MAIZE TRAINING IN THE INTERNATIONAL MAIZE AND WHEAT IMPROVEMENT CENTER, (CIMMYT).

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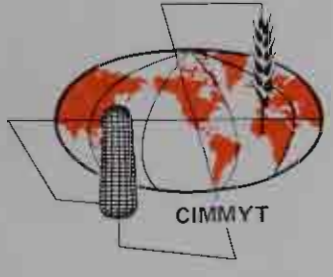

CENTRO INTERNACIONAL DE MEJORAMIENTO DE MAIZ Y TRIGO

INTERNATIONAL MAIZE AND WHEAT IMPROVEMENT CENTER

México

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One of the major problems facing many countries is the scarcity of well trained technical personnel who are needed to develop regional and national programs which can rapidly increase maize production.

CIMMYT at El Batan, Mexico has progressively evolved a Maize Training Program to meet the specific needs of these national production programs. Its objective is to prepare people to work in maize improvement by following the system used in CIMMYT, and by teaching production systems, production research methodology and technology transfer which will increase maize production in the shortest possible time.

THE CIMMYT TRAINING PROGRAM.

In principle, the CIMMYT scheme provides trainees with knowledge and in-service practical instruction in seed matters and in research, both on experiment stations and on farm properties. The course gives a solid educational foundation which enables the trainees to return to their home countries well equipped to increase maize production in national programs.

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THE OUTSTANDING FEATURES OF THE PROGRAM.

Recognizing the vital role of superior varieties to increase maize yields in regional and national programs, the CIMMYT system especially demonstrates the methods used to select, multiply and maintain such varieties.

To enable these varieties ultimately to express their potential in the hands of the farmers, it is essential to conduct research both on experiment stations and in the farmers' fields. This research defines the components, and their relative importance in the technological alternatives or packages which accompany the new variety. Such research also includes the study of the interaction between these production components plus the economic aspects of the technical recommendations at each socio-economic level. The training program therefore demonstrates the development of a flexible technology which permits constant adjustments of the technical parameters. These adjustments are necessary in order to respond to the changing economic and biophysical restrictions which characterize the agriculture of countries in their process of development.

Some of the professional workers who participate in CIMMYT's in-service training, come from recently created national programs while others come from older, well establised programs. Generally these programs represent varying degrees of technical sophistication and success. Because of this, the practical and academic backgrounds of the trainees are also quite variable. For this reason, a large amount of personal attention is given to each trainee, even although the overall training is carried out in small groups.

The training program is therefore flexible in order to meet the needs of those countries which are endeavouring to increase their maize production.

TRAINING IN THE FIELD.

It receives maximum priority in the program because it exposes the reality of agriculture. This field work is organized in a sequence of five stages which range from research in experiment stations up to the testing and fitting of technological alternatives into actual on-farm production systems.

In the first stage, the trainee is acquainted with the type of experiments which should be undertaken in experiment stations. These are normally the development and selection of varieties, the production of foundation seed, the testing of new chemical products, and the testing and calibration of equipment and machinery, etc. All the other stages take place outside the experiment station viz., in the fields of local farmers who are representative of the technical and socio-economic structure of the area.

In stage two, various experiments are planted to determine those factors which limit the production of maize in

that area. Emphasis is given to experiments which identify critical management factors (including their priority and interactions), and which test new chemicals for control of weeds and insects that are not present on the experiment station.

Experiments are also conducted which allow a preliminary investigation of new management practices. The experimental results obtained at this stage, supply the information which is needed to determine those economically relevant factors which must be considered in the experiments programmed for the next stage.

In the third stage, the experiments are designed specifically to evaluate the effects of using different levels of those critical factors which were identified in stage two. The experimental results determine the best varieties, plant population, optimum fertilizer levels and application rates of herbicides and insecticides.

The information obtained in these three stages is also used to demonstrate to the trainees, the proper techniques of formulating complete production alternatives at different levels of farmer risk. These alternatives are then evaluated in the fourth stage. The agronomic and economic evaluation of these experimental results assure that the variables, which are tested in the fourth stage, are those with the greatest probability of farmer acceptance and of increasing maize yield.

The fourth stage, which is called the Verification Stage is highly important. It summarizes the results of the previous research into technological recommendations which are then applied and evaluated in a large number of locations.

The fifth and final state is the most challenging one because it is here that the technological alternatives produced in the production research system are exposed to the realities of large scale agriculture. The actual field work is carried out by the participating farmers, under the supervision of production agronomists and plant breeders. This fifth stage is of vital importance because it condenses into one operation, the diffusion of technological alternatives and supervised seed multiplication.

