>Rural Dev. Agr.</u>	<u>Enjoy- able</u>	<u>Worth- while</u>	<u>Busi- ness</u>	<u>Total</u>
Eric Rosenberg	63	3,01	1,55	5,01	2,45	2,50	2,60	5,57
Ngwane	32	-1,33	0,57	0,21	-0,19	-0,11	0,12	-1,24
Salesian	70	2,34	1,14	0,45	-0,36	2,81	-0,30	1,85
Girls	51	1,43	1,87	2,37	0,68	1,59	1,85	3,05
Boys	114	2,45	1,32	2,62	0,81	2,87	0,61	3,27
Overall	165	2,62	1,95	3,53	1,06	3,29	1,55	4,43

The figures presented here are the result of an attempt to quantify attitude change. Attitude may however be defined as an "action tendency", or in other words, people's actions depend upon their attitudes and their attitudes are most effectively demonstrated by their actions, rather than anything which they may say, or what they write in a test. Although attempts were made to present the tests anonymously, it may be that pupils will tend to give what they perceive to be the desired response. The only real measure of changed attitudes may well be whether or not there is a change in behavior.

It is important to note that attitudes can be changed through education. Evans (26) points out that "although many attitudes are acquired during childhood as a result of home influences, these are not necessarily immutable. If they were, schools would have very little chance of doing anything more than teaching their pupils a certain amount of academic subject matter . . . fortunately attitudes change and develop throughout life." It should be emphasized that the agriculture programs in schools project is but one of a great many influences acting on the child. Some of these influences may well be in competition with the objectives of the program. There are also many other influences both in the school, the family, the press, radio and so on, all of which have a potential for more positive attitudes to agriculture in its broadest sense.

It should be pointed out that this project is still in a very early stage and it is essential that there should be an on-going program of research into its effectiveness, with feedback to ensure that improvements are introduced wherever possible. And finally, it must be asserted that the alternative to a program in schools designed to achieve attitude change in these vital areas is to have no such program, and to run the risk that the many other influences acting on the younger generation will have a much more harmful effect.

FIGURE 7.1  
A MODEL FOR SCHOOL AGRICULTURE PROGRAM



ARROWS = FLOW OF INFLUENCE

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## Agriculture in the General Curriculum: The USDA Agriculture in the Classroom Model

Panel Presentation by Mr. David Winkelmann, U.S. Department of Agriculture

"The Agriculture in the Classroom" program in the United States was started in 1981, by the Secretary of Agriculture in response to the growing concern that the U.S. public simply did not understand agriculture. This was causing great problems ranging from attitudes people had about agriculture, through problems regarding the department's budgets and programs. There had been isolated attempts at teaching agriculture to the general population for several years, but no real coordinated, intensive effort. Since starting, the program has been growing rapidly. It is generating tremendous excitement and interest.

The goals of the program are twofold.

1. To help young people understand the source of the food supply. Less than 3 percent of the U.S. population is involved in farming, so many people have no contact with agriculture.
2. To help young people understand the role of agriculture in the total economy and society. Even with less than 3 percent on farms, agriculture employs 22 percent of the population in various related services. Many Americans do not understand this, of the role of agriculture in generating foreign exchange and contributing to the total economy.

Obviously, the situation in the U.S. and the reason for a general agricultural education program is quite different from that in Africa. The immediate question, then, is "Why discuss this in relation to Africa?"

First, perhaps some of the same needs do exist in Africa too. Do all Africans understand the importance of agriculture in their countries? Second, goals can be changed to meet the situation, with some of the same techniques used. There are a few useful things that could be applied in setting up any program.

Let me talk about the nature of the agriculture in the schools program. First, it is more of a "philosophy", than a "program." We are not trying to set up a program or a curriculum to be handed to all schools for implementation. Agriculture is so varied across the United States that we feel states could do a better job of developing specific programs that local people could relate to, and thus increase the impact of the program.

Basically, then, "Agriculture in the Classroom" is set up to support specific programs being developed by others. That support is in the form of facts about agriculture; a centralized information and material sharing system; generation of public relations information for radio, television and other public media; and an effort to provide encouragement, offer suggestions and give leadership to those working on it.

Many types of teaching materials and activities are used in the program for both in-school and out-of-school learning including:

- farm tours;
- agriculture examples tied to the teaching of math, history, geography, etc., to make these subjects more realistic and practical for students;
- travel games for children handed out at tourist information offices, with children getting points in the game for every crop they identify correctly;
- comic books and coloring books;
- games, crafts, and crossword puzzles with an agriculture focus;
- structural exercises, and curricula guides;
- older youth teaching younger children in the classroom and in non-formal settings;
- agriculture specialists/farmers as classroom guest teachers; and
- film strips, slide sets, films, posters, and other visual materials.

Many of these activities are developed as complete packages to make them simple to use. The Future Farmers of America package, for example, tells what the objectives are, how to get started, how to organize field days and how to evaluate the program. It also gives specific lesson plans and activities sheets (on ditto master), that teachers can use with the students. This packaged approach is one of the keys to the success of the "Agriculture in the Classroom" program. The easier it is for teachers to use the materials, or to implement the program without a lot of agricultural knowledge themselves, the greater are the chances that the program will be implemented.

What are some of the things we have learned that we feel might be of use in trying to build programs elsewhere?

1. Programs need to be a collaborative effort, involving both agriculture and education, with strong leadership to tie the ideas together, provide support and encouragement, work with the media, develop program suggestions and materials, and in general, create excitement for the program.
2. The program activities need to be responsive to the needs of the user. For example, the program must be:
  - appropriate for the land, equipment, and other inputs that are available;

- at a knowledge level that is consistent with program goals, teacher competence, and student understandings;
  - consistent with what teachers are willing to undertake; and
  - designed with teacher training as part of the program.
3. Readily available materials and speakers should be used whenever possible, including successful local farmers. One state has a directory of farm people who are willing to work with school groups.
  4. There should be an administrative focal point for helping people share ideas and materials so that people do not need to create from scratch if similar ideas and materials can be shared.
  5. Programs should have specific goals and objectives to determine specifically what is to be accomplished.
  6. Finally, evaluation should be built into the project to allow for the measurement of success.

### Agriculture in the General Curriculum: the Mauritius Model.

Panel Presentation by Mr. Basantjy Putty, Institute of Education. Mauritius

Mauritius' education system has undergone a reform which included the incorporation of agriculture in the general education curriculum. The reform is still in its infancy and has included many problems, not all of which have been overcome. However, the inclusion of agriculture in the curriculum is seen as having definite merits and the program's implementation has included specific areas of success.

The education system prior to reform included:

- An academically oriented examination-based curriculum with no focus whatever on the practical elements of education.
- Parental and student attitudes which were resistant to change and supportive of the status quo in education which was seen as a "passport for a better life."
- The agricultural education that did exist failed to provide either the attitudes or the skills needed for the development of agriculture as an industry.
- The cost of inputs and infrastructure was a major constraint to technical education.

- Mauritius was facing severe unemployment problems with 20 to 30 thousand unemployed (mostly young people) and a majority of in-school youth working toward white collar jobs. At the same time, 50 percent of the country's food requirements were imported while farming was seen as an undesirable, low status job.

In reforming the education system, planners sought to develop a balanced curriculum which would integrate technical subjects and science at the early secondary levels. It would begin to develop a vocational orientation at the secondary and post secondary levels and include agriculture as a part of environmental studies throughout the curriculum.

The program of agriculture in the curriculum includes a focus upon conservation and pollution. Gardening in the schools, even at the primary level, is used to develop an awareness of food availability, export and import. The students' involvement in and responsibility for the school gardens, as well as the profits they make by selling their products, are seen as enhancing the nutritional standards of the families while furthering a more positive attitude toward agriculture as a source of livelihood.

After starting in the primary schools, the agriculture programs quickly spread to the secondary levels. At that level it was introduced as an elective subject due to anticipated resistance. It has begun to slowly take hold at that level.

The overall agriculture program (primary and secondary) had several broad student objectives including the following:

#### Knowledge Component

- To develop an understanding of the natural resources of the country, their value and their uses, especially as they exist in a rural environment.
- To understand the scientific principles involved in agriculture and the linkage of those principles to actual agricultural production.
- To develop an awareness of the various income and career opportunities in the field of agriculture.
- To apply a problem-solving approach to the planning and implementation of agricultural projects.
- To consider various sources of reliable agricultural and scientific information and use them in solving problems independently.

### Attitude Component

- To develop more positive attitudes toward the worth and relative status of agriculture and rural life.
- To develop the resourcefulness and self-confidence necessary to independently solve problems.
- To accept personal responsibility for actions and activities.

### Psychomotor Component

- To develop the psychomotor skills and techniques related to success in agricultural production.

Progress in implementing the new program has been extremely slow with the following barriers to success evidenced:

- The acceptance of agriculture as a subject has been very slow on the part of both students and parents.
- Administrative resistance at the secondary level has resulted in a lack of teachers allowed or allocated to teach agriculture.
- In primary schools teachers refused to teach agriculture because it was not a part of their already scheduled duty.
- While school gardens appeared on schedule, it was often left to the school caretakers to carry on the work.

In spite of the above mentioned problems, several elements of success already encourage optimism regarding the ultimate impact of the program.

- Agriculture has begun to play an important role in the integration of other subjects such as math, science and geography into the curriculum.
- The problem-solving approach to teaching is increasing with the teacher serving as a guide but giving students independence to identify and solve problems.
- National consciousness of the importance of agriculture as a subject is on the rise.
- Convincing evidence has been generated that if agriculture is to make headway, it cannot be left to less able students, many of the best students must be involved.
- Radio programs are being used to arouse national consciousness of the program and to generate enthusiasm for it.

- A government "white policy paper" which was recently published states that agriculture must be taught to all segments of the population, regardless of social class.

Key comments and opinions expressed during the question period following the panel presentations are summarized below.

### 1. Attitudinal Change

The most pervasive and difficult problem confronting African agriculture at all levels of education is negative attitudes towards farming. The discussants felt that the appropriate presentation of agriculture at all levels could make a major contribution towards reversing these attitudes, together with the following:

- Development of agricultural education on a massive scale, starting with planners, administrators and educators. This must precede any planning of teacher training programs.
- Every African should not only be learning something about agriculture but he/she should be growing something; both the privileged and the under-privileged, no one should be denied this opportunity.
- Increase the level of practical teaching, using gardens and other means, which would include simple explanations of theory and principles and their application, making a genuine teaching tool out of the exercise and not one of drudgery or punishment.
- Some governments are beginning to show interest and to provide support to programs that create awareness of the importance of agriculture.

### 2. Mass Media

- Several African countries reported using radio to teach and to change attitudes about agriculture, i.e., Mauritius, Lesotho and Togo.
- Counter arguments were offered to show limitation of radio use: high levels of illiteracy, low levels of radio ownership, poor reception in mountainous countries and competition from other neighboring countries.
- Other local strategies such as story telling and appropriate visual aids should be devised to supplement or replace radio.

### 3. Evolution, Persistence and Current Results of Agriculture in General Education Curriculum

- The history of agriculture in the general curriculum in Africa is one of rhetoric, commissions and recommendations, spanning well into the colonial period with a few spasmodic programs that were not sustained.

- Twelve years ago, no agriculture was taught in Swaziland at the lower levels of the school system. Over the past ten years a program was introduced and expanded.

<u>Level</u>	<u>Number of Schools</u>
Primary	83
Junior Secondary	57
Secondary ("O" Level)	9

Total students reached in 1984 = 33,970.

Problems: donor design is slow and faulty, teachers are not well trained in supporting scientific subjects, agriculture is viewed as a separate discipline due to the lack of science based subjects where teachers are trained. Five more years will be required to evaluate the relevance of the curriculum.

- Mauritius: the program began as a grass-roots effort and is making very satisfactory progress. There has been a change in the attitudes of the students, parents and the general public. A strong politician will back the program. A recently issued policy paper stated the government position.

#### 4. Point of Entry

- Once policy, action plan, and resources are established, teacher training is clearly the best point of entry for introducing and expanding the program of agriculture in the general curriculum.
- The development of relevant teaching material is critical and viewed as one of the most expedient means of effecting change in both the learning experiences and attitudes of teachers and students.

The following is a listing of the key points brought out by the workshop small group discussions of agriculture in the general education curriculum. These were unanimously accepted by the workshop participants during the final workshop session as a basis for future planning efforts.

- The rural to urban migration continues to be a problem in African countries. A challenge for education at the primary level is to make village life agriculture more desirable.
- There is a need to develop an awareness of the importance of agriculture at an early age (in primary school).

- Agriculture must be infused into the primary school curriculum in a way that will improve its image. This could help prevent urban migration.
- Donors must insure that primary level education projects include agriculture.
- There is need for a curriculum model that would offer a continuum in agricultural education--primary through graduate study. The rest of such a continuum might be that a learner could leave the educational system at any point along the continuum with some degree of appreciation for and competence in agriculture.
- There are awareness and exploratory experiences that could be provided at the primary level to develop favorable attitudes regarding village life and agricultural production.
- The questions of who teaches agriculture and how it is done become vital; if it is taught too vocationally or too early it may fail, if it is taught in an academic way then the purpose will not be achieved.

## B. TECHNICAL/VOCATIONAL AGRICULTURE AT THE SECONDARY AND POST-SECONDARY LEVELS IN AFRICA

Moderator: Dr. John Kamara, Principal, Njala College, Sierra Leone.

### Panel and Paper Presenters:

Mr. J. Meka Ngamba, Director of Agricultural Education,  
Ministry of Agriculture, Cameroon

Dr. James Christiansen, Department of Agricultural Education,  
Texas A & M University

Dr. Earl Russell, Department of Agricultural Education,  
University of Illinois

Dr. Roger Steinkamp, Creative Associates, Ministry of  
Education, Rwanda

### Vocational Agriculture in Cameroon

Panel Presentation by Mr. J. Meka Ngamba, Director of Agricultural Education  
Ministry of Agriculture, Cameroon

In order to better use the human resources of the agricultural sector, the Ministry of Agriculture has chosen professional or vocational training, relevant to the positions that are going to be held by the students when they graduate from school. The students can be rapidly operational in the field. The following are a few of the guidelines, that have enabled us to set up this training in the past five years and the reforms that have been included in the training.

Great effort has been made in building these facilities and providing equipment to our schools. We have also focused our effort on preparing curriculum, adapted to our own needs and our own context in Cameroon. We are now at the experimental phase particularly in relation to the implementation of this program.

The department of agricultural training has the role of guiding the programs and trying to adjust them to be responsible to the needs of the country. The Department of Agricultural Training offers support in the areas of curriculum, examination, and management. In the external services existing in all the provinces of the country, there are agricultural schools including three regional agricultural colleges, five technical agricultural colleges, one forestry school, two cooperative schools, and three community development schools. In addition to the schools, we have centers for the training of young farmers.

For all of schools we have about 100 trainers. Our problem right now is that most of these people are young. They have just graduated from school and do not have any real field experience. We hope that with time it will be possible for us to require field experience before coming to teach.

Another problem in Cameroon is the lack of structure for the training of trainers in the agricultural areas. They are generally young people who do not have any teaching experience. The principle of our policy is that each trainer should be a teacher and promoter of rural development. This can be carried out in the rural areas where the trainer engages in applied research and in extension work. We try to have as much contact as possible with the rural people. We have set up a national committee charged with coordinating all agricultural educational activities. We are facing many difficulties related to the links we have with extension work.

In conclusion, our training is vocational training. The system is adapted through annual reviews to our own needs. It is a system that ensures the promotion of human resource. The students do not just come from the grammar schools, we also have people who are already working in the field. We have a certain percentage of places that are reserved for people who are already employed so they can go back to school and later be promoted. These schools are very important because we organize seminars and workshops for ministry officials and students themselves, because the students become actors in development.

