

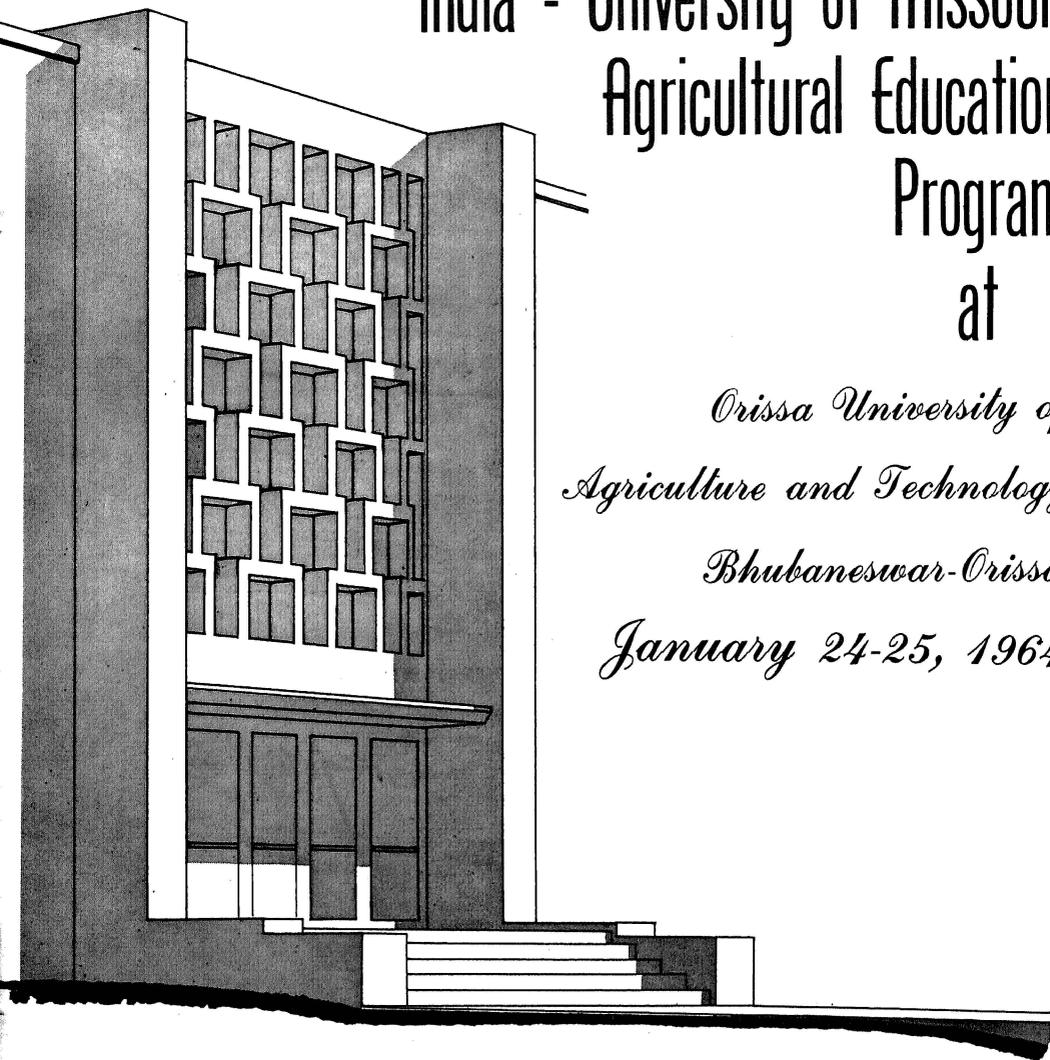
Proceedings of Seminar for Participants in

India - University of Missouri
Agricultural Education
Program
at

*Orissa University of
Agriculture and Technology*

Bhubaneswar-Orissa

January 24-25, 1964



University of Missouri

AGRICULTURAL EXPERIMENT STATION

Special Report 40

May, 1964

CONTENTS

	Page
Introduction	3
Seminar Program	4
Is Your Training Paying Dividends? Elmer R. Kiehl	5
Establishing Guidelines for Agricultural Research in India. J. M. Poehlman	9
Guidelines for Success in Extension Teaching. D. B. Robinson	14
Guidelines for Success in Teaching. F. E. Rogers	18
Reports of Discussion Groups	
Teaching	20
Research	22
Extension	23
Survey of Returned Participants	25

INTRODUCTION

Probably the most effective part of the educational program, which the University of Missouri is conducting in India, is the one in which faculty members from the Indian colleges come to the University for a year or more of graduate study. The participants in this program have come from the five colleges of agriculture and four colleges of veterinary science in the four states, Assam, Bihar, Orissa and West Bengal, in which the University is working. Most of these participants have returned to the colleges from which they came to Missouri. They return to India with broadened outlook and enthusiastic intent to develop programs of research and education which help Indian farm people to increase food production and improve their own levels of living.

This seminar, held at Orissa University of Agriculture and Technology, was attended by sixty-six participants representing all of the nine colleges. The seminar was addressed by Dean Elmer R. Kiehl, Professor F. E. Rogers, and Dr. J. M. Poehlman of the University of Missouri and by Professor D. B. Robinson of Ohio State University. In three discussion groups participants discussed problems and suggested solutions in research, resident teaching, and extension.

This publication includes the addresses and reports of the discussion groups of this seminar. From it the reader will learn some of the problems which confront India and Indian research workers and teachers, and of progress which is being made to solve these problems.

John H. Longwell
Director
Special Studies and Programs

IS YOUR TRAINING PAYING DIVIDENDS?

Elmer R. Kiehl, Dean, University of Missouri College
of Agriculture, Columbia, Missouri.