A summary of the strategies used by CIMMYT for training in maize production research, is shown in table 1.

During the training program, weekly visits are made to the farmers' fields. Each trip provides excellent opportunities to study problems and situations associated with maize production, which are referred to in the chart as the "in the field case-studies". This feed back mechanism is the end result of the field participation of personnel involved in the system.

VALUABLE SKILLS.

The technical training incorporated in the CIMMYT program, offers the skills necessary to design maize production and improvement projects, conduct experiments, interpret the results and develop alternative technical recommendations which are suitable for the average farmer of a region. These skills are complemented with classroom lectures in experimental design, soil fertility, applied genetics, entomology, maize pathology, weed control, economics, irrigation, maize physiology and morphology, maize growth, etc.

In addition, the trainees have the opportunity to present technical seminars which increase their technical knowledge and improve their ability to communicate their knowledge to other persons.

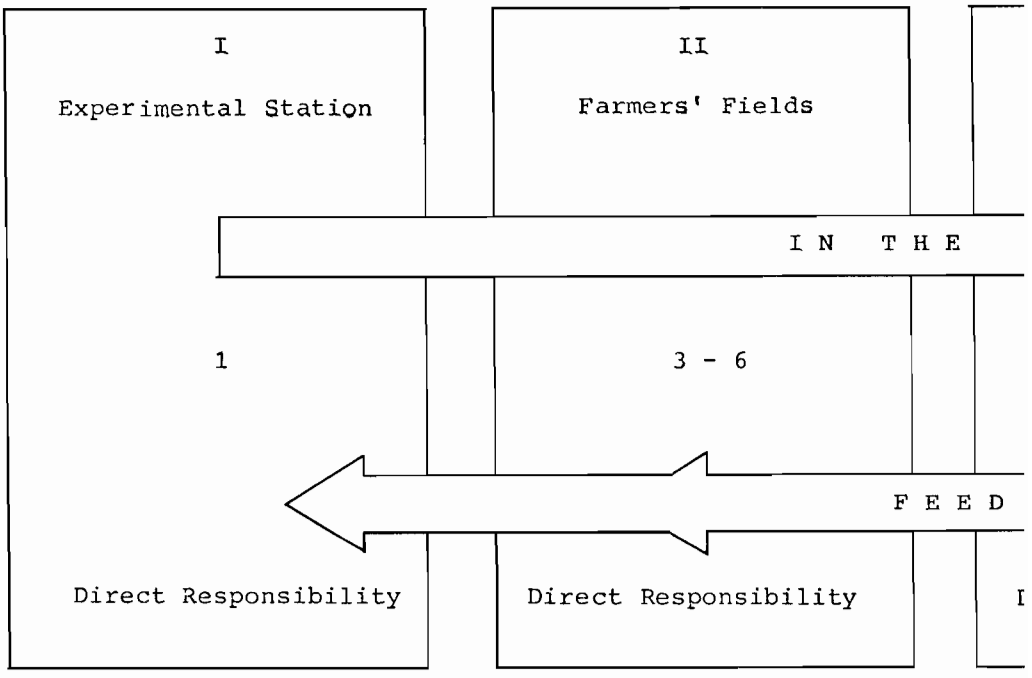
All classroom time is devoted entirely to increasing the trainees' effectiveness as field researchers and nearly every subject has a specific field component. The objective of all subjects is to enable each trainee to integrate field observations with scientific realities so that he can formulate technological alternatives at the end of the course. Using constant translation, the whole instructional process is given in both English and Spanish.

SUMMING UP.

There are many ways to train maize specialists for countries with developing agriculture. The strategy followed by CIMMYT provides sound and comprehensive knowledge within a logical system, which integrates all phases of production research. It is CIMMYT's hope that similar systems can be developed in such countries to meet their specific needs.

