

training at

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CIMMYT is an internationally funded, nonprofit scientific research and training organization. Headquartered in Mexico, the Center is engaged in a worldwide research program for maize, wheat, and triticale, with emphasis on improving the productivity of agricultural resources in developing countries. It is one of 13 nonprofit international agricultural research and training centers supported by the Consultative Group on International Agricultural Research (CGIAR), which is sponsored by the Food and Agriculture Organization (FAO) of the United Nations, the International Bank for Reconstruction and Development (World Bank), and the United Nations Development Programme (UNDP). The CGIAR consists of a combination of 40 donor countries, international and regional organizations, and private foundations.

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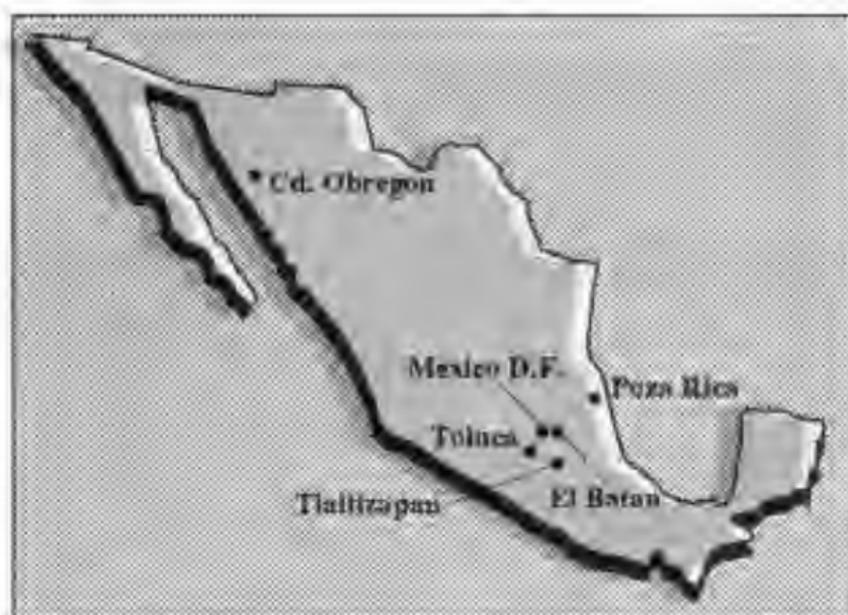
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The Center

The International Maize and Wheat Improvement Center (CIMMYT) is a non-profit agricultural research and training institution. Since its inauguration in 1966, CIMMYT's primary purpose has been to strengthen and support the agricultural research efforts of developing countries around the world. The Center achieves this goal through a global program of maize, wheat and triticale improvement, the investigation of agronomic and economic issues related to these crops, and through a diverse training agenda.

CIMMYT headquarters is located in central Mexico about 45 kilometers northeast of Mexico City. The headquarters itself is the location of one of CIMMYT's highland research stations. The 78-hectare site serves as the nucleus for the Center's many worldwide research and training functions.



Experiment stations in Mexico

In addition to the headquarters site, CIMMYT conducts research and training at and in the vicinity of four other stations in Mexico (see map.) Because of their agro-climatic diversity, these stations make it possible to grow experimental crops year-round under conditions representing many of the maize and wheat growing environments of the world.

About one-half of the Center's staff is assigned to regional and national programs outside Mexico. Along with their many research and training responsibilities, these staff members are the primary source of information and recommendations regarding potential participants in CIMMYT's training programs and courses.



Types of Training

The basic objective of CIMMYT's training efforts is to improve the research capabilities of national program scientists so that they might be better equipped to address the needs of their client farmers. Evidence of this philosophy can be found in the objectives and curricula of CIMMYT training in Mexico and throughout the world. There is a distinct contrast between CIMMYT training and more traditional learning environments in that course participants spend much of their time in the field side-by-side with experienced agricultural researchers and educators, actively participating in and contributing to the learning process.

Visiting Scientists

For scientists who wish to work with CIMMYT staff on specific research projects, there are often visiting scientist positions available. Visiting scientists, frequently representing their country's national crop research programs, may spend from a few days to several months at the Center, becoming acquainted with CIMMYT's research procedures. They participate directly in ongoing research or plan and conduct independent research of mutual interest.

Postdoctoral Fellows

Individuals who have recently completed doctoral work in fields of mutual interest may be selected to spend up to two years working as Postdoctoral fellows. These scientists are active participants in CIMMYT research and training programs.

Predocctoral Fellows

University students, working toward a doctoral degree in agriculture, may join the scientific community at the Center as pre-doctoral fellows. These students spend various lengths of time working on their thesis research under the supervision of senior scientists.