### Technical/Vocational Agriculture: Some Crucial Principles and Practices

Panel Presentation by Dr. James E. Christiansen, Department of Agricultural Education, Texas A & M University

Programs of agricultural education, irrespective of the institutional settings or organizational structures under which they occur, should not be made to shoulder the complete task of providing the vehicle by which self-sufficiency in food production is to be achieved. For example, in one country in the Western Hemisphere, after programs of agricultural education were in place where none had been before, the country became a net importer of food stuff rather than the net exporter that it had been previously. Comments were heard that such programs were a failure, even though the graduates of the programs were being successful. The real culprit? Change in land tenure laws, an imperfectly designed program of agrarian reform and land redistribution, and inconsistent governmental policy in those areas.

With that note of caution (or excuse?) out of the way, let us look at some questions pertaining to the topic assigned to this panel.

1. Is a program of vocational agriculture important in increasing, sustaining, and improving the quality of food production in African nations? Yes, definitely. As this is the case, what is the next question?

2. Are there basic concepts, principles, and practices inherent in successful programs of agricultural education, that apply irrespective of the institutional setting or organizational structure in which they are found? Yes. Some of these principles and practices concern students, some concern their teachers. What are they?

- Classroom instruction should emphasize practice in solving problems, practice that will help the farmer or future farmer learning to farm better, the future teacher of agriculture, the extension agent transferring knowledge, and others to be better as decision-makers and managers. Learning to solve problems should be the main approach of both formal and non-formal programs of agricultural education. However, learning to identify problems to be solved is also crucial.
- Classroom and laboratory instruction, whether in the farm shop, on the school farm, or on the farm of cooperating farmers should emphasize learning by doing through hands-on experiences. From infancy onward, we learn from experience in action.
- Teachers of vocational agriculture need the same skills as farmers, they need to be able to perform those skills better, and they need to be able to teach others. They need to be able to explain and demonstrate practices that clients can use. The Egerton Colleges of this world need to multiply that is, the Egerton Colleges that emphasize a high proportion of the practical hands-on training in relation to the theoretical instruction provided.
- Continuous programs of in-service education for teachers of vocational agriculture should be provided to keep them up-to-date, to provide the support, help, assistance, "pat on the back," etc. necessary so that they do not become second class, forgotten stepchildren in an educational system.
- Teachers on the firing line, whether in a small outlying school or in a large post-secondary institution should be involved in developing curricula and in sharing successful teaching techniques. They need to believe that it is "their" curriculum and that they had a hand in designing it, testing it, and carrying it out.
- Develop and use appropriate teaching materials. But even if they are not available, use community resources i.e., the good farmers. Extend the walls of the classroom to the real world.

- Remember the farmer and the farmer's household. They come first, despite national goals. Therefore, local problems take precedence over national goals. When teachers teach to solve the problems in agriculture faced by the farmer in his/her community, then many other problems will take care of themselves.
- Extend the preparatory programs of vocational agriculture into the surrounding communities. Help local people to benefit from what students are learning. Give students a chance to deal with the real world by getting practice in passing on to others what they are learning.
- Follow one of the basic principles of sound vocational education, namely, teach students using practices, facilities, equipment, etc. similar to that to which they will have access upon completion of the program. There is such a thing as teaching using resources that are appropriate to the "real" world. Why teach students to operate a 100 horsepower tractor when they will be using a two horsepower, two wheeled garden tractor after graduation?
- Use two-pronged, or two level, approach in developing a program of vocational agriculture. You do make a quicker impact if you teach older people, the people presently farming; but you reach more, ultimately, if you teach those who are younger, who are in school.
- When the teacher of agriculture, the extension agent, or whatever title by which the agricultural change agent is known, is on the job, that person should live in and be a part of the community in which he or she works. That person is, or should be, a community resource for agriculture, and should be accessible when needed.
- Teachers must be present, on the job, actually to teach for the whole day, every day. This needs to happen, no matter what curricular model is followed.
- A curriculum in agriculture should not be designed at one level to be primarily preparation for the next "higher" institutional level. Design the curriculum so that if the student cannot pursue a higher level of education, that person will have learned agricultural skills he or she can take upon leaving a program to use to make a living in agriculture.

Finally, a point that cuts across all 13 principles above. There is a different "state of the art" for the development of human resources in each country in Africa. Hopefully, each different "state of the art" can provide perspectives for starting programs of agricultural education at different points of emphasis where needs exist.

### The Vocational Agricultural Model

Panel presentation by Dr. Earl Russell, Department of Agricultural Education, University of Illinois

In looking at vocational agriculture, I will focus upon three essential dimensions of the model as it is applied in the U.S.

- Classroom instruction from a problem-solving perspective.
- Related laboratory instructions for application of theory principles and skills; and
- Supporting youth organizations which are actively a part of the total vocational curriculum.

### Problem Solving in Classroom Instruction

Problem solving based on needs and concerns of students is a primary emphasis with real agricultural problems from the local level as the focus of instruction. Students are required to think, raise questions, debate, argue, challenge the instructor, analyze the alternative solutions to problems and decide as a group on the course of action. Conversely, teaching by the teacher and rote memory action by the students are generally avoided in this approach to instruction. I might add that a curriculum that takes its shape from this instructional approach is one that reflects local community conditions and needs, and from this perspective there is no such thing as a national curriculum.

### Laboratory Instruction

This dimension extends the problem solving approach to the learning by doing principle. It occurs in school facilities such as agricultural mechanics shops, land laboratories or school farms, home farms of the students or farms in the community. Occupational experiences are provided and supervised by the teacher of agriculture. Students are required to keep records of themselves, their learning activities, and laboratory instructions. Pride of ownership is enhanced by the requirement of record keeping. Both individual and group instruction should be provided in the laboratory.

## Youth Organizations

This organization in the United States, as many of you know, is called the Future Farmers of America. The youth organization emphasizes the development of leadership and communication skills among agriculture students. It creates pride in agriculture as the basis of national well being and economic health. The youth organization elevates the status of agriculture as a worthwhile occupation and professional pursuit. It motivates students to learn and be recognized for achievement for individual and group activities. The activities are both cooperative and competitive as an appropriate balance needs to be struck between individual, group, cooperative, and competitive youth organization activities.

During the 1920's, the Future Farmers of America emphasized training of people to farm. That is the concern we are hearing at this conference. I would caution that as agriculture develops and becomes more diversified, as the curriculum begins to reflect dimensions of agriculture which may include marketing, agriculture business, entrepreneurship and off-farm activities, the level of the organization could become a problem, as it has become in the USA. As was said by a panel member yesterday, "In Africa we need to emphasize farm culture in the Mother tongue in Africa, rather than agriculture with the American term." I would simply urge that perhaps, we should consider at some point, whether or not we should view vocational agriculture in Africa from a strict farming perspective or whether we should begin to look at the diversification of the curriculum to include agriculture business, marketing, processing of food products and the various steps to get food from the point of production to the point of consumption. We would define this agriculture to be much more than agriculture production. I would urge this to be considered from a policy as well as from a curriculum perspective.

Policy decisions to elevate primary and vocational agriculture as a part of a total school curriculum in African countries will be a key to future economic development, improvement of the status and prestige of agriculture as a career field and aid in the elimination, the shortage of agriculturally trained technical and extension workers.

## Post Primary Agricultural Education in Rwanda

Panel Presentation by Dr. Roger Steinkamp, Creative Associates, Ministry of Education, Rwanda

### Introduction

The 304 three-year post-primary vocational training institutions recently developed in Rwanda are a brave attempt to extend vocational training to the masses. The doors of these schools opened in 1982. Thus the first graduates will leave school next year.

The system has its problems, but since the project was begun a year ago, we have shifted responsibility to the teachers and school boards. We have

asked them to modify programs to suit their needs and supported them in their efforts in a pilot zone. The results have been very positive both in terms of concrete accomplishments in the field and attitudes of teachers. Thus the lesson is to allow teachers to deal with their problems and support them in their endeavor.

### The Reform

Rwanda instituted its reform for many reasons other countries share:

- programs were unsuited to the local socio-economic environment;
- too few students could hope to obtain secondary education (5%); and
- the program blindly followed European models.

Thus, two years of vocational training were added to primary school with an additional three years planned for post-primary. The program is very ambitious, perhaps beyond the current capacity of the manpower and financial means of the government in the short run.

Currently 304 schools are operational with ten being added annually. Staffing is a problem as is production of teaching materials and tools. These may be overcome in time.

### Prospectus

Overwhelming problems in the short-run may discourage both donors and the government. To date most schools have operated with poorly trained staff, no tools or books, and with too small an operating budget. The greatest anxiety is produced by the problem of jobs for graduates. The tendency to standardize all programs could prove the death of the system since an over supply of skilled workers will quickly be produced in any sort of nation-wide training.

The prognosis may be bleak but is not necessarily so. The best critique and suggestions have come directly from teachers, parents and students. Teachers are more than able to modify curriculum to meet local conditions when encouraged to do so and given proper support. Even budgetary shortfalls become manageable when school directors are allowed to budget their money and build structures in line with their own and community means. In fact, better results have been obtained through modest means than in projects which parachute heavy infrastructure upon schools which are beyond their means to maintain.

Much work needs to be done.

- Teachers and directors need to be taught problem solving techniques.
- They need technical support in their endeavors.

- They need to be encouraged and rewarded to take the initiative to use material at hand in their programs.
- Applied research needs to be conducted to supply schools with tested subject matters.
- Vertical mobility of teachers to higher positions should be instituted.
- Continuous in service training needs to be given during vacations to up-grade current staff.

Key comments and opinions expressed during the question period following panel presentations on Technical/Vocational Agriculture at the secondary and post-secondary levels.

### 1. Selection of Students

Preference should be given to students of rural origin and students who wish to remain in rural areas following training. (Avoid duplicating the Nigerian experience of training large numbers of agriculture students who do not remain in rural areas.)

### 2. Practical Training

Cameroon agricultural schools have several categories of practical work which make up approximately 60 percent of all training. Categories are:

- practical farm work--common tasks;
- field training--living in the field and learning the tasks of a field worker;
- environmental study--collaboration with farmers to identify farm problems and solutions;
- pre-vocational training--technical experience in an area with approximately 5,000 farmers, requiring research and report writing; and
- practical laboratory work.

### 3. Rural-Urban Migration

The following measures are being taken to improve the balance of amenities between urban and rural areas.

- Promoting village development, including availability of water, electricity and cinema.
- Setting up schools and centers to teach young people to organize rural people.
- Encouraging the development of common interest links between rural workers and rural communities and making the workers more answerable to local communities.
- Improving policies to make agriculture more attractive, valuable and profitable.
- Helping young farmers who are just getting started.

#### 4. Curriculum Development

To ease the differences between rural and urban students, curricula should give more attention to the importance of agriculture, agri-business, processing, marketing and other services needed to support agriculture and rural development.

There should not be a national curriculum, but rather a "living kind of curriculum" with support (but not control) from ministries of agriculture and education and flexibility to incorporate topics related to local conditions, needs and agricultural problems.

#### 5. In-Service Training and Teacher Selection

In-service training should:

- have major input from teachers and workers to ensure active participation;
- emphasize problem-solving and minimize lecturing;
- stress relevance;
- maintain good supervision and follow-up;
- offer in-depth training at frequent intervals, rather than large workshops or short courses;
- use rigorous teacher selection criteria to ensure the employment of progressive, innovative teachers; and
- encourage experimentation with a variety of teaching styles.

The following is a listing of the key points brought out by the workshop small group discussions of technical and vocational agriculture at secondary and post-secondary levels. These were unanimously accepted by the workshop participants during the final workshop session as a basis for future planning efforts in the theme areas.

- A critical issue at the secondary school level is to provide "economic promise" in agriculture. The potential for success must be made visible to learners.
- This issue has social and economic implications that go beyond the traditional agricultural science curriculum objectives.

- Youth organizations such as 4-H and FFA have great promise as integral parts of the secondary school experience. Youth organizations may have some political implications in African countries but the changed attitudes and social impact brought about by such groups could be very positive.
- Youth at the secondary school level need to observe success (improved life style and economic gain) in farming.

## C. WOMEN IN AFRICAN AGRICULTURE

Moderator: Dr. Eudora Pettigrew, Associate Provost, University of Delaware.

### Panel and Paper Presenters:

Dr. Mary Rojas, Office of International Extension, Virginia Polytechnic Institute and State University.

Dr. Terry Hardt, Agricultural Development Officer, USAID/Sudan.

Dr. Maria Mullei, Rural Development Officer, USAID/Kenya.

Mrs. Agatha Nji, Chief of Service Women's Agricultural Programs, Department of Community Development, Ministry of Agriculture, Cameroon.

Dr. Francille Firebaugh, Vice Provost of International Affairs, Ohio State University.

Dr. Jean Weidemann, Institutional and Human Resource Division, Board for International Food and Agricultural Development, AID/Washington.

### Including Women in Agricultural Education: A Rationale

Panel Presentation by Dr. Mary Rojas, Director, Women in World Development, Office of International Development, Virginia Polytechnic Institute and State University

The thesis of this presentation is that women need to be more fully integrated into all aspects of agriculture education. Traditionally, development activities and education programs that have targeted women as beneficiaries, primarily have focused on women's reproductive, health and nurturing roles, not on their productive roles (AID/WID Policy Paper, 1982). Training for women has emphasized nutrition and balanced meals, childcare, family planning and primary health care. All are essential to enhancing quality of life, a fundamental goal of national development whether it be in the United States or in countries in Africa. However, in the minds of development planners, policy-makers and educators, women as homemakers and as recipients of social welfare often have been synonymous. The labor of women, their economic contributions to development and their economic needs for the most part have been invisible to development planners and educators. One problem is that policy planners and educators often do not see women's economic roles because of inadequate data. Let me show some slides to illustrate my point.

Kenya  
Man and Woman  
Hoeing  
(L. Kirjavainen)

Typically, as here in Kenya of men and women working together, the man is counted as "farming", the woman as "helping." Women are often misclassified. An example from the United States, underscores these problems.

Graphic  
United States  
Census  
(J. Kalbacher)

The United States census asked for "one primary operator of a farm." The man most frequently was named. The result was that only 5% of women were classified as farmers.

Graphic  
USDA survey  
(Jones and  
Rosenfield)

Yet, a United States Department of Agriculture Survey asked for the primary operators of a farm. The result was that 55% of the women considered themselves farmers.

Virginia  
Hay  
(A. Neilan)

These slides of women in southwest Virginia clearly show women as farmers.  
Here, loading hay;

Virginia  
Broccoli  
(A. Neilan)

here, packing broccoli;

Virginia  
Tending Livestock  
(A. Neilan)

here, tending livestock.

Togo  
Women's Fields  
(L. Kirjavainen)

In other countries these same data errors are made. In many parts of Africa, women cultivate fields of their own as these women are doing in Togo. Development planners often do not see these fields with detrimental consequences for the women and the projects and with serious consequences in formulating policy in such areas as education.

Graphic  
Vegetables,  
Peanuts, Rice  
(D. McMillan)

By not seeing these private fields, often cultivated by women, planners would miss 91% of the vegetable production, 80% of the peanuts, and half of the rice, all important crops in development. This omission also has important implications for agricultural education. (Rojas, 1984).

Social scientists have helped us reevaluate our assumptions and stereotypes about the roles of men and women in agriculture. An anthropologist, for example, provided me with these slides from selected countries in West Africa, which delineate the agricultural work of men and women.

Graphic  
Women, Men and  
cropping systems

Throughout the world, both sexes are often involved in a number of agricultural activities dealing with cropping systems.

Nigeria  
Kofyar Women  
Transplanting Millet  
(R. Netting)

These activities include planting, weeding, and transplanting such as these women are doing in Nigeria, harvesting.

Nigeria  
Women and Men with  
Late Millet Sheaves  
(R. Netting)

Women and men often work together in these activities.

Nigeria  
Kafyar Cooperative  
Work Group  
(R. Netting)

They also take part in cooperative work groups, particularly at times of labor bottlenecks such as happen during planting season.