Before undertaking the development of the topic, addressed in the form of a question, I am pleased to extend the greetings of President Elmer Ellis, Dean John Longwell, and the faculty of the College of Agriculture of the University of Missouri. I can assure you that each has a deep concern for your welfare and the progress you are making in this country. Our faculty members have a continuing interest in the development of your respective Universities, in Assam, Bihar, Orissa and West Bengal States. Your participation in studies on the Campus of the University of Missouri has enriched our staff and has contributed to greater understanding between our people and the people of India.

The question embodied in my assignment -- Is your training paying dividends? -- may seem a bit inappropriate on this occasion. Yet I know that you understand that this question flows from our deep concern about your progress and progress of agriculture in your respective States. We have committed resources, time, and talent to assist you so that you can make a greater contribution to agricultural development in India. We are earnestly interested in whether or not we are proceeding in the appropriate manner.

Modern day India is the successor to one of the oldest religious, social, and cultural heritages in the world. It is undergoing more changes today than ever before in its history. A most critical and compelling force that has given rise to these changes is the adverse relationship between population and resources. This is the push for change. This is the force that must be reckoned with in order to achieve political stability and which in turn establishes conditions for economic growth and rising levels of living.

I need not remind you that national incomes have risen (+40%) and that agricultural (+41%) and industrial (+94%) output have increased in the last decade and a half. These are impressive gains. But population has risen more rapidly than food productivity per acre. If current trends continue the annual foodstuffs deficit might exceed 30 million tons annually by the end of this decade.

Overcoming this deficit is the challenge of India. It must overcome this so that it can achieve some measure of industrialization. In all the studies I have seen concerning developing nations agricultural productivity precede industrial development. This is the history of our country. In 1862, when our Land-Grant Colleges were established, the average American farmer produced enough for himself and four others. This was enough surplus to provide some foreign exchange but would hardly be enough for the industrial development attained today.

Agricultural productivity has increased so that one farmer produces enough for himself and 28 others. These are average figures. This increase was not achieved overnight and most of this increase has come in the last 30 years. The prime factor

in this growth in productivity was the establishment of Land-Grant Colleges which, throughout coordinated research, teaching, and extension programs, assisted in solving problems of farmers and farm people.

Let us review briefly our own experience in educational programs serving agriculture.

Establishing a research program was critical in that it provided information for teaching. But most important research was done for the purpose of solving problems of farmers. In time the Colleges gained the respect of farmers. The extension program of the Colleges further extended the respect and even expanded the demand by farmers for more research. The extension program extending educational contact directly to farmers was the most important aspect of the whole effort. Fortunately for American agriculture, extension education was under the direct control of the College. Although the College and its teaching, research and extension programs were dependent on public funds, they were not under control of the politicians. Farmers asked for and obtained public funds and support for what they proudly called "their Colleges" and "their extension programs". Political control of these institutions and programs would have reduced their effectiveness and the farmers would have had less confidence in them. Imagine our farmers accepting educational programs based on whether or not they were sponsored by the Democratic or the Republican party!

There were difficulties early to keep the public service and regulatory programs properly separated from the educational programs. We continue our efforts to make this distinction as it is for the best interest of farmers and education in general. Education must remain free from Party ideology; it thrives in the environment of free and unfettered climate of inquiry and dissemination. Its success is dependent on the quality of objectivity.

How did these educational arrangements and relationships develop? They developed partly because of the motivation of farmers. The early farm leaders were concerned for their future. They began to appreciate that knowledge applied to problems yielded great gain. Probably more important was the attitude of the early staff members. Studies of the history of several of our Land-Grant institutions show that the attitude of service and dedication of the staff was the most important factor in this development.

At the University of Missouri, for example, men such as Professors Schweitzer, Mumford, Trowbridge, Etheridge, Miller, Johnson, and Talbert had one main concern, that of promoting the welfare of the individual farmer and his family. There was an attitude of sacrifice. Some have suggested that these men were really missionaries dispensing knowledge, not for their own gain, but hopefully so that farmers might achieve a better living. They used the means at their disposal with little resources. The early teachers went out to farmers, held meetings often at their own expense. They were unconcerned for their own security -- but dedicated to service. These were the men who built the institution and established the principle of service to farmers above self.

I am not suggesting that there were not problems of administration, of finance, and the host of other problems that beset a developing institution. But crucial in this development was the continuing attitude of service, of contact with farmers which prevailed throughout these difficulties and firmly established principles of educational relationships that have served us well.

How do we then measure or evaluate ourselves in answer to the question: Is our training paying dividends? This question is specific and applies to me as well as to each of you. It becomes a question of self-evaluation.

We are inclined first to evaluate the progress of our institutions in terms of their purpose and objectives. But should we not start with ourselves first? Institutions are composed of people -- their success or failure is dependent on the individual staff member. Staff members represent the building blocks of the entire edifice. Dedicated and motivated staff members build and make great institutions. In this context let us examine the question. It implies that we measure our results as the pay-off of our own efforts. This is obviously difficult to do. How do I measure my own contributions? They must be measured in the light of our contributions to agriculture in general and to welfare of the farmer in particular. It follows that they also must be in the national interest.

Let us examine the pay-off matter in this context as resident teachers, as researchers and as extension educators. It becomes a personal matter -- a personal yardstick.

1. Resident teachers --

- (a) Do I instill the spirit of inquiry in my students, to relate science and the relationships between actions and reactions of soils, plants and animals in the context of their experience? Do I motivate students to think independently, to understand the power of inquiry?
- (b) Do I encourage them to understand their role as potential agricultural leaders - on their own land; in business related to agriculture; in other services?
- (c) Do I impart the spirit of cooperation, of concern for the farmer (villagers)?