Courses for National Program Researchers

These courses constitute CIMMYT's largest educational activity. Each year, promising agricultural researchers working in national agricultural research programs in many countries are selected to participate. These are intensive, field-oriented courses focused on developing and refining agricultural research and research leadership skills. Courses are offered in maize and wheat improvement (breeding and pathology), maize and wheat crop management research, cereal chemistry, cereal technology and experiment station management. Field studies are conducted at CIMMYT experiment stations and in farmers' fields. Emphasis in all courses is on "learning by doing".



Courses for National Program Researchers

Maize and Wheat Improvement

These courses are intended to build skills for planning, conducting, and leading practical and comprehensive breeding programs at the national level. The basic courses focus on the identification of farmer and market needs in relation to plant and grain type and biotic and abiotic constraints that limit production in various geographic areas. Participants learn to identify germplasm sources and the most efficient breeding technologies to be used in a breeding program. They learn how to characterize varieties and lines, maintain improved germplasm, and produce basic seed and commercial germplasm. Although the courses emphasize germplasm improvement research, crop management as well as other important topics are included. Advanced short courses, designed for more experienced national program scientists with significant research leadership responsibilities, emphasize maize and wheat improvement research design. (See Appendix A for basic course objectives.)

Maize and Wheat Crop Management Research

These courses are intended to build the participants' crop management research skills and confidence so they can work more effectively in their home country's national research program. Farmers' circumstances and on-farm research techniques are emphasized in these courses. In basic courses, participants learn the research process for developing appropriate technological recommendations to help farmers improve their crop productivity and

profitability. Advanced short courses, designed for more experienced national program scientists with significant research leadership responsibilities, emphasize crop management research program design. (See Appendix B for course objectives.)

Cereal Chemistry

Training in cereal chemistry is offered as part of the maize training program. Participants who study in the cereal chemistry laboratory learn to evaluate the nutritional quality of maize breeding materials and thus support ongoing breeding programs. (See Appendix C for course objectives.)

Cereal Technology

Cereal technology is the study of grain quality from the standpoint of market needs and industrial and nutritional quality. The goal of the cereal technology training course is to teach participants how to recognize and analyze important wheat, triticale, and barley grain quality characteristics. The information derived from the analysis is used by breeding programs in evaluating progress toward breeding goals. (See Appendix D for course objectives.)

Experiment Station Management

While many graduates from CIMMYT training programs return to their national crop programs to become research leaders in crop improvement or crop management research, others assume the important responsibility of



managing experiment stations. To provide those scientists with the skills needed to be effective experiment station managers, CIMMYT conducts a course each year in Mexico in experiment station management. (See Appendix E for course objectives.)

Course offerings vary from year to year. Contact CIMMYT headquarters for information on current offerings.

In-country Training

CIMMYT's training activities outside Mexico take on various forms. Particular attention is placed on courses in crop management research and on-farm research methods. These courses are usually taught by staff of the regional crop and economics programs along with training staff from headquarters. Former students of in-service training are often called upon to assist in teaching these courses.

In-country on-farm research courses include introductory workshops that present the basic concepts and methods of on-farm research, as well as more advanced short courses for practitioners on particular methods or themes. Many courses in on-farm research are presented as an integral part of on-going national research and extension program activities, such as farmer surveys, planning an experimental program, or data analysis.

In addition, CIMMYT regularly sponsors a variety of conferences, seminars, and workshops at headquarters and in a number of other countries. These educational forums are aimed at keeping the scientific community up to date on the latest agricultural research information emanating from CIMMYT and from research institutions around the world.

For more information on current offerings in any of the above categories, contact headquarters or the CIMMYT regional staff member nearest you.

Facilities

Norman Borlaug Building

In 1986, the Norman Borlaug Training and Conference Building was completed at CIMMYT headquarters in Mexico. The completion of this facility signaled CIMMYT's enhanced commitment to providing the highest quality training and information services possible.

Along with increased office space for training and information services staff, the building is equipped with modern classrooms, seminar rooms, conference rooms, and a greatly enhanced library facility. In addition to books, journal collections and the like, the new library includes a microcomputer users room, a self-learning center with equipment for viewing audio-visual instructional materials, microcomputers for computer-assisted instruction, and a language laboratory.





Food and Housing

For course participants located at CIMMYT headquarters, there is a modern dormitory with 60 individual furnished rooms with private baths. Since most courses designed for national program scientists are of a relatively short duration (2 to 5 months), no facilities are available to accommodate families. For those on longer assignments at CIMMYT, there are furnished apartments to accommodate individuals and families. The cafeteria offers three international style meals per day for staff, course participants, and visitors. Regular laundry services are available at no cost to training participants.