Nigeria  
Firing the Bush  
(R. Netting)

But gender-differentiated task specialization also occurs. Almost everywhere men specialize in the cutting and clearing of the forest through burning.

Graphic

As we see in this United Nations chart, women may have special responsibility for weeding and hoeing, harvesting and transporting crops from the fields.

Nigeria  
Man with Palm  
Nuts  
(R. Netting)

And men and women may specialize in different phases of production, for example, here in Nigeria the men pick the palm nuts.

Nigeria  
Processing Nuts  
into Oil  
(R. Netting)

And both women and men work in processing the nuts into oil.

Nigeria  
Woman Digging Sweet  
Potato  
(R. Netting)

Or, women have the job of digging up sweet potatoes prior to food preparation.

Nigeria  
Sorting Tubers  
(R. Netting)

And for sorting tubers.

Nigeria  
Cassava Field  
(R. Henderson)

In many areas, men and women have special responsibilities for different crops. Among the Onitsha Ibo of Nigeria, women concentrate on growing cassava, here pictured.

Nigeria  
Yam Barn  
(R. Henderson)

and men on yam production.

Niger Garden  
(H. Henderson)

Women are often associated with the planting and upkeep of household kitchen gardens such as these.

Girl Harvesting  
Wild Plants  
(R. Netting)

and with the gathering of wild fruits and leaves for family meals. (Henderson, 1984)

Another anthropologist with whom I work, has charted the similar and contrasting interests in natural resources of men and women in parts of Upper Volta and Mali. The handout attached provides you with some of this information. Without careful attention to the use of natural resources, for instance, the natural vegetation upon which women may rely for food, fuel, herbs and fibers is sometimes seen as "useless bush" by developers and its value ignored in project planning and education. (Hoskins, 1984)

Often migration of men from rural to urban areas in search of wage labor both in the United States and parts of Africa has left rural women with increasing work loads, greater decision-making roles, more agricultural work and a greater need for agriculture education. One recent report on the future of the southern United States commented on the "urbanization" of men and the "ruralization" of women with a consequent "feminization of poverty" in the rural areas. (Stack, 1984).

However, in the United States for the most part our rural extension services have been dicotomized by sex, offering home economics to women and agricultural production to men. This split between the disciplines can keep women from learning needed agricultural skills. Until very recently, agricultural education in the United States was a man's field. In my state of Virginia, this is changing at the university level . The College of Agriculture my university now has almost 45 percent women students but its faculty is still almost wholly men. Specifically, the University's Department of Agricultural Education has 30 women being trained out of 100 but as yet no women faculty. There are 45 women agriculture education teachers at the primary and secondary level in the state of Virginia out of a total of 368. In the United States, out of 380 agricultural teacher educators at universities ten are women. But with more women being trained, soon more faculty and teachers will be women. (Virginia Tech, 1984).

From my readings and experience I know these statistics are common worldwide, including many countries in Africa. I am impressed, however, with the recognition of the issue of women's role in agriculture education among some African nations. For instance, I have a friend recently hired by FAO to work with the government of Sudan to assure the inclusion of women in agriculture education. I have also used innumerable times the studies and programs on the inclusion of women in agriculture from areas in Africa to enlighten educators and extension personnel in the United States.

Much needs to be done, however, so I will close by suggesting some simple ways of including women in agricultural education whether in Africa or in the United States:

1. First, we must see what rural women do. In order to do this adequately, data must be gathered and disaggregated by sex. We often have very stereotyped ideas about the roles of men and women. A large body of literature is now available that belies these stereotypes.
2. Second, when we gather data we must assure that women are interviewed, and that women are included as interviewers.
3. Third, we must provide workshops as in-service for our agricultural educators and extension personnel, both men and women. The workshops need to introduce the findings of studies done on the role of women in agriculture and suggest ways educators can make women comfortable in agricultural education as well as make more educators comfortable in working with women. I have been involved in several such workshops.
4. Fourth, we must assure that the classroom environment is comfortable for women. To do this curriculum should reflect women's role in agriculture in its examples, graphics, and language. A concerted effort must be made to have women as teachers, visiting lecturers and workshop leaders. It goes without saying that this is essential in areas where women can only be trained by other women. Also, the often special needs of women need to be addressed to provide them with access to classrooms and to schools in general.
5. Finally, home economics and others who have traditionally worked with women, need to look at ways they can better enhance the production skills of women and they need to assess how they can assist agriculture educators to better include women.

In conclusion, the inclusion of women in all aspects of agriculture education is not simply a matter equity it is an essential aspect of national well being and development whether in the United States or in Africa. Thank you.

CHART 1

SUMMARY OF CITED EXAMPLES OF WOMEN'S INTERESTS IN RESOURCES WITH SIMILAR AND  
CONTRASTING INTERESTS OF MEN

	WOMEN	MEN
Primary Tree Products	Daily fuelwood collection near the household. Concern over availability of preferred species. Interest in access to building poles for local use.	Interest in building poles and timber trees as cash crop as well as local use. Interest in fuelwood mainly as cash crop.
Secondary Tree Products	Major involvement in collecting human food and having available fodder for small animals near home site. In certain areas where cattle are at the household, women are in charge of gathering fodder.	Herders apt to be involved with large animal grazing but not limited to areas near the home site. Little interest in collecting wild food products from natural vegetation.
Tertiary Tree Products	Collect numerous products needed in the household and for barter or sale. Women's employment or extra cash income may depend on access to tertiary products as raw materials.	Some men make medicines especially herders for their animals. Men may use tertiary products but they often use fewer and quite different ones than those used by women of their own communities.
Soil	Use limited to areas near household. Special interest in soil quality in gardens and in fields with subsistence crops.	More choice of area for farming as men are more mobile and may have access to fertilizer. Interest generally focuses on best soils used for cash crops.
Water	Generally responsible for locating and transporting household water. Often also responsible for water delivery for introduced projects (i.e., poultry, watering newly planted trees). General concern over percolation of water into garden and field-crop soils.	Herders generally take animals to water source so may be more concerned with water lifting than delivery or source availability close to home. Concern also over percolation of water into soils of fields.

(Hoskins, 1983)

## Commitment and Creativity

Panel Presentation by Dr. Terry Hardt, Agricultural Development Officer, USAID/Sudan

Women's general education opportunity in Africa is limited. Women's agricultural education opportunity is further limited, relative to their general education opportunity and relative to men's agricultural educational opportunity.

Findings from the worldwide UNESCO study completed in 1979 reported for developing countries, women account for 32 percent of general vocational secondary level students--11 percent of students enrolled in intermediate agricultural education institutions examined, and 19 percent of students in the agricultural education institutions examined. The proportion of African women studying agriculture and related fields is determined to be about 10 percent of all students. Because women are so heavily involved in agriculture in Africa, the question becomes how to provide relevant agricultural education to a larger number of women.

The literature strongly infers that a variety of constraints prevent women from obtaining formal study or degrees in agriculture; the force of tradition, lack of funds, sex-differentiated curricula, inadequate recruitment strategies and inappropriate facilities. All mediate women's desire to undertake agricultural education.

Because of the traditionally strong role of women in African agriculture, means must be achieved which will alleviate or reduce these constraints. I propose two ideas.

### 1. Commitment to policy

Long-term national commitment aimed at improving the role of women in general, and manifested by improving women's access to agriculture programs in particular, must be pursued. Research must be focused on the food crops traditionally raised by women, additional scholarships for women desiring study in agricultural disciplines must be designed. Institutions must be committed to establishing credit and agricultural input systems which provide equal access to women farmers.

### 2. Creativity in Practice

The second idea, that of creativity in practice, is necessary for those practitioners working with women and women's projects, particularly those working with non-formal, informal, and outreach programs. Problem-solving techniques must be used to overcome traditional barriers.

From the Agricultural Extension Reference Manual, published by the FAO in 1984, I summarize the section on improving extension service for women. The extension service must be gender-sensitive. New curriculum materials must be developed which are appropriate for women farmers, which take into account the low literacy rate of women in rural areas. More attention

must be given to women in training and employment of women in all areas of extension work.

It is a big challenge, but one that is necessary if Africa is to reach its potential.

Again, commitment to policy and creativity in practice. Those of you who work at the policy level must constantly be aware of the potential effects of new projects, and carefully review all activities with reference to relevance to women farmers. Those of you who work in the technical areas must constantly strive to provide fresh, innovative approaches to reaching women farmers. Creative curriculum in schools and extension programs is necessary to provide the African women the information and skills she needs.

### Rural Women's Extension Service Project

Panel Presentation by Dr. Maria Mullei, Rural Development Officer, USAID/Kenya

Rural Kenyan women form a major part of the agricultural work force and play an important role in agricultural production, processing, and marketing of food. They constitute a substantial economic and development resource; yet their status is often disadvantaged because of limited access to existing agricultural services.

The Women in Development, Rural Women's Extension Service Project seeks to develop this important resource. The purpose of the project is to encourage women to control their futures by identifying, and making better use of their own abilities and resources.

The primary problem addressed is the low productivity of subsistence farmers, most of whom are women. Low productivity in this case is caused by lack of the knowledge and/or technical advice necessary to make more efficient use of time and labor. A second problem addressed is the lack of cash income further limiting the ability of subsistence farmers to raise the quality of life of their families and to invest in the inputs necessary to improve their farms and homes.

The project specifically addresses the inability of the Ministry of Agriculture and Livestock Development to deliver the type and quality of services needed by women farmers at the grassroots level.

The Rural Women's Extension Service (RWE) Project provides the Government of Kenya's Ministry of Agriculture and Livestock Development, Home Economics and Rural Youth Branch with Peace Corps Volunteers, transportation, training, technical materials and technical assistance to make extension services more responsive to rural women. The Volunteers have worked with government and community counterparts to upgrade the technical and managerial skills of Ministry's divisional staff and community women leaders.

Funding is being provided as follows:

USAID	\$184,000
Peace Corps	\$642,572
GOK	\$318,487

Since the project started in 1980, 46 Volunteers have served in 30 districts throughout Kenya. Currently, there are 38 Volunteers involved in the project. The Volunteers have been involved in various income generating activities such as vegetable growing, beekeeping, water jars, handcrafts, tree nurseries, etc. Nine jeeps, 22 motor-cycles, fourteen bicycles, and one pick-up have been purchased for the project.

This approach could increase female agricultural productivity through the provision of information, inputs, contracts and services, as well as reduce the time constraints of home and farm tasks through local, low cost labor saving technology.

### Agricultural and Home Economics Education for Women

Paper prepared by:

Mr. Ayatha J. Nji, Chief of Service, Women's Agricultural Programs, Department of Community Development, Ministry of Agriculture, Cameroon.

Dr. Francille M. Firebaugh, Vice Provost of International Affairs and Professor, Department of Home Management and Housing, College of Home Economics, The Ohio State University.

Dr. Jean Weidemann, Institutional and Human Resources Division, Board for International Food and Agricultural Development, AID/Washington.

Dr. Mary Rojas, Director, Women in World Development, Office of International Development, Virginia Polytechnic Institute and State University.

### Introduction

"In many parts of the developing world, the growing, preparing, and selling of food is women's work. In Africa, women produce 80 percent of the food grown for domestic consumption. This fact is often overlooked by male-dominated rural agencies that provide credit, extension, technical and training services for agricultural development. These agencies tend to work with male farmers who grow crops for export and thus provide the foreign exchange for imported products." (Ford Foundation:1).

Women in Cameroon, in particular, have the major responsibility for food crop production which dominates their waking hours (Bryson:48). Women also have the responsibility for the physical care and nurturing of family members, including food preparation and preservation. It is this combination of roles

and the potential contribution of home economics and agricultural education which are the focus of this paper.

### Education for Women

At the time of independence, girls were 30 percent of the school population (Bryson). By 1973-74, in Cameroon, "there were 568,455 boys as against 445,680 girls in primary schools. Unfortunately, the gap increases at the higher educational level. Out of 7,169 students in the University of Yaounde in the academic year, only 1,004 were girls." (McFadden:36).

### Home Economics

During colonial times, home science "école ménagère" training for girls dominated the Catholic missions, while Protestant missions stressed academic programs for both sexes (Bryson:69). Home Science (Home Economics) has had a strong European influence. In colonial times, and even today, examples are cited of cake baking and embroidery as mainstays of home economics instruction. Social mobility through preparation of wives to assume a proper role in relation to their husband's position was not unknown in home economics programming in the United States, but perhaps was more obvious in the colonial setting.

As late as 1971, the Association pour la Formation des Cadres de l'Industrie de l'Administration (AFCA) in Yaounde and Douala "trains men for management positions in business, and trains their wives in nutrition, child care, sewing and cooking so they will be able to keep up with their advancing husbands (Bryson:75, see also Scoffield:40).

Nji wrote in 1981:

Home Economists working among women, should carry out studies of specific areas where women's participation is initiated. Today it is clear that home economics programmes can only be effective in rural development if they can strengthen rural women's role in the field of agricultural production and storage, food and nutrition, small animal production, hygiene and environmental sanitation, marketing, labour saving devices for home and farm, non-farm income generating activities, family responsibility, housing and home management, population education and organization of rural children's groups to release mothers for some time from child care. It is important to examine and evaluate the contribution of women in the light of national needs and the priorities of the country. (Nji:26).

She further noted the isolation of home economics programs and suggested changing that situation. "In my view women's programmes should not simply be seen as something parallel to an agricultural programme for men. Too often, planners say, because we have an agricultural production programme, we will

just add 'a small' programme for the women in home economics, or nutrition or family planning. There is little attempt to develop an integrated programme for both sexes." (Nji:28).

Rogers has sharply criticized home economics programs in third world countries which have the effect of intensifying the domestication of women. She then notes:

The new generation of home economists claims to be incorporating new elements such as small-stock husbandry, horticulture and certain income-generating activities like handicraft production, which involve a more useful approach to women's work. However, one characteristic, of these activities is that they are additional to women's routine work; they usually involve learning new skills rather than applying resources to routine occupations. (Rogers:87).

Our thesis here is that women are heavily involved in food crop production and that they are not benefiting from extension education related to that production. "Long-term objectives of home economics can include food production and utilization, development of labour-saving tools and equipment for home and farm, training in home management, creation of incentives for more efficient agricultural production and development of home industries to help raise the family income." (Nji:32).

#### Food Crop Production/Women's Roles

Bryson noted that all food crop production is the responsibility of Cameroonian women except the clearing of fields, the cultivation of bananas and plantain, and the planting of corn on newly cleared fields (Bryson:55).

Increased cash income in rural areas comes primarily from cash crops and thus the conflict in relation to food crops. Women often have a specific field which they farm.

Depending on the facility of the area, climatic conditions, the number of persons dependent on each active woman, and/or the assistance the women receive from other family members, they are more or less able to meet the nutritional needs of their dependents and generate a marketable surplus from the land area they are able to cultivate. It should be noted that in all areas reviewed, the women were marketing a portion of their crops to meet other needs (kerosene, salt, etc.) whether or not there was sufficient food available to cover the families' 'nutritional needs'. (Bryson:55).

## Primary Education

In relation to agriculture Bryson notes: "Cameroonian women are an essential element in food crop production and an improvement in their methods is essential if increases in production are to be achieved. Much more strenuous efforts need to be made to increase the efficiency of the school system in meeting this requirement." (Bryson:72).

The opportunity for girls to attend school close to home is essential for some ethnic groups. Curricular content which provides basic education including agriculture and home economics should recognize the transitional culture without stifling opportunities for growth--an exceedingly delicate balance (Bryson:73).

## Extension

Roberts suggests that retraining of home economics extension workers is possible.

Home economics employees, and the crops of women they initiate, can be retrained to make their activities more relevant to the needs of rural areas. For example, home extension workers in Zambia, trained in home economics and in organizing women's groups as well as conducting courses for women at the farmers' training centres, told me that by far the most popular topic among village women was agriculture; about three-quarters of the time was spent on this. The 'home extension' workers were now spending much of their time distributing seeds, helping with agricultural techniques, and demonstrating food preservation by sun-drying. When they had first staffed the groups, the women had expected to be taught sewing; they changed their attitude radically as food became scarcer and more expensive, and became keen on agricultural techniques... (Rogers:106).