2. Researchers --

- (a) Do I cooperate with my fellow staff members so that the greatest amount of research results can be achieved within given resources?
- (b) Do I have objectives in my research program that will primarily and ultimately lead to solving a problem or problems of farmers (cultivators)?
- (c) Do I maintain contact with Extension staff and farmers as well so that I may fully understand problems of farmers (cultivators)?
- (d) Do I publish the results of my research for the use of Extension Education and for farmers as soon as practicable?

3. Extension Education --

- (a) Do I instill confidence in farmers of my ability to help them to improve their production and the level of living of their families?
- (b) Do I approach the farmer with respect and concern for his welfare?
- (c) Do I consult regularly with my research counterparts for new information?

These are questions American staff members at home must continually ask themselves if they are to contribute to maintaining a viable and effective College. These same questions must be asked and answered by Indian staff members if they are to contribute to establishing and maintaining a University that has purpose and a commitment to increased productivity in agriculture, and to raising the dignity of rural India. We must evaluate ourselves, our attitude, our work and our output to be sure we are pulling our full weight in this great effort.

Rural Universities in India can flourish in the climate of change that has now become an impelling force. Universities generate change, create the climate for change in attitude and reaction of people. We must not sit idly by and let the forces of change go their course unguided by intelligent and purposeful behavior by University trained people. The greatest challenge of India is that educated people must make sacrifices of time and talent, creating attitude for the greatest good in these tremendously important times. The key to India's future lies in the hands of the trained people -- the most precious and scarce resource of India. Intelligent and widespread application of knowledge in the use of your natural resources can bring a better balance between population and resources. Your contribution to increasing agricultural productivity is the basis for national growth and strength. We hope you will rise to the challenge that belongs to the educated and trained person. Nothing less than full commitment of the educated could mean the sharing of the dreams that every Indian has -- of peace and prosperity for all.

ESTABLISHING GUIDELINES FOR AGRICULTURAL RESEARCH IN INDIA

J. M. Poehlman, Research Adviser, Orissa University
of Agriculture and Technology, Bhubaneswar, Orissa.

To establish some guidelines for agricultural research in India it is first necessary to have a comprehensive and clear picture of the nature, purpose, and objectives of the Agricultural University in India. At the risk of covering information which many of you may be more familiar with than I, permit me to review a few historical items in order that we may be on common ground and have our thinking oriented in the same direction. Also let me make clear that the term "agricultural research" is used here in the broad context to include research in all of the fields of agricultural science, including animal husbandry, and veterinary science.

A blueprint for the formulation of the Agricultural or Rural University in India was developed in the report of the University Education Commission which was established in 1948 under the chairmanship of Dr. S. Radhakrishnan to make recommendations on the aims and objectives of university education. The Commission proposed that the Agricultural University should make provision not only for instruction and practical training, but also for research and extension in all of the related fields of agricultural science.

Strong arguments for coordinating and strengthening the programs of research, teaching, and extension were given by the First Joint Indo-American Team in 1955 and again by the Second Joint Indo-American Team in 1960. As you perhaps know, the Third Joint Indo-American Team has just completed another survey of agricultural research in India and their report is not yet completed.

The report of the First Joint Indo-American Team noted "There is abundant experience in India and in other countries to warrant the statement that a college whose faculty is not actively interested in productive research is incomplete and that education in such institutions cannot be at a level which will be demanded by the needs of India." Also, "The teacher who takes no interest in research, . . . is rarely an inspiration or model to his students." The first team visited a number of Land-Grant Colleges in America prior to their review of agricultural research and education in India and made a comparative study of the organization and functions of the educational and research institutions in the two countries.

One of the basic premises upon which the Second Joint Indo-American Team developed its report was, "that the key to increased and more efficient agricultural production is a coordinated system of agricultural education, research, and extension that is suited to the unique characteristics and requirements of India's cultivation." The second team also noted that "agricultural education must rest on a foundation of research . . . All agricultural research should be geared to India's major problem of increased agricultural production."

The latter view was strongly expressed by the Agricultural Production Team sponsored by the Ford Foundation in the report on "India's Food Crisis and Steps to Meet It," published in 1959.

In all of these reports the American Land-Grant College was taken as the model or blueprint around which the Indian Agricultural or Rural University was to be developed. We are all familiar with the reason -- the outstanding success of the American institution in increasing the efficiency and productivity of American agriculture through the combined program of teaching, research, and extension. This example is cited here in order to raise the question, "What characteristics of the American Land-Grant College system have contributed most to this success?"

No doubt many factors have contributed, but I would like to call your attention to two: First, is the bringing together in one organization of teachers and research workers in many subject matter fields, who, through the Agricultural Extension Service, have a direct two-way contact with the farmers and their problems. This system was unique and differed greatly from the European pattern of separate teaching and research institutes, in the different subject matter fields, isolated from each other and the cultivator.

The second, and perhaps more important to research, has been the sincere dedication of the American research worker to improve the lot of the American farmer. In so doing he has cast aside the ivory tower of "knowledge for knowledge's sake," knowledge which may some day in some way find a use, and has substituted a more practical approach. First he defines the problem which limits the efficiency of the farmer or the productivity of the farmer's efforts, and then, steadfast and resolute in his efforts, he directs and utilizes the resources available to him to find a solution that will benefit the farmer.

To this end the research worker will devote long hours in the laboratory or the field, expecting as his greatest reward the pride of knowing that he had made some useful contribution to the welfare of agriculture and farmers.