Recreation and Leisure

During free time, those residing at headquarters have access to a variety of recreation and leisure facilities including a recreation room, tennis courts, a sports field for soccer, softball and volleyball, swimming pool, and satellite television viewing areas (English and Spanish).

The nearby town of Texcoco offers a variety of shops and restaurants, and limited recreational facilities. There is local bus service between headquarters and Mexico City where an almost limitless variety of recreation and leisure opportunities exist.

Selecting Course Participants

CIMMYT training is focused on improving the research capabilities of promising scientists working in national agricultural research programs of developing countries. The basic criteria for selection of prospective course participants is their commitment to solving the agricultural problems of small farmers in their countries and their potential for success in this endeavor.

Courses involve many hours of extremely demanding work in the field. Good health, a positive attitude, and a willingness to focus all attention and energy on the learning process are basic ingredients to successful participation in CIMMYT training.

Qualifications

Candidates for basic courses conducted in Mexico are required to have the following qualifications:

- Academic training to at least the bachelor of science level, or the equivalent.
- Command of either English or Spanish.
- Employment with a public or private institution working in maize or wheat research.
- Permission to attend courses from their employers, both to ensure continued payment of their salaries and to guarantee their employment after returning home.
- Excellent physical and mental health.

Any exceptions to the above qualifications are determined by CIMMYT staff on a case-by-case basis.

Application Procedures

Before applying for courses in Mexico, candidates must be recommended by their employers. The acceptance of recommended candidates is based on a review of their application form and other appropriate documents and an interview with a CIMMYT staff member or representative. The final decision on a candidate's acceptance is made by CIMMYT program directors in cooperation with other senior scientific and training staff.

In addition to the above listed qualifications, acceptance into a given course is based on:

- The number of openings.
- The timeliness of a candidate's application. **Applications MUST be received at least 3 months before the start of the course to allow time to review qualifications, process visas and make travel arrangements.**
- The importance of the training to the candidate's national program.
- Availability of funds.

There are many reasons why a particular candidate might not be accepted. Since the number of openings is limited, space is often the reason for not being accepted. Qualified candidates who are not accepted on the basis of space may be automatically reconsidered for future courses.

Financing Course Participants

Scholarships to CIMMYT's training programs may be provided by the employers of prospective participants, by national or international agencies or institutions, or by CIMMYT itself. While in Mexico, course participants receive a stipend for room, board, and incidental expenses. Local travel, medical insurance, supplies, and materials are also provided.

CIMMYT will provide registration forms, as well as detailed information of the costs involved in administering scholarships, to institutions interested in sponsoring candidates.



More Information

Details about specific course offerings and schedules are available, as is additional information concerning qualifications, selection, funding, and registration. Requests for additional information may be addressed directly to CIMMYT staff located in any of the outreach offices or you may contact headquarters directly at the address below.

Training Office

International Maize and Wheat
Improvement Center (CIMMYT)
Lisboa 27, Apdo. Postal 6-641
06600 Mexico D.F. Mexico

Telex: 1772023 CIMTME
Cable: CENCIMMYT
FAX: 954-1069

Phone in Mexico City:
761-3311 or 761-3865

Appendix A

Course Objectives in Maize and Wheat Improvement

Upon completion of the maize or wheat improvement courses, students should be able to:

Set realistic breeding goals based on the identification of farmer and market needs in relation to plant and grain types.

Describe the breeding goals and objectives of CIMMYT's maize or wheat improvement programs.

Describe the principles of plant breeding and genetics related to CIMMYT's maize or wheat breeding methodologies.

Describe the international testing program and how participating national programs cooperate to exchange materials and improve germplasm.

Demonstrate an understanding of the organization and function of CIMMYT's germplasm banks.

Design, lay out, plant, and manage breeding nurseries and obtain and record the appropriate observations.

Identify desirable plant types and accurately select parental material based on the characteristics identified.

Make crosses and select plants for desirable characteristics.

Identify important diseases and insects that affect maize or wheat crops and prescribe corrective or preventive measures.

Evaluate diseases by type of reaction and degree of infection in nurseries and farmers' fields.

Demonstrate a basic understanding of how to collect, preserve, and prepare disease inoculum and/or mass rear insects, properly inoculate plants with disease or insects (or both), and select plants on the basis of resistance.

Organize and operate a pathology and/or entomology program in conjunction with a maize or wheat breeding program.

Accurately harvest experiments and nurseries and evaluate and select seed (or ears) based on a variety of grain quality criteria.

Record and properly analyze all data related to maize or wheat improvement activities and be able to defend and support all decisions related to improvement experiments.

Maintain and multiply pure seed and organize seed production programs.

Prepare seed for future breeding cycles, yield experiments, and for storage in the germplasm banks.