Home economists in extension have close contacts with families, especially women. Programs should take advantage of this relationship. "Home economists who work closely with rural families are in a unique position to identify priorities among the needs of the rural area." (Nji:33).

Existing extension workers in Cameroon . . . "need refresher courses, and the assistance in extension developing methods and in programme of work to relate their activities more closely to local conditions and resources. It is necessary to promote down to earth programmes that meet the real needs of the people and at the same time are part of national development plans." (Nji:52).

The question which must be addressed is whether or not programs for the benefit of women should be integrated into programs already existing for men, already existing for women, or some different combination. Local beliefs and tolerance of men instructing women or only women instructing women, and the willingness or lack of it for women to participate in classes with men must be considered. Wherever it is appropriate to have informal education for men and women together, the prestige of the effort will be higher than for informal education for women alone.

In Cameroon where there is a rather sharp distinction in the agricultural work of men and women, segregation of sexes will occur by topic--cash crops versus food crops.

Women's market and agricultural roles will determine what hour, day or season they are available for training and what training is most appropriate. When one can point with some degree of specificity to women's exact agricultural activities, such as storing, grading and transporting certain crops, then short-term agricultural training directed at those functions can be offered. Such measures are especially appropriate where personnel are too scarce for an entire agricultural extension system for women. Similarly, women in seclusion could perhaps be most effectively reached in the evenings when they are allowed to go out, in locations where they are permitted to gather, such as other women's compounds, at weddings and health clinics, or by means of radio broadcasts.

#### Implications for Higher Education

In the lesser developed countries at the university level, practical field experience in home economics and agricultural must be a part of home economics education if the aims of a multifaceted program are to be achieved. To some extent, public health concerns must also be addressed with the needs which exist in sanitation and family planning. Course work and field work in agriculture will, of necessity, be introductory in nature.

The post-secondary or university curriculum for home economics and particularly for training home economics extension workers must be based on analysis of rural household. In Nigeria, as advisor to the Food and Agriculture Organization of the United Nations, one of the authors helped design and administer studies on women's farm and household roles in various areas of the country. (Weidemann, 1982). The results of the research were used to plan a new extension unit in the Ministry of Agriculture, as well as curricula in universities and schools of agriculture to train extension personnel for such programs.

The Food and Agriculture Organization has developed a set of guidelines for baseline studies on women in rural household. (FAO, 1981). The guidelines suggest that at the national level data is needed on: (1) female-headed household, (2) employment, (3) income, (4) access to land and production resources, and (5) participation in rural organizations.

At the local or village level, one must collect other information which does not lend itself to inclusion in national statistics. Such information includes: (1) female-headed household, (2) patterns of household labor allocation,, (3) valuation of home production time, (4) distribution of resources within the family, (5) patterns of decision-making, and (6) participation in village organization and activities.

Home economics curriculum must then be planned or redirected to address the realities identified in these studies. While traditional home economic

extension programs directed solely at women's domestic activities are inadequate, development efforts which ignore these roles are insufficient also. There is little evidence from the industrialized world that development significantly relieves women of domestic responsibilities.

Rather there needs to be a balance between instruction aimed at women's roles in production and in consumption. There can be vast and critical differences in women's visibility and roles within a single country or region. These differences are related to a host of complex factors, such as ecological zone, type of farming system, religion, ethnicity and stage in the life cycle. This argues for decentralized and specialized programs and curricula for training home economics extension workers.

Rural development at the village level in home economics and agriculture cannot wait for a new curriculum and a new generation of students. But examination of the relevance of the home economics curriculum in higher education should be addressed without delay.

Equally important is for colleges of home economics and agriculture in the United States to be cognizant of the role of women in agriculture and household production in developing countries.

Land grant universities in the United States have been recognized as institutions especially suited to addressing issues of international development in lesser developed countries because of their focus on agriculture, food, nutrition and the rural family. By way of illustration, Title XII of the International Development and Food Assistance Act of 1975 creates a partnership between the land grant universities and the United States Agency for International Development to work to solve food problems in developing countries. This responsibility, plus the profound responsibility United States institutions of higher education have in educating students from lesser developed countries, makes it essential that educators do not perpetuate the dichotomy between agriculture and home economics and, in so doing, reinforce the "domestication of women."

Increasingly clear is that the traditional curricular division in the United States between home economics and agriculture is often inappropriate for developing nations where an integrated approach addressing the needs of the total limited resource farm is essential. The obvious need for a synthesis of the fields of home economics and agriculture in international development can be seen in the strategies frequently mentioned for alleviating the world's food crisis and reducing malnutrition, including increased agriculture production; reduction in post harvest food loss; human nutrition; and improved food preparation, distribution and marketing. To ensure faculty development and to provide adequate training for students within international development, it is critical that university curriculum draw on agriculture and home economic, "agri-home economics," through a multidisciplinary approach.

One model being tried at Virginia Polytechnic Institute and State University under a federal grant is the rapprochement of agriculture faculty and home economics faculty through faculty in-service training and curriculum

development. Through workshops and seminars, faculty from both colleges will discuss together a new scholarship related to international development and the role of agriculture and home economics in developing countries; and they will seek to assure the integration of this scholarship into the three missions of the University, research, teaching and extension.

Existing courses focusing on international development will be revised to incorporate both agriculture and home economics and new courses will be developed. For example, during the first year of the grant the four courses to be developed or revised will be:

(1) The Impact of Food and Agricultural Systems on Human Nutrition.

Food production and availability affect nutritional status of populations. This course will examine the basic concepts of nutrition and its application to agriculture at the family and community level, food marketing, and the interrelationships of nutrition, food and family and community resource management.

(2) Socio-Cultural Patterns and Their Impact on Food Availability and Nutrition.

The cultural practices of a community or state have an impact on what people eat. Development programs are changing agricultural practices, and therefore, impact on eating patterns and on nutrition. This course would explore these interrelationships by drawing on the disciplines of sociology, agriculture and home economics.

(3) Linking Agriculture and Home Economics in Training Extension Workers.

This course will modify an existing course in vocational education which currently emphasizes only agricultural training and does not look at the totality of the farm when teaching future extension workers. By integrating components of home economics such as nutrition, food preservation and storage, extension workers will better address the reality of rural life both domestically and internationally.

(4) Appropriate Technology in Food Preparation, Processing and Storage Methods.

This course recognizes that women in developing countries do most of the post harvest food processing and preservation as well as the family food preparation. It also examines technologies that enhance the ability of those who prepare, process and store food to find time and energy to seek fuelwood and water, produce the harvest and cook the food.

All the courses will be developed by teams of home economists, agriculturists and social scientists. Whatever the model, the examination of the relevance of the home economics curriculum in higher education both in the United States and in developing countries should be addressed without delay.

## Conclusion

Earlier Nji wrote that rural farm women cannot be neglected for the following reasons.

- Improving rural women's legal and social status is an investment in human resources with an enormous potential for development.
- Improving rural farm women's education is an investment designed to achieve the informed participation of present and future generations.
- Providing rural farm women with basic facilities such as labour-saving devices and services is an investment that will yield time and energy for family and village improvement, community and the nation building as a whole.
- Giving rural women agricultural and vocational training and getting them to join the ranks of village councils and cooperatives, are investments in agricultural production, better management of resources and meaningful contribution to planning and decision making. (Nji:7).

The agricultural production workload and the dual responsibilities in child bearing and rearing as well as the household duties contribute to a heavy total workload for women. A parallel emphasis to the search for improved appropriate technologies in food crops should be improved appropriate technologies for the household.

This paper urges the recognition of the role of women in agriculture and in household production and suggests the increased involvement of women in agricultural education and in a more relevant home economics program.

Implication for the United States curriculum for students in international development included one model underway at a land grant university which has an interdisciplinary approach to home economics and agriculture.

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Key comments and opinions expressed during the question period following the panel presentations are summarized below.

### 1. Men's Fears

- Family destabilization likely to occur with women gaining more economic power by increasing their participation in agriculture and commerce.
- A growing number of young women are becoming economically independent and refusing to marry.

### 2. Discrimination Against Women

Discrimination against women exists in so many insidious forms, men are not always aware of it. An example, often the effect of training women on a society is questioned, whereas the effect of trained men is not.

- Money invested in agriculture has had a minimal effect, due partially to husbands not allowing women, the food farmers, to become trained.
- Borrowed western concepts are not necessarily appropriate for Africa. Home economics taught in African schools does not teach the female students about their most important farmstead responsibilities, growing, preparing and storing food crops.
- Government support services, credit etc., are always negotiated with men, mostly in the absence of women, yet women have the responsibility for utilizing these resources.

### 3. Recognition of Women's Role in Agriculture

It was highly evident from the exchange between participants that the importance of women in agriculture has gained high visibility at all levels. However:

- Current public support services are controlled by men, and male farmers are favored, a condition which cannot change overnight.
- There is a growing awareness that all human resources, male and female, must be actively involved in reducing if not eliminating the African food deficit.
- Agents and producers, be they male or female, must effectively receive the message, recognition, training, support, incentives and awards necessary to increase production.

- Programs especially geared towards women should not be created but they should become an integral part of the existing programs.

#### 4. In-Country Training Institutions

It was stressed that both donor and government organizations should give more attention to strengthening in-country institutions for training. The risk of family destabilization would be minimized, since the amount of time women would be absent from the farmstead for training would be greatly reduced.

The following is a list of key points brought out by the workshop small group discussions of Women in African agriculture. These were unanimously accepted by the workshop session as a basis for future planning efforts.

- Not only are women farmers in Africa, but far more females than males are engaged in farming even though their educational opportunities are less.
- There is a need to develop extension skills unique to the delivery of information to women.
- There is an urgent need to avoid sex segregation in teaching programs.
- In many African societies sex equity cannot be effectively mandated. However, donor agencies can carry out some requirements that will promote equity.
- Females have many vital (but latent) impacts on African agriculture. These need to be made more manifest.
- The female role is especially vital to the production of food crops and this makes it essential to provide sex equity in education and information delivery.
- Sex equity is evolving in most African cultures. The challenge is to find "softer" ways than mandatory sex equity. Strategies are needed that will put less strain on the social and family conditions as the move toward equity evolves.

#### D. HIGHER EDUCATION IN AGRICULTURE

Moderator: Dr. Norma Jean Anderson, Associate  
Dean of Education, University of Massachusetts.

#### Panel and Paper Presenters:

Dr. Glen Magagula, Dean of the Faculty of Agriculture,  
University of Swaziland.

Dr. Rene Owona, Director General, University Center at  
Dschang, Cameroon.

Dr. U. Donald Meaders, Department of Agricultural and Adult  
Education, Michigan State University.

Mr. Founba Kouroma, Ministry of Higher Education, Guinea.

#### Higher Agricultural Education in Africa

Panel Presentation by Dr. Glen Magagula, Dean of the Faculty of Agriculture,  
University of Swaziland

In attempting to make several statements of generalization about higher agricultural education in Africa, I realize this is an impossible task, given the fact Africa is one of those continents that does not readily subject itself to generalizations. Forgive me if some of my statements do not affect your country. If they don't affect your country, ignore those statements all together. One generalization which I am quite sure affects us all as members or member countries of sub-Saharan Africa is that we are facing a crisis situation in food production and food security. If you look at some of the statistics that have been produced by international organizations and research results in the field, you will notice that the production of food and other agricultural commodities in Africa is declining at a phenomenal rate. We cannot catch up with the increasing and escalating population growth.

We are put in a position where we are relying on food imports and food aid to sustain ourselves. This, in my view, is a short-term solution to our problems. We as Africans must address this problem ourselves, and we should not rely on such measures, though welcomed, from the developed world. It has been emphasized time and time again that education is one of the critical factors which conditions production and productivity of agricultural commodities in the rural areas. I wish to hasten to add or qualify that education is necessary, but not by any means a sufficient measure for accelerating agricultural production in our countries in Africa.

There is a litany of factors which condition agricultural production and these must be addressed by all of us, particularly at the college level. We cannot ignore education, because we now know that it is also a very legitimate tool for assisting us in developing our agricultural base in Africa.

Horberson, for instance, has stated that human resources constitute the ultimate basis for wealth of nations. Capital and national resources are passive factors of production, human beings are the active agents to accumulate capital; exploit natural resources; build social, economic and political organizations; and carry forward national development.

Clearly a country which is unable to develop the skills and knowledge of its people and to utilize them effectively in the national economy will be unable to develop anything. According to Floyd, "Development may take place in a democracy or dictatorship, in capitalism, communism, or socialism but it can not occur without a critical mass of specialists." The political decisions to develop require snifing a considerable share of government expenditures to education and research over a long period.

My view is that while education is important, it has got to be the right type of education. Unless we can develop an educational system which addresses the critical and grave problems facing our rural economies, whatever money we spend on education is money down the drain. It is absolutely important that we provide our curricula and syllabuses to reflect the rural conscience of our economy. African countries have made tremendous strides in expanding the numbers of educational facilities, but in most cases we have looked at the quantitative aspects of education, mainly to provide education for as many children and young people as possible. We have not looked at the qualitative aspect of education. According to President Mugabe of Zimbabwe, since education is a tool of development it follows that what is taught in the schools must be relevant to the nation's need. Education which is but an extension of colonial culture can do more harm than good. The curricula cannot afford to be neutral. What African countries need is an education system which is in conformity with their development aim and that is designed to give the recipients their place in society.

Let's look at higher education in agriculture. Basically, our institutions of higher learning in agriculture have several functions to perform. One function is in the area of skill formation, the generation of what we referred to earlier as a critical mass of specialist. In this connection the sure way that the institution of higher learning can justify its existence and elicit support from its government is to continue to produce graduates in sufficient numbers so as to meet the urgent national manpower requirement.

There is another function of our institutions, a much more important function, namely, the expansion of the frontiers of knowledge through research and publication. This is one, in most cases, which tends to be overlooked in our institutions. Higher education has the tendency to view itself as set apart from the national mainstream and to lose sight of the social economic objective. If we do this we are not only isolating ourselves, we are isolating the students we train. Whether or not we will be misfits in the society, we will have to see ourselves as a part of the social economic milieu of our nations.

Governments must take a share of the blame. In most cases they rely on so called experts from outside to design and implement projects and virtually

ignore indigenous expertise. This is a problem with donor agencies and international organizations, they don't take into account the fact that Africa has some indigenous expertise which can contribute to sound projects and programs.

Let me quickly go through the problems that we face. First is the attitudes of the students, which emanate from the educational system. In most cases, our students are more interested in going into more exotic fields such as medicine, engineering, etc. Those students who qualify to enter universities drift to those areas and what we get are the rejects from the schools of medicine, schools of engineering, schools of law and etc. This presents us with enormous problems of educating those individuals.

Secondly, our faculties of agriculture have shortages of teaching and research facilities. To improve on our performance, institutions of higher agricultural education must be provided with necessary support and resources to better their activities of teaching and research.

Thirdly, we have a problem of heavy teaching loads. Most of our teaching staff are engaged full time in teaching, consequently, research suffers.

Fourthly, in the Southern Africa region there are no post-graduate schools. Therefore, we have to rely on the U.S., U.K., Germany, etc. If we are going to produce a cadre of sensible individuals or academics, or whatever you call them, we must address ourself to the problem of having some post-graduate training facilities in our region, even if it is on a regional cooperative basis. This is an urgent need.

### Higher Agricultural Education in Cameroon: University Center at Dschang

Panel Presentation by Dr. Rene Owona Director General, University Center at Dschang, Cameroon

Ladies and gentlemen, I'll be very brief in my statement. The holder of the floor before me, Dr. Magagula has summarized the problems we encounter in the Cameroons. My presence here shows that the Cameroon government has a lot of confidence in the teachers of the higher agricultural institutes. The government wants this education to be in line with the economic needs of the country. I am a technocrat of the administration, that is why the government has given me the responsibility of guiding this education so as to be able to remedy some of the problems of the country in this area.