In India various degrees of success and failure have been encountered in bringing together the research efforts in various subject matter fields and coordinating programs of research, teaching, and extension. This problem is difficult to solve in India because it involves reorganization of existing agricultural institutions and requires both physical relocation of existing facilities and personal adjustments in procedures and routine already established.

But the dedication of the research worker to direct his efforts toward the improvement of the lot of the cultivator is an individual matter. It need not be hampered by existing conditions or traditions. As far as you are concerned personally, on this, there can be no compromise. Unless you hold this view with me, then we have no common ground on which to develop guidelines for agricultural research in India. This is the basic premise on which we must proceed.

I should now like to ask some questions pertaining to research and the development of agricultural research projects and to comment on each briefly. I am not proposing to answer all of the questions. The answer to some of them will be obvious. Others can be answered only by you as you plan and prepare your own research program. I hope some of them will prove controversial and can be used as the basis for discussions when you assemble into the discussion group. Perhaps you or your chairman can add to the list.

1. What should be the objectives of Agricultural Research in India?

I may have made my position clear on this point when I defined the premises upon which this discussion was based. But I would like to comment here on the question of "fundamental" vs. "applied" research. Those terms are widely used and in my opinion often misused. It is often implied that fundamental research is research that is not directed toward the solution of a specific problem, but is conducted for the purpose of adding to our total knowledge without thought of how or whether it will ever have an application. In some circles this is considered to be a more dignified and sophisticated type of research. By contrast applied research is wholly directed toward the solution of a specific problem, hence its application is already assumed. These of course represent extreme views and if correct might better be called "undirected" and "directed" research.

I find it difficult to divide research into two such categories. Rather, it appears that individual research projects may be distributed somewhere along the whole range between these two extremes. In casting about for examples of "fundamental" research which would emphasize the extreme views, I have come to the conclusion that there is probably less of the "undirected" research than the advocates of "fundamental" research would have you believe.

2. What should be the basis for the choice of a research problem?

Obviously this will vary with the individual and the field in which he is working. But if the research worker keeps in mind the over-all objectives of agricultural research in India which we have just discussed, then within this framework he must answer to himself the question, "Is this the most important research that I could be doing? Will the information that I obtain from this work be the most useful information that I could get for the cultivator?"

If your choice is a problem on the side of fundamental research, the question must still be considered, "Can I, through a solution to this research problem, make a greater contribution to agricultural production than by some research problem of more immediate application?"

One of the poorest reasons for choosing a particular line of research is that this was the research problem you worked on when you received an M. S. or Ph. D. Degree. Most theses problems are chosen with regard to the interests of the adviser, the research materials and facilities available, and what can be completed in the time schedule of the candidate. These are poor reasons, I submit, for choosing a research project to solve the most pressing food problems in India.

The remaining questions I will try to cover more quickly.

3. Are the objectives of your research problem clearly defined?

After having chosen the research problem the research worker must define the goals of his research. Unless his objectives are clearly in mind, he may become side-tracked, his attention diverted, and the problem which he is trying to solve re-

mains unanswered. Look your problem over carefully. Decide what answers you want your experiment to give you before you start planning your experiment.

4. Can you justify your research project?

The answer to this question is tied up closely with the answer to the question on the choice of a problem. A good choice can be justified readily. A poor choice may be hard to justify. The research worker dependent upon public funds must always remember that he is a servant of the public. An as employee of a public institution you are spending tax money. Are you spending it wisely and will the results of your research give the tax-payer full value?

5. Are you acquainted with the previous work in the area of your research?

Much time may be lost and much money wasted by the research worker repeating work of others. Furthermore, many mistakes may be avoided if reports on research work of a similar nature have been evaluated carefully before one draws up his own plan. I do not advocate that work already done should never be repeated. Repe-
tition of results breeds confidence and is often necessary for self-education. But un-
necessary duplication is wasteful.

6. How carefully do you plan your experiments?

Careful planning of the experiment is necessary to assure its proper conduct. The first step in good planning is to have the objective of the experiment clearly defined. The alternative of careful planning is, at best, inefficient use of your resources and time, and, in its worst form, may lead to complete waste because the data obtained is unreliable or does not give the information that is needed to answer the questions you wished to have answered. The good experiment plan should outline the major procedures with sufficient detail that they may be carried out in their normal sequence. It should detail the facilities and equipment required and provide for keeping of proper records.

7. Experiment Design -- Is it your tool or your master?

In regard to experiment design I would like to make two points. The first is that statistics is a useful and necessary tool for measuring the validity of the data. In research the good experiment is planned to give an answer to a specific question. A well-designed experiment with randomization, replication, and adequate controls for comparisons, permits the experimenter to measure the magnitude of the experimental error. By comparison of the error with the mean differences between treatments the validity of the data can be established. What is sometimes overlooked, however, is that the accuracy of the data is not necessarily improved because it was analyzed statistically. Accuracy of data is improved by careful selection of the treatments and their placement, and painstaking care and accuracy in all of the details and measurements during the conduct of the experiment. Statistical analysis only enables you to establish the validity of your results for that particular experiment.

The second point I would make is that we may let the design of the experiment dictate the treatments or comparisons we make. Factorial experiments, while eminently

correct from a statistical viewpoint, may often be too sophisticated for the type of experiment we are conducting. I was recently told that the factorial design was used in a particular experiment because it enhanced publication of the paper. If this is correct then perhaps we need to go back to the question of the objectives of agricultural research in India. Is it to publish papers with sophisticated statistical analysis, or is it to solve the problems of the cultivator? The simplest design that will enable you to answer the question from your experiment is usually the most satisfactory design to use.