TABLE 1

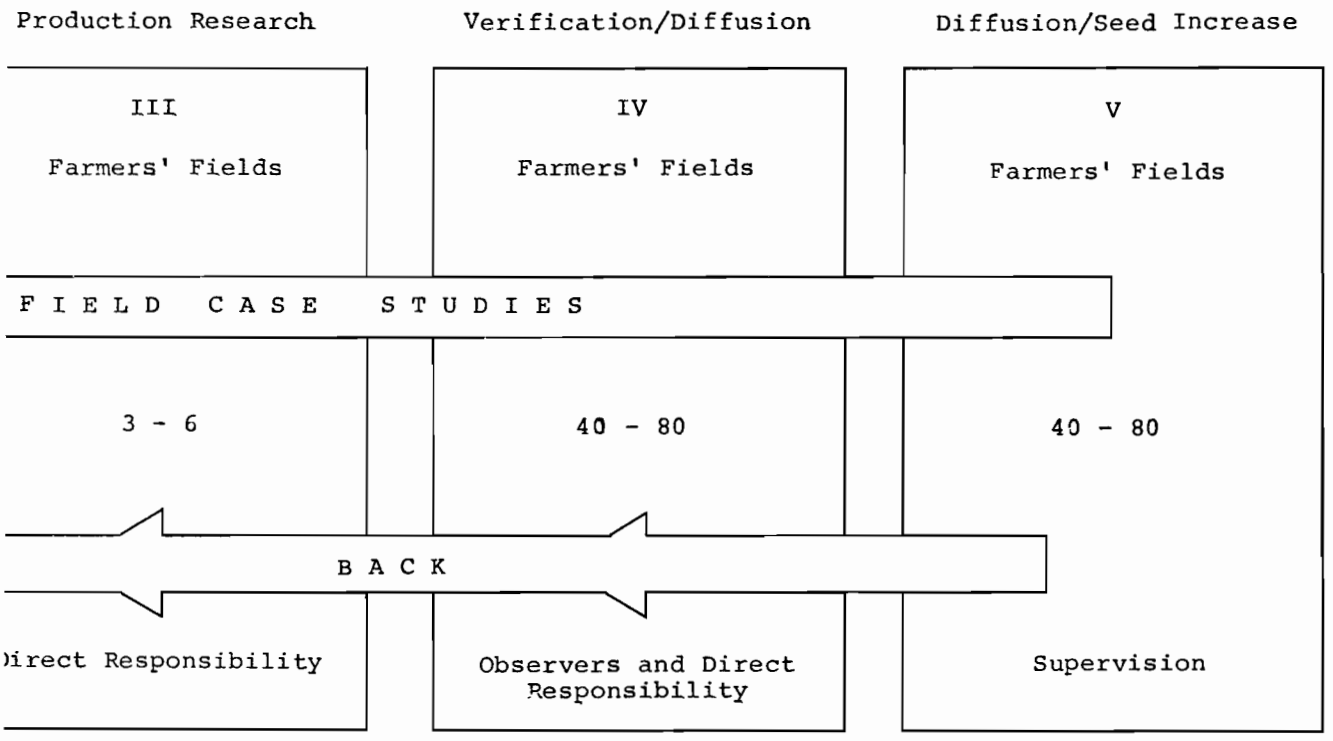
TABLE 1 MODEL OF THE STRATEGY USED BY



Objectives:

A. Screening new varieties based on relevant criteria at farmers' level (yield, grain, end uses, etc.)	A. Identify critical management factors, their order of importance and significant interactions.	A.
B. Studies on planting dates.	B. Testing agricultural chemicals against pests and weeds detected as problems by farmers.	B.
C. Testing new agricultural chemicals.	C. Preliminary investigations of new management methods e.g. minimum tillage.	C.
D. Testing agricultural machinery.	D. Preliminary evaluations of breeding objectives.	D.
E. Related laboratory studies.	E. Economic analysis to detect factors of production with a higher impact on benefits and higher probability of acceptance by farmers.	E.
		F.
		G.
		H.

CIMMYT FOR MAIZE TRAINING IN PRODUCTION RESEARCH



Describe quantitatively the response to each critical management factor.

Further investigation of significant interactions.

Trials of promising varieties.

Comparative trials of promising pesticide rates.

Evaluation of breeding materials under different input levels.

Formulation of technological alternatives (packages) with different benefit levels and related risk.

Demonstration to extension agents on formulation of technological alternatives and how to carry out stage IV.

Partial budget analysis of agronomic data and range of relevant economic factors to be considered in future trials.

A. Verification trials of technological production packages.

B. Assessing farmers reaction to new inputs and breeding materials.

C. Observation of new factors limiting production.

D. Economic analysis of possible modification of production packages due to changes in relative prices.

E. Sample survey of farmers to determine the agro-economic circumstances relevant to maize production.

A. Verification of experimental results in production size plot (1 hectare or more).

B. Experience with production size plot on farmers' fields.

C. Assessing farmers' reaction to other technological alternatives.

D. Increase of open pollinated variety seed for potential release in the area.

E. Supervision and maintenance of varietal purity.

F. Large scale economic study of the technological alternatives used.