The need for an institution of higher agricultural education such as the University Center at Dschang came from the goal of having a specific institution to cater to the problems of agriculture. Immediately after independence, the government set up an institution to train staff who would be responsible for this crucial sector of the economy. Since 1960, our institution has been training staff at various levels to meet the needs of the

agriculture sector in Cameroon. Our institution has been changed over the years. Today we have a university of agriculture, one which trains senior staff and technical officers of agriculture.

What are the objectives of the training as concerns the higher institutes of agriculture which trains senior staff? We train agriculturalists and foresters and the role of this training is to give students enough theoretical training so that graduates will have sufficient technical knowledge to enable them to work in the agriculture area and to continue research. We also give them some practical and laboratory training so that they can draw some relationship between the problems they encounter in the field and those that are related to research.

My institution is responsible for training all experts in the area of agriculture and the various specialties, that concern the protection of plant life, animal science and forestry. We have had some satisfactory growth so far as teaching is concerned, sometimes a bottleneck in higher institutions. We now have some permanent teachers. From 1962-65, we had a very limited number, but now we have about 85 permanent teachers.

Cameroon, therefore has been able to train a significant number of higher or senior staff, but there are still problems to be solved. Bit by bit we realize the training that we give is not really adapted to what we want to see the farmers do in the rural areas. There are also certain realities, or certain contexts of the country that has to be taken into account. The government is trying to look at all the aspects. There should be a direct link between training, research and extension. The government is seeking solutions and we have a cooperative financial agreement with the U.S.A. for the construction of the school and other facilities, but above all to try to see or to get some ideas from the American system.

We will get some elements from the American system that will be integrated into the higher education system in Cameroon. In the next few years Cameroon will have certain reforms effected not only at the University Center at Dschang, but within all services that are involved in agricultural extension. There should be greater integration because this constitutes the main framework for promoting better higher education for development in Cameroon.

### Some Comments on Higher Education in Agriculture in the United States

Panel Presentation by Dr. O. Donald Meaders, Department of Agricultural and Adult Education, Michigan State University

This is an auspicious conference. It is a conference which is focusing on a topic which should have a high priority in all countries. The topic, Agricultural Education in Africa, would be just as important in many other parts of the world. The speeches, the discussions, the recommendations, and more important, the outcomes from this conference will be viewed by many others who are concerned with agriculture.

This is an auspicious conference because it is bringing together agricultural educators from many African nations to talk about agricultural education. It is bringing together agricultural educators from other nations to learn more about African agricultural education and to share some experiences from other nations.

Finally, this is an auspicious conference because it is dealing with the topic of agricultural education, not in isolation, but in the context of agriculture, education and overall development situations found in the various countries.

My personal experiences with higher education in agriculture in the United States started in the fall of 1941 when I enrolled as a new student in the College of Agriculture, University of Nebraska with a declared major in agricultural education. I wanted to become a teacher of vocational agriculture. Some 43 years later, I see that experience within the context of American higher education in agriculture.

Higher education in agriculture in the United States is part of a comprehensive, decentralized public and private educational system. At the same time, it is part of a decentralized agricultural system which includes education, research, production, marketing, processing, supplies and services, credit and policies. The decentralized nature and comprehensiveness of both of the systems for education and agriculture are unique characteristics of the American situation.

The place of higher education in agriculture, as part of two systems, could be described as part of five sets of institutions which compose the core of the U.S. developmental system of agricultural institutions which support agricultural productivity and growth. These are, as described by Bonnen (1981):

- the farm organizations;
- the Land Grant colleges of agriculture;
- the U.S. Department of Agriculture;
- the private sector markets for purchased inputs and the sale of farm products; and
- the political process with committees of the U.S. Congress and state legislatures dealing with public policy for agriculture.

To these five I would add one more institution, the secondary schools with their programs of vocational education in agriculture. These six include both public and private institutions, and the functions of production, marketing, education, research, service, and government.

Let us look first at the educational system in the United States. Agricultural education is but a small, albeit important, part of the system. In the total system, primary through universities, there are about 54 million students: 41 million in primary and secondary schools, eight million in higher education, and five million in higher education degree programs there are about 145,000 in agriculture and natural resources or approximately 1.9 percent of the total degree enrollment. Out of the five million enrolled in two-year programs, about 70,000 or 1.4 percent are in agricultural technical programs. Out of the seventeen million secondary school students approximately 800,000 (or 4.8 percent) are enrolled in vocational agriculture programs. All of these students of agriculture and natural resources, enrolled in vocational, technical, and professional programs, constitute an important but minor part of the total number of students in the educational system.

Higher education in agriculture is usually equated with the Land Grant colleges and universities. The historical development of those institutions with their integration of "teaching, research and extension" functions is simplistically referred to as the "Land Grant Philosophy." The roots of the Land Grant institutions are deep and complex, coming from a public commission expressed through state and federal legislation, after much "grass-roots" expression of concern for the elitist education in the early 1800's. In the late 1840's a few prominent leaders in Michigan, Illinois, New York, Pennsylvania and other states concluded that the educational institutions were not providing "the great majority of the people . . . access to education which would help them in their everyday lives." (Anderson, 1984).

The establishment of the Michigan Agricultural College in 1855 has been viewed as one of the key agricultural education developments preceding the now famous Morrill Act in 1862. The mandate from that federal law was "to promote the liberal and practical education of the agricultural and industrial classes in the several pursuits and professions of life." That was, and still is, a mighty challenge. Today there is a network of approximately 70 Land Grant colleges and universities. The U.S. Department of Agriculture is designated as the agency of the Federal Government for research, extension and teaching in the food and agricultural sciences. In this capacity, coordination is provided for the decentralized institutions.

The curricula in each institution have evolved from those early beginnings, like at Michigan State University when the first president, Joseph Williams, is reported to have told his handful of faculty members: "We have no guides, no precedents. We have to mark out the course of studies and the whole discipline and policy to be followed . . ." (Anderson, 1984). The curricula of each institution represent the best judgment of many individuals and groups for serving, through formal teaching, the agricultural interests in the various states and for the nation. The development of new technologies, the concerns for problem solving (both short-term and long-term), and within the past 35 years, a growing concern for international agriculture, have all provided their imprint on courses and curricula. Voluntary networks among the institutions and professional associations provide for communication and coordination for curricula and standards among these institution.

Higher education in agriculture in the United States is usually described with reference to the instruction (teaching), research, and public service (extension) in agriculture: all three of which are conducted through the Land Grant colleges and universities; teaching came first, followed by the development of research as a partial basis for knowing what to teach, but also as a means of helping farmers solve problems. The development of the agricultural extension service came later, with a major boost from the federal legislation in 1914 (Smith-Lever Act) for the present-day Cooperative Extension Service: Cooperation among the federal, state and local (county) governments.

The combination of the three functions within the administrative responsibility of the Land Grant colleges and universities has been one basis for the responsiveness of higher education to the needs of agriculture. For example, the teaching faculty (professors) are likely to be engaged also in research and/or extension. The research professors are likely to be engaged in some extension and/or teaching. In addition, the graduate study programs are greatly strengthened through the availability of research assistantships for graduate students. Students have learned to do, as well as to know.

Higher education in agriculture in the United States includes, in addition to approximately 70 Land Grant institutions, some private baccalaureate colleges which teach agriculture, and more than 550 public and private two-year junior colleges, community colleges and technical institutes which offer instruction in agriculture. These two-year institutions, in 1983-84, enrolled about 86,000 students and adults in approximately 1,800 programs. This adult and technical education in agriculture is the fastest growing segment of American education in agriculture.

At the secondary school level, there are programs of vocational education in agriculture in all 50 states. They enroll approximately 800,000 students in curricula for:

- farming;
- ornamental horticulture;
- agricultural supplies and services;
- agricultural mechanics;
- agricultural products processing;
- renewable natural resources; and/or
- forestry.

The high school instruction in agriculture includes leadership training as well as practical application of agricultural principles through the youth organization named FFA (Future Farmers of America) and the supervised occupational experience programs.

Let us return now to two additional points regarding American higher education in agriculture.

What happens to the agricultural graduates from these colleges and universities? The limited amount of time available permits only a general overview of the post graduation activities of the graduates. In 1983, there were approximately 20,000 bachelors degrees awarded in agriculture. Information from those graduates indicates that approximately 26 percent entered into agriculture business, 16 percent into graduate study, 6 percent into government positions, 5 percent into teaching including extension, and 8 percent into farming. About 25 percent of the graduates did not report their post graduation activities.

During this past five years, there have been some changes in the post graduation activities. Most of the graduates go into farming, agriculture business, graduate study and teaching. When the 1983 graduates were compared with the 1973 graduates, even though the studies were not identical, it is evident that the two major changes are: fewer graduates in 1983 going into farming (8 percent compared with 23 percent in 1973) and fewer going into military service (very few in 1983 compared with 3 percent in 1973).

Another area of concern for consideration by this conference is the nature and role of the departments of agricultural and extension education in U.S. agricultural education. There are over 70 departments throughout the U.S. At the present time, more than 60 percent are administered in colleges of agriculture. The others are in colleges of education. In both administrative arrangements there is a cooperative effort between the two colleges for conducting the program. Thirty years ago, the placement of the departments was approximately 50 percent in colleges of agriculture and 50 percent in colleges of education.

The departments all provide pre-service education for the preparation of teachers of vocational agriculture. Some include pre-service education for extension workers. Many of the departments provide graduate study. All provide in-service education in cooperation with both the technical subject matter departments and with the State Departments of Education. Many have instructional materials services.

The relationship of the departments to the extension programs provides a good illustration of the diversity which exists both in the departments and in the organizations for extension activities. In some colleges of agriculture the extension specialists are located in a department of extension. In another state, the extension specialists may be located within the subject matter department. In our situation at Michigan State University, the specialists are faculty members of equal status within the various subject matter (or discipline) departments. Our department of agricultural and extension education coordinates the in-service program for the extension workers. We provide an instructional materials distributions service including the responsibility for distribution of bulletins and other extension publications. We also have an instructional materials specialist who gives assistance and training in preparation of audio and visual materials.

I am sure that those of you who have visited and/or studied in the U.S. Land Grant institutions could say, "It wasn't like that at my school." Each institution has evolved, for various reasons, into a particular organizational shape. There are many shapes.

Now, I think you want the answer to the question, what are the implications of all of this for African agricultural education? We all are seeking the truth for how to increase agricultural productivity, achieve food self-sufficiency and improve the life for all of the people in every country. Twenty years ago, I would have given you a different answer.

The U.S. experience with agricultural development has evolved over more than a century, has evolved with many and varied agricultural and educational institutions. The farmer organizations; the U.S. Department of Agriculture; the colleges of agriculture with their research stations and extension programs; the public secondary schools with vocational agriculture for both youth and adults; the more recently developed community colleges with their technical agriculture programs; the farmers and agriculture business; and the political structures at local, state and federal levels all have been important and have played significant roles.

This web of diverse institutions evolved around a common goal of agricultural development. By the 1930's it constituted a coherent science-based system that subsequently transformed U.S. agriculture. Today we can tell you what happened and when, but paradoxically no one, from the participants to scholarly observers, can explain in a convincing manner how it happened or why. (bonnen: 1981)

The U.S. transformation of agriculture took place at the same time that political and social institutions were growing and taking shape. You already have in place government based institutions such as extension services and research stations. You have in place educational systems and curricula which have been imported from other countries. In the U.S. the educational institutions were shaped and reshaped with a system characterized by the decentralization of decision-making; you have highly centralized systems for decision-making.

The conditions of decentralization, significant leadership involvement by the farmers (not just tokenism) and the agriculture-business sector, and the political forces from country, state and federal agricultural committees, all have been a part of the U.S. achievement.

So, being philosophical, but not a philosopher, I am still searching for the truth about "how to get from there to here." I would welcome the opportunity to search with you. But for sure, you must initiate the search for the truth for yourself. For me it seems that the truth is likely to be with people (using the truth in a generic sense) and not in organization.

Thank you for the opportunity to be here and to learn from you.

## Higher Agricultural Education in Guinea

Panel Presentation by Mr. Foubma Kourouma, Ministry of Higher Education, Guinea

I am going to talk about Higher Education in Guinea. First of all, let me give you a few figures. We have 611,000 peasant farmers in Guinea (figures given by the Department of Statistics in Guinea). We estimate that there are about two young people per family. This gives about an average of 2.9 people who have to be taught so far as agriculture is concerned, or approximately 12,000 young people. Beginning in 1970, we set up the facilities necessary to provide this agriculture training. In the entire country we set up 34 agriculture training centers. The centers recruit all young people who have the ambition of becoming agriculturalists. The recruitment of these people in Guinea is done on the basis of an entrance examination after twelve years of school. During the twelve years the pupils have already had some basic agriculture training.

The curriculum covers all agriculture disciplines. It is broken down into four options: agriculture; development; forestry and livestock. The curriculum for each option covers three parts: classroom training, 32 hours per week; practical laboratories, four hours per week; and production in the field, six hours per week. I would like to underscore here that our objective has been to require enough practical work in the field to make the faculties self-sufficient in local food stuffs. All the various options have as a core, natural science, history, geography and economics. The content of these courses do vary according to the option chosen by the students. The cycle of study is five years with one year practical training in the agricultural production unit before thesis presentation. We try in Guinea to have as many young people as possible engaged in agriculture. About 75 percent, of young people are being geared toward agriculture.

The results that we have recorded show that we have about 9,000 senior staff in the offices. Take into account the agriculture policies that are general to all African countries, that is, it does not give any incentives for the young people to get back into the field. So, we face a very serious problem in Guinea. The only way to be employed is to live in the urban area. This is what should not be done in the respective countries.

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Key comments and opinions expressed during the question period following the panel presentations are summarized below.

Discussion focused on how the U.S. land grant system operated and how the U.S. experience relates to improving agricultural education in Africa.

## 1. The U.S. Land Grant System

In the U.S., education is a state responsibility, although the federal government does have some responsibilities in terms of general welfare and equality of opportunity. Standards and accreditation are handled by organizations that are non-governmental, so quality control is self-imposed. If graduates are not effective, the institution ultimately suffers in the competition for students.

U.S. agricultural institutions have a strong tradition of serving rural populations. They started with the teaching function, then added research and later extension. The interrelationship of research, teaching and extension remains important today and some institutions require faculty to be involved in at least two of the three functions. Other institutions evaluate faculty primarily on basic research; in this case, faculty usually neglect adaptive research.

U.S. institutions are still evolving. Today, many students do not have rural backgrounds. This necessitates adjustments. Also, U.S. institutions are evaluating their clientele. Many institutions consider the international scene to be part of their responsibility. Through support or non-support for funding requests in the state legislatures, farmers, agri-business people and the political sector all exert influence on the land grant system.

## 2. Higher Agricultural Education in Africa

Higher education in agriculture in Africa suffers from insufficient facilities, inadequate teaching materials and high student-teacher ratios. Professionals trained overseas often have trouble fitting in because they compare African and overseas systems.

The role of higher education in agriculture in the African context is not different from the role that universities in America have been playing. But the African environment is different with different kinds of problems; different flora and fauna, and different challenges. The American system cannot be transplanted to Africa.

The primary function of a university education is to get an agriculture graduate student started on the road to problem-solving, to provide an initial fund of knowledge and to teach skills for acquiring more knowledge. African educational systems must grapple with this; they must teach problem-solving, not just fact memorization.

The following is a listing of the key points brought out by the workshop small group discussions of higher education in agriculture. These were unanimously accepted by the workshop participants during the final workshop session as a basis for future planning efforts.