8. How complete and how carefully do you record your research data?

Record keeping involves the choice of the records to be kept and the accuracy with which they are recorded. In determining which records to keep, one needs to look carefully at the objectives of the experiment. Do your records give you the data to answer the question you wish to have answered by your experiment? Are they accurate? Do you spend unnecessary time in taking records that have little value and that will never be used?

9. How do you utilize the findings of your research?

Are the results of your research made available to those for whom it was intended? This may be a cultivator, or it may be another research worker.

10. How much of your research do you supervise personally?

How many assistants handle the planting plans between your desk and the actual worker who plants the seed, or feeds the animals? How many pairs of hands does the data come through on its return journey?

One last question which was asked by the recent Joint Indo-American Team.

11. "What factors limit your research efforts?"

I will not comment on this question. You may wish to include it in your discussion. I would admonish you to discuss it, however, only on one condition. That is that you would agree to attack with equal vigor the question, "What are the solutions to these limitations?" It is necessary to define your problems, but it is also necessary to be willing to apply all of your efforts toward their solution.

If I were to summarize the guidelines for agricultural research, the summary would be as follows:

"Choose your research problem wisely, plan and conduct it carefully."

GUIDELINES FOR SUCCESS IN EXTENSION TEACHING

D. B. Robinson, Ohio State University; Extension Adviser, University of Udaipur, College of Agriculture, Udaipur, Rajasthan, India.

The Agricultural Extension Service as it is known in India is composed of education and service. This discussion will deal only with the educational phase which in my opinion belongs with the College of Agriculture as an educational institution.

The responsibility of a College of Agriculture is one of teaching and research. Its teaching may be divided into on campus instruction called resident teaching and off campus instruction called Extension teaching. Resident teaching consists of teaching the students enrolled for course and degree work taught on the campus. Extension teaching consists of teaching the farmers who live in the villages away from the campus. In this discussion we will deal with Extension teaching referred to as the off-campus teaching responsibility of the College of Agriculture. It means extending the findings of research and the teachings of the College to the people in the villages.

Extension teaching consists of disseminating useful and practical information to farmers pertaining to agriculture and encouraging the application of the same. It is bringing about changes in the behavior of the farmer. It helps in changing the feelings of the farmer, what he knows about agriculture and farming, what he can do with what he knows, and what he actually does apply. Only as the farmer changes his attitudes about improved farming will he learn any new practices and do anything about applying them. Changes in attitudes, knowledge, abilities, skills, understanding, and appreciation, therefore, become the end products of Extension teaching and what the Extension worker or teacher hopes to bring about with the farmer. This means that Extension is education if we accept the definition that education is bringing about desirable changes in the behavior of people. And that the primary purpose of Extension Education is to change how the farmer feels, what he knows, and what he does about improving agriculture and his farming methods.

Extension education is a cooperative venture. It implies a partnership. This partnership exists between the College of Agriculture, the farmer, and any other people interested and assisting in bringing about improved practices in farming and agriculture.

Since we have defined Extension as being educational and the responsibility of the College of Agriculture, Extension workers may logically be called its teachers and its audience for teaching are the farmers. If we are Extension teachers then our first assignment is to become familiar with the different areas recommended by the Indian Agricultural Planning Commission for farmers to consider in improving agriculture. These areas are:

1. Varieties of seed.
2. Chemical fertilizers and manures.
3. Cultural and agronomic practices.
4. Irrigation and soil conservation practices.

5. Breeding, feeding and management of animals.
6. Fruit and vegetable production.
7. Agriculture implements.
8. Plant insect and disease control.

These eight areas of recommended agricultural improvements are the subject matter areas and Extension workers need to learn about them if they are to be informed about what the farmer is to learn. It is the responsibility of the College of Agriculture to conduct a research program in these major areas so they can recommend the best practices for farmers to use in each of the areas. Acquiring the latest knowledge in these subject matter production areas should be a part of the Bachelor of Science course of study for the undergraduate and a part of the graduate course of study for the Master of Science students. Post graduates need to take frequent refresher courses to be sure they are abreast with the latest subject matter that farmers should know.

To be effective Extension teachers it is necessary for Extension workers to learn where the farmers are in the steps of adopting new practices and what their problems are. Extension workers need to know:

1. Where the farmers are in being aware of what is available to them.
2. If the farmer has interest in what is available for him to try.
3. If he has all the facts and has properly evaluated the new practice he is thinking about trying.
4. If the farmer is ready to give it a trial.
5. If he has tried it and is ready to adopt it as a part of his regular farming program.

These five stages of learning are known as the steps farmers pass through in the adoption of a new practice.

To find out where the farmer is in his adoption of a new practice and what his problems are, the Extension worker needs to make a personal contact with the farmer. The Extension worker must be a good listener. He must observe what the farmer is doing and how he does it. Asking the farmer questions and talking with him to find out his feelings will reflect his attitude about the subject as well as what he knows and what ability and skill he possesses. It is also important for the Extension worker to find out all the reasons why the farmer does not adopt improved practices.

There are many reasons why farmers do not readily adopt new farming practices. Some of these may be custom, tradition, fear of risk, lack of awareness, interest, and knowledge of another way of doing. In a recent study entitled "Farmer Typology in Relation to Improved Agricultural Practices", O. S. Rathore, Extension Demonstrator at University of Udaipur, College of Agriculture, Udaipur, found some of the reasons given by farmers for not adopting improved practices were:

1. Improved seed requires high doses of manure and one extra irrigation so it becomes a costly affair.
2. Local varieties of maize and barley are sweeter in taste.
3. Improved agronomic practices require extra labor and handwork.
4. Repair for implements are not available in the village.
5. Crops require greater amount of irrigation when fertilizer is used.