Demonstrate proficiency in selected agronomy, economics, and on-farm research topics covered in the crop management research course.

Demonstrate proficiency in setting appropriate breeding program goals based on information collected in the field from farmers.

Demonstrate proficiency in the use of computers and various computer programs for the analysis of maize or wheat breeding data.

Appendix B

Course Objectives in Maize and Wheat Crop Management Research

Basic Agronomic Knowledge and Skills

Upon completion of the basic maize or wheat crop management research courses, students should be able to:

Identify plant parts and recognize stages of development.

Collect soil samples from the field, prepare them for laboratory analysis, and interpret results.

Based on the chemical and physical analysis of soil samples, judge the production suitability of a given field.

Identify and classify weeds and properly conduct weed counts.

Interpret herbicide and pesticide label information, describe and demonstrate proper application techniques and safety procedures, and score phytotoxicity damage.

Prepare a field and plant a crop using a variety of methods and explain the advantages, disadvantages, and suitability of each method for different environments.

Identify, score, describe life cycles, and otherwise demonstrate the ability to handle correctly major aspects of the identification and control of diseases and insects affecting a crop.

Describe methods of seed and grain multiplication and storage, advantages and disadvantages of each and conduct tests for viability and quality.

Operate, maintain, and where applicable, calibrate agricultural equipment essential for operating an effective crop management research program.

Describe the goals and objectives of CIMMYT's maize or wheat research programs.

Demonstrate an understanding of the main factors (environmental, genetic, management) that affect plant and crop development, and how these factors operate.*

Skills Needed for Effective Crop Production Research

Upon completion of the basic maize or wheat crop management research courses, students should be able to:

Design and plant experiments.

Describe the role of on-farm research in technology transfer and the importance of good research/extension linkages.*

Demonstrate a basic understanding of CIMMYT's methods of crop improvement (breeding).

Conduct an agronomic survey including soil types, insects, disease, fertility levels, weeds, erosion, etc., and an economic survey (farmers' circumstances) of the area.*

Identify major factors that might cause a reduction in crop productivity and develop potential solutions to those problems based on the results of agronomic and economic surveys.*

Develop realistic research objectives based on the assessment of production limitations and an analysis of available resources.*

Conduct agronomic, statistical and economic analysis of agronomic trials and interpret those results.*

Determine how the results of experiments should be used in developing recommendations for farmers and/or further research objectives.*

Demonstrate proficiency in the use of computers and various computer programs for the analysis of agronomic data.*

Design a long-term research program to generate and verify production technologies appropriate to farmers' circumstances.*

*** Objectives also applicable in advanced courses.**

Appendix C

Course Objectives in Cereal Chemistry

Upon completion of the cereal chemistry course, students should be able to:

Prepare samples for analysis by properly dissecting, grinding, and defatting the seed.

Determine total nitrogen in cereal grains through the use of the Technicon Autoanalyzer and other tests.

Determine lysine and tryptophan contents using a modified colorimetric method.

Analyze protein quality using the dye-binding capacity method.

Perform zein determination in maize.

Test maize for a variety of other protein quality characteristics including free amino acids and protein fractions.

Interpret results and data for the use of plant breeders.

Appendix D

Course Objectives in Cereal Technology

Upon completion of the cereal technology course, students should be able to:

Organize and manage a small grain cereal quality appraisal laboratory.

Install, calibrate, operate, and maintain laboratory equipment.

Train supporting technicians on the job.

Perform and interpret laboratory tests for evaluating the quality traits of wheat, triticale and barley including:

- Quality analysis based on grain weight.
- Grain classification based on size and plumpness.
- Grain moisture content.
- Kernel hardness.
- Tempering and milling.
- Moisture content and ash (mineral) content.
- Dough mixing time and tolerance to mixing.
- Dough plasticity and mobility.
- Gluten content and strength characteristics.
- Gelatinizing properties – crumb structure.
- Alpha-amylase activity – extent of sprout damage.
- Dough extensibility and resistance to extension (tenacity.)
- Baking tests to determine general dough character, water absorption, crust color, crumb characteristics, texture, color, and loaf volume.

Appendix E

Course Objectives in Experiment Station Management

Upon completion of the experiment station management course, students should be proficient in:

Experiment station organization, planning, development, and daily operations.

Irrigation and drainage management.

Tillage systems and seed bed preparation, surveying and land leveling.

Selection and operation of agricultural machinery and plot equipment used on the experiment station.

Calibration and operation of various types of planters.

Pesticide and fertilizer management.

Calibration and operation of various types of sprayers.

Harvesting procedures and use of mobile and stationary equipment.

Grain treatment, drying and storage.

Workshop administration and basic shop skills.

General agronomic principles of maize and wheat crops.