- African institutions are developing a critical mass of well prepared professional staff. The recent FAO report indicates that there may be a surplus of highly prepared persons in some areas.
- The two-year, associate degree granting institutions in the U.S. have potential, but are not currently involved to any extent in developing nations.
- Faculty members at major U.S. universities may be too involved with research efforts to truly involve themselves in agricultural development.
- Africian linkages to U.S. institutions may tend to be with well known researchers. These researchers may not provide the best linkages.
- Donors should be having greater impact on support materials (curriculum and instructional materials development). The U.S. experience has illustrated the importance of support materials.
- In-service education for professionals in teaching and extension is as important as pre-service preparation. There is no possible way to completely equip these professionals for their work with a pre-preparation program only.
- There is an urgent need for applied research. There may be a tendency to place resources on basic research which is over sophisticated.
- Counter-parts studying in U.S. institutions may not be studying the priority problems which need to be addressed in their respective countries.
- Even though the higher education problems and challenges may be unique to individual African nations, there are models and prototypes that should be studied.
- Many Africans have had experience with the U.S. Land Grant Model. There is a need to identify the components of that model that are workable in the respective African countries and apply those components.

## E. EXTENSION AND NONFORMAL AGRICULTURAL EDUCATION

Moderator: Dr. Maiza Shandomo, School of Veterinary Medicine, University of Zambia

### Panel and Paper Presenters:

Dr. K.G.B. Keregero, Head, Department of Agricultural Education and Extension, Sokoine University, Tanzania

Dr. Cynthia Connolly, International Fertilizer Development Center

Dr. Joe Busby, University of Florida, University Center at Dschang, Cameroon

Mr. Mahluli Mngadi, Director, Lesotho Distance Teaching Center, Lesotho

Mr. Benoit Ouedraogo, Director, Young Farmer Training Program, Ministry of Rural Development, Burkina Faso

### Agricultural Extension in Tanzania

Panel Presentation by Dr. K.G. B. Keregero, Head, Department of Agricultural Education and Extension, Sokoine University, Tanzania

Agricultural extension, in Tanzania is basically an outgrowth of the colonial system of extension, which was predominantly regulatory and, if you will, advisory in nature. I am talking about a situation where you find a man, (there were no women in extension then), dressed in a Kaki uniform, a thick hat, with "D.A." written on his uniform, Department of Agriculture. So we are talking about an extension system that grew out of an advisory service; a regulatory service, which is gradually adapting to an educational approach.

Tanzania has been hailed by some, and criticized by others, for having a fairly well established, organized base at the village level. This, for some of us who do extension, seems to be a very good base for getting ideas across to the village. Village governments and village assemblies are policy making organs, village councils are executive organs of the village and they have various committees for decision making in various areas. However, I am not about to say the extension service in the country has been the best, as a matter of fact the nations own President, Julius Nyerere, once remarked "It would not make any significant difference in any production, if I fired all extension workers". He has a point, but the extension workers would not have taken it as easily as that. They were quick to comment, "Essentially, perhaps it is the government that has betrayed them," there are certain inadequacies in the extension system that can partly be contributed to the government. Some of the basic requirements of extension which the Tanzanians have to confront, and perhaps must be confronted in other countries, include the following.

- A clearly defined policy and philosophy of extension is essential. Up to last year we did not have a clearly defined policy of agriculture and therefore, we did not have a clearly defined policy of extension. We did not know what exactly an extension worker should do. Should an extension worker be a political leader or just a professional, and what exactly is extension work?
- Strengthen the link between research and training institutions. Originally the extension service was under the Ministry of Agriculture only for the technical base, administratively it was under the Prime Minister's office. That in itself presented difficulties of coordination. The research system was under the Ministry of Agriculture, but had no direct linkage to the extension service. The same can be said between research and training. This means to get information from the research people to the extension and down to the farmers was very difficult.
- Another problem is the dilution of extension efforts. Extension workers have extraneous duties to the extent that their effectiveness in extension becomes very low. There is also the question of duplication of effort. We had a system up to last year where certain cash crops had their own extension. We had people dealing with coffee extension or cotton extension only. But these people very often deal with the same farmer.
- The all too familiar problem, not only for Tanzania I am sure, but for other countries is one of the lack of transport, fuel, tires, inputs and all that it takes to make an extension worker's job effective.
- Then there is the problem of inadequate training. All I can say is inadequate in terms of quality and in terms of quantity. Quality in the sense that most of them are trained to tell people what to do, rather than getting people involved in solving problems.

### The Role of Extension in A Research Organization

Panel Presentation by Dr. Cynthia Connolly, International Fertilizer Development Center

In speaking on the role of extension in a research organization, I would like to focus my discussion on international agricultural research organizations, since I am most closely affiliated with such an organization, namely, the International Fertilizer Development Center (IFDC).

There are a number of international agricultural research centers; probably the most widely known are the 133 centers that are part of the Consultative Group on International Agricultural Research (CGIAR). All of the international research centers have certain things in common, including an international board of trustees, international staff, and an international, as opposed to country specific, mission.

These centers are concerned with basic agricultural research. Many of the centers are particularly involved in plant breeding and building up collections of the world's germplasm resources. The international research centers are distinct from national research centers, universities, and industry, and have a unique extension role.

IFDC is similar to other international research centers in that it conducts basic research. Like some of these other centers, IFDC also becomes involved in applied or adaptive research. Its research activities focus on improved fertilizers and fertilizer practices for developing countries.

### Applied and Adaptive Research

IFDC has its Headquarters in the United States in the state of Alabama. It has staff outposted in different areas of the world where findings from laboratories and greenhouse research are being field tested under diverse conditions. This work is being done in collaboration with other international agricultural research centers and national research centers. These scientists are involved in what may be termed applied or adaptive research.

Applied Research can be defined as "studies undertaken to transform knowledge into potentially usable technology".

Adaptive Research can be defined as "studies undertaken to test potentially usable technology under conditions of intended use".

As research moves from basic to applied to adaptive, it moves into the area of pre-extension.

The Africa Fertilizer Program is an example of applied research. Thirteen African countries are collaborating in conducting research on nitrogen (N) and phosphate (P) sources of fertilizer nutrients. Agronomic trials are underway at experiment stations in collaboration with various national research institut and universities. This regionwide research network provides the framework for testing laboratory and greenhouse findings in the different agro-climatic zones (humid tropics, semiarid tropics, cool tropics/subtropics) of Africa.

IFDC is working with the Government of Mali on a national-level, collaborative, "adaptive research" project to test potentially usable technology under conditions of intended use. Rock from the indigenous phosphate deposit in the Tilemsi Valley in northern Mali was evaluated in IFDC laboratories and found to be a "potentially usable" source for improved phosphate fertilization technology. Research activities have been established

at ten experimental station sites and approximately 120 farmers' field representing the major soils, climatic patterns, and cropping sequences in Mali.

Research activities and results have gained exposure through extensive field trials and further through post-trial farmer surveys aimed at obtaining feedback on fertilization alternatives. This process of adaptive research may be termed pre-extension as such, it has provided an important input to the extension process.

### Participatory Research

Another IFDC research project provides an example of participatory research; this project is underway in Columbia, South America. Participatory research can be defined as "studies undertaken with the active involvement of farmers helping to identify problems and set criteria for, as well as judge the results of, farm-level trials". In this case an agronomist, a sociologist, and farmers are working together.

Farmers were asked to evaluate alternative fertilizers. Questions raised by farmers about the use of different fertilizers were incorporated into an experimental design, which was called the "farmer design". Two groups of trials were conducted with this design. One group was managed by the researcher and implemented by the farmers. The other group was both managed and implemented by the farmers who also determined their own treatment levels.

Participatory research of this nature may provide a means for achieving earlier identification of improved technology and, thereby, facilitate more rapid adoption of such technology by farmers. These, as well as other field projects, link IFDC to international and national level organizations and bring research one step closer to the farmer.

One school of thought suggests that a good technological innovation will transfer itself. National Research Centers, through applied and adaptive research at the experiment station and farm level, help to ensure that extension will have improved technology available to take to the farmers. At the same time, to the extent that extension workers are involved in this type of pre-extension research, they become better informed and provide great assistance in helping to link the researcher and the farmer.

### Outreach Activities

Fertilizer, which is the focus of IFDC's research, is a commercial commodity, and its availability depends on various supply functions being met. To provide the needed extension and technology transfer, IFDC is involved in several "outreach" activities. The IFDC outreach activities that fulfill an extension role include information dissemination, technical assistance, and training.

At IFDC information dissemination includes responding to specific technical inquiries as well as providing printed information of a general nature to visitors and others. Research findings are published in scientific journals, special publications, and reports. IFDC publishes a list of available publications on research findings.

Another outreach activity involves technical assistance. One type of technical assistance is provided in the area of fertilizer manufacturing; it is concerned with the engineering aspects of plant design and operation, including plant modifications to accommodate different fertilizer products.

Another type of technical assistance is provided in marketing development. Most marketing systems have a network of dealers through which information as well as products pass. A marketing system is an extension system in itself and is relied upon by farmers for fertilizer and other agricultural products and guidance in their use.

The major outreach or extension activity is training. At IFDC this includes internships and training programs for individuals as well as courses and workshops for groups. Training is geared toward key fertilizer sector personnel--agronomists and soil scientists, involved in field research; and marketing and production managers. Group training programs, both at headquarters and in the field, are offered in the areas of fertilizer marketing and distribution, fertilizer production, and fertilizer efficiency research.

To strengthen the link between research and extension, a new program is being developed titled "Fertilizer Efficiency Research and Technology Transfer Workshop." It is scheduled to be held in Africa in early 1985.

Outreach activities are an integral part of IFDC's programs and complement the center's primary function, which is research. Fundamental or basic research, though costly and long ranging, is needed to broaden our knowledge base and to provide the foundation for applied and adaptive research. Such research, however costly, also has a high payoff over time.

### Extension Philosophy

The extension philosophy of the international agricultural research centers is to form links and research networks with other institutions. In research these linkages translate into cooperative programs of assistance and collaboration in applied and adaptive research.

International agricultural research centers do not have the resources to tailor-make technologies for each national system. National research systems have their own capability to test and adapt materials coming from these centers and to generate technology fitted to the unique situations of their individual countries.

### Conclusion

The issue is not whether research or extension is needed or has a role in organizations established for the primary purpose of one or the other. It is not whether these ingredients are necessary any more than whether nitrogen, phosphorus, and potassium are essential for plant growth. The issue is one of balance. What is the right mix, and how can it be accommodated?

The importance of extension, research, and teaching is axiomatic. The need to continue each has been established and accepted. What is needed is a balanced mix of these roles to achieve the greatest sustained agricultural development.

### Extension and Non-Formal Education

Panel Presentation by Dr. Joe Busby, University of Florida and University Center at Dschang, Cameroon.

No areas of agricultural education have received more emphasis, more actual monetary support and technical assistance in the last quarter of a century in developing countries than extension. I think it's also fair to say that the results of these efforts have ranged from mediocre to miserable failures.

Before my colleagues take me to task for that statement, let me hasten to add that I am a professional Extension Educator. I'm a product of the U.S. Land Grant System and am proud of the achievements of extension education in the U.S. I'm also aware of successes in India, Philippines and Mexico in transferring the technology of International Agricultural Research Centers. The USAID National Cereal Grains Research and Extension Project in Cameroon administered by IITA, Ibadan, Nigeria has similar prospects of success in early evaluations. Other areas of success have been most often in direct transfer of technology and production inputs for export crops that are often the primary source of foreign exchange for developing countries.

What is non-formal education? Most often we refer to extension workers as change agents coming from the concept that the audience is to be persuaded or conditioned to feel, believe or act in a desired way or to accept something as desirable. They are teachers in the broad sense that applies to any manner of imparting information or skills so that others may learn. It is non-formal in that it is not conducted under structured classroom situations. The end result goes beyond intellectual knowledge and pre-supposes adoption and practical application of technology or skills. For this reason, non-formal education can be more difficult and require more innovation to be successful than classroom teaching.

Numerous comparisons have been made between the U.S. Land Grant University Extension System for agriculture and the extension services in developing countries. Evaluation studies have identified many reasons for the limited success in developing countries. I have been privileged to participate in some program evaluations in Central and South America and Africa which pointed out some of these reasons. Following are some observations and conclusions that may be of use to us as we seek to improve Agricultural Education in developing countries.

## 1. Institutional Base for Extension

In the United States the Extension Service was created after Land Grant Universities had become well established in teaching and research. The extension service, thus, became a part of an established and often prestigious institution of education. This institutional base placed U.S. extension services in a very advantageous position from the beginning. It also made it much easier to establish this non-formal teaching as a part of the educational system and contributed to the continual improvement of academic qualifications of extension personnel.

In developing countries, there have been very few well developed agricultural universities doing teaching and research in which an extension service could be placed. More often than not, they have been placed within Ministries of Agriculture where their role as educators has not been emphasized. All too frequently the role of post extension workers as educators is not recognized or is given only secondary importance. Very often these agents who have direct contact with people are poorly trained and have minimal support from within the system. The training and visitation system now widely advocated can provide lesson plans and training to help post extension workers teach farmers a new skill or to adopt a practice, but the system will be only as effective as the capability of the trainer/educator responsible for training and supervising monitors.

## 2. Research--Extension Team

Modern agriculture has its base in scientific research. Extension workers must have access to research agencies and the information they develop, the post extension workers often need assistance in making the transfer from technology produced by research to farm application. In the U.S. this is accomplished by highly trained subject matter specialists teamed with research counterparts. The specialist function is often weak or non-existent in developing countries and to further weaken the research-extension tie, these two functions are often located in different Ministries. Specialists in the U.S. also are the resource base for continuous in-service training and support of field agents. Post extension workers in developing countries often have limited support and in-service training.

## 3. Commercial U.S. Subsistence Farming

Agriculture in the developed world is a very competitive business based on sophisticated technology. In the developing countries food production is primary subsistence and often follows traditions closely bound to ethnic cultures. An educational principle is that we must know audience characteristics and design program content and teaching methods for the target audience. In Africa, South of the Sahara, countries follow colonial boundaries and each one contains large numbers of separate ethnic groups. I'm told that Cameroon has over 200 separate ethnic groups. Even in relatively homogeneous societies, extension programs to improve nutrition by the introduction of different crops or new varieties can be very difficult when long standing food habits are subjected to change.

Knowledge of such habits and taboos must be considered when programs are designed to increase food production.

The role of social scientists in helping to design programs to reach target audiences in developing countries has probably not received sufficient attention as they can provide many of the audience characteristics to be considered.

#### 4. Economic Feasibility

The assessment of risk in the adoption of new technology is an important function of agricultural economists who participate in the programs developed in the U.S. There are also many farmers who have the capability of spreading risks and can thus afford to serve as "early adopters" of new technology. Subsistence farmers in the less developed countries cannot afford risks that could jeopardize family food supplies. Very careful assessment of risks must be made and risks in the adoption of new technology must be minimized or perhaps, in some cases, assumed by government. Often adaptive research must precede farm application. For example, new, high yielding varieties may actually yield less than traditional varieties under farm conditions lacking in-puts such as fertilizers, pesticides and irrigation. Perhaps Farming Systems Research and Extension can supply much needed adaptive research under such conditions, and agricultural economists can help to minimize risk or suggest ways for the system to assume risks for subsistence farmers adopting new technology.

The role of agricultural economists in the development of agricultural policy and an infrastructure of production and marketing systems within the private sector has been of great value in the U.S. and has been the basis for extension organization of many commodity and trade groups. Research and development leading to private sector infrastructure for agriculture is weak in most developing countries and there is a tendency to rely on government to provide services necessary for agricultural development.

#### 5. Insert Individual vs. Multiple Person Audiences

Extension services in the U.S. have been extremely successful in helping farmers, rural communities, commodity groups, etc. to organize and to develop into independent, self-sustaining entities. Others such as 4-H, home economic clubs, and planning councils have continued as direct recipients of extension educational programs. In the developing countries extension service workers operate primarily on a one to one basis. Even cooperatives are usually organized and serviced by a separate division within Ministries of Agriculture, often resulting in duplication of extension efforts, particularly with export crops. In developing countries such as Cameroon where public education has received wide support, literacy rates have increased to where it would seem desirable to test methods using group techniques and media such as radio to make non-formal education cost effective.