6. Farmers are afraid of plant protection chemicals due to their poisonous effects on plants, animals, and humans.

7. Farmers are not ready to shoulder the risk and responsibility for trying new varieties.

8. Castration is considered to be a crime.

These reasons become the obstacles which prevent the farmer from changing his practices. Unless these reasons are removed there will be no change in the farmers' methods of farming. Helping the farmers with such difficulties becomes the responsibility of the Extension worker.

Another requirement for effective Extension teaching is for the Extension worker to motivate the farmer to want to do a better job of farming, to encourage him to try something new and different, to demonstrate and show him how to be a more efficient farmer, and to help him move some distance each day toward his goals. This requires the application of well selected and effective teaching methods. There are many known Extension teaching methods. The various methods are not always effective for all situations and for all kinds of learning. It is the responsibility of the Extension worker to seek out those most appropriate for the situation and see that they are effectively used.

In making plans for using more effective teaching methods, the Extension teacher needs to know where the farmers are in the basic steps of learning. He needs to know what changes he wants to bring about with the farmer and what information the farmer should learn. He needs to set up the kinds of learning experiences that will appeal to the farmer's interest and then help the farmer carry them out. He also needs to know where the teaching will be done. The teacher's own abilities, experiences, philosophies, and limitations need to be considered and he must improve himself in those areas where he feels inefficient and not capable.

Personal contacts make for one of the most effective learning experiences. Face to face contacts are the most effective way of communication, when they take place on the farm. It is well to focus on the person as well as his problem because problems are people oriented. Try to understand why the farmer is having difficulty. Listen to what he has to say before making suggestions. Farm visits give first hand information about the farmer and his problems.

Meetings are the heart of the group approach. The time spent by farmers attending meetings can be tremendous. It should make us stop and think as to what kind of meetings we are holding. A good meeting comes about when many factors are considered and many moves are carefully planned and skillfully executed. There is no magic formula for getting a better meeting every time.

It takes a variety of teaching methods to get across to farmers information that they can and will use. Repetition in a variety of ways is exceedingly important to learning. This means that many different methods are necessary to reach groups of varying educational levels, ages, and background. Teaching methods may be classified as written, such as letters, news releases, bulletins, and leaflets. They may also be classified as spoken, including visits, meetings, radio and demonstrations. Visual

methods are many, consisting of demonstrations, exhibits, motion pictures, slides, charts, and posters. Extension teachers must use a greater variety of teaching methods than is normally used.

No teaching operation is complete until progress made and results achieved are measured. Evaluation is an important step in the process of helping farmers. It is needed so that we can have some measure of the desirable and undesirable outcomes of Extension teaching. It is needed to let us know where we are and how we are doing toward bringing about change in behavior of the farmer. Extension teachers cannot be sure how much they are accomplishing until the effects of their teaching can be traced in the lives of the farmers they serve. Evaluation is not a separate thing. It is built into the teaching process and should be done each day, week, and month throughout the year.

Extension workers should always be researching for new and more effective ways of bringing about change in farmers. They should try something new on their own initiative. They should be dreamers of ideas. They should not be afraid to take a risk of being different. Researching for new ideas provides a sound basis for practices we teach and procedures we use.

An effective Extension educational system with a core of well trained staff will go a long way in helping India develop its resources -- people, land, water, minerals, institutions, agriculture, business, and industry -- into a free democratic society. It will help the people develop themselves strong enough politically, economically, socially, and militarily to exert a positive influence on other countries. It will help to improve the standard of living of its people. And it will provide the people an opportunity to determine their goals and make their own plan for attaining them.

This is one of the responsibilities of the Extension division of the College of Agriculture. It is the job ahead for Extension education and its teachers.

GUIDELINES FOR SUCCESS IN TEACHING .

F. E. Rogers, Group Leader, University of Missouri
Team to India.

Purposes of teaching are:

1. To inform.
2. To develop skills.
3. To develop attitudes and appreciation.

The successful teacher must know (1) what to teach, and (2) how to teach.

When you teach something to somebody you do not take something from your store of knowledge and put it into his. Your main job is to arrange conditions so that he will be able to learn it for himself. Attempting to educate a group of people by lecturing to them is like trying to fill a group of narrow-necked bottles by throwing water over them.

Research indicates that 85% of the learning is by seeing. Thus if we depend on oral presentations we are only 15% effective in our teaching. We can help the learning process if we visualize our messages by use of chalk boards, charts, film strips, flannel boards, and written material. The main benefit from a lecture is to the lecturer, who profits by the necessary preparation.

Some Principles of Learning:

Self-activity: Learning is an active process on the part of the learner. Teachers can only set up the learning situation and stimulate a person to learn.

Association: Learning is building on to previous experience. The new must be associated with past knowledge or experience.

Disassociation: A person must realize inadequacy of the present knowledge and want to substitute a more desirable new knowledge or behavior.

Readiness (Motivation): A favorable attitude accelerates learning, a bad attitude retards learning. Without drive or incentive a person does not learn.

Rewards: Learning depends primarily upon satisfaction of wants or needs, in other words, upon success. Rewards maintain and strengthen the learning process.

Practices: Practice leads to perfection. People learn by doing.

Timeliness: Learning takes place more readily when the facts are given at the time or just before it is to be used in a serviceable way.

Clarity: Learning takes place readily if the learner can see clearly what he will achieve by learning.

Criteria for successful teaching:

1. The subject matter is used to promote thinking and planning by the students;
2. The teacher is enthusiastic and interested in the job at hand;
3. The teacher demonstrates through competence in technical knowledge and ability;
4. The teacher demonstrates adequate knowledge and use of various teaching techniques. Supplementary teaching aids are used;
5. There is evidence of purposeful effort to have students recognize and analyze their own problems; and
6. Students participate in the discussion.

Successful teachers are interested in their students. A friendly attitude both in and out of the classroom will go a long way to create a favorable attitude or climate for learning. Each student has certain past experiences and beliefs. Unless the teacher knows these he cannot successfully adjust his teaching to fit the needs of the students. Each student has certain interests.

It has been said that people are made up of three parts:

1. Heredity - that which comes from tradition;
2. Environment - that which comes from outside direction, and
3. Urges - that which comes from within the person.

When the teacher learns these about his students, he is in a better position to help motivate them to learn.

The good teacher thinks in terms of the other person, the one he is teaching. He is teaching people not crops. He is trying to communicate new information to another person. Even though he is trying to teach a group, learning is an individual process.

Teaching is communicating ideas to others so they may be learned, understood, and remembered. It is a process that includes: (1) expression, (2) interpretation, and (3) response. It is one thing to express ideas, to pass out information to people, but quite another to get ideas widely understood, interpreted as intended, and responded to as desired. Communication is a two-way process, always involving interaction between people. This is necessary to assure that information presented is interpreted as intended.

Knowledge may be gained from books but the love of knowledge is transmitted only by personal contact. Learning can be an enjoyable and exciting experience but the teacher must be exciting too.

Success in teaching is not easy to measure. The number of failures is not a criterion for success. It may indicate the opposite. The doctor's success is not measured by the number of his patients who die but by the ones he saves. The lawyer's success is measured by the cases he wins not the ones he loses. So the teacher's success is measured by the success of his students. If the learner hasn't learned the teacher hasn't taught.

For successful teaching, know your students, motivate them to want to learn, visualize your messages, and involve your students.

REPORT OF THE DISCUSSION GROUP ON TEACHING.

The discussion group which included 27 participants mainly dealt with the following:

- (i) objectives in college teaching
- (ii) problems involved in college teaching
- (iii) suggestions for improving the efficiency of college teachers.

1. Personnel.

Main objectives in college teaching should be to prepare adequately qualified personnel who may be able to carry out their functions effectively in the teaching, research, and extension programs of the institutions or departments employing them, who may also have the capacity and confidence to take up independent professions in the fields of their training, and who may have the basic knowledge for undertaking specialized studies in any branch of agriculture or veterinary science.

2. Problems in classroom teaching.

a. The number of students in theory and practical classes, very often, is so large that effective teaching is not possible. The student teacher ratio should be 16:1 in each practical class and the maximum number of students in a theory class should not usually exceed 100.

b. Most of the students admitted to agricultural and veterinary colleges are of lower standard and hence steps should be taken by the college authorities to attract students of higher calibre for admission to these colleges.

c. A large majority of the college students possess a poor standard of the English language, so that they are unable to follow the lectures properly. It is therefore necessary to strengthen the study of this language at the college level.

d. Students usually do not possess text books of different subjects and mainly depend upon lecture notes. To obviate this, a lending library may be started whereby text books may be loaned out to students for one session at a small fraction of the cost of these books. The existing library facilities may also be improved and the students be encouraged to utilize the facilities of the college library.

e. Lack of sufficient audio-visual and other teaching aids is also a problem in effective teaching. These teaching aids should be provided wherever they are not available.

f. The courses of studies in different subjects taught in the Colleges of Agriculture and Veterinary Science should be reviewed to avoid overlapping and unnecessary repetition and should be properly coordinated with related subjects. They should also be revised with a view to making them as short as possible without eliminating the fundamental principles.

g. In many institutions, there is a shortage of classroom and laboratory space so that overcrowding of the classrooms and laboratories is quite common. These difficulties should be solved as early as possible.

h. Adequate repairing and servicing of facilities for mechanical, electronic, and scientific equipments, often do not exist in many institutions. As a result, much

equipment gets out of order and thus affects the teaching and research programs. These facilities should be provided to each institution.

3. Suggestions for improving efficiency of college teachers.

- a. As most college teachers are expected to carry on research work or extension work in addition to teaching, it is necessary to reduce their work load to a level where they will find sufficient time for research work or extension work and for preparation for classroom teaching.
- b. Every college teacher should be encouraged to participate in conferences and seminars of his subject or allied subjects held either in the State or outside the State.
- c. Facilities should be provided at least once a year for college teachers to visit other teaching institutes for purposes of consultation and exchange of ideas with his counterparts in these institutions.
- d. Temporary exchange of experienced college teachers on a reciprocal basis between two institutions will help in improving the efficiency of college teachers.
- e. Provisions should be made for giving sabbatical leave to college teachers to enable them to acquire advanced training useful in raising their efficiency.
- f. The administrative work-load of college teachers should be reduced and the heads of teaching sections should be provided with clerical assistance to cope with their administrative responsibility.
- g. College teachers should be provided with opportunities and incentives for qualifying themselves for higher degrees.
- h. Participants with M.S. degrees at the University of Missouri may be allowed to register for higher degrees in Indian Universities to qualify themselves for higher research degrees without going abroad.

TEACHING DISCUSSION GROUP

P. C. Ghosh - Leader
M. C. Das
M. N. Bhattacharjee
A. K. Sharma
P. C. Das
B. N. Thakuria
P. K. Barua
Harendra Nath Sharma
Ram Prakash
D. B. Mukherjee
P. Mukherjee
K. C. Das
B. N. Sahoo
S. Sahu

Md. Sharifullah
K. P. Singh
M. N. Sahani
H. Sinha
C. S. Roy
P. B. Kuppuswamy
S. K. Mukherjee
S. P. Maity
A. N. Chakraborty
S. K. Addy
P. K. Harichandan
J. Mohanty

REPORT OF DISCUSSION GROUP ON RESEARCH

I. What should be the main objectives of our research projects?

Research projects whose results are expected to augment the agricultural production of the country should be taken up. Priority should be given on the immediate problems of farmers. Emphasis should be given on applied research in agriculture and veterinary colleges. Basic research which is likely to have a direct bearing on applied research should also be encouraged. Problems relating to social sciences should be investigated with a view to finding out devices for convincing farmers to adopt new agricultural practices. Subjects not directly related to production but prerequisite for studying production should also be included in research.