The above comparisons are given in the hope that they will generate some useful discussion that can help strengthen non-formal education in developing countries. As with all education, non-formal education is a long-term and continuing process that must be constantly evaluated and adjusted to meet new needs. To be successful it must be free to function as an educational process unencumbered by regulatory and political activities. Finally, long-term political stability is necessary if non-formal education is to succeed in reaching broad goals such as increased food supplies, improved nutrition, better health and general well being of the population.

### Lesotho Distance Teaching Center

Panel Presentation by Mngadi, Director, Lesotho Distance Teaching Center, Lesotho

What I would like to discuss with you is the use of radio in Lesotho both formal and non-formal. I will start by saying something about the current status of radio in Lesotho, and then move onto how we at the Lesotho Distance teaching center are using radio.

In Lesotho we have one national station, which is called Radio Lesotho. Anybody or any organization who wishes to use radio has to send its program to Radio Lesotho. There are organizations both from the government and private sector who use radio as a medium of education in Lesotho. The organizations that are currently using radio as a support medium in formal education do so in the schools broadcast section, which is under the Ministry of Education, and the Lesotho Distance Teaching Center. We are also a department in the Ministry of Education.

The formal education programs which were done by the formal schools' broadcast section were not really educational programs. One reason for this was due to the problem of training the producers who make up the programs. If their teachers are told to make a program for secondary school students, the teachers are not always trained to use radio as a medium of education. That is one reason why those programs failed.

Several government ministries, for example the Agricultural Information Service under the Ministry of Agriculture, has two weekly programs. These programs are meant especially for farmers. Another organization which used radio, is the Labor Department in the Ministry of Labor. The Health Education Unit in the Ministry of Health, the Lesotho Family Planning Association, the Lesotho Cooperative Credit Union League and the Roads Safety Office in the Ministry of Transport, are several organizations which contribute programs to Radio Lesotho. All of the programs are meant for special audiences. I believe most of them are geared to just giving out information, rather than being part of a training program or scheme.

Lets now come to the Lesotho Distance Teaching Center. This organization is quite young. It was established in 1974 by the International Extension College. The Lesotho Government requested the IEC to establish a sort of correspondence college. But the idea of the LDTC, is not just a correspondence college. It works in four main ways.

1. Acting as a service agency to non-formal organizations, the LTUC can provide publishing, recording, evaluation facilities for any organization in Lesotho which is involved in non-formal education.
2. The second area is working with rural people on practical skills. The service agency section at the center is providing practical skills training to village groups in many different ways.
3. The third area which concerns us is developing literacy and numerary skills in young people. We have a program of literacy and numerary for herd boys and other young people.
4. The last part of our job is to help private examination candidates. There is a high level of drop-outs from the formal system. These people would like to get certificates in order to improve their job opportunities

We act as a correspondence college, using radio, printed materials and Saturday classes. I would like to briefly list the problem we have had at the LDTC using radio as a means of formal and non-formal education.

- The first constraint is the geography of the country. Eighty-five percent of the country is mountainous, making radio reception in many areas very poor. This means that half of the population which lives in the mountains cannot be reached by radio.
- Competition from Radio Station Broadcasting, from our gentle giant across the border. These stations broadcast mostly on FM which for reception is the best.
- We have conducted many studies and one of the studies found that only 50 percent of the local people listen to their own station, Radio Lesotho. The other 50 percent listens to a station from South Africa.
- The other problem is ownership of radio receivers, I think Dr. Muller mentioned that radios are quite expensive to peasants who live in rural areas. I agree. This considerably limits the power of radio in Lesotho. If people do not own radios, then this is not a feasible means of passing on information.
- There is only one national station in Lesotho. I was envious and surprised when I was told there are eight stations in Cameroon. With only one radio station, it

must provide all sorts of programs: entertainment programs, information programs and education programs. The education programs tend to come last. So maybe one of the solutions to the problem is if Lesotho had a special channel for education. That is for someone else to say.

### Young Farmer Training Program, Burkina Faso

Panel Presentation by Dr. Benoit Ouedraogo, Director, Young Farmer Training Program, Ministry of Rural Development, Burkina Faso

I would like to talk about the experience of training young farmers in Upper Volta. The training of young farmers in Upper Volta is a system of base education and additional training in agriculture, developed to overcome this shortage in the conventional school system. The training is designed to support the dominating class and also promote change in the minority class. Through both national and African assistance, this training modifies successful foreign systems, without introducing new ones, to satisfy the needs of Upper Volta.

What is the mission of this training? Basically, it is to declare the distinction between it and the classical system. That is to give to the people the fundamental right to decide their future, and to acquire the right to participate in the development and planning of future education. The mission is to assist the farmers to be confident and to be creative.

What are the objectives of training for these young farmers? To give basic professional agricultural training over a period of three years within their community. People who are not illiterate between the ages of fourteen to eighteen, are given the necessary training to implement and manage their small holdings and meet the challenge of national development in general.

How do we go about instituting this kind of system? We have to animate and sensitize the people, urging them to establish a center of information which participates in the training of young people along side development agents in the village. These institutions enable the village to pass on the technology and impart knowledge to the young people who will one day be responsible for agriculture production. This transfer is necessary for agriculture development.

With this center, we have a real agricultural exploratory system for production, also a pedagogy tool for training. We are supposed to show in the field how we can apply this technology, and what can be produced as invention or innovation to enable the village to develop much further.

We use the national languages for training in order to encourage the farmers' or villagers' participation, and as a means of promoting real culture.

Finally, there is follow-up with the young farmers who come out of the centers. We welcome these young people who have been trained in these centers

into cooperatives. In methodology, we carry out an alternating pedagogy from village to village in various activities that are theoretical and practical. Mainly, it consists of setting up a system that is productive and educative. The best method is reflection/action/reflection/action, with constant correlation to what is happening in the village.

The training of young farmers is done in four centers. We train about 20,000 young people, a high percentage of which are boys. There are 52 centers in direct collaboration with research institutes, which act to support agriculture production. The training of young farmers includes about 350 people who participated actively in the training program. This leads to economic development of farms, market gardening, handcrafts, development of roads, cultural and social activities, and educational activities. Afterwards, people go back to their villages and act as extension workers, carrying out various activities. We move towards self-reliance and self-guidance in the training of young farmers.

The success of these centers at the national level provided the opportunity to establish three permanent centers at regional levels. We have training units to plan all training for development agents and to plan farmer training programs. At these training centers, we produce some farming tools and disseminate information on agriculture at the basic level. We have animation units that meet once a month and travel to exchange ideas, and to carry out related activities.

In conclusion, we strive to achieve our goals of which training is only one aspect. The other factors are:

- mastering of water;
- increasing of production;
- training and organizing villages, to acquire the power of purchase; and
- developing a policy of incentives.

Development in Upper Volta can only be dynamic when these four elements are sought in conjunction with one another. Thank you very much.

Key comments and opinions expressed during the question period following the panel presentations are summarized below.

This panel was viewed by many as the bottom-line of all the workshop discussions since this segment of education is the contact point with the primary agriculture producers and their families. Many of the respondents thought that the number one focus should be at the lower levels of the formal education systems and non-formal adult education, but skewed more towards young adult farmers who are primary and secondary school leavers. It is obvious that most Africans have contact with the education system at the primary level followed by the secondary level, while the least contact is beyond secondary school. However, none of the tiers should be neglected. The responsibility and supportive role of the middle and upper levels should be redefined, and the whole education system must be locked into an integrated continuum mode.

### 1. One-on-one Extension Concept

Is it possible to apply the one-on-one concept, i.e. one extension worker per 1,000 farmers, in African countries where there are scarce resources and large numbers of small farmers? Experience shows it to be workable in some African countries, i.e. Sudan and Cameroon. Farmers can also be supported in the following ways.

- Employ other methods for transferring information as literacy rates rise.
- Test group learning processes where leadership components can be developed.
- Create an awareness via mass media in the learning adoption process.
- Emphasize research and testing of cost effective systems, particularly in situations with scarce resources.

### 2. Subject Matter Specialist

One school of thought states that extension work with African farmers requires a broad-based practical training in agriculture. Other schools of thought feel specialization is required. Should African institutions introduce specialization at the first degree level? What should be the priority in dealing with the problem within a framework of existing institutions? Having trained specialists, how should they be deployed? Given the African situation, should dual responsibility be given to one person, researcher/subject matter specialist or researcher/extension specialist?

- Subject matter specialists are not on-the-line agents and at this early stage of development, it is not feasible for African nations to have specialists in on-line positions.

- The role of specialists is to interpret and adapt scientific research information for utilization in a particular environment. They are experts at packaging and transferring technology into education programs.
- Subject matter specialists should have training equivalent to research workers, as well as pedagogy and communication skills in order to gain the respect of researchers.
- Assignment of dual responsibilities to extension specialists should be done on a trial basis, using the results to determine to what extent the concept should be applied.
- Limited success have been experienced when combining three responsibilities; usually it leads to confusion and frustration. Dual responsibilities have been much more successful, i.e. researcher/subject matter specialists or researcher/extensionists.

### 3. Failure of Extension System

- African economies lack the capacity to provide services essential to effective extension.
- Many African countries have an output of large numbers of extension workers which have out paced the establishment of good quality training institutions, effective research and input systems.
- Farmers lack confidence in extension workers abilities and in government programs.
- African countries tend to view research, training and extension as separate compartments, which have no basis for interaction.
- Research information that could be used by farmers to improve production at this current level of circumstance is lacking or poorly communicated.
- Action oriented policies which make agriculture a worthwhile pursuit is lacking.

### 4. Suggested Actions For Improvement

- Direct extension efforts more towards young adult farmers, especially school leavers. Experience shows this group is more receptive to change.

- Encourage effective collaboration between home economics and agriculture extension, i.e. nutrition, home gardens, farm and home development programs.
- Build strong linkages among extension, primary, and secondary agriculture education programs. Contact farm families to encourage them to have family members enroll in agricultural classes and keep abreast of the school leavers who are good candidates for young farmer adult classes.
- Continue to expand the role of women at all levels.
- Rebuild farmer confidence through quality extension training, government policy and programs and dependable support systems.
- Design and carry out relevant, high quality in-service extension training programs.
- Forge better links between research, training and extension to reduce dissipation of effort and to maximize their impact on production.
- Conduct research studies of indigenous systems of knowledge and instruction in order to determine how they: market, fish, make things, accumulate capital, organize themselves, etc. Determine the pedagogical value indigenous systems may have in designing and implementing village training programs.

The following is a listing of key points brought out by the workshop small group discussions of extension and non-formal agricultural education. These were unanimously accepted by the workshop participants during the final workshop session as a basis for future planning efforts.

1. Many of the extension efforts in African nations have failed.
2. Given the strength of traditions (family, village, tribal, etc.), it is quite apparent that extension efforts must include a humanities dimension. Currently, extension workers are not adequately prepared to handle these social situations.
3. If only the matter of agriculture in primary and secondary schools is addressed, then we "leave out" a generation of farmers.
4. There is an apparent need to rebuild a failing extension system to serve the present generation of farmers and concurrently strengthen agricultural education at the primary and secondary school levels.
5. The extension problem is major in African countries. The following set of extension principles could translate well into a set of extension strategies for improving the system.

- Start high--go to the top of the government to get support.
- Go low enough--go to the grass roots level to get the problems identified. Make sure they are the people's problems. Good programs start by using people to identify the problems.
- Subject matter should be research based (basic, applied, library and borrowed research).
- Start the activity where the people are (not below them and not above them), understand the position of the clients.
- Seek out and harness local leadership in planning programs and in carrying out programs.
- Evaluate programs and results periodically to
  - measure progress;
  - monitor extension employee;
  - provide a record; and
  - establish a mile marker for future evaluation.
- Report evaluation result to
  - recipient;
  - top level officials; and
  - extension workers at all levels.
- Use result and process demonstration methods.
- Build a reward system for participants and extension workers.
- Establish adequate pre-service and in-service training.
- Cooperate with other agencies:
  - the private sector; and
  - the public sector.
- Separate regulation and education. The same individuals cannot enforce and educate.
- Be satisfied with tiny success rather than looking for grand success.
- Use extension methods in various combinations.
- Find ways to involve both men and women equally as participants and as extension workers.

## VIII. CLOSING CEREMONIES

### WRAP-UP

DR. CYNTHIA S. PERRY  
CHIEF, EDUCATION AND HUMAN RESOURCES DEVELOPMENT DIVISION  
BUREAU FOR AFRICA, USAID

Let us now look at the results of our hard work, and take stock of where we are and where we should go from here. It is my task to try to wrap it up, so I'm going to tell you a few things that I think that we should do and can do, from a donor point of view. I will also talk to you a bit about AID's education strategy and how this all fits in.

The role of education and human resources development in development strategy is to reduce illiteracy, to extend basic education, and to increase manpower training in skills related to development. In this sense, basic education has a distinct definition. The target group is the farm family. Basic education is number one, a formal approach to the training of children, and secondly, a non-formal approach to the training of farmers and all out-of-school youth. Education and human resources development are among the major elements of AID's food and agriculture development policy. The policy in this area is to develop human resources, institutional capabilities, and especially to generate, adopt, and apply improved science and technology.

As part of this policy, AID will support in-country training of trainers, educators, scientists, technicians, managers, extension agents and farmers with expansion as necessary of in-country training facilities. Secondly, we will work to extend the training in the United States or third countries, both short-term and long-term. And thirdly, AID will make long-term commitments to assist countries to develop their institutional capacity for food and agriculture planning, policy analysis, and research and dissemination of improved technology. The proposal is for a ten-year commitment to this kind of development.

A major component of AID's policy is a Title XII amendment to the Foreign Assistance Act. We have been discussing land grant colleges and we have heard a great deal from land grant colleges, and I always wondered if everybody knew how that fit in to AID's development strategy. That represents an amendment to our Foreign Assistance Act. This amendment specifies broad programs oriented towards strengthening indigenous institutions, training people, and applying science to solve food and nutrition problems in developing countries. The amendment also created the Board for International Food and Agriculture Development, which we call BIFAD, whose primary mission is to help AID utilize the faculty and institutional resources of 1862 and 1890 land grant universities, and other institutions who fall under the Title XII programs.

More specifically, AID's policy paper on basic education and technical training points out that AID's policy for agriculture and national development programs stress the importance of institutions and the development of basic infrastructure. Local schools and training systems are among the most important local institutions. In addition to the education they provide, they can also have a powerful effect on community organization and local administrative systems. This report also states, referring still to our policy, that basic education and related skills training are highly correlated with agricultural productivity, and rural and urban development. For example, a review of 20 independent research studies on relationships between education and agricultural productivity concluded that the productivity of farmers, whether male or female with at least four years of primary education, was on the average about 7 percent higher than that of farmers with no formal education. This was true even after controlling for factors such as the size of land holdings. The difference was even greater, about 13 percent, when other productivity factors such as credit and technical input were present.

We have been discussing in this conference a number of approaches to carrying out our policy. One part of that is participant training. I have noticed in talking to many of you that you have been participants in some of AID's programs such as ASPA, AFGRAD, and AMDP, so you are already familiar with these programs. AID is committed to assist developing countries address critical occupational shortages through its programs of participant training, and through efforts to strengthen local and regional institutional training capacity. This is an important point to remember, that commitment to training in-country institutional training capacity.

About three hundred million dollars in the decade from 1960 to 1970 were expended for participant training, local staff training, and extension education activities. AID has trained over 18,000 students in agriculturally related areas since the 1950s. Participants receiving agriculture related training as of 1981 represent about one-third of all of our participants, in contrast to a historic ratio of less than 20 percent. Our current policy paper on participant training stresses that training programs must address specific human resources constraints to development. Therefore, training in the United States will be limited to fields in which training is not available locally, with a great deal of our support going to the development of local institutional strengths.

After all the discussions we have had at this conference, the question raised now is "what's next?" So I'm going to try to summarize that immediately following the close of this workshop. For instance, tomorrow afternoon a selected team of AID professionals will begin to draft an assistance strategy on agricultural education for AID. The strategy is merely a guidance to our AID missions on activities that they might want to support to implement the policy, at the request of their host governments. The first draft will be completed by Monday, here in Cameroon, before the team returns to Washington or to their respective missions.

You have heard already the recommendations prepared by Dr. Drake, which were unanimously adopted by the workshop participants and include an immediate next step involving a meeting of a committee to design the expressed recommendations for funding. The conference proceedings are also going to be prepared immediately and will be sent out to all participants, and we are asking that you share that information with your governments so that the dialogue can begin at country level. To all of the participants here, we are challenging you to return to your countries and to begin that dialogue, at the highest and the lowest levels that you can for dissemination of information. Immediately following this meeting, AID will approach donor collaboration for agriculture education in Africa. I am meeting next week with FAO Rome, with Ambassador Fenwick, to discuss the final reports of both FAO's Harare conference and the results of our workshop here in Cameroon.

Secondly, I spoke a while ago about the CDA donor agencies, cooperative donor agencies which represent six countries which have significant bilateral programs in Africa; that is the United States, Canada, the United Kingdom, Italy, Germany, and Japan. We have been asked for the first time since CDA has been established to hold a meeting in December on education, and specifically on agricultural education to discuss donor collaboration in this particular field. You have the greatest task, to be ready to respond to these donors when they come to you and ask your country what they would like to do. We will also support country-specific workshops, where our AID missions and the local governments express clear interest in developing agricultural education projects or programs for that country. We would support your utilizing consultants who are in this group or are outside this group, and will try to find the funding to make that happen. So if we are dealing with 43 countries, then that is how many specific workshops we might expect to occur.

We will also work through our subregional offices, like the REDSO offices in Abidjan, Nairobi and Harare; and will try to develop workshops at that point, perhaps for higher level persons. When I say higher level you understand, I am talking about political, policy making, ministerial levels. AID missions will then develop possible regional level surveys if they are indicated, and will come up with possible project identification documents for funding consideration for specific proposals.

There are probably many more things that will come out of this meeting of the small committee; we don't know whether it's going to be in Ouagadougou now or whether it's going to be Abidjan, our REDSO office will determine that. You have already helped us to establish this information network. We are holding you responsible; you are here for a purpose. You will receive this information from us and we would expect feedback from you in the form of action oriented recommendations. The few of you who are from the United States, we would expect you to be willing to go and help to develop specific programs. So you are not coming out here just for a vacation. You are here, invited specifically for a task that has to be done. We believe in agricultural education as a solution, at least partially, and a major step towards food self-sufficiency and the associated problems.

In terms of the goals and objectives that were set for the workshop, in my own estimation this gathering has been a huge success. Those of you who have had to assemble a workshop like this before understand the amount of time, the sustained effort, and the level of planning and coordination required for the smooth implementation of a workshop this size. Consider the broad diversity represented here in terms of numbers of countries, regions, and continents; more than 110 personalities involved. It could not have happened without the excellent secretarial and logistic support services provided by the AID mission here in Cameroon, and we are highly appreciative. I have a feeling that they suspended their total operation in order to keep this workshop going with copying, typing and so forth. We want to thank especially Edwina Neba, Mavis Thomas and Fran Norton, the bus drivers, the coffee servers, everybody who was involved in making this a success. We owe everyone our sincere gratitude.

Very often administrators like myself fail to publically commend the outstanding contributions of their own staff members, who go far and beyond the demands of their scopes of work to produce a work of excellence, especially one of such far-reaching consequences as this workshop for the future of food self-sufficiency in Africa. Let me not be guilty. Dr. Edna McBreen, has just been moving things along, and added her personal touch to those necessary supports for this workshop. For example, the sumptuous evening meal at the hotel, the totally unexpected, fabulous luncheon catered by Mont Febe Sofitel, and then today the lovely little tokens and momentos of Cameroon that were placed at your seats. If some of you were missed, you must be sure to tell me or Edna so that we can make sure you get this to take back with you, as a token of Cameroon.

I wish to publically commend Dr. McBreen for all her efforts above and beyond the call of duty and her degree of professionalism. You cannot leave Cameroon, Edna, without the memento we now will present to you. Thank you again, for the fine work that you've done.

And we have so much gratitude to express to the government of the Republic of Cameroon, and I am going to leave that to someone else to do, Dr. Babs Fafunwa.

#### EXPRESSION OF GRATITUDE

DR. A. BABS FAFUNWA  
LAGOS, NIGERIA

The Secretary General for Agriculture, the U.S. Embassy representatives in Yaounde, Dr. Cynthia Perry, our energetic convener and motivator, the representatives of international agencies, fellow delegates, distinguished ladies and gentlemen: it is indeed a pleasure on my part to present a motion of thanks to his Excellency the President of the Republic of Cameroon, President Paul Biya. First and foremost, I must thank the President and

the people of the Republic of Cameroon, our neighbors because I am from Nigeria, for making this workshop in Yaounde possible. Many of us arrived here without any idea of how we would be received, but in no time at all the people of Cameroon made us feel welcome everywhere we went. This gesture goes to reconfirm the well-known fact that we Africans are a very friendly people indeed.

Cameroon's traditional culture combined with modern architecture, as demonstrated by the Hotel le Depute, the Palais des Congres, the telecommunication building, and Cameroon's unique bilingualism, really make this republic a unique nation not only in Africa, but in the world. Many of the countries in Africa are largely either Anglophone or Francophone, but in Cameroon the two have met.

I can really go on extolling the sterling qualities of the Republic of Cameroon and its energetic and forward-looking President, Paul Biya, but time would not allow. But I hope that the Secretary General will convey our warmest regards and felicitations to the President and the people of Cameroon. I make a motion, and ask that we now give a standing ovation to the President and the people of Cameroon. I must pause and let that sink in because that is a very important effect.

Secondly, you will recall that just a few minutes ago, Dr. Perry was thanking us on behalf of USAID. Now I, as an African, represent the majority of the delegates here. I represent the potential receivers here, where there are potential donors as well. Not only have we received but we look forward to receiving more, so my task is dual. I must on behalf of my own colleagues thank the US government represented by His Excellency the U.S. Ambassador who unfortunately is not here in person. I also thank Dr. Cynthia Perry, the convener of this workshop, her energetic team, as well as our non-AID, American colleagues. Not only do we have AID staff and officials, we have additional colleagues from the United States who are not from AID, but who came and participated in this important workshop. Included among them, I must say, are our soul brothers and sisters. We thank you all very much.

Dr. Perry and her team made it possible for us, African as well as American peers, to have the opportunity of interacting on a cross-continental basis. This resulted in a meaningful and fruitful, with accent on fruitful, dialogue. As a result of this dialogue, a number of recommendations have emerged and it behooves all of us Africans and Americans to carry these messages to our home governments and institutions for meaningful follow-up. Follow-up is a very necessary and important task. We must press our governments and institutions to take active part in the implementation of our well-considered recommendations. For it is then, and only then, that the government of the Republic of Cameroon and its people, as well as USAID and the U.S. government, can be happy that their labors have not been in vain.

Our immediate target group is where the majority of the people are: that is the farm family, the primary school children, the out-of-school children, the drop-outs and the drop-ins, the literate and non-literate adult farmers,

men and women--I will always emphasize that from now on--the teachers, the extension workers, and others. This combined group constitutes the largest percentage of our population in Africa. They produce most of our food, whether it is cash crop or food crop, and they are the first group to feel the pangs of starvation and low yield due to drought or excessive rain.

I must also thank the various international organizations represented at this conference: the World Bank, the OAU, the IFDC, the AAU, the ISNAR, the IITA, the ECA, the FAO, and many others. I hope we are all bright enough to know what these acronyms stand for. They are in fact the enabling agencies that we hope will do their best by cooperating with USAID and our own various governments in the implementation of our recommendations; and all in the spirit of the Lagos plan.

I cannot conclude this task without extending the delegates' special thanks to the staff and management of the Palais des Congres for their excellent service. We must also thank the Director General of the Hotel de Depute and his staff, particularly the kitchen staff. I am sure you all agree. The kitchen staff, the desk clerks, the janitors, the cleaners, and all the other staff, contributed to the success of this workshop in no small way. As for our drivers, they got us everywhere we wanted to go and we would not be here now if it were not for them.

Finally, I must thank my fellow delegates. Some of them took three to four days to get here. Some of them have already left because it takes two to three days to get back. Everyone has made some sacrifice to be here in the interest of Africa and of one world. I am especially proud of them.

When I return to Nigeria, I will do two things. First, I will tell the government and the people of Nigeria of the warm and friendly people of Cameroon, and what took place here. And secondly, I will tell the people of Lagos, my own home town, that the Lagos Plan is alive and well. Thank you very much.

#### CLOSING ADDRESS

DR. B. KOUESSEU  
SECRETARY GENERAL  
MINISTRY OF AGRICULTURE  
CAMEROON

Madame Chairman, distinguished representative of the Ambassador of the United States of America, representative of USAID, Cameroon, distinguished participants, and noble invitees, ladies and gentlemen: last 24 July in this same hall, Dr. Nfor Gwei, Vice-Minister of Agriculture, officially opened your workshop organized by the United States Agency for International Development on agricultural education and the development of agriculture in Africa, and more especially on the theme "Agriculture Education as a Catalyst of

Development in Africa." Since he is absent from Yaounde at this time, he has requested that I close this workshop on his behalf and on behalf of the government. It is a pleasure for me to perform this duty.

Your Excellencies, ladies and gentlemen, my country felt especially honored to have been chosen as host to such a high level encounter, to discuss a theme whose importance cannot be over-emphasized, and to bring together so many distinguished and learned persons from Africa and the United States of America. For four full days, high-level officials of institutions of agriculture, training, and extension from more than ten African countries have had the opportunity to meet with experts, professors, and researchers from more than 20 United States universities. They have had the opportunity to discuss and to exchange their experiences and ideas in the key area of training in the development of the rural world. An encounter of this nature, taking into account the number of persons and their qualifications, is not very current but it is a turning point in the cooperation that the United States of America has with the African continent. The Government of Cameroon would like to extend its gratitude to the officials of USAID for their happy initiative and all the sacrifices made to make this real encounter a very good one for both continents.

Your Excellencies, ladies and gentlemen, everything has been said, and a lot more is going to be said about African agriculture. Irrespective of the method that is going to be taken as an approach, its poor performance is the basic problem which calls for concern. Therefore, it is inevitable that everywhere in the world, as in all corners of the continent, real opinion should be mobilized to sensitize the political and technical officials to the catastrophies looming in the horizon if from now on appropriate and urgent measures are not taken to correct the unfavorable trend of African agriculture, in particular its food production.

While you are holding your workshop here in Yaounde on the improvement of the agri-education system with a view to obtaining a better development of African agriculture, other no-less-important meetings are being held simultaneously in other countries of the continent. I am talking, for example, of the meeting taking place at the moment in Dakar and the conference of African Ministers of Agriculture which has just ended in Harare under the aegis of FAO. The members of the former meeting are discussing the advance of the desert and soil restoration, while those at the latter studied the conditions for implementing a policy of food self-sufficiency at the continental level.

Today it is Yaounde, Dakar, and Harare. Yesterday it was Lagos, with its well-known plan of action, and Addis Ababa, too. Tomorrow it will be Brazzaville or elsewhere. Why are so many meetings taking place at such a quick pace to discuss African agriculture?

Your Excellencies, ladies and gentlemen, the African continent at the present point in time is a region directly threatened by the specter of famine for most of the countries of the continent. The annual growth of the GNP has

been negative since the beginning of the '80s, and the per capita income is now lower than that of the '70s. The result is that 26 of the 50 independent countries of Africa are among the least developed countries of developing countries.

In 1984, already 24 African countries depend on donated food for their survival. Although the international community has responded very generously to the various calls by providing more than 2.5 million dollars of food products to Africa, it still remains that we should still very urgently find more than 500,000 tons of food to fight against famine in various areas of the continent. These efforts deployed by the international community in 1983-84 enabled us to reduce the incidence of the problem and check a major catastrophe. But, as declared by Dr. Solomon Nfor Gwei when opening this workshop, food imports and aid can only be but temporary safeguard measures.

The first and real answer to all of the ills Africa faces, is its food self-sufficiency. As far as food self-sufficiency is concerned, it is clear that everything has to pass through the various ills that constitute a bottleneck to agriculture in Africa. It is the fight against the advancing desert, the fight against the rural urban drift, improvement of farms, and more especially adapting agricultural training to the development of the rural sector. As the Vice-Minister of Agriculture said, it is necessary to set up a type of agriculture education which gives a new dynamism to agriculture.

There are many examples in the world where the absence of a clear-cut definition of training objectives has led to the total failure of agriculture projects. This lack of interest in the training aspect is generally due to misunderstanding of the role of training and to its investment costs, which are generally very high at the beginning as compared to other aspects of the project. It is also due to the fact that the benefits to be derived from training are not immediate.

I am very pleased to note your discussions have shown that the institution of a solid education and training system, as well as the increase of quality staff at all levels of the project contributes in a determining fashion to the success of any agriculture project. Your workshop has shown the need to include fixed objectives in training which fit into general project patterns, so that the nature and length of studies can be geared towards those objectives. Special emphasis has been placed on the training of educators who have to implement the new policy. This is also true for continuous training of staff who are already working, so to adapt them even more to the evolution of agricultural science. Each country or groups of countries should be able to have adequate training units to ensure the training of their agents, farmers, and senior staff.

At the level of general education, the introduction of agriculture in the curricula should be able to sensitize and educate the youth on the various jobs that can be offered by the agricultural sector in production, transportation, marketing and processing. Your workshop has especially insisted on the importance of training farmers. In most cases, this training is usually neglected.

A good organization of farmers which is the result of solid training, is considered today as the surest means of leading the small peasants towards a market economy. By associating pilot production programs to demonstration farms, the struggle against hunger, malnutrition, poverty, issues which all our governments are fighting to overcome, will be taken into the hands of the farmer himself.

Ladies and gentlemen, distinguished participants, these are just a few resolves obtained from your workshop. The results and recommendations of the constant concern that you have shared remain alive to the realities of the continent. This proves the high experience of all the participants of this workshop. For its part, Cameroon is pleased to have been associated in contributing to the success of this workshop.

The presentations of the Cameroon delegation has shown that our country has set up structures, which although are not perfect, already contribute to producing officials who are prepared immediately upon graduating from agricultural institutions. Structures which also make the peasant more aware of the problems, and integrate the young people who have a general educational background into the agricultural production sector. In so doing, I think of the reform of agricultural training undertaken by the Minister of Agriculture, and I think particularly of the programs of the Training Center for Young Farmers, the National Civic Service for Participation in Development and all their centers, and the University Center of Dschang where we train higher staff.

I know that more and even better efforts have been made in other countries. Our participants here have directly benefited from this workshop by exchanging their experiences and ideas with experts who have come from elsewhere, and by consolidating the links of collaboration between the training structures existing in Africa and the rest of the world. This consolidation of cooperation between research, training and extension institutes is a need in a world where science is evolving very rapidly and where the exchange of experience and ideas are key to success.

The conclusions from your deliberations will enable each country to develop a training strategy which is appropriate. It will enable assistance bodies and possible donor countries to adapt their systems to the needs of the African countries.

Your Excellencies, ladies and gentlemen, I am assuring you that Cameroon will benefit from the pertinent recommendations of your deliberations for the improvement of training system and agricultural extension system. Permit me to end by thanking you for the very kind words that you have spoken about Cameroon and in particular, about its President, His Excellency Paul Biya. Permit me also on my part to once again congratulate the government of the United States of America, and especially the officials of USAID for their perfect organization of this workshop.

While wishing those of you who have come from abroad a safe return to your respective countries, I declare the Workshop on Agricultural Education and Development in Africa closed. Long live international cooperation.