II. Main problems that restrict the quality and quantity of research.

The main problems confronting the research worker are:

1. Research is not an integral part of the duty of a teacher in many agriculture and veterinary colleges.
2. A teacher is often overloaded with teaching.
3. There is lack of adequate incentive for research workers.
4. Lack of adequate funds and equipment for carrying out research.
5. Shortage of adequate numbers of trained staff.
6. Lack of suitable library facilities.

III. Some solutions of the problems above are:

1. Research should necessarily complement teaching in agriculture and veterinary colleges.
2. In order to enable a teacher to do adequate research he should be relieved of corresponding quota of teaching, file, and miscellaneous work.
3. Candidates sent on specific programs of training should be properly utilized after their return with due consideration to their pay and prospects for promotion.
4. For creating an environment of security and prospect for research workers, merit, ability, and experience should be the guiding criteria for promotion and not mere academic qualifications.
5. In order to infuse interest in deserving research workers, whose promotion prospects happen to be blocked due to unavoidable service conditions, suitable additional posts should be created.
6. Efforts should be made to provide adequate funds, equipment, trained staff, and library facilities.
7. While drawing out research programs, proper coordination should be made between the research and the extension workers.

MEMBERS OF THE DISCUSSION GROUP WERE:

N. C. Panda - Leader
Sasanka Barua
B. C. Borthakur
D. N. Borthakur
L. C. Bora
G. K. Roy Choudhury
P. R. Ghosh
Abdul Raquib
Joyadeb Padhi
K. C. Misra
Maheswar Mishra
L. Das

K. P. Sinha
D. P. Srivastava
R. S. Singh
Allauddin Ahmed
Anirudh Prasad
M. S. Das
P. K. Sinha
N. R. Panigrahi
A. Misra
Ananta Mishra
N. K. Dutta

REPORT OF DISCUSSION GROUP ON EXTENSION

Regarding the important extension methods which were used most successfully for educating farmers the group agreed on the following points:

1. Demonstration is the best method for effective extension work.
2. Demonstations associated with farm and home visits are more effective than demonstrations alone.
3. Selection of the right farmer is important for the success of the demonstration.

Things that handicap the conduct of a successful extension education program:

1. Lack of adequate supply and service facilities.
2. Lack of right type of personnel for extension work.
3. Lack of sufficient emphasis and allocation of resources by the authorities for extension work.
4. Inadequate transport facility.
5. Lack of adequate coordination and integration with research and teaching.
6. Lack of sufficient coordination among the block staff.
7. Lack of coordination between the college and the block staff.
8. Not enough extension subject-matter specialists.
9. Misunderstanding of the concept of extension education by some administrators.

Solutions and recommendations for these problems:

1. Give encouragement to private and cooperative agencies for supply and services.
2. Selection of personnel with rural background, and aptitude and interest in extension work. Service conditions, remuneration and recognition, etc., of personnel should be improved.

3. Adequate transport facilities should be provided.
4. One person should be in charge of the over-all program to ensure proper coordination between research, teaching, and extension.
5. Extension workers should have adequate knowledge in rural sociology and rural problems.
6. Specific recommendations applicable in the field are required from re-search stations for adoption by the farmers.

MEMBERS OF THE DISCUSSION GROUP:

L. Kar - Leader

Muralidhar Sharma

S. N. Bezborah

Ubedur Rahman

T. N. Borgohain

A. N. P. Sinha

S. K. Mukhopadhyay

Lingaraj Mishra

B. N. Singh

D. K. Singh

Md. Hamid

J. S. Ahluqalia

Narendranath Prasad

B. T. Banerjee

S. N. Pani

SURVEY OF RETURNED PARTICIPANTS-UNIVERSITY OF MISSOURI-CONDUCTED
BY ROBERT G. GRIFFITH, AID TRAINING OFFICER-BHUBANESWAR
JANUARY 25, 1964

	No	Yes	% yes
1. Have you completed a scientific research project during the past year?	30	23	43
2. Have you started one?	14	39	73
3. Have you made the results available to cultivators?	39	14	27
4. Have you arranged for publication of your findings?	25	28	53
5. Are you planning a definite research project in the next year?	10	43	81
6. Have you talked individually to each student you have to know his attitude, interests aspirations?	18	35	68
7. Do you try to make each presentation vivid, interesting, easy to remember?	15	38	72
8. Do you use quizzes, outside reading, papers to maintain interest throughout the year?	37	16	30
9. Are your students learning the value and dignity of working with their own hands?	18	35	68
10. Are your students learning to think for themselves, to use scientific methods?	1	52	98
11. Have you talked about their problems with at least 5 cultivators the last month?	39	14	27
12. Have you changed one attitude of one cultivator in the last month?	47	6	11
13. Have you increased the knowledge of one cultivator during the last month?	31	22	42
14. Have you convinced one cultivator during the past six months to adopt a new practice?	36	17	32
15. Have you lent your expert knowledge to one community betterment project in your leisure time during the last year?	7	46	87
Number with Teaching as main responsibility	36		
Number with Teaching and Research responsibilities	11		
Number with Extension as main responsibility	3		
Number with Research as main responsibility	2		
Number with Librarian as main responsibility	1		
Total number answering questionnaire	